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The value of community pharmacy – detailed report

PSNC

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Contents

Key findings

The Department of Health (DH) and NHS England (NHSE) have proposed a 6% reduction in the funding they pay to community pharmacy in 2016/17 and they have suggested that the services provided can simultaneously be enhanced. In its response, the Pharmaceutical Services Negotiating Committee (PSNC) has questioned whether there is evidence to justify the proposed changes.[1]

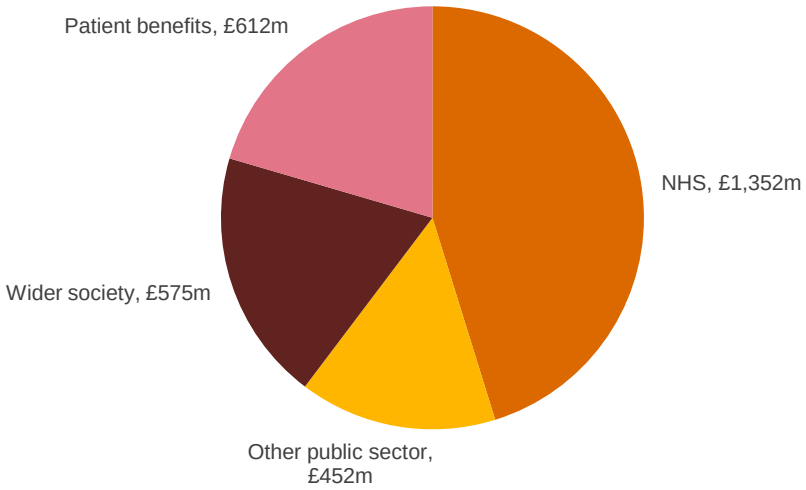
In order to help boost the evidence base, PricewaterhouseCoopers LLP (PwC) was commissioned by the PSNC to examine the contribution of community pharmacy in England in 2015. Our report analyses the value (net benefits) to the NHS, to patients and to wider society of 12 specific services provided by community pharmacy.[2] We do not assess the value of the £2.8 billion that DH pays community pharmacy for Essential and Advanced services.

Overall, the key findings from our analysis are:

- Through the services considered in this report, in 2015 community pharmacy in England contributed a net increase of £3.0 billion in value in that year, with a further £1.9 billion expected to accrue over the next 20 years.
- The in-year benefit in 2015 of £3.0 billion is net of the £247 million in compensation which pharmacy received through funding for the 12 services evaluated. Even considering just this limited list of 12 services, and applying conservative assumptions, the single year net benefit identified exceeds the total £2.8 billion community pharmacy was paid by NHSE in 2015.
- On top of this, we estimate that indirect health system cost savings could be worth up to a further £2.5 billion in 2015 from the knock-on effects of self-care and medicines support.
- Apportioning the single year net benefit evenly across all the 11,815 pharmacies which operated in England at the end of 2015 leads to a benefit of more than £250,000 per pharmacy in 2015 alone. This rises to more than £410,000 when considering the long term effects as well, and up to £625,000 per pharmacy when potential knock-on health impacts are included.
- Figure 1 below summarises how this value is distributed between different beneficiaries of community pharmacy activity. The NHS itself is the biggest beneficiary: community pharmacies contributed a net value of £1,352 million in the short run; this is net of the funding received by community pharmacies for the 12 services, both directly from the NHS and from local commissioners (which was £247 million – hence the gross value was £1,599 million). Of this net value to the NHS, the majority was direct NHS cash savings as a result of cost efficiencies, worth £1,111 million in 2015. In addition, the NHS saved an extra £242 million as a result of avoided treatment, and a further £172 million in avoided long term treatment costs.
- Further, 55% of in-year benefits and 91% of long run benefits (69% of total benefits) accrued outside the NHS. Other public sector bodies (e.g. local authorities) and wider society together received over £1 billion of benefits in 2015 as a result of the community pharmacy services covered. A further £1.7 billion is expected to accrue over the next 20 years.
- In addition, patients experienced around £600 million of benefits, mainly in the form of reduced travel time to alternative NHS settings to seek a similar type of services as the ones provided by community pharmacy.

[1] PSNC, Response to Department of Health letter on 'Community pharmacy in 2016/2017 and beyond', 15 January 2016.
[2] We estimate the value of 12 services which include two services related to managing prescriptions: managing prescribing errors and clarifying prescriptions.

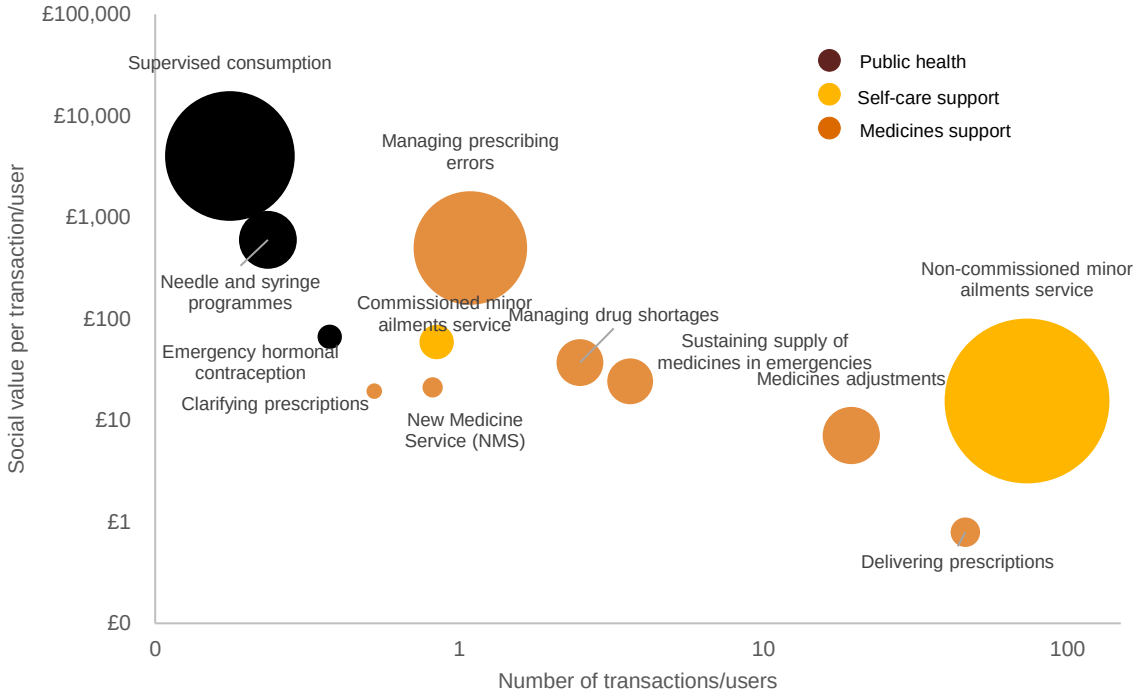
Figure 1: Estimated distribution of the value of community pharmacy in the short term (England, 2015)



Source: PwC analysis

- Through the services covered in our analysis, community pharmacy made more than 150 million interventions in 2015 – including nearly 75 million minor ailment consultations and 74 million medicine support interventions – and supported 800,000 public health users.
- For many of these interventions the scale of value created is substantial and greatly exceeds the cost to the NHS of delivering them. Each patient treated with supervised consumption, for example, generated in excess of £4,000 in value in 2015 alone, and a further £7,500 in the long term. Figure 2 shows for each service the number of transactions/users and the value generated (the size of each circle shows the relative size of the total value generated in 2015).

Figure 2: Value of community pharmacy services in the short term (England, 2015)



Source: PwC analysis

- Finally, based just on the 12 services considered in our analysis, community pharmacy was self-funding in 2015. More specifically, as illustrated in Table 1, we estimate that the activities of community pharmacy will avoid costs for the public sector including the NHS and other public sector bodies, in both the short- and long-term, totalling an estimated £3,017.5 million – £1,771.4 million to the NHS and £1,246.5 million to other parts of the public sector. This compares with total funding for community pharmacy in England provided by DH in 2015 of £2.8 billion, and estimated additional funding from local sources for the 12 services analysed of £135 million. So, the expected amount of public sector spending saved directly as a result of the 12 services analysed is enough, by itself, to offset the entire amount of public funding provided for community pharmacy in 2015. Effectively this means that all the other benefits of community pharmacy – including the patient, society and knock-on health benefits of the 12 services we analyse, and, more importantly, the benefits of the core NHS prescription service itself – can be seen as additional net benefits of community pharmacy that are provided at no cost to the Exchequer.

Table 1: Estimated impact on the public finances of the 12 services in the short and long term (England, 2015)

Theme	Avoided costs for the NHS (gross, £m)	Avoided costs for other parts of the public sector (gross, £m)	Funding by local commissioners (£m)
Public health	£467.8m	£1,122.3m	£64.6m
Self-care support	£615.1m	n/r	£3.8m
Medicines support	£688.5m	£124.3	£66.6m
Total (£m)	**£1,771.4m**	**£1,246.5m**	**£135.0m**

Key:
n/r = Impact not materially relevant, and hence not included within impact pathway
Source: PwC analysis

Glossary

Advanced Services: These are five specific services which fall within the NHS Community Pharmacy Contractual Framework (CPCF) which community pharmacies can choose to provide as long as they meet the requirements set out in the Secretary of State for Health's Directions.

AIMp: The Association of Independent Multiple Pharmacies is a membership organisation which represents companies with between 5 and 300 community pharmacies.[3]

BBV: Blood borne viruses.

BNF: The British National Formulary is the pharmaceutical reference manual in the UK which provides information and advice to pharmacists, doctors and other prescribing professionals on prescribing and pharmacology in addition to specific details about medicines available on the National Health Service (NHS).

Carer: Someone who looks after a friend or family member (unpaid).

Care worker: Someone who is paid by the patient, his or her relatives or public bodies such as local authorities to look after a patient.

CCA: The Company Chemists Association is the organisation that represents large companies engaged in community pharmacy activities. Its members include Asda, Boots UK, Lloyds Pharmacy, Wm Morrison Supermarkets, Rowlands Pharmacy, Sainsbury's, Superdrug, Tesco and Well.[4]

CCG: Clinical Commissioning Groups are responsible for commissioning healthcare services for the local areas that they cover.

Counterfactual scenario: The counterfactual scenario (or journey) describes the assumed alternative services (either existing or hypothetical) that would be available to the patients who currently use the community pharmacy services if community pharmacy was to stop providing the services.

CPCF: The Community Pharmacy Contractual Framework is the overarching agreement between NHS England and community pharmacies governing provision of NHS services.

DfT: Department for Transport.

DH: Department of Health.

EHC: Emergency hormonal contraception, sometimes referred to as the 'morning after pill'.

EPS: The electronic prescription service is a new NHS service that enables prescribers, such as GPs and practice nurses, to send prescriptions electronically to a dispenser such as a pharmacy of the patient's choice.

Essential services: These are services that all pharmacy contractors provide under the CPCF.

GIS: A geographic information system is an information system to assist with geographical analysis.

GMC: The General Medical Council is the UK organisation with which all medical doctors must be registered.

GP OOH: The GP out-of-hours service is part of the urgent care system. It provides services between 18:30 and 08:00 (including weekends). This is the period when GPs are not contractually obliged to see patients.

HSCIC: The Health & Social Care Information Centre is the national provider of information, data and IT systems for health and social care.[5]

[3] http://www.aimp.co.uk/
[4] http://www.thecca.org.uk/about
[5] HSCIC, 2016

Impact pathway: An impact pathway links activities / interventions, in this case in the healthcare sector, to social outcomes and specific impacts on stakeholders.

LA: Local authorities are the administrative bodies within local government.

Locally commissioned services: Services that are contracted on a local basis by different commissioners, including local authorities, Clinical Commissioning Groups (CCGs) and local NHS teams. They are not mandatory and, so, are not provided universally within England.

LPC: Local Pharmaceutical Committees are the local organisations which represent community pharmacy. They work with NHS England Area Teams, CCGs, local authorities and other healthcare professionals to plan healthcare services.

LSOA: Lower Super Output Areas are statistical areas (within England) with roughly 1,500 residents and 650 households.[6]

MAS: Minor ailment service refers to the provision of advice to patients on minor ailments. Community pharmacy currently provides patients with advice on minor ailments, such as colds, sprains and hay fever. It does this either through a locally commissioned minor ailments service or through over-the-counter, free or privately paid for, advice.

MUR: Medicines Use Reviews involve accredited pharmacists undertaking structured adherence-centred reviews with patients on multiple medicines, particularly those receiving medicines for long term conditions to help patients use their medicines more effectively.

NHS 111: This is part of the urgent care system. It is a phone service that provides patients with medical advice and is also the gateway to other points of delivery in the urgent care system, notably GP out of hours (GP OOH).

NHS England: The organisation that leads the National Health Service (NHS) in England, setting priorities, providing direction and commissioning services on behalf of the NHS.[7]

NICE: The National Institute for Health and Care Excellence provides national guidance and advice to improve health and social care.[8]

NMS: The New Medicine Service provides support to patients with long-term conditions who are newly prescribed a medicine. It is intended to improve medicines adherence and is focused on particular patient groups and conditions.

NSP: Needle and syringe programmes provide injecting drug users with access to clean injecting equipment and effective disposal of used equipment; they are sometimes referred to as a needle exchange service.

NTA: The National Treatment Agency for Substance Misuse managed drug and alcohol treatment in England before 1st April 2013. It is now part of Public Health England, an executive agency of the Department of Health.[9]

ONS: The Office for National Statistics is the UK's largest independent producer of official statistics and is the recognised national statistical institute for the UK. It is responsible for collecting and publishing statistics related to the economy, population and society at national, regional and local levels.

OTC: Over the counter drugs are medicines sold directly to a consumer without a prescription from a healthcare professional, as compared to prescription medicines, which may be sold only to customers possessing a valid prescription.

Patient pathway: The patient pathway refers to the route that a patient will take from their first contact with an NHS member of staff, though referral, to the completion of their treatment. Similarly, a patient pathway may refer to the journey that a group of patients takes when using a (community pharmacy) service.

[6] https://neighbourhood.statistics.gov.uk/HTMLDocs/nessgeography/superoutputareasexplained/output-areas-explained.htm
[7] https://www.england.nhs.uk/about/
[8] https://www.nice.org.uk/about
[9] http://www.nta.nhs.uk/about.aspx

PGD: A Patient Group Direction is a written instruction for the sale, supply and/or administration of medicines to groups of patients who may not be individually identified before presentation for treatment. PGDs allow specified health care professionals to supply and/or administer a medicine directly to a patient with an identified clinical condition without the need for a prescription or an instruction from a prescriber. The health care professional working within the PGD is responsible for assessing that the patient fits the criteria set out in the PGD.

PharmOutcomes: PharmOutcomes is a database that collates information on commissioned pharmacy services; the web-based system allows pharmacy teams to record their locally commissioned services and means that payment claims can be automatically created on a regular basis. PharmOutcomes is provided by Pinnacle Health LLP in partnership with PSNC.

POM: Prescription only medicines are those which must be prescribed by a doctor and are not licensed for sale to the general public.[10]

PURM: Pharmacy Urgent Repeat Medicines refer to emergency supplies of medicines made as part of a locally commissioned service.

Prescription item: A single item prescribed on a prescription form.

Prescribing error: A clinical error on a prescription script, for example the wrong drug or quantity.

PSNC: The Pharmaceutical Services Negotiating Committee is recognised by the UK Secretary for Health as representative of community pharmacy on NHS matters in England.

PwC: PricewaterhouseCoopers LLP.

QALY: A quality-adjusted life year is a generic measure of disease burden, including both the quality and quantity of life lived. It is widely used in health economic evaluations as a measure of the change in a person's health, to assess the value for money of medical interventions.[11]

Sensitivity test: A test of the effect on our results of adopting alternative assumptions.

SC: Supervised consumption is controlled, self-administration of prescribed methadone or buprenorphine in daily instalment doses at community pharmacies.

Urgent care: Urgent care is the provision of care where patients require prompt attention but where their condition is not considered life-threatening. Urgent care is provided by various organisations including GP out of hours services, Accident and Emergency departments, Walk-in centres, ambulance services, community pharmacies and other Urgent Care centres.

Wellbeing benefits: Wellbeing is an economic welfare measure (i.e. it is about feeling good and functioning well). For example, patients (and / or their families and friends) experience wellbeing disbenefits in terms of their mental health and happiness as a result of being or 'feeling' ill.

[10] http://www.pmlive.com/intelligence/healthcare_glossary_211509/Terms/p/prescription_only_medicine_pom
[11] https://www.nice.org.uk/glossary?letter=q

Introduction

Context

On 17th December 2015 the Department of Health (DH) and NHS England (NHSE) published an open letter which, amongst other things, set out:

- Proposals for a funding cut for community pharmacy of 6% in cash terms in 2016/17 compared with 2015/16;
- Suggestions as to how this might be achieved without detriment to services or access to them (e.g. through pharmacy closures and adoption of internet enabled supply); and
- Other proposals for ways in which community pharmacy services might be improved.[12]

The Pharmaceutical Services Negotiating Committee (PSNC) published its initial response on 15th January 2016 and criticised the proposals, pointing out the lack of an appropriate evidence base to support them.[13]

On 14th April 2016, the PSNC commissioned PricewaterhouseCoopers LLP (PwC) to help it assess the value of community pharmacy in England to the NHS, to patients and to the wider community. This work is intended to provide an evidence base to assess the value that community pharmacy provides.

Report structure

This detailed report provides our assessment of the value associated with community pharmacy's role in providing different services in England in 2015.

Our work focuses on three broad groups of services delivered by community pharmacy:

- Public health services (which benefit the NHS in terms of avoided costs and help protect the public);
- Support for self-care (which also benefits the NHS by reducing its costs and supports patients and their families by enhancing their wellbeing); and
- Medicine support which includes enhancing access to medicines and delivering patient management services.

Separate chapters cover the services shown in Table 2.

Table 2: Services provided by community pharmacy

Group	Service	Description
Public health	Emergency hormonal contraception services	• Locally commissioned service designed to improve access to emergency contraception
	Needle and syringe programmes	• Locally commissioned service intended to support delivery of the national Drug Strategy • Provides injecting drug users with access to clean injecting equipment and effective disposal of used equipment
	Supervised consumption services	• Locally commissioned service intended to support delivery of the national Drug Strategy • Provides drug users with controlled access to substitutes (e.g. methadone)
Self-care support	Minor ailments advice	• Provision of advice to patients on minor ailments, sometimes as part of a locally commissioned service which covers specified conditions
Medicines support	Managing prescribing errors/clarifying prescriptions	• Identification and resolution of actual and potential errors with prescriptions, including clarifications (e.g. where the prescription is unclear or unsigned)
	Medicines adjustments	• Making adjustments when dispensing prescriptions to enable patients to adhere better to their medication regime where they have a condition which affects their ability to do so

[12] Department of Health, Community pharmacy in 2016/17 and beyond, 15 December 2015.
[13] PSNC, Response to Department of Health letter on 'Community pharmacy in 2016/2017 and beyond', 15 January 2016.

Group	Service	Description
	Delivering prescriptions	• Making or facilitating home delivery of prescriptions to patients
	Managing drug shortages	• Helping patients to resolve drug shortages
	Sustaining supply of medicines in emergencies	• Providing non-commissioned emergency supplies of medicines to patients
	Medicines Use Reviews (MUR)	• A structured, adherence-based review to help patients use their medicines more effectively
	New Medicine Service (NMS)	• Provision of guidance and support to patients when first taking new medicine for a long-term condition

Source: PwC analysis

This detailed report is intended to be read in conjunction with our summary report which:

- Describes the services of community pharmacy for which we assess the value and provides an overview of our approach to assessing the value;
- Presents our key results of the contribution of community pharmacy across the areas in scope; and
- Articulates the key conclusions and implications of our analysis.

A set of six appendices provides further details of key, common elements of our methodology and the associated data sources we use to estimate the value of the different services provided by community pharmacy.

Public health

Emergency hormonal contraception services

1. Introduction

This chapter provides our assessment of the value associated with community pharmacy's current role in providing emergency hormonal contraception (EHC) services in England. We estimate the value that would be at risk if community pharmacy no longer supplied its current EHC service, using data for 2015.

The chapter is structured as follows:

- Section 2 describes the EHC service currently provided by community pharmacy, including what it means from the service user perspective, and sets out our assumptions for what would happen from the service user perspective if community pharmacy did not provide its current service (i.e. the counterfactual);
- Section 3 describes the value that flows from the current activities of community pharmacy in terms of potential avoidable costs to the NHS and other parts of the public sector, the service user and wider society, and explains the key impacts;
- Section 4 explains our approach to assessing each element of expected value, specifically:
  - How we estimate the number of individuals who benefit from the EHC service provided by community pharmacy (the 'volume');
  - How we estimate the value delivered each time the service is provided (i.e. for each individual service user) (the 'value'); and
- Section 5 summarises our key results as well as the results of our sensitivity analysis.

A set of technical appendices provides further details of the methodology and the data sources we use to estimate the value of the EHC services provided by community pharmacy in England in 2015.

2. Description of activity

According to the Department of Health, around 50% of all pregnancies are unplanned. Such pregnancies can have adverse effects on individuals, their families and wider society which are seen in terms of poorer health related behaviours during pregnancy, lower uptake of antenatal care and weaker parenting behaviour.[14] Although some women decide to proceed with unplanned pregnancies, the fact that the pregnancy was unplanned can cause financial, housing and relationship pressures.[15]

The government's ambition, as set out in the Sexual Health Framework[16], is to reduce unwanted pregnancies among all women of fertile age by increasing knowledge and awareness of all methods of contraception and improving access to these methods, including EHC, for women of all ages and their partners. The Sexual Health Framework concludes that "emergency contraception is a safe and effective way of preventing unwanted pregnancy when regular methods have failed or have not been used."[17]

Over-the-counter sales of EHC were legalised in the UK in 2001. The government's aim behind reclassifying EHC as a pharmacy medicine was that supply through pharmacies would increase access to emergency contraception and would, therefore, contribute to reducing unintended pregnancies.

[14] Carson et al. (2011); Brown, S.S. et al. (1995).
[15] Department of Health. A framework for sexual health improvement in England, March 2013.
[16] Ibid.
[17] Ibid.

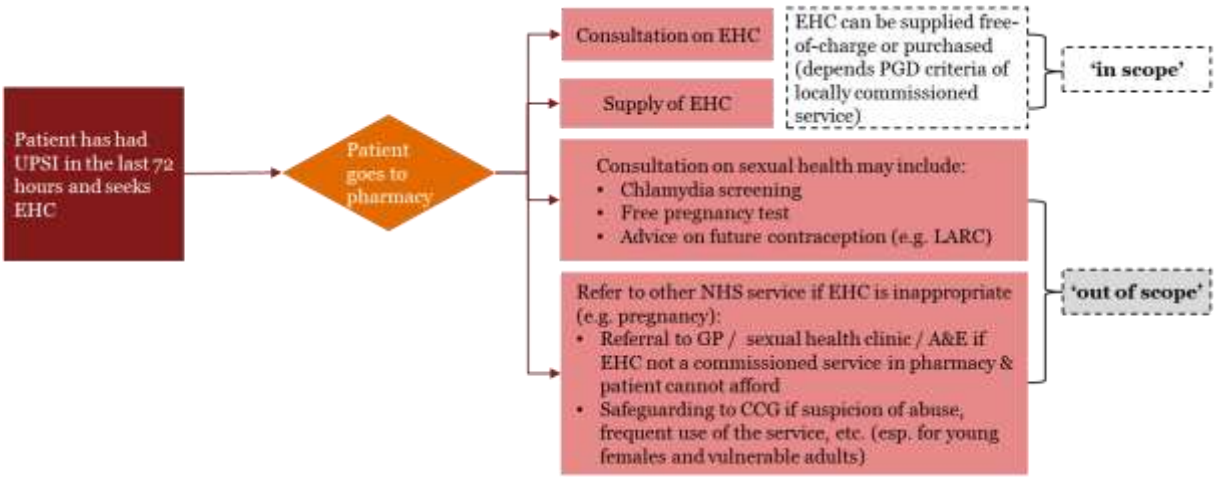
Nevertheless, many pharmacies are locally commissioned by local authorities (LAs) to provide a sexual health service, including EHC supply (see Figure 3).[18] At present, EHC can be purchased in pharmacies or supplied free of charge on prescriptions or through a Patient Group Direction (PGD). Pharmacies are commissioned to supply EHC free of charge (at NHS expense) when appropriate to clients in line with the requirements of a locally agreed PGD. The PGD specifies the age range of clients that are eligible for the service and any other eligibility criteria; it may facilitate supply to young persons under 16 in appropriate circumstances. Clients excluded from the PGD criteria are referred to another local service able to assist them, as soon as possible, e.g. GP or community contraception service, or will be invited to purchase the medicine if the exclusion from supply via the PGD is only due to an administrative matter such as the age range determined by the commissioner.[19] There is good evidence that community pharmacy EHC services provide more timely access to treatment and are highly rated by women.[20]

Figure 3 illustrates the sexual health services currently provided by locally commissioned pharmacies, including consultation and supply of EHC (i.e. the focus of our analysis in this chapter). More specifically, sexual health services provided by community pharmacies include:

- Consultation and supply of EHC at NHS expense via a locally agreed PGD;
- Consultation on general sexual health, including chlamydia screening, supply of free pregnancy test and advice in relation to future contraception such as long-acting reversible contraceptives (LARC);
- Signposting to other NHS services for more appropriate consultation and treatment; and
- Safeguarding to Clinical Commissioning Groups (CCG) if the pharmacist deems appropriate.

Our analysis focuses only on services resulting to the supply of EHC following an occasion of unprotected sexual intercourse (UPSI). It is important to note that there are additional benefits that may arise from the other sexual health services outlined above but, due to data and methodological limitations, we do not include these in the current analysis ('out of scope' services in Figure 3). First, we cannot identify the number of pharmacy clients who receive general sexual health advice as well as those who are referred to or signposted to other services. Second, it is difficult to identify the link between advice and referral to other services to patient and societal benefits that will depend on the change in the client's behaviour which we cannot quantify.

Figure 3: Current service user pathway (through community pharmacy)



Source: PwC analysis

EHC continues to be available free of charge through GP surgeries, family planning/contraceptive clinics, youth clinics, NHS walk-in centres and some A&E departments or other urgent care centres.

[18] There are two methods of EHC available through pharmacies: Levonorgestrel 1.5mg (Levonelle), which is indicated for use within 72 hours of UPSI and, a newer drug, ulipristal acetate (EllaOne 30mg) which is indicated for use within 120 hours since UPSI. Other sexual health services which may be commissioned as a bundle include chlamydia screening and pregnancy testing.
[19] PSNC, NHS Community Pharmacy Contractual Framework: Enhanced Service – Emergency Hormonal Contraception Service.
[20] Anderson and Blenkinsopp (2006).

Women presenting for EHC in pharmacies or other settings in the NHS that supply EHC are clearly indicating that they do not wish to become pregnant, despite being at risk of pregnancy following UPSI. As such, they are at risk of having an avoidable unintended pregnancy.

We analyse the population who present in pharmacies, who are at risk of an unintended pregnancy and for whom EHC is an option. We only consider the female population that is supplied with EHC free of charge on prescription or through a PGD (see Figure 3). We do not consider service users who present in pharmacies to purchase EHC over-the-counter. The data we have available on EHC services provided by pharmacies enable us to identify the number of females presenting in pharmacies that are commissioned to provide EHC free of charge. We do not have information on the number of EHC medicines purchased over-the-counter but it is likely that those women who purchase EHC medicines over-the-counter would also try to obtain EHC through some other NHS channels if this private service was not available from community pharmacy.

In our counterfactual scenario, we assume that locally commissioned EHC services would stop being provided by community pharmacies. We do not make any assumptions about the sale of EHC medicines over-the-counter. The exclusion of EHC supplies over-the-counter implies that our approach is conservative in estimating the contribution of the pharmacy intervention in terms of avoided cost to the NHS and the rest of the public sector (in providing these services in alternative settings).

Without the pharmacy service, we assume that service users would visit either an alternative NHS setting that can supply EHC free of charge or, in the event of no EHC and conception, seek an abortion through the NHS or other private routes or continue with the pregnancy.

3. Contribution of community pharmacy

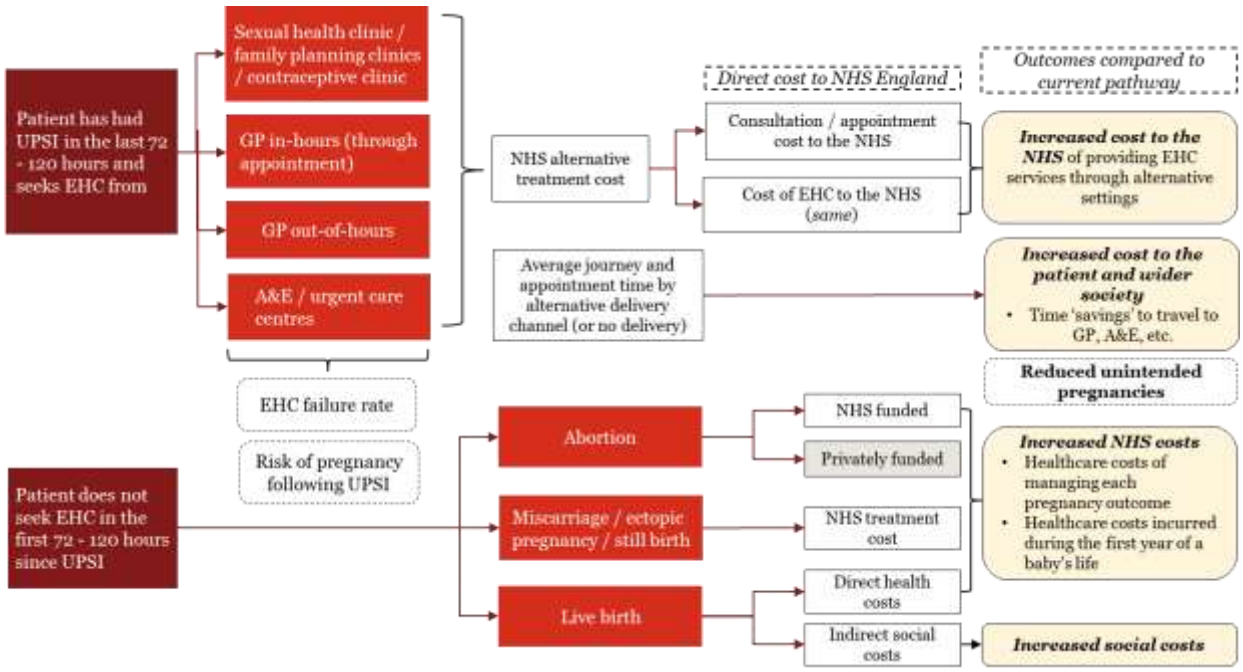
Through EHC services, community pharmacy has the potential to make a positive contribution in four main ways (see Figure 4):

- **By reducing the cost to the NHS of providing EHC** (see top panel of Figure 4): Barriers to accessing EHC are a key issue because the sooner EHC is taken after UPSI, the more likely it is to be effective. Supplying EHC through community pharmacies without the need for a doctor's prescription or scheduling an appointment plays an important role in reducing the number of unintended pregnancies. Where this intervention is successful (i.e. avoiding an unintended pregnancy), there is a positive impact on the service user and the society as a whole (*see below*). Where this intervention is more cost-effective than the alternative pathway for the service user (e.g. seeking EHC from an A&E department), this represents a potential cost saving for the NHS. As illustrated in the top panel of Figure 4, in the absence of community pharmacy, EHC services would continue to be provided through alternative NHS settings (e.g. GP in-hours or A&E departments). The provision of EHC services through these NHS settings would impose a cost on the local authority or the NHS – remuneration based on a consultation / appointment fee (which will differ across NHS settings with the pharmacy being more cost-effective) and appropriate reimbursement for the cost of EHC medicines supplied (which will be the same across all NHS settings as outlined in the Drug Tariff).
- **By reducing travel time for service users** who, in the absence of the pharmacy service, would travel to alternative NHS settings to request an EHC supply: In the absence of the community pharmacy service, some service users may request an EHC supply through alternative NHS channels (e.g. GP in hours, A&E departments). This would impose a time and, potentially, monetary cost, on the service user. The EHC service provided by community pharmacy, therefore, has the potential to save the time it would take for the service user to travel to the alternative NHS setting to request an EHC supply.
- **By reducing unintended pregnancies that would result in avoidable costs for the NHS**: Unintended pregnancies are conceptions that are unplanned by women (both women who want to become pregnant in the future but also those who do not). Any pregnancy, whether intended or not, can lead to abortion, miscarriage / ectopic pregnancy or planned delivery (live birth or still birth). The provision of EHC services by community pharmacies can reduce the number of unintended pregnancies, driven by the increased use of EHC. It is important to note that even though most women who use EHC do not become pregnant (some because conception is prevented by EHC and most because they were not going to conceive originally), EHC will fail in a

small proportion of cases and UPSI will still result in conception. However, without the community pharmacy EHC service, it is likely that some women who would go to the pharmacy to obtain EHC will no longer seek EHC following UPSI. This may result in an increase in unintended pregnancies. All outcomes of unintended pregnancies are associated with costs to the NHS, both direct healthcare management costs as well as indirect health care costs associated with live births (e.g. during the first year of a baby's life). The model pathway is illustrated in the lower panel of Figure 4.

- **By reducing unintended pregnancies that would result in avoidable costs for the public sector**: The supply of EHC through community pharmacies can also reduce the adverse effects on other public sector costs of unintended pregnancies compared to a counterfactual scenario where EHC is available but not freely through pharmacies. A proportion of unintended pregnancies will result in live births. A pregnancy resulting in a live birth gives rise to additional costs for the public sector. For example, the government subsidises employment costs for working women through Statutory Maternity Pay (SMP) (this is paid by the employer who can then claim most or all of the SMP back from HM Revenue and Customs (HMRC)) or Maternity Allowance and social welfare payments are given in the form of child benefit, working and child tax credit. These constitute additional avoidable costs to the Exchequer. It is important, however, to note that these are transfer payments, i.e. public expenditure (e.g. social security benefits) which does not in itself affect the total resources in the economy but signal a movement of resources from one section of the population (tax payers) to another (benefit-claiming mothers). There do not represent true economic resource costs which the Green Book indicates should be accounted for in cost benefit analyses. We focus on the costs incurred by the public sector during the first year of a baby's life. It is important to also note that unintended pregnancies will have an additional impact on the revenues to the Exchequer (and wider society) related to lost economic output. Although we do not consider the impact of unintended pregnancies on lost economic output, unintended pregnancies lead to a smaller labour force (e.g. due to maternity leave) which implies that the costs to the Exchequer may increase not only due to transfer payments such as maternity pay but also due to a reduction in potential economic output.

Figure 4: Counterfactual service user pathway following UPSI in the absence of community pharmacy services



Source: PwC analysis

4. Approach to estimating contribution of community pharmacy

Our approach to determining the value of the EHC services provided by community pharmacy in 2015 involves two elements:

- Estimating the number of times pharmacy has delivered the service and generated each of the benefits described earlier (the 'volume'); and
- Estimating the value delivered each time the service is provided (the 'value').

We summarise our approach to each element below; more details are provided in the technical appendices.

Volume

We estimate that the total number of EHC supplies by community pharmacies in 2015 was 375,000. This is based on information recorded on the PharmOutcomes database which we use to estimate the average rate of take up of the pharmacy EHC service by age group and information recorded on the PSNC services database which we use to extrapolate across pharmacy EHC services that were running in 2015. More details of our approach are in Appendix 3.

Our estimate is consistent with an approximation of the volume derived using the results of an emergency contraception survey conducted by Family Planning Association (FPA) in 2014. This indicated that 55% of sexually active women aged 16-54 who used emergency contraception after an incident of UPSI when not planning a pregnancy were most likely to go to a community pharmacy (394,500).[21] As noted above and detailed in Appendix 3, our extrapolation approach is based on service providers recorded on PharmOutcomes and those recorded on the PSNC services database. It is likely, therefore, that some EHC services that were available in 2015 are not recorded on PharmOutcomes nor the PSNC services database and, as a result, our estimated volume of EHC supplies may be a conservative estimate of the activity undertaken by community pharmacies.

Value

Figure 4 illustrates the benefits to society of EHC supplied through community pharmacies. We focus on three key areas:

1. The avoided costs to the NHS through more cost-effective intervention by community pharmacies (as opposed to EHC supplies through alternative NHS settings);
2. The avoided time spent by the service user travelling and attending alternative NHS settings (e.g. A&E or GP surgeries); and
3. The avoided costs to the NHS and the public sector through a reduction in unintended pregnancies.

To estimate the avoided costs to the NHS of providing EHC through alternative settings we consider:

- The service user pathway for women following UPSI in the absence of a commissioned community pharmacy service for EHC; and
- The costs to the NHS associated with each alternative setting in terms of consultation / appointment fee (see Table 3).

To estimate the net benefit of the EHC services provided by community pharmacies we also need to account for any payment received by pharmacies for providing the services (i.e. the consultation fees and reimbursement for medicines supplied). As this is a cost incurred by the local commissioner, we need to offset it in calculating the net benefit of pharmacy services. Our approach to estimate the cost of provision of EHC services is similar across all NHS settings, i.e. we estimate the average consultation fee, which may differ across settings, and apply the estimated reimbursement received

[21] Family Planning Association (2014).

for an EHC supply to the volume of EHC supplies in both the current and counterfactual scenarios. More specifically:

- To estimate an average consultation fee received by pharmacies we used information on fees as recorded on PSNC's services database. This is drawn from the service specification agreement on remuneration (e.g. amount to be paid to the pharmacy by the commissioner for each EHC consultation provided to service users); and
- To estimate the reimbursement received for any EHC medicine supplied we use the Drug Tariff prices (see Table 4).

Proportion of individuals across alternative delivery channels

To quantify the avoided costs to the NHS of providing EHC through alternative settings we estimate, first, the counterfactual scenario which illustrates the service user pathway for women following UPSI and, second, the NHS costs associated with each alternative setting in terms of consultation / appointment fees (see Table 3). In our final estimation we also offset the reimbursement for the EHC drugs supplied in the current versus the counterfactual scenario (see Table 3 and Table 4).

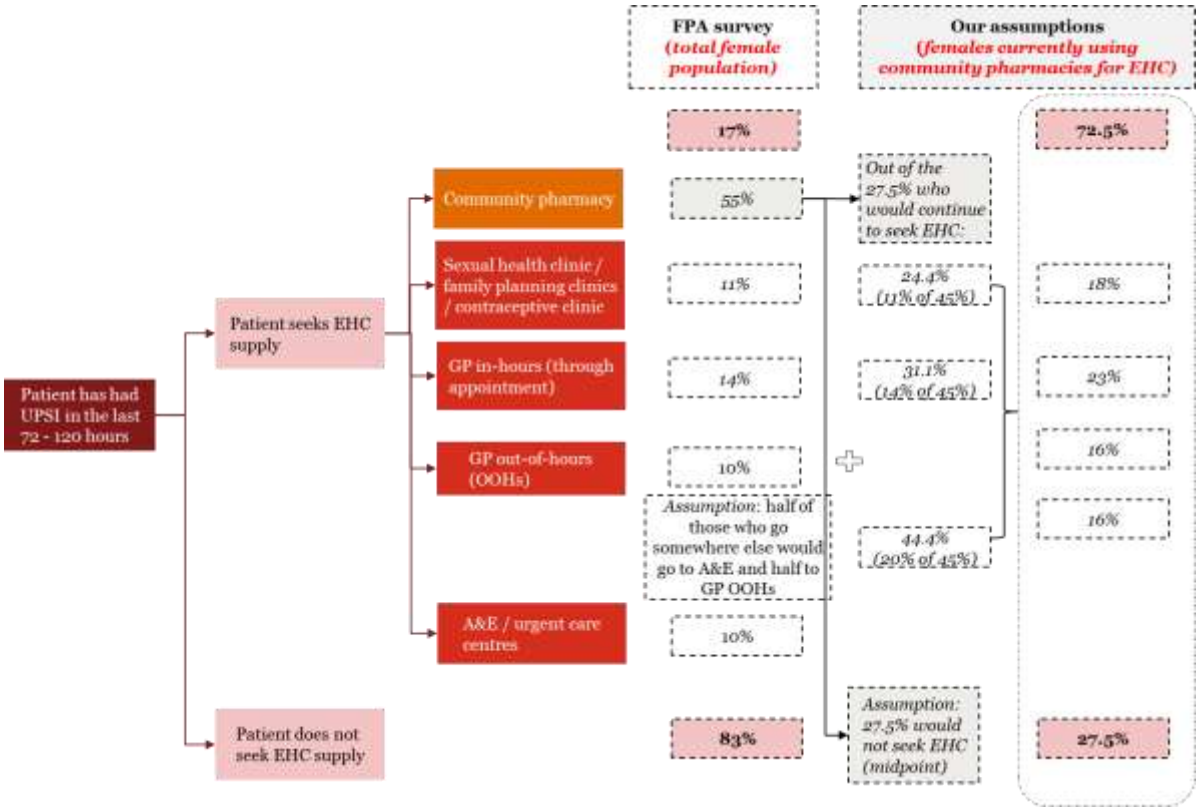
More specifically, to estimate the counterfactual we use the results of the FPA EHC survey which showed that, out of the women who sought EHC following UPSI (only 17% of the survey sample), 55% were more likely to go to a pharmacy, 14% to a GP, 11% to a contraception clinic and 20% to alternative settings that provide an EHC service.

We use these results and make a few assumptions to develop our counterfactual (see Figure 5). We assume that, in the absence of locally commissioned EHC pharmacy services, out of the 375,000 women who in 2015 were supplied with EHC from a community pharmacy:

- Half of those who would have gone to a pharmacy as shown in the FPA survey results (27.5% of the 55%) would not seek EHC supply in the appropriate time period following UPSI;
- The remaining half (27.5%) would seek EHC supply from alternative NHS settings in the same proportion as estimated using the survey results, i.e. of the 45% who did seek EHC through setting other than the pharmacy 14% went to the GP, 11% went to a contraception clinic and 20% went somewhere else; and
- Out of those women who would go somewhere else we assume that half would visit an A&E department and the other half would book an appointment with the GP out-of-hours through NHS 111.

It is important to understand how our counterfactual compares to the results of the FPA survey. The results of the FPA survey show that more than 80% of women will not seek EHC following a single occasion of UPSI. Of those who do seek EHC, a narrow majority (55%) uses community pharmacies. To develop our model we need to estimate the number of those women who would not use EHC if community pharmacies did not provide the service. At one extreme, it could be that the small minority who do currently use EHC (i.e. 17% of the survey sample) are determined to use EHC and, therefore, would seek an alternative if pharmacy based services were not available. At the other extreme, it could be that not seeking EHC is by far the favoured option, as shown by the majority of women who actually do not seek EHC at all, and that those who currently go to the community pharmacy only do so because it is very convenient and anonymous. In this scenario, none of them would use a different NHS setting absent of community pharmacy services. We have gone for a midpoint scenario where half of those who currently go to community pharmacies for EHC would not seek EHC supply were the pharmacies to stop providing the service. To assess the criticality of this assumption, we present some sensitivity analysis towards the end of the chapter.

Figure 5: Our approach to estimating the counterfactual scenario in the absence of community pharmacy



Source: PwC analysis

In summary, in the absence of EHC service provided by community pharmacies, out of those women who in the current scenario seek EHC from locally commissioned community pharmacies:

- 72.5% of women would seek EHC supply following UPSI through an alternative NHS setting (18% through a contraceptive clinic, 23% through a GP in hours, 16% through an A&E or other urgent care centre and 16% through the GP out of hours[22]); and
- 27.5% would not seek EHC supply in the appropriate time following UPSI and would, therefore, in the event of conception, seek an abortion or go ahead with the pregnancy (*see more on the outcomes below*).

Table 3: Counterfactual scenarios of EHC supply in the absence of pharmacy services[23]

Alternative service providers / delivery channels	%	Volume	NHS cost	Source & calculation
Community pharmacy	*100%*	*375,000*	*£13.8 per consultation & EHC drug cost*	*PharmOutcomes & own calculations* PSNC services database and Drug Tariff prices 2015
Family planning / contraceptive clinic	17.7%	66,470	£13.8 per consultation & EHC drug cost	FPA (2014) & own calculations Assume the cost to the NHS of providing this service is the same as for pharmacy EHC services
GP in-hours (through appointment)	22.6%	84,600	£45 per consultation & EHC drug cost	FPA (2014) & own calculations Curtis (2014)
A&E / urgent care centres	16.1%	60,430	£68 per consultation & EHC drug cost	FPA (2014) & own calculations New economy (2015) ('A&E attendance – no investigation and no significant treatment')

[22] The share of women who would go to A&E or GP out of hours is estimated by assuming that of those women who went 'somewhere other than the GP in hours, the contraceptive clinic or the pharmacy' as indicated in the FPA survey, half went to an A&E department and the other half went to the GP out of hours.
[23] All volume figures in this chapter are rounded to the nearest tenth (00).

Alternative service providers / delivery channels	%	Volume	NHS cost	Source & calculation
GP out-of-hours	16.1%	60,430	£79 per consultation (incl. NHS 111 call) & EHC drug cost	FPA (2014) & own calculations NAO (2014); updated using GDP deflator Turner et al. (2012); updated using GDP deflator
No EHC supply	27.5%	103,140		Assume 50% of females who were most likely to go to pharmacy for EHC

Source: PwC analysis

Offsetting the cost of providing the service

As discussed above, to estimate the net benefit of the services provided by community pharmacies we need to account for any payment received by pharmacies and other NHS settings (e.g. GP in-hours) for providing the services (i.e. the consultation fees and reimbursement for medicines supplied) as this is a cost to the local commissioner and should be offset to estimate the net benefit of pharmacy services.

To estimate the average consultation fee received by pharmacies, we use information on fees recorded on pharmacy contracts on the PSNC services database. We also need to estimate the average consultation fee across the alternative NHS settings that provide EHC services in the counterfactual scenario (i.e. in the absence of community pharmacy EHC services).

- *Family planning / contraceptive clinics*: In the absence of specific data on the costs of family planning clinics, we assume that the consultation fee received by family planning or contraceptive clinics is the same as the fee that community pharmacies would receive.
- *GP in-hours, GP OOH & A&E*: We use publicly available data on NHS unit costs to estimate the consultation fee for GP in-hours, A&E attendance and a GP OOH appointment (see Table 3 for the sources used). For the purposes of our analysis we assume that an EHC consultation with the GP in-hours, the GP-out-of-hours or an A&E staff is equivalent to a standard appointment with a doctor in a GP practice or GP out-of-hours or an A&E attendance that requires no significant treatment (see Table 3 for unit costs used). The consultation costs for these alternative settings are higher than the consultation costs of EHC services provided by community pharmacies.

Also, to estimate the reimbursement for any EHC medicine supplied, across any NHS setting, we use information on the number of primary care prescriptions and the Drug Tariff prices for the most common drugs to calculate a weighted average as illustrated in Table 4.[24] We cross-check our estimates for consistency with payment data recorded on PharmOutcomes.

Table 4: Reimbursement for the cost of EHC drugs (weighted average)[25]

EHC drug	Number of prescriptions items	% of total prescriptions	Drug tariff price (2015)
EllaOne Tab 30mg	31,539	16.9%	£15
Levonelle One Step Tab 1.5mg	5,517	3.0%	£13.8
Levonelle Tab 1.5mg	35,346	19%	£5.20
Levonorgest Tab 1.5mg	108,638	58.4%	£5.2
Upostelle Tab 1500mcg	5,035	2.7%	£3.8
Weighted cost	*186,075*	*100%*	***£7.07***

Source: PwC analysis

Time 'savings' for service users and wider society across alternative delivery channels

In order to value the benefits of community pharmacy EHC services to service users (in terms of avoiding lost leisure time) and wider society (in terms of avoiding time off work), we need to

[24] Note that we exclude Levonell Postcoital Tab 750mcg and Levonel-2 Postcoital Tab 750mcg from our analysis as these represent a negligible share of the total prescriptions in 2014.
[25] *Sources*: NHS Drug Tariff (201)5; Prescription cost analysis 2015 (These represent women who went to primary care provider and were issued a prescription for EHC).

understand the differences in the time to request and travel to obtain an EHC supply in each of the alternative NHS settings under consideration (see Table 5).

We make some important assumptions across all alternative channels:

- We estimate the average distance for the relevant journeys using GIS mapping and publicly available sources. A detailed analysis of our approach is provided in Appendix 4;
- We assume that the EHC consultation time across all settings is the same as the average consultation time per GP appointment (11.7 minutes). We also assume that the time to collect a prescription or buy medicines in a pharmacy is 2 minutes[26]; and
- We assume that the service user will travel to the pharmacy to receive an EHC supply following their visit to the alternative NHS setting across all alternative delivery channels before travelling back to their home.

The final step in our valuation is to put a value on this time saving to service users. For those who give up leisure time, we value this time at £7.05/ hour: this is derived from the DfT's WebTAG guidance and represents the value of leisure time spent travelling (adjusted to 2015 prices). For those who take time off work to visit the GP in hours, we use the average hourly Gross Value Added (GVA) per worker in England which is estimated to be £31.50/ hour in 2015. This captures the lost output that would have been produced had the employee been at work.

Table 5 summarises the journey, consultation, booking and waiting times relevant to the journeys to the alternative NHS settings as well as the total value to the service user using the figures described above. We provide more details on our technical approach and data sources used to estimate these times in Appendix 4.

Table 5: Average travel time (and value) to request an EHC supply across alternative delivery channels, 2015

Alternative service provider	Time to value (minutes)	Average return journey time	Appointment time	Value (£)[27]	Source(s)
Community pharmacy	• Time to travel to nearest pharmacy	9.3	13.7	£2.7	GIS mapping NHS, March 2016 UK Data Service (2015) Department of Transport (2015a) Department of Transport Statistics (2015) Department of Transport (2014)
Family planning / contraceptive clinic	• Time for visit - Travel to clinic - Attendance time • Travel from clinic to pharmacy - Travel - Collection time • Travel from pharmacy to home	40	36.2	£9	Roberts et al. (2014) Monitor (2014) *Assume same as walk-in centre (see Appendix 4)*
GP in-hours (through appointment)	• Time for GP visit - Book appointment - Travel to GP - Waiting time - Consultation time • Time from GP to pharmacy - Travel - Collection time	11.8	27.9	£3.3 (leisure time) £6 (time off work)[28]	GIS mapping HSCIC (2016) UK Data Service (2015) Department of Transport (2015a) Department of Transport Statistics (2015) Department of Transport (2014)

[26] Curtis (2015)
[27] This column is estimated by multiplying the total time by the value of time. We assume that the service user would use their leisure time to visit a pharmacy, A&E or out of hours service. In comparison, the service user would take time off work to visit a GP in hours.
[28] We assume that 28.8% of service users would take time off work to visit the GP in hours. In all other counterfactuals we assume that all service users would use their leisure time rather than take time off work. Please refer to the Appendix 4 for more details.

Alternative service provider	Time to value (minutes)	Average return journey time	Appointment time	Value (£)[27]	Source(s)
	• Travel from pharmacy to home				
A&E / urgent care centres	• Time for A&E visits - Travel to A&E - Attendance time • Travel from A&E to pharmacy - Travel - Collection time • Travel from pharmacy to home	40	137.9	£20.9	Roberts et al. (2014)
GP out-of-hours	• Time per NHS 111 call • Time for GP OOHs - Travel to GP OOHs (assuming physical attendance) - Waiting time - Consultation time • Travel from GP OOHs to pharmacy - Travel time - Collection time • Travel from pharmacy to home	40	30.2	£8.2	Roberts et al. (2014) Turner et al. (2012) Primary care foundation (2012)
No EHC supply		0		£0	

Source: PwC analysis

Outcomes and costs of unintended pregnancy

Some of the women who become pregnant unintentionally may opt to continue with the pregnancy or terminate through a planned abortion; miscarriage or ectopic pregnancy may also occur. Adopting the methodology used in Thomas and Cameron (2013), we use the outcome proportions observed in the comparative clinical trial of women who become pregnant following EHC failure. These proportions may differ from those associated with an intended pregnancy (i.e. where the mother is more likely to be happy about the pregnancy) with the outcome of an unintended pregnancy more likely to be an abortion compared to an intended pregnancy.[29] For example, a study in Scotland looking at contraceptive use in unintended pregnancy showed that approximately 90% of induced abortions, almost 8% of deliveries and 12% of miscarriages were the result of unintended pregnancy.[30] To illustrate the impact of varying the outcomes of unintended pregnancy on our results we conduct sensitivity analysis. The proportions applied to our analysis and estimated NHS costs associated with each outcome are outlined in Table 6. We also analyse publicly available data sources from the NHS and the ONS to estimate the healthcare costs incurred by pregnant women in 2014/15; these are illustrated in Table 6 (also see Table 7 and Table 8).[31]

Table 6: Assumptions – the outcomes and NHS costs of unintended pregnancies

Pregnancy outcome	%	NHS cost[32]	Source & calculation
Risk of pregnancy following UPSI	*6.75%*		Average within estimated range (Shohel et al., 2014)[33]
Risk of pregnancy following EHC supply	*2.2%*		Glasier, A.F. et al. (2010)[34]
Abortion (NHS funded)	66%	£798	

[29] Cameron, S.T. and Glasier, A. (2013).
[30] Lakha F. and Glasier A. (2006).
[31] Note that the sources used refer to different time periods (i.e. 2014, 2015 or the FY2014/15 year. For the purposes of this analysis we have not made any adjustments although we believe the implications will be small).
[32] The cost of each pregnancy outcome includes the direct healthcare costs of managing each pregnancy whether it resulted in an abortion, miscarriage, ectopic pregnancy or delivery of a live or stillborn baby. More details are provided in the Appendix 2.
[33] Shohel et al. (2014).
[34] Glasier, AF et al. (2010). .

Pregnancy outcome	%	NHS cost[32]	Source & calculation
Miscarriage	15%	£578	Thomas, CM and Cameron, S. (2013)[35] Assuming a rate of 1% ectopic pregnancies and 0.5% of stillbirths National Schedule Reference Costs (NSRC) 2014/15 Health & Social Care Information Centre (HSCIC), Hospital Episode Statistics (HES) 2014/15 Department of Health, Abortion Statistics 2014 HSCIC, NHS Immunisation Statistics 2014-15
Ectopic pregnancy	1%	£1,532	
Stillbirth	0.5%	£4,033	
Live birth[36]	17.5%	£5,893 / £6,781	

Source: PwC analysis

Table 7: The direct healthcare costs of unintended pregnancies, breakdown of key elements

Parameter	Source
Abortion	
Total legal abortions (NHS funded)	Abortion Statistics 2014
NHS healthcare costs	National Schedule Reference Costs (NSRC) 2014/15 included in HRGs: MA17C, MA17D, MA18C, MA19A, MA19B, MA20Z
Miscarriage	
Total number of miscarriages recorded in NSRC	National Schedule Reference Costs (NSRC) 2014/15 included in HRGs: MB08A, MB08B
NHS healthcare costs	HES 2014/15 Primary diagnosis 3 character code: O01, O02, O03, O05, O06, O08, O20
Ectopic pregnancy	
Total number of hospital admissions	HES 2014/15 Primary diagnosis 3 character code: O00
NHS healthcare costs	National Schedule Reference Costs (NSRC) 2014/15 included in HRGs: MB05C-L, MB09A-F
Delivery of birth	
Total number of live births	Department of Health, Birth Statistics, 2014
NHS health care costs	National Schedule Reference Costs (NSRC) 2014/15 including: Antenatal care, Hospital delivery, postnatal care and Neonatal care

Source: PwC analysis

To calculate the NHS costs associated with unintended pregnancies we use the approach developed by Thomas and Cameron (2013), i.e. we calculate the cost per event for all pregnancy outcomes using NHS data. The cost of each pregnancy includes the direct healthcare costs of managing each pregnancy whether it resulted in an abortion, miscarriage, ectopic pregnancy or delivery of a live or stillborn baby. These included community and hospital costs with the exception of additional GP visits for pregnancy related issues. For the purposes of this analysis, we also examined the routine healthcare costs that are incurred during the first year of a baby's life which we estimate to be, on average, £948 per child. These include the standard immunisation schedule for the baby (assuming each child completes the recommended course of three vaccinations by the age of one), hospital admissions recorded for children under 1 year, health visitor costs, community paediatric appointments and visits to the GP (assuming that the rate of visits for babies under the age of one is the same as GP consultation rates for children under the age of five, that is a weighted average of 6.9 GP visits per year.[37] A detailed breakdown of the various elements of healthcare costs for each pregnancy outcome and the healthcare costs for children in their first year is outlined in Table 7 and Table 8.

[35] Thomas, CM. and Cameron, S. (2013).
[36] For the purposes of this analysis we estimate: (a) the direct healthcare management costs associated with the delivery of a live birth, and (b) the routine healthcare costs incurred during the first year of a baby's life (e.g. immunisation schedule).
[37] HSCIC (2009).

Table 8: The healthcare costs incurred during the first year of a child's life, breakdown of key elements, 2015

Parameter	Value per live birth (£)	Source
Standard immunisation schedule for a baby	£42	NHS Immunisation Statistics 2014/15 National Schedule Reference Costs (NSRC) 2014/15: N03N Assume all children complete the recommended course of 3 vaccinations by their first birthday (£26 per course)
Hospital admissions recorded for children under 1 year	£279	National Schedule Reference Costs (NSRC) 2014/15 including all HGRs that refer to paediatric care
Health visitor costs	£345	National Schedule Reference Costs (NSRC) 2014/15: N03PC, N03C, N03D, N03F, N03G, N03J
Community paediatric appointment	£68	National Schedule Reference Costs (NSRC) 2014/15: 290
Visits to GP	£215	Curtis (2015) Thomas and Cameron (2013) GP consultation trends, 1995-2008
Total (per live birth)	*£948*	

Source: PwC analysis

As outlined in Table 9, a pregnancy resulting in a live birth gives rise to additional costs and benefits for society.

For the purposes of our analysis we focus on the additional costs to society by estimating the average cost of maternity benefits (SMP, maternity allowance, working and child tax credits and child benefits) per pregnant woman by dividing the total maternity costs spent in 2014/15 (depending on data availability) by the number of pregnant women in that year. We also analyse public spending on other social benefits such as social security payments and housing benefits and calculate the proportion that was spent on pregnant women and children under 1 year in 2015. On average, we estimate the cost for each woman delivering a baby to be £7,657 in 2015. Our estimates are conservative as we do not consider all potential impacts on the public sector and wider society such as reduced economic output due to lost working time during pregnancy to attend healthcare appointments and during the first year of a baby's life (e.g. maternity leave).

We do not consider the benefits to society of an additional birth. This is a complex methodological task and we did not find any robust and widely used figures of the estimated value to society of an additional person being born (as we did for the value of human life which is estimated by the government in relation to transport investment). Therefore, our results in Section 5 which assess the value of community pharmacy EHC services exclude the long term societal benefits of an additional person being born.

Table 9: Key elements of social costs of unintended pregnancies during the first year of a baby's life, 2015

Cost element	Social cost per delivery	Sources
Child benefit	£1,061	• UK Office of National Statistics (ONS): • HMRC Tax and NI receipts 2014/15 • Benefit Expenditure 2014/15 • Child benefit statistics 2014/15 • Department of Health, Birth Statistics 2014
Working tax and child tax credit	£2,428	
Maternity allowance	£558	
Statutory Maternity Pay (SMP)	£2,920	
Social security	£146	
Housing benefit	£545	
Total average per live birth	***£7,657***	

Source: PwC analysis

5. Key results and sensitivities

Table 10 summarises the overall contribution of community pharmacy to society from providing EHC services in England. It is based on combining the volume and value assumptions outlined above.

Table 10: Estimated value of EHC services provided by community pharmacies, 2015

Stakeholder	Impact area / path	Element	Volume	Value (£ per service user)	Total value (£m)
NHS	Reduction in EHC supply through alternative routes (e.g. GP in-hours, A&E departments)	*Pharmacy*	*375,060*	*£20*	*£7.8*
		Counterfactual	271,920	£53.8[38]	£15.5
		Net value			**£7.7**
	Reduction in cost of unintended pregnancies across all outcomes (healthcare costs per pregnancy outcome and incurred during the first year of a baby's life)	Abortions	3,122	£798	£2.5
		Miscarriages	710	£578	£0.4
		Ectopic Pregnancies	47	£1,532	£0.1
		Stillbirths	24	£4,033	£0.1
		Live births	828	£6,781	£5.7
		Net value			**£8.7**
Patient/ service user	*Leisure time*: Reduction in service user travel time to reach alternative delivery channels (e.g. A&E, GP OOHs)	*Pharmacy*	*375,060*	£2.7	£1
		Counterfactual	271,920	£7.3[39]	£2.6
		Net value			**£1.6**
Wider society	*Time off work*: Reduction in service user travel time to reach GP in-hours	*Pharmacy*	0		£0
		Counterfactual	66,469[40]		£0.5
		Net value			**£0.5**
Public sector	Reduction in cost of unintended pregnancies that result in live births	Live births	828	£7,657	**£6.3**
Total					***£24.9***

Source: PwC analysis

We estimate that EHC services provided by community pharmacies resulted in an overall contribution to wider society of **£24.9** million in 2015. More specifically, the pharmacy services resulted in an annual cost saving to the NHS of £16.5 million – £7.7 million due to more cost-effective treatment provided in a community pharmacy setting and £8.7 million associated with avoided healthcare costs due to a reduction in unintended pregnancies. In addition there are annual savings to the service user and the wider society of £1.6 million and £0.5 million respectively as a result of avoided travel time to request an EHC from alternative NHS service providers. Finally, there is an estimated annual cost saving to the UK public sector spending on children under 1 year and their mothers of £6.3 million as a result of the reduction in unintended pregnancies that result in live births.

Sensitivities

Our results are sensitive to the assumptions we have made, including:

- The risk of pregnancy following UPSI;
- The outcome of unintended pregnancy; and
- How women would have responded if community pharmacy did not provide an EHC service.

We have, therefore, tested the sensitivity of our results to altering these assumptions.

[38] Weighted average of consultation fees by the number of service users seeking EHC through each alternative delivery channel.
[39] Weighted average of time * value by the number of service users requesting EHC through each alternative delivery channel.
[40] We assume that when visiting the GP practice in hours, 28.8% of the time would be time lost off work and the remaining 71.2% would be lost leisure time for those service users (see Appendix 4 for more details).

Risk of pregnancy following UPSI

The risk of pregnancy following a single instance of UPSI depends on the time in the menstrual cycle but also individual health characteristics. Estimates indicate that following a single occasion of UPSI, the average risk of pregnancy without use of EHC is between 5.5% and 8%.[41] In our 'base case' we use the average within this range (i.e. 6.75%). As a sensitivity, we investigate how our results change if we use the lower and upper bound of the estimated range (i.e. 5.5% and 8%). This affects the estimated costs related to the reduction in unintended pregnancies with our results ranging from 16% lower (£20.8 million) to 16% higher (£29 million) than our 'base case' of £24.9 million (see Table 11).

Table 11: Estimated value of EHC services provided by community pharmacies in 2015 – comparing risk of pregnancy scenarios (£m)

Stakeholder	Impact area / path	'Lower bound' 5.5%	'Base case' 6.75%	'Upper bound' 8%
NHS	Reduction in EHC supply through alternative routes (e.g. GP in-hours, A&E departments)	£7.7	£7.7	£7.7
	Reduction in unintended pregnancies across all outcomes (healthcare costs per pregnancy outcome and incurred during the first year of a baby's life)	£6.4	£8.7	£11.1
Patient/ service user	*Leisure time*: Reduction in service user travel time to reach alternative delivery channels (e.g. A&E, GP OOHs)	£1.6	£1.6	£1.6
Wider society	*Time off work*: Reduction in service user travel time to reach GP in-hours	£0.5	£0.5	£0.5
Public sector	Reduction in unintended pregnancies that result in live births	£4.6	£6.3	£8.1
Total		*£20.8*	*£24.9*	*£29*

Source: PwC analysis

Outcomes of unintended pregnancy

In this sensitivity analysis, we examine the impact of varying the outcomes of intended pregnancy on our results. As discussed above, the evidence shows that the proportion of unintended pregnancies that result in termination is greater than that of intended pregnancies which, as expected, are more likely to result in live births.[42] For the purposes of our sensitivity analysis, we test the implications of using the proportions estimated using the total number of pregnancies in England, both planned and unintended. In England, overall pregnancy outcomes (i.e. planned and unintended pregnancies) have a much greater proportion of women delivering (75%) and subsequently fewer induced abortions (21%) and miscarriages that require hospital treatment (4%).[43] As we do in the 'base case', we account for a fixed rate of ectopic pregnancies and stillbirths.

Table 12: Sensitivity analysis #2 – proportions of pregnancy outcomes

Pregnancy outcome	'Base case'	'Sensitivity analysis'
Abortion (NHS funded)	66%	20%
Miscarriage	15%	6%
Ectopic pregnancy	1%	1%
Stillbirth	0.5%	0.5%
Live birth	17.5%	72.5%

Source: PwC analysis

Changing the assumptions increases the costs to the NHS and other parts of the public sector costs associated with reduced unintended pregnancies (143% higher overall contribution of EHC pharmacy

[41] Shohel et al. (2013).
[42] Lakha F. and Glasier A. (2006).
[43] Statistics are drawn from: ONS Abortion and Birth Statistics and HES data (miscarriage episodes).

services) (see Table 13). This is driven by the change in the balance between unintended pregnancies that result in abortions (lower than in the 'base case') and those that result in live births (higher than in the 'base case'). It is important to note, however, that evidence suggests that the outcomes of unintended pregnancies are likely to differ from those of intended pregnancies with the majority resulting in the termination of pregnancy.[44]

Table 13: Estimated value of EHC services provided by community pharmacies in 2015 – comparing unintended and intended pregnancy outcomes proportions

Stakeholder	Impact area / path	'Base case'	'Sensitivity analysis'
NHS	Reduction in EHC supply through alternative routes (e.g. GP in-hours, A&E departments)	£7.7	£7.7
	Reduction in unintended pregnancies across all outcomes (healthcare costs per pregnancy outcome and incurred during the first year of a baby's life)	£8.7	£24.5
Patient/ service user	*Leisure time*: Reduction in service user travel time to reach alternative delivery channels (e.g. A&E, GP OOHs)	£1.6	£1.6
Wider society	*Time off work*: Reduction in service user travel time to reach GP in-hours	£0.5	£0.5
Public sector	Reduction in unintended pregnancies that result in live births	£6.3	£26.3
Total		*£24.9*	*£60.7*

Source: PwC analysis

Proportion of women who would not seek EHC if not provided by community pharmacy

The probability of women not seeking EHC following UPSI adopted in our 'base case' is based on a combination of assumptions and evidence from an emergency contraception survey by the FPA. We model two different scenarios in relation to the probability of women who, following UPSI in the scenario where EHC is not available through community pharmacies, would not seek EHC to test the robustness of our results. We test a 30% plus/minus range for women who, in the absence of pharmacy services, would not seek EHC in the appropriate time interval (see Table 14). Our analysis shows that the overall contribution of pharmacy EHC services would be around 10% less / more if 30% of women who in the current scenario would seek EHC supplies would not do so / would do so through an alternative NHS setting in the absence of pharmacy (see Table 15).

Table 14: Sensitivity analysis #3 – proportion of women seeking/not seeking EHC in the absence of pharmacy

Pregnancy outcome	'Lower bound'	'Base case'	'Upper bound'
Family planning / contraceptive clinic	19.7%	17.7%	15.7%
GP in-hours (through appointment)	25.1%	22.6%	20.0%
A&E / urgent care centres	17.9%	16.1%	14.3%
GP out-of-hours	17.9%	16.1%	14.3%
No EHC supply	19.3%	27.5%	35.8%

Source: PwC analysis

Table 15: Estimated value of EHC services provided by community pharmacies in 2015 – comparing counterfactual scenarios (£m)

Stakeholder	Impact area / path	'Lower bound'	'Base case'	'Upper bound'
NHS	Reduction in EHC supply through alternative routes (e.g. GP in-hours, A&E departments)	£9.5	£7.7	£6.0
	Reduction in unintended pregnancies across all outcomes (healthcare costs per pregnancy	£6.1	£8.7	£11.4

[44] Lakha F. and Glasier A. (2006).

Stakeholder	Impact area / path	'Lower bound'	'Base case'	'Upper bound'
	outcome and incurred during the first year of a baby's life)			
Patient/ service user	*Leisure time*: Reduction in service user travel time to reach alternative delivery channels (e.g. A&E, GP OOHs)	£1.9	£1.6	£1.3
Wider society	*Time off work*: Reduction in service user travel time to reach GP in-hours	£0.6	£0.5	£0.4
Public sector	Reduction in unintended pregnancies that result in live births	£4.4	£6.3	£8.2
Total		*£22.5*	*£24.9*	*£27.3*

Source: PwC analysis

Interpretation of the results

Our analysis is likely to provide a conservative estimate of the contribution of community pharmacy for various reasons including:

- The number of EHC services provided by community pharmacies is likely to be underestimated since not all services are recorded on PharmOutcomes and the PSNC database;
- The healthcare costs of unintended pregnancies are likely to be larger than that of intended pregnancies so our estimates, which are based on NHS publicly available healthcare costs may be underestimates; for example, women who experience an unintended pregnancy may incur more difficulties psychologically in dealing with the unintended event in their life;
- We only consider short term costs to the NHS and the public sector associated with costs incurred during the first year of a child's life;
- We do not consider the potential loss of output as a result of unintended pregnancies as well as the potential benefit in terms of lifetime output and other societal benefits of the additional person born. Although unintended pregnancy can reduce short term output, due to lost working days whilst pregnant and, possibly, caring for children, this needs to be offset against the longer term boost provided by the birth of a child. In the absence of an established approach to assessing such an impact, we do not account for it, but if the benefits of an additional person being born outweigh the lost output of the mother due to the unintended pregnancy, our estimate is likely to be overstated, i.e. in the counterfactual we assume that a larger number of unintended pregnancies will result in live births and, if the benefits of an additional person being born outweigh the costs of pregnancy (e.g. lost economic output), our estimate is forgoing these benefits; and
- We only consider the direct health care costs associated with unintended pregnancies and the indirect social costs incurred during the baby's first year. We do not consider other impacts such as reduced economic output due to lost working time or impact on service user wellbeing and health across the current and counterfactual scenarios.

Finally, our analysis does not include the additional benefits that may arise from a reduction in STI rates following an EHC consultation with a pharmacist for various reasons:

- It is difficult to identify the number of individuals that receive STI advice (including chlamydia screening) during an EHC consultation;
- We cannot identify the impact of STI advice from pharmacists on the service users' behaviour; and
- The treatment cost of STIs vary by infection, time of intervention and individual characteristics such as age and health status.

Even though we cannot quantify the additional benefits of reduced STI rates it is important to note that EHC consultations by community pharmacies are often accompanied by general sexual health advice as well as chlamydia screening.

Needle and syringe programmes

1. Introduction

This chapter provides our assessment of the value associated with community pharmacy's current role in providing needle and syringe programmes (NSP) in England. We estimate the value that would be at risk if community pharmacy no longer supplied its current service, using data for 2015.

The chapter is structured as follows:

- Section 2 describes the service currently provided by community pharmacy, including what it means from the service user perspective, and sets out our assumptions for what would happen from the service user perspective if community pharmacy did not provide its current service (i.e. the counterfactual);
- Section 3 describes the value that flows from the current activities of community pharmacy in terms of potential avoided costs to the NHS and wider society and explains the key impacts;
- Section 4 explains our approach to assessing each element of expected value, specifically:
  - How we estimate the number of individuals who benefit from the service provided by the pharmacy (the 'volume');
  - How we estimate the value delivered each time the service is provided (i.e. for each individual patient) (the 'value'); and
- Section 5 summarises our key results as well as the results of our sensitivity analysis.

A set of technical appendices provides further details of the methodology and the data sources we use to estimate the value of the NSP services provided by community pharmacy in England in 2015.

2. Description of activity

People who inject drugs are at risk of both fatal and non-fatal overdoses and are vulnerable to a wide range of viral and bacterial infections which can result in higher levels of morbidity and mortality; studies show that the risk of death among injectors can be over 13 times higher than the general gender and age matched population.[45] In 2014, there were 2,120 deaths relating to drug misuse in England including those who died as a result of accidental overdose, intentional self-poisoning and from drug use and drug dependence.[46]

Injecting risk behaviours among injecting drug users (IDUs) such as sharing needles and syringes have a wider public health impact since the sharing of injecting equipment (e.g. needles) can be an important factor in the transmission of blood borne viruses (BBV)[47]: almost a fifth (17%) of IDUs currently in drug treatment reported sharing injecting equipment (including needles, syringes, filters, mixing containers and water) in the previous 28 days.[48] BBVs may be transmitted beyond the IDU population through sexual contact with the wider non-IDU population and vertically through pregnancy and childbirth. They may result in poor health and higher mortality risk.[49] The most prevalent BBVs among IDUs include[50]:

- **Hepatitis C (or HCV)** which is currently the most important infectious disease among IDUs affecting two in five of those who inject drugs, of which about one half remain undiagnosed. Moreover, over 90% of those infected by HCV reported injecting drug use as the route of infection.

[45] UK Focal Point (2015); Hulse et al. (1999).
[46] ONS (2014)
[47] The transmission of BBVs among IDUs occurs primarily as a result of blood contact, especially when IDUs share needles and syringes but also other type of equipment such as spoons or filters.
[48] PHE (2015)
[49] PHE (2014)
[50] All figures are drawn from PHE (2015).

- **HIV** which is relatively uncommon among the IDU population with only one in 100 IDUs living with HIV; most of these people have been diagnosed and are in receipt of care. Around 2% of new HIV diagnoses occur as a result of injecting drug use.
- **Hepatitis B** which around one in 200 people who have injected drugs are living with, and where the low level reflects the increase in uptake of the Hepatitis B vaccine.

The government's 2010 drug strategy aims to reduce illicit and other harmful drug use.[51] Although the strategy emphasises recovery, it specifically states that NSPs alongside treatment can help 'reduce the harms caused by dependence such as the spread of blood borne viruses like HIV'.[52]

NSPs were first established in the UK in the mid-1980s and are viewed as an important public health intervention aimed at preventing BBV transmission. In England, NSPs are provided by a range of organisations including pharmacies, specialist services (e.g. local drug clinics), outreach / mobile services, custody sites and A&E departments. A survey of NSPs across England in 2005 found that the majority (80%) were based in community pharmacies.[53] The Department of Health groups adult drug-related treatment into four tiers according to the scale of intervention required; pharmacy needle and syringe programmes are classified as Tier 2 interventions.[54]

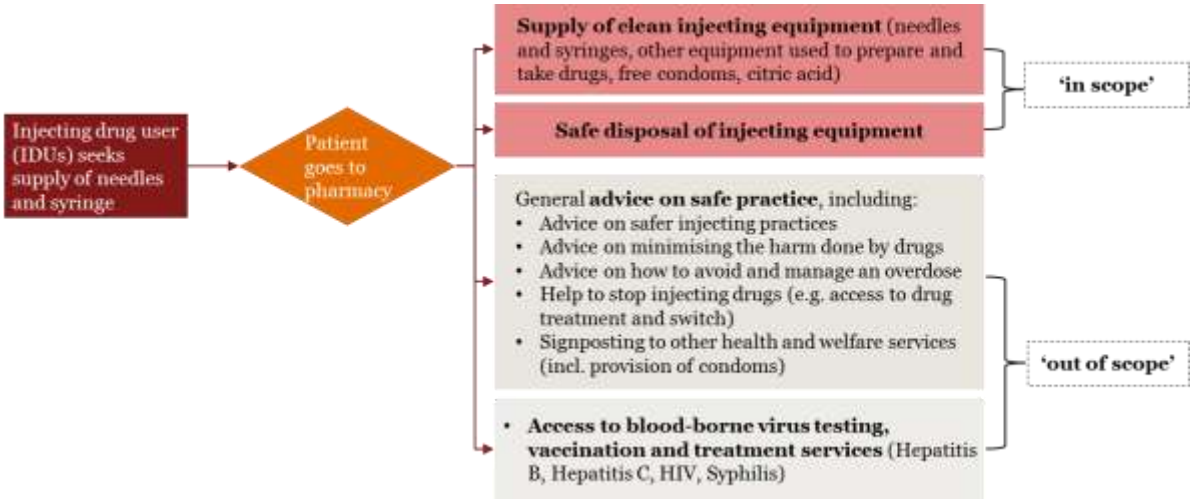
The focus of our analysis is IDUs who, in 2015, used NSPs provided by community pharmacies. These services are commissioned by local authorities in response to local health needs. Services can be based on nationally produced service specifications or locally designed and negotiated with Local Pharmaceutical Committees (LPCs).

As illustrated in Figure 6, community pharmacy provides NSPs which ensure that IDUs have the opportunity to exchange used needles and syringes for new ones and receive safer injection information. More specifically, community pharmacy interventions provide a mix of services at different levels, including[55]:

- Level 1: distribution of injecting equipment either loose or in packs suitable for different types of injecting practice with written information on harm reduction (e.g. on safer injecting or overdose prevention) – the focus of our analysis;
- Level 2: distribution of 'pick and mix' (bespoke) injecting equipment plus health promotion advice (including advice and information on how to reduce the harms caused by injecting drugs) (see first greyed box in Figure 6); and
- Level 3: Level 2 plus provision of, or referral to, specialist services (e.g. specialist clinics, vaccination, drug treatment and secondary care) (see first and second greyed boxes in Figure 6).

[51] Home Office (2010)
[52] Home Office (2010)
[53] NTA (2007). Although the survey was carried out in 2005, we use it in the absence of a more recent survey to build our counterfactual scenario. We recognise that the data is old but we believe that the survey results are a credible source to use for 2015 for three reasons. First, NSP services were first provided in the mid-1980s and quickly expanded across England. We expect that by the early 2000s, the service was available across England. Second, the PSNC services database indicates that an NSP services are currently commissioned in 74 out of 77 LPCs. We do not have information on the exact geographical coverage but NICE guidance on NSP recommends that commissioners use pharmacies that can help ensure geographical and demographic coverage. Third, the NTA conducted a DH-funded survey of needle exchange provision in response to the Hepatitis C action plan (DH, 2004). This is the best evidence we have access to help us build our counterfactual scenario.
It is important to note that the changing nature of injecting drugs (i.e. the increase in the use of anabolic steroids) may have led to a change in the organisations that provide NSP services (e.g. mobile clinics). Given the lack of information on the scale of anabolic steroid use, we do not assess this change.
[54] DH (2005).
[55] PSNC (2016).

Figure 6: Current service user pathway (through community pharmacy)



Source: PwC analysis

Our analysis focuses on level 1 type services as described above (i.e. 'in scope' in Figure 6). Our analysis does not include the additional benefits that may arise from advice given by pharmacists on safe practice, increasing signposting as well as specific benefits related to screening and treatment services of BBV and other infections. The reasons for excluding these services from our analysis include:

- It is difficult to identify the number of individuals that use NSP services in community pharmacies that also receive advice on safe practice as well as screening and treatment services in relation to BBV; and
- We cannot identify the impact of safe practice advice or BBV screening on the patient's behaviour.

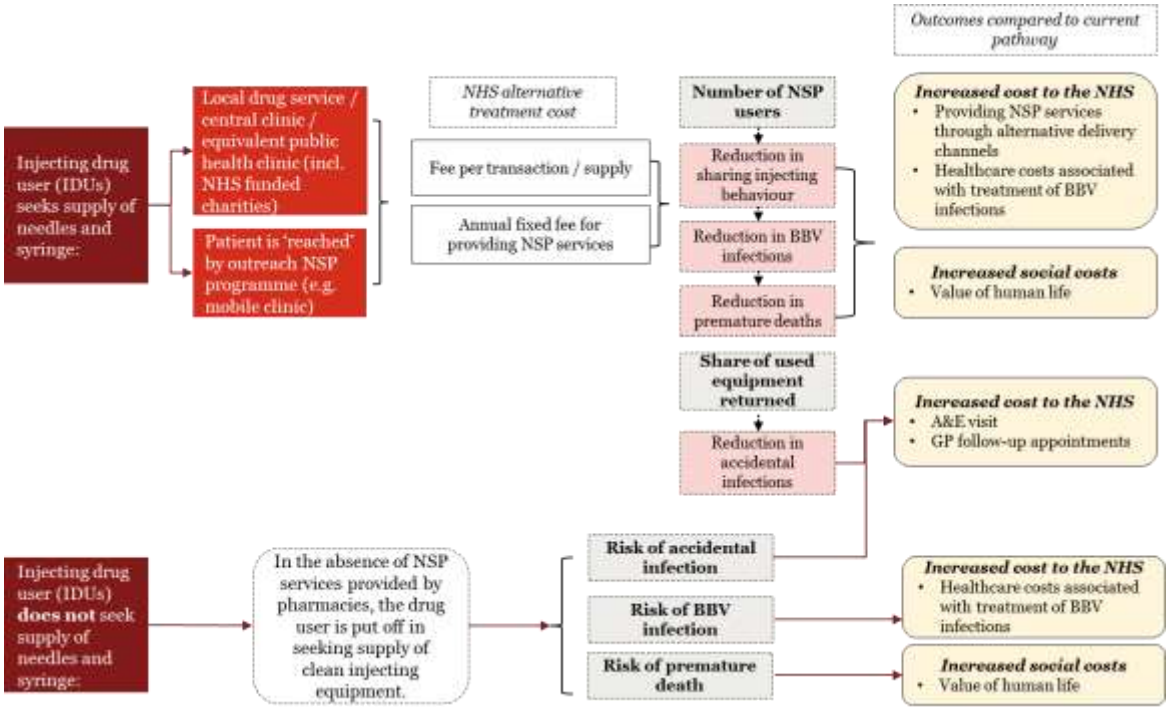
The aims of the interventions are to reduce the transmission of BBV and other infections caused by sharing injecting equipment, more specifically[56]:

- Reduce the rate of sharing and other high-risk injecting behaviours by providing sterile injecting equipment and other support;
- Promote safer injecting practices, to reduce the risk of BBV infection and risk of overdose;
- Help service users access other health and social care services and act as a gateway to other services (e.g. Hepatitis B immunisation, Hepatitis C and HIV screening, primary care service, etc.);
- Ensure the safe disposal of used injecting equipment;
- Maximise the access and retention of all injectors, especially the highly socially excluded, through the low-threshold nature of service delivery and interventions provided; and
- Prevent the initiation into injecting and to encourage alternatives to injecting.

We focus on the contribution of community pharmacy NSP services in terms of potential avoided costs to the NHS and wider society. Without the community pharmacy service, we assume that injecting drug users would visit an alternative NHS setting that provides clean injecting equipment (e.g. a local drug clinic) or would not use the service at all. Our expected counterfactual pathway for service users is set out in Figure 7.

[56] NTA (2007)

Figure 7: Counterfactual service user pathway in the absence of community pharmacy services



Source: PwC analysis

3. Contribution of community pharmacy

Through its provision of NSP services, community pharmacy has the potential to make a positive contribution in three main ways (see Figure 7):

- **By reducing the cost to the NHS of providing NSP services** (see top panel of Figure 7): Flexibility in accessing NSP is a key issue. The National Treatment Agency for Substance Misuse (NTA) assumes that NSP services must be within five miles of all IDUs to be deemed accessible, and therefore, the widespread availability of pharmacies may increase the uptake of NSP services.[57] Where the intervention is successful (i.e. it leads to a fall in risky injecting behaviour and, therefore, a reduced risk of BBV transmission and infection), there is a positive impact on the patient and society as a whole. And if it is more cost-effective than the alternative delivery channel (e.g. mobile / outreach clinic), this represents a potential cost saving for the NHS. If this intervention were not to be provided to some IDUs in the absence of pharmacy, whilst this would reduce the cost to the NHS of providing the service, it might also increase the healthcare and social care costs associated with such IDUs.
- **By reducing the prevalence of BBVs and the associated premature deaths** that would result, it contributes to avoided treatment costs for the NHS and avoided costs to the wider society (see Figure 7): As a result of using NSP services, most people report reduced sharing of injecting equipment behaviour.[58] As discussed above, sharing of injecting equipment can cause BBV infection and, therefore, it is expected that the use of NSP services will reduce the incidence of BBV infections and the associated health consequences. We estimate the number of averted BBV infections based on evidence in relation to differences in the risk of infection for IDUs who use NSP services compared to those who do not. We focus our analysis on HCV infections since this is of greatest concern to the IDU population. We use various research studies to estimate the healthcare and wider social costs associated with HCV infections, including associated premature deaths. In this way, we assess the contribution of community pharmacy in terms of the avoided

[57] NTA (2007).
[58] Jones et al. (2012)

NHS treatment costs per year (looking at the annual treatment costs associated with HCV) and the avoided social costs associated with premature deaths as a result of the infection.

- **Reducing the number of infected needles in public areas (e.g. parks, pavements) results in avoided costs for the NHS**: NSPs provided by community pharmacies encourage safe disposal of used injecting equipment, and evidence shows that they are relatively effective as a disposal site for used equipment.[59] A member of the public may be pricked by a used needle that has been inappropriately discarded in the community. Evidence suggests that although the likelihood of BBV infection such as HIV is around 0.3% for an occupational needle stick injury sustained by health workers, it is lower for a member of the public, less than 0.1%.[60] Nevertheless there is a risk, and we assess the value arising from community pharmacy's role in reducing the number of infected needles found in public areas. We do this by estimating the avoided costs for the NHS assuming that any incident would result in the affected individual attending an A&E department with follow up GP appointments to ensure clearance of any infection. We note that the removal of infected needles from public areas has wider potential benefits, for example reduced costs for local authorities and businesses as a result of fewer incidents related to infections from unsafely disposed used needles and syringes, and the improved utility associated with public areas and amenities being perceived as safer. Due to methodological challenges and lack of data, however, we do not assess these wider impacts in this chapter.

4. Approach to estimating contribution of community pharmacy

Our approach to determining the value of the NSP provided by community pharmacy in 2015 involves two elements:

- Estimating the number of IDUs who used NSPs in community pharmacies in 2015 and who, therefore, generated each of the benefits described earlier (the 'volume'); and
- Estimating the value delivered each time the service is provided (i.e. for each individual client) (the 'value').

We summarise our approach to each element below; more details are provided in the technical appendices.

Volume

We estimate that the total number of IDUs who used NSPs in community pharmacies in 2015 in England was 234,823. This is based on information recorded on the PharmOutcomes database, which we use to estimate the average rate of take up of the services by age group, and information recorded on the PSNC services database which we use to extrapolate across the pharmacy NSP services that were running in 2015. Further details of our approach can be found in Appendix 3.

Estimating the number of IDUs is difficult due to the 'hidden' and stigmatised nature of injecting drug use.[61] This means that the majority of sources, including reports from government departments and academic studies, use indirect methods. For example, the latest national estimates suggest that in 2011/12 there were 293,879 high risk drug users in England, including people who inject drugs.[62] Of those, 87,302 were IDUs of opiate and/or crack cocaine.[63] Other estimates from the literature suggest that the number of IDUs may be higher; for example, King et al. (2014) estimate that in 2005/6 there were 195,840 IDUs in England using mainly opiates.[64]

We note that these estimates do not take account of those people who inject other drugs including amphetamines and anabolic steroids. In recent years, concern has grown about the use of anabolic steroids and image and performance enhancing drugs (IPEDs). Evidence shows that more than 90% of these users are injecting the drug. Robust evidence on the current prevalence of anabolic steroids and IPEDs in the UK is lacking, especially information regarding the number of users of IPEDs. The

[59] Ksobiech (2004)
[60] Makwana and Riordan (2005)
[61] NICE (2014)
[62] Hay et al. (2013). The 95% confidence interval is 291,029 to 302,146. The estimates for 2011/12 are for opioid users and crack cocaine users with separate estimates for opioid use, crack cocaine use, and injecting drug use.
[63] Hay et al. (2013). The 95% confidence interval is 85,307 to 90,353.
[64] King et al. (2014). The 95% confidence interval is 181,700 to 210,480.

latest estimates, drawn from the Crime Survey for England & Wales (CSEW), suggest that in 2012/13 in England and Wales, prevalence among 16 to 59 year olds for lifetime use of anabolic steroids was 293,000[65] and for use in the previous 12 months, 73,000.[66] Use and injection of anabolic steroids and IPEDs, mainly among image-obsessed young men, can have similar health and social consequences to that experienced by users of opiate (e.g. heroin) and/or crack cocaine.

Our estimate of 234,823 is higher than publicly available estimates of the number of IDUs in England. As described above, there is no direct source of information on the number of IDUs in England and most estimates are based on indirect methods which use statistical estimation approaches. To assess the consistency of our estimate of the number of IDUs who used pharmacy-based NSPs in England in 2015, we consider estimates from various publicly available sources. More specifically, the latest data in the academic and government literature is for 2012/13. Table 16 illustrates our approach and the assumption we make.

First, we draw on publicly available information on the number of IDUs in England. We use two sources which have estimated the number of IDUs who inject opiates and/or crack cocaine – Hay et al. (2013) provide an estimate for 2011/12 and King et al. (2014) use a different statistical approach and provide an estimate for 2005/6. We update these figures for 2012/13 using historical trends (see first row in Table 16).[67]

Second, we use public data on the number of users injecting anabolic steroids. We use the share of population in England and Wales to estimate that there were around 69,012 users injecting anabolic steroids in England in 2012/13 (see second row in Table 16).

Third, we estimate the number of IDUs who use NSPs based on information from NICE (2014) that indicates that around 89% of IDUs self-report to have ever used NSPs.[68]

Fourth, we use evidence from the NTA that suggests that around 80% of NSPs clients use pharmacy-based NSPs.[69]

We estimate a lower and higher number of IDUs who used pharmacy-based NSPs in England in 2012/13:

- We estimate the lower end using the lower bound of the 95% confidence interval on the number of users injecting opiates and/or crack cocaine from Hay et al. (2014), the lower bound of the 95% confidence interval on the number of injecting anabolic users and apply the assumptions outlined above. This gives us a figure of 89,063.
- Similarly, we estimate the upper end using the upper bound of the 95% confidence interval on the number of users injecting opiates and/or crack cocaine as estimated by King et al. (2014), the upper bound of the 95% confidence interval on the number of injecting anabolic users and apply the assumptions outlined above. This gives us a figure of 166,099.

Table 16: Estimated number of IDUs who used pharmacy-based NSPs in England (2012/13)[70]

IDUs by type of drug injected	Number of users (2012 / 13)[71]	Source
Number of users injecting opiates and/or crack cocaine	87,302 (78,767 – 82,832)	Hay et al. (2014); updated to 2012/13 using rate of growth based on historical trends
	129,977 (120,592 – 139,693)	King et al. (2014); updated to 2012/13 using rate of growth based on historical trends
Number of users injecting anabolic steroids	69,012 (46,322 – 93,592)	CSEW (2013)
Number of users injecting image and performance enhancing drugs (IPEDs)	-	Limited information available
Proportion of IDUs who self-report to have ever used NSPs	89%	NICE (2014)
Proportion of pharmacy-based NSP services	80%	NTA (2007)
Total number of IDUs using pharmacy-based NSPs	89,063 – 166,099	93,700 – 131,000 (using Hay et al.) 118,900 – 166,100 (using King et al.)

[65] CSEW (2013). The 95% confidence interval is 242,000 to 345,000 and includes both England and Wales.
[66] CSEW (2013). The 95% confidence interval is 48,999 to 99,000 and includes both England and Wales.
[67] We assume that the average annual growth rate remained the same across the years.
[68] NICE (2014).
[69] NTA (2007).
[70] Hay et al. (2014); CSEW (2014); King et al. (2014).
[71] Latest date for which estimates are available from government and academic sources.

Source: PwC analysis

We estimate that between 89,063 and 166,099 IDUs used NSPs in community pharmacies in England during 2012/13 (see Table 16).[72] Our estimate of the number of IDUs who used NSPs in community pharmacies in England in 2015, using data from PharmOutcomes and the PSNC services database, is higher than the estimate for 2012/13 as outlined in Table 16. This may be for various possible reasons, including:

- The publicly available data are from 2012/13 whereas our estimates are for 2015. Although there is evidence of a decline in IDUs who inject opiates and/or crack cocaine, in recent years there have been growing concerns related to the use of IPEDs and anabolic steroids.
- Limited information exists about the prevalence and use of these substances although data from the CSEW suggests that, in 2012/13, the prevalence of anabolic steroid use among 16 to 59 year olds in England was 69,012[73], having increased by 9% in the previous year.
- The steep increase in anabolic steroid use as well as the 'hidden' number of people who inject IPEDs may explain the differences between our estimate and other estimates using publicly available sources.

Value

Figure 7 illustrates the benefits to society of NSP services provided through community pharmacies. We focus on three key areas:

- The avoided costs to the NHS through more cost-effective intervention by community pharmacies (as opposed to NSPs being provided through alternative NHS settings);
- The avoided costs to the NHS and the public sector through a reduction in the number of IDUs who do not use NSPs; and
- The avoided costs to the NHS through a reduction in the number of infected needles in public spaces.

We quantify the first two impacts but, due to lack of adequate data, we illustrate the potential magnitude of the last area (i.e. the potential avoided costs to the NHS through a reduction in the number of infected needles) using a 'ready reckoner' approach. This means assessing the potential avoided cost for the NHS by applying a range of assumptions about the likely number of averted injuries due to infected needles to the relevant NHS cost (through the contribution of pharmacy NSPs).

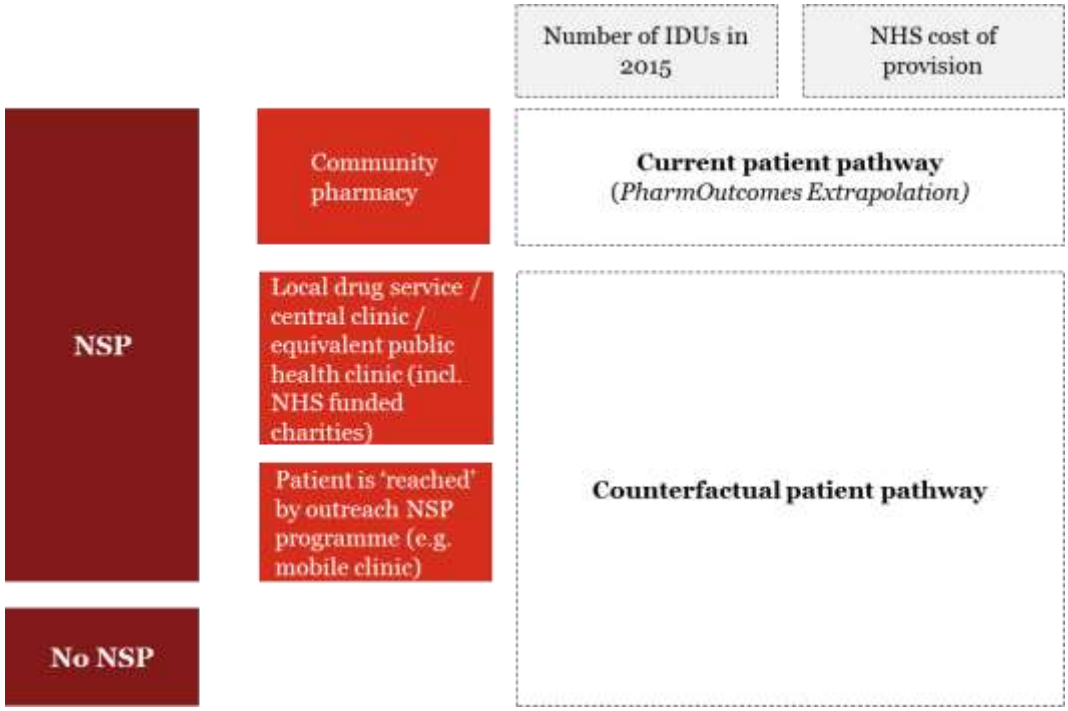
Proportion of individuals across alternative delivery channels

To estimate the avoided costs to the NHS of providing NSPs through alternative settings we consider (see Figure 8):

- The patient pathway for individuals who inject drugs in the absence of a commissioned NSP service in community pharmacies;
- The costs to the NHS associated with each alternative setting in terms of consultation / appointment fee; and
- The cost to the NHS of providing clean injecting equipment in each setting for supply to the users of the service; this is paid for by the service commissioner who then supplies them, free-of-charge, to community pharmacies (see Table 17).

[72] King et al. (2014); NICE (2014).
[73] CSEW (2013). The 95% confidence interval is 46,322 to 93,592.

Figure 8: Approach to estimating the counterfactual patient pathway



Source: PwC analysis

To estimate the net value of NSPs provided by community pharmacies we also need to account for any payment received by pharmacies for providing the services (i.e. the consultation fees). As this is a cost incurred by the service commissioner, we need to offset it in calculating the net benefit of pharmacy services. More specifically, we estimate the average consultation fee received by pharmacies using information on fees recorded on the PSNC services database which itself is drawn from the service specification agreement on remuneration (e.g. the amount to be paid to the pharmacy by the commissioner for each NSP service provision). We note that this varies across service providers. There are two types of payment:

- The professional fee per transaction / pack supplied / client per day; and
- The fixed fee for providing the service; this may be annual, monthly or quarterly.

To estimate the cost per user per year we combine information on the average professional fee received by pharmacies per supply (£1.47) as recorded on the PSNC services database and information on the average number of supplies per month as recorded on the PharmOutcomes database (2.5 per month). We note that a customer may receive any number of packs per transaction / intervention from the service provider and that each pack may contain more than one needle, syringe or other injecting equipment.[74] In the absence of specific information on the number of packs provided to each user, we assume that each supply / transaction provides one pack for which pharmacies or other providers receive reimbursement. We apply this to the average fee received by pharmacies per transaction.

A small proportion of pharmacies receive a separate fee per return. Previous studies show that the average return rates for UK schemes is around 80% (i.e. 8 needles and syringes are returned for every 10 taken from the NSP service).[75] Given that we only identify three service specifications that include a separate return fee, we exclude this from our estimate of the cost. In the majority of cases, the return fee is included within the fee per transaction or supply.

[74] There are four type of packs, identified by colour, with a different collection of equipment. On average, each pack contains around 20 needles and syringes as well as other equipment such as sterile spoons and a sharps bin.
[75] Ksobiech (2004). We note that some studies from the UK report return rates in excess of 100%; this implies that needles and syringes were obtained elsewhere, but returned to the NSP (i.e. 'imported' needles).

For the purposes of our analysis, we assume that all service providers receive an annual payment of £293 for providing the services which is independent of the number of clients per service. This is based on information from the PSNC services database. We also assume that the average annual payment received is the same across pharmacies and other service providers such as local drug clinics. Moreover, we estimate the average number of NSP service providers (pharmacies) per commissioner based on the following:

- From 1st of April 2013, the 152 'top tier' local authorities were responsible for commissioning the majority of public health services: for the purposes of our analysis we assume that this holds for NSP services provided by pharmacies and other specialist providers (e.g. local drug clinic);
- There were 11,815 pharmacies in England in December 2015[76]; and
- The average number of pharmacies per NSP services commissioner (i.e. 'top tier' local authorities) is estimated to be 78.

We identify that, in 2015, 111 commissioners supported NSP services: more details are provided in Appendix 3 which sets out our approach to estimating the volume of NSP service users. To estimate the total fixed cost, we multiply the average number of pharmacies per commissioner (78) by the total number of commissioners providing NSP services (111).

We then account for the accessibility of pharmacies compared to other NSP providers. We use the results from an NTA survey which indicated that there were 11 pharmacies per drug action team (DAT)[77] providing NSPs compared to 2.4 specialist services providing NSPs per DAT (80% less). This means that we assume around 17 specialist providers per commissioner.[78]

On this basis, we estimate that the average annual fee received by all pharmacies providing the service was £293 and an estimated £45 per user per year (see Table 17).[79]

Table 17: Estimates of the NHS cost of providing NSP services through community pharmacy (England, 2015)

Type of professional fee	Annual average fee (£)	Volume (2015)	Source
Fee per supply[80]	£1.47 per supply £44.5 per user	30.4 supplies per year per customer	PSNC (2016) PharmOutcomes (2016)
Fee per service provider	*£292.5 per service provider*	*111 service commissioners* *78 pharmacies per commissioner*	*PSNC (2016)* *PharmOutcomes (2016)*

Source: PwC analysis

The first step in our valuation approach is to estimate what would happen in the absence of NSPs being provided by community pharmacy. In comparison to other pharmacy services analysed in our report, we do not have information on what users would do in the absence of pharmacy. Therefore, we need to make a few assumptions which we also test as part of our sensitivity analysis (see Table 18).

Evidence from the NTA, which surveyed providers of NSPs, shows that approximately 80% of the services were operated from community pharmacies and the remaining 20% operated from non-pharmacy specialists, including local drug clinics and mobile/outreach services.[81]

We assume that one-third of pharmacy-based NSPs users (i.e. 80% of all NSP users) would drop off NSPs if pharmacies were to stop providing the service (i.e. 26.7% of current pharmacy-based NSPs users would drop off the service altogether). This is consistent with evidence which shows that there are more pharmacies than specialist services available and that, in the absence of pharmacies, accessibility will decline reducing the number of IDUs who use NSPs (at least in the short term). For

[76] NHS Business Services Authority (http://www.nhsbsa.nhs.uk/PrescriptionServices/5045.aspx)
[77] Drug action team (DAT) or DAT partnership used as a shorthand for all strategic partnerships of commissioners or their equivalents in which NSP services are based. The study gathered data from all 149 English DATs or equivalent partnerships.
[78] For the purposes of our analysis, we assume that the proportion of pharmacies compared to other providers in 2015 follow the same pattern as they did in 2005.
[79] PSNC (2016); PharmOutcomes (2016).
[80] This is calculated as the average fee per supply, transaction or customer per day using information from the PSNC services database.
[81] NTA (2007).

example, the NTA survey estimated that there were 11 pharmacies per drug action team (DAT)[82] providing NSPs compared to 2.4 specialist services providing NSPs per DAT (80% less) indicating that there are less specialist services than pharmacies.[83]

Moreover, information drawn from surveys of drug users in treatment indicate that 89% of IDUs have, at some point in time, used NSPs.[84] In the absence of community pharmacy, we assume that the share of IDUs who do not use NSPs would increase to around 27% as some people who in 2015 were using NSPs based in community pharmacies would be deterred from seeking NSPs once the community pharmacy option was unavailable.

Of the remaining current pharmacy-based NSPs users (73.3%), we assume that they would continue to use NSPs through alternative NHS channels. Out of the nearly three quarters of IDUs, half (36.7%) would use NSPs provided by specialist clinics such as local drug clinics and the other half (36.7%) would use NSPs provided by mobile / outreach clinics.

Our results are sensitive to our assumption about the number of IDUs who, in the absence of pharmacy, would not use NSPs at all. Given this, we undertake some sensitivity analysis which we report at the end of the section.

Table 18: Counterfactual scenarios of NSP supply in the absence of pharmacy services

Alternative service providers / delivery channels	%	Volume (2015)[85]	NHS costs (£)[86]	Source & calculation
Community pharmacy	100%	234,820	£44.5 per user per year £292.5 per service provider	PharmOutcomes & own calculations PSNC (2016) NTA (2007)
Local drug service / central clinic / equivalent	36.7%	86,102	£44.5 per user per year £292.5 per service provider	Assume the cost to the NHS of providing this service is the same as for pharmacy
Mobile / outreach clinic	36.7%	86,102	£44.5 per user per year £292.5 per service provider	
No NSP	26.7%	62,619	No direct cost for providing treatment services	NICE (2014); assumptions

Source: PwC analysis

To determine the avoided costs to the NHS arising from community pharmacy's NSP service, we estimate the average NHS costs associated with the counterfactual (i.e. the alternative service providers / delivery channels illustrated in Table 17).

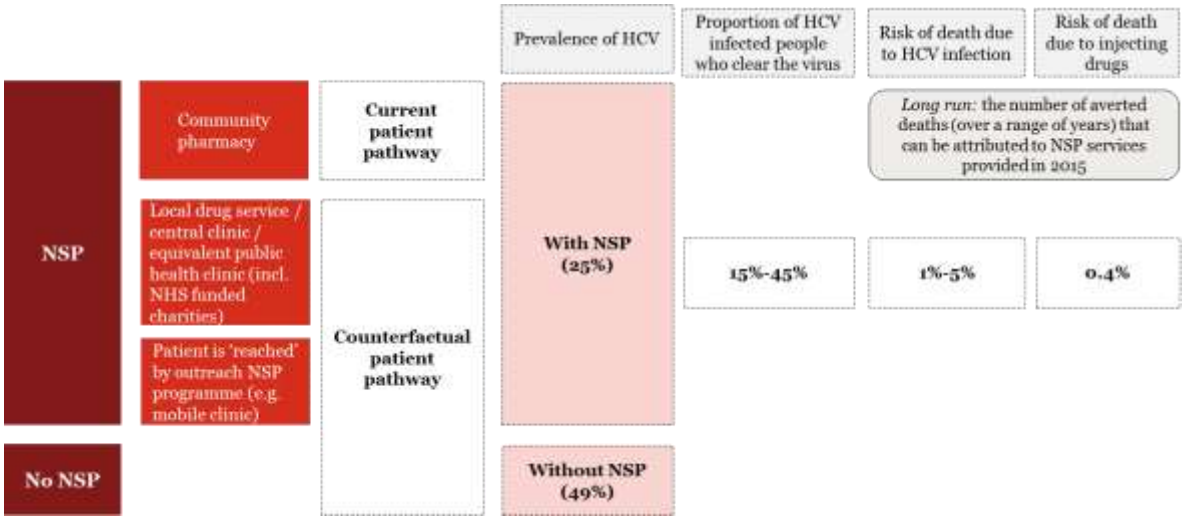
We estimate that, in the absence of community pharmacy NSP services, the NHS would 'save' £4.9 million. This saving is driven by the number of people we estimate who, in the absence of community pharmacy service provision, would receive no NSPs at all and, therefore, would not require the NHS to pay for the service. As we illustrate below, however, evidence suggests that IDUs who do not use NSP services share equipment more frequently and are subject to a higher prevalence and incidence of HCV and HIV.[87] As described above, BBV infection can lead to poor health and risk of premature death, both of which lead to increased costs for the NHS and the wider society.

Number of averted HCV infections

In the absence of robust evidence, we assume that use of NSPs is equally effective in other settings. To assess the costs to the NHS and wider society associated with IDUs' use of NSPs, we focus on HCV infection. Figure 9 illustrates our approach to estimating the number of 'averted' HCV infections as a result of pharmacy-based NSPs. We provide more details below.

[82] Drug action team (DAT) or DAT partnership used as a shorthand for all strategic partnerships of commissioners or their equivalents in which NSP services are based. The study gathered data from all 149 English DATs or equivalent partnerships.
[83] NTA (2007).
[84] NICE (2014)
[85] All volume figures are rounded to the nearest tenth.
[86] The costs estimated include the cost per user and the cost per service.
[87] Jones et al. (2012)

Figure 9: Approach to estimating the number of averted HCV infections



Source: PwC analysis

We start by examining the difference in the prevalence of HCV with and without NSPs (see Table 19). To do this we make the following assumptions:

- *Prevalence of HCV among IDUs with and without NSPs*: Data from the 2014 Unlinked Anonymous Monitoring (UAM) survey of people who inject drugs suggest that the level of infection in this group in 49%.[88] We use this estimate as our assumption for the prevalence rate of IDUs who do not use NSPs. Also, other evidence from the literature suggests that users of NSP services are, on average, 48% less likely to be infected by HCV than IDUs who do not use these services.[89] We assume, therefore, that the prevalence rate for IDUs who use NSP services across all providers is 25%.[90]

  We recognise that the estimated 49% HCV prevalence rate among IDUs who respond to the UAM survey may be a weighted average of some IDUs who use NSPs and some who do not use NSPs. The survey does not provide sufficient information to identify the average prevalence rate for IDUs who use NSPs compared to those who do not. Therefore, for the purposes of our main estimates, we assume that IDUs who do not use NSPs have a prevalence rate of 49% and use evidence from the literature to estimate the prevalence rate for those who do use NSPs. We explore the impact of these assumptions on our key results in a sensitivity analysis.

  In order to estimate the number of averted HCV infections in the current and counterfactual scenarios, we take account of the proportion of people who, although HCV positive, will clear the virus spontaneously within six months. The World Health Organisation (WHO) indicates that between 15% and 45% of infected persons spontaneously clear the virus within six months of infection without any treatment. We use the midpoint as the input to our model but also perform some sensitivity analysis later on.

- *Risk of premature death*: Injecting drugs by itself is associated with a risk of premature death; the evidence suggests this to be around 0.4% (0.37 – 0.42).[91] Moreover, HCV infection is associated with life-threatening diseases such as cirrhosis or liver cancer; estimates suggest that 1 to 5 out of every 100 people diagnosed with HCV will die from cirrhosis or liver cancer.[92] We adopt the mid-point as our base estimate but also perform some sensitivity analysis across the estimated range.
- *Number of premature deaths averted due to NSPs provided in 2015*: We estimate the number of deaths that would occur across a number of years as the disease develops. We focus on the

[88] PHE (2015)
[89] Jones et al. (2012). The 95% confidence interval is 25% to 935.
[90] Turner et al. (2011)
[91] King et al. (2014)
[92] CDA (2016)

number of premature deaths avoided as a result of the NSPs provided in 2015. We estimate that 268 premature deaths would be averted, across a number of years, as a result of pharmacy based NSPs provided in 2015[93]

Table 19: Number of HCV infections, by delivery channel (England, 2015)

Alternative service providers	%	Volume[94]	Prevalence of HCV without NSP	Prevalence of HCV with NSP	Proportion who will clear the virus[95]	Number of HCV infections	Number of premature deaths[96]
Community pharmacy	100%	234,820	49%	25%	30% (15% - 45%)	41,883	2,028
Local drug service / central clinic / equivalent	36.7%	86,102				15,357	744
Mobile / outreach clinic	36.7%	86,102				15,357	744
No NSP	26.7%	62,619				21,478	809
Total number of averted HCV infections and premature deaths						*10,310*	*268*

Source: PwC analysis

In order to estimate the costs to the NHS and wider society, we use the treatment costs associated with HCV as well as the value of human life. There are no average estimates of HCV treatment costs due to the complexity of the disease and the variety of forms that may develop following an infection. For the purposes of our analysis, we follow the approaches of Patruni et al. (2013) and Martin et al. (2011). More specifically:

- We adopt the (annual) **transition probabilities** used by Martin et al. (2011) to estimate the number of infected people who will transition across the different stages and types of the disease (see Table 20). We model NHS treatment during three stages of the disease: mild HCV, moderate HCV and compensated cirrhosis following anti-viral treatment. The transition probability is the annual probability of progressing through the various HCV disease stages following infection. For example, following HCV infection (and no spontaneous clearance of the virus), 2.5% of those infected are expected to develop moderate chronic HCV on an annual basis.
- We use the **annual treatment costs** associated with various disease progression / types as estimated by Patruni et al. (2013) which we update to 2015 prices (see Table 20).

Table 20: HCV treatment cost per year (2015)

Element	Sub-element	Transition probability between HCV disease stage[97]	NHS cost (£ per treatment)[98]
Antiviral treatment	Antiviral treatment (24 week treatment - largely genotypes 2 and 3)	0.45	£6,960
	Antiviral treatment (12 week treatment - largely genotypes 1)	0.8	£13,646
Cost of treatment of HCV-related disease	Mild chronic HCV		£182
	Moderate chronic HCV	0.025	£945
	Compensated cirrhosis	0.037	£1,499
	Decomposed cirrhosis	0.039	£12,015
	Hepatocellular carcinoma (HCC)	0.014	£10,706
	Liver transplant	0.02[99]	£36,004

[93] Patruni et al. (2013)
[94] All volume figures are rounded to the nearest tenth.
[95] WHO (2015). About 15-45% of infected persons spontaneously clear the virus within 6 months of infection without any treatment. The remaining 55-85% of persons will develop chronic HCV infection.
[96] This figure is based on the number of premature deaths associated with injecting drugs (0.4%) and the risk of premature death following HCV infection (3%, 1-5%). We provide more information in the core text.
[97] Martin et al. (2011)
[98] Patruni et al. (2013); updated using GDP deflator.
[99] 2% of all cases of decompensated cirrhosis and HCV are considered to receive a liver transplant.

Element	Sub-element	Transition probability between HCV disease stage[97]	NHS cost (£ per treatment)[98]
	Hospital costs year of transplant		£12,459
	Post liver transplant		£1,825

Source: PwC analysis

Finally, we adopt an estimate of the value of a life saved from the Department for Transport and updating it to 2015 prices so that the assumed value of a human life is £1.9 million (see Table 21).[100]

Table 21: Components of the value of human life (2014)[101]

Component	NHS cost (£)	Wider society cost (£)
Lost output		£651,853
Human costs		£1,265,578
Medical and ambulance costs	£1,135	
Total		£1,918,566

Source: PwC analysis

Number of averted community infections by used equipment

One of the aims of NSPs is to ensure the safe disposal of used injecting equipment. Results from the NTA (2007) survey of NSPs in England show that the majority had a returns policy designed to encourage returns but this was not a condition for accessing sterile injecting equipment. Two types of injuries can arise from used needles and syringes:

- Occupational needle stick injury sustained by health care workers and other staff during their work (e.g. police and paramedics entering private spaces such as an IDU's home); and
- When a member of the public is pricked by a used needle that has been inappropriately discarded in the community.

Evidence suggests that the likelihood of HIV infection after an occupational injury from an HIV positive patient in a healthcare setting is around 0.3% and the probability of contracting HCV or Hepatitis B is slightly higher.[102]

The probability of a member of the public becoming infected with a BBV after being pricked by a used needle is, however, lower for a variety of reasons including:

- The needle often has to pierce clothes or skin before penetrating the skin;
- The needle and syringe may have been exposed to the elements for some time; and
- The equipment is likely to contain less blood than those encountered in a healthcare setting.

For the purpose of our analysis, we focus on incidents where a member of the public is injured by a drug needle or syringe unsafely disposed of in public areas. Moreover, we focus on the short-term costs associated with incidents of infection due to a used needle or syringe in public spaces (i.e. first aid in A&E departments followed by GP appointments and laboratory tests). The (greater) risk of exposure to infected needles during work, for example police and paramedics dealing with incidents involving exposure to infected needles, is excluded from our analysis.

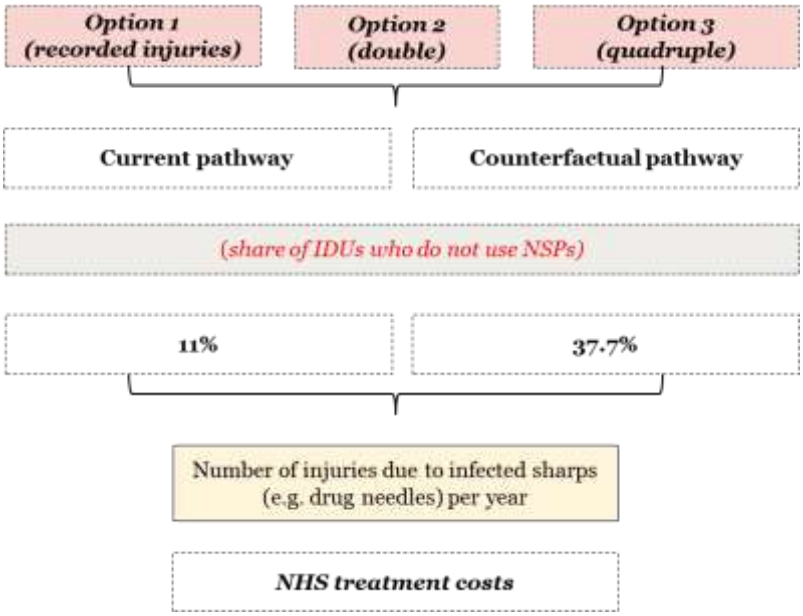
We make the following assumptions:

- **Number of accidental infections**: To investigate the potential magnitude of the risk, we use a 'ready reckoner' approach to estimate the potential costs to the NHS depending on what proportion of people are injured by infected needles unsafely disposed of by IDUs who use pharmacy-based NSPs. Our approach is as follows:

[100] DFT (2008)
[101] DFT (2008)
[102] CSA (2001)

- First, we estimate an indicative range of the number of accidental infections that occur annually based on evidence from Environmental Campaigns (Ltd) presented to the Select Committee on Environmental Audit in 2004. [103] More specifically, the evidence noted that "a reported 200 people a year are injured by drug needles, including around 20 children, but this is only the number recorded".[104] The evidence also noted that it is difficult to know the true nature of the problem as many injuries from needles go unreported. Therefore, we assess the potential costs to the NHS, starting with the figure provided in the evidence (i.e. 200) and analysing how NHS costs are affected if we double or quadruple this figure (see Figure 10 and Table 22).
- Second we estimate the average probability of infection by assuming that the return rate is the same across all NHS delivery channels for NSPs (i.e. pharmacies and specialist clinics).
- Third, we assume that in the current scenario (i.e. where community pharmacy provides NSPs), 11% of IDUs do not use NSPs at all and, therefore, their return rate is 0%, increasing the probability of infection. On the basis of our counterfactual scenario, outlined in Table 18, we assume that, in the absence of pharmacy NSP services, 26.7% of IDUs who previously used pharmacy-based NSP services no longer use NSPs. In summary, we assume that in the current scenario, 11% of IDUs do not use NSPs and in the counterfactual an additional 26.7% also drop off (i.e. 37.7%);
- Finally, we assume that the 11% of IDUs who do not use NSPs contribute to the 200 incidents recorded in the current scenario and that in the counterfactual the increase of IDUs who do not use NSPs to 37.7% increase the number of incidents proportionally, i.e. to 685.

Figure 10: Approach to estimating the number of accidental infections due to infected needles



Source: PwC analysis

- **NHS costs**: We assume that, following an injury with a used needle or syringe, individuals would attend an A&E department to be tested for infection and to be treated with a post-exposure prophylaxis regimen. Following this, we assume that, on average, patients would attend three follow-up appointments with their GP to ensure clearance of any infections (see Table 22).

Table 22: NHS costs associated with injury due to infected needles and syringes (2015)

	Cost per attendance (£)	Number of visits per incident	Source
A&E attendance	£134	1	New economy (2015) ('A&E attendance – investigation with subsequent treatment')
GP follow up	£45	3	Curtis (2015)

[103] Select Committee on Environmental Audit (2004)
[104] Ibid.

	Cost per attendance (£)	Number of visits per incident	Source
Laboratory test	£69[105]	1.001	Manchester Laboratory (2016) 0.10% will be infected and require a second test Makwana et al. (2005)
NHS cost per injury (£)	*£337*		

Source: PwC analysis

Table 23: Potential NHS costs associated with the number of averted infected needles injuries (England, 2015)

	Option 1	Option 2	Option 3	Source
Number of injuries by infected needles per year (current scenario)	200	400	800	Select Committee (2004) & assumptions
Share of IDUs who do not use NSPs (current scenario)			11%	NTA (2007)
Share of IDUs who do not use NSPs (counterfactual scenario)			37.7%	Ksobiech (2004)
Total (current scenario)	200	400	800	
Total (counterfactual)	685	1,370	2,739	
Number of 'averted' injuries	*485*	*970*	*1,939*	
NHS cost per injury			*£337*	Table 22
Total NHS costs	*£163,571*	*£327,141*	*£654,283*	

Source: PwC analysis

We estimate that the contribution of community pharmacy based NSPs to avoided NHS costs due to injuries by infected needles found in public area (i.e. non-occupational injuries) is between £163,571 and £654,283 (see Table 23).

5. Key results and sensitivities

Table 24 summarises our overall estimate of the value provided by community pharmacy to society through its delivery of NSP services in England. It is based on combining the volume and value estimates explained above.

Table 24: Estimated value of NSP services provided by community pharmacy (England, 2015)

	Stakeholder	Impact area / path	Element	Volume	Value	Total value (£m)
Short term	NHS	Reduction in NSP patients through alternative routes / no treatment (e.g. central clinics, mobile clinics or no treatment)	Pharmacy	234,823	£44.5 per user £292.5 per service provider	£13
			Counterfactual 'in treatment'	172,203	£44.5 per user £292.5 per service provider	£8.1
			Counterfactual 'not in treatment'	62,619	£0	£0
			Net value			-£4.9
	NHS	Avoided NHS healthcare costs through reduced number of HCV infections and associated treatment	Pharmacy	41,883	Please refer to Table 20	
			Counterfactual (net)	52,193		
			Net value	10,310		£145.7
	Total					**£140.8**
Long term	Wider society	Avoided social costs through a reduction in drug-related deaths	Net value	268	£1.9m	£514.3

[105] This cost includes the following tests: Hep B confirmation, Hep B core antibody, Hep Bs antigen, Hep C confirmation, Hep C screen, HIV confirmation, HIV screen (Manchester Laboratory, 2015/2016)

Stakeholder	Impact area / path	Element	Volume	Value	Total value (£m)
Total					**£514.3** (£25.7 annually if costs occur across 20 years)
Total					***£655.1***

Source: PwC analysis

We estimate that the NSPs provided by community pharmacy in 2015 made an overall contribution to wider society worth **£655.1 million of which £140.8 million would have been expected to accrue in the short term**. More specifically, in the short term, the community pharmacy service is expected to result in an annual cost increase to the NHS of £4.9 million driven by the number of individuals who, in the absence of community pharmacy, would not use NSPs. Moreover, the NSPs are expected to lead to an annual cost saving for the NHS of £145.7 million driven by the number of 'averted' HCV infections. Finally, we estimate that, in the long term, NSPs provided in 2015 are expected to avoid 268 premature deaths. This translates to a cost saving of £514.3 million across society as a result of human lives saved (or £25.7 million annually if these deaths occur within a time frame of 20 years).

Sensitivities

Our results are sensitive to the assumptions we have made, including:

- The share of people who, in the absence of community pharmacy NSP services, would not use NSPs across any alternative channel;
- The proportion of HCV infected people who would clear the virus without treatment;
- The probability of premature death following HCV infection;
- The prevalence of HCV among IDUs who do not use NSPs;
- The impact of NSPs on the he prevalence of HCV among IDUs who use the services; and
- The number of IDUs who used community pharmacy NSPs in 2015.

We have, therefore, tested the sensitivity of our results to each assumption.

The share of people who, in the absence of community pharmacy NSPs, would not use NSP

In this sensitivity analysis, we explore the impact of our assumption about the number of users who, in the absence of NSPs provided by community pharmacy, would not use NSPs at all. We explore how our results are affected if 50% less / more (compared to our main scenario) would not use NSPs if community pharmacy provided NSP services (i.e. in the counterfactual). Instead, we assume that the remaining users would receive NSPs from an alternative NHS provider (see Table 25).

Table 25: Sensitivity analysis #1 – counterfactual scenarios of NSP use in the absence of pharmacy services

Alternative service providers / delivery channels	No treatment (-50%)	No treatment (27%) Main scenario	No treatment (+50%)
Community pharmacy	100%	100%	100%
Local drug service / central clinic / equivalent	43.3%	36.7%	30%
Mobile / outreach clinic	43.3%	36.7%	30%
No NSP	13.3%	26.7%	40%

Source: PwC analysis

Our results show that changing our assumption about the proportion of people who, in the absence of NSPs provided by pharmacies, would not use any NSPs to 13% and 40% (from 27% in our main scenario) leads to a 50% change in the estimated total value of community pharmacy's NSPs (see Table 26).

Table 26: Sensitivity analysis #1 – estimated value of NSP services provided by community pharmacy (£m, England, 2015)

	Stakeholder	Impact area / path	No treatment (-50%)	No treatment (27%) Main scenario	No treatment (+50%)
Short term	NHS	Reduction in NSP patients through alternative routes / no treatment (e.g. central clinics, mobile clinics or no treatment)	-£3.4	-£4.9	-£6.4
	NHS	Avoided NHS healthcare costs through a reduction in the number of HCV infections and associated treatment	£72.9	£145.7	£218.6
	Total		*£69.4*	*£140.8*	*£212.2*
Long term	Wider society	Avoided social costs through a reduction in drug-related deaths	£257.1 (£12.9 annually)	£514.3 (£25.7 annually)	£771.4 (£38.6 annually)
Total			***£326.6***	***£655.1***	***£983.6***

Source: PwC analysis

The proportion of HCV infected people who would clear the virus without treatment

Between 15% and 45% of people infected with HCV spontaneously clear the infection by a strong immune response without need for treatment.[106] We use the mid-point of the range (i.e. 30%). In this sensitivity analysis, we explore how our results change if we use the lower and upper bound of the range.

Our results show that when a smaller proportion of HCV infected people clear the virus without treatment (15%), the contribution of community pharmacy NSPs increases by 22% compared to our main scenario (30%). Conversely, when a larger proportion of HCV infected people clear the virus spontaneously (45%), the contribution of community pharmacy NSPs falls by 22%. These results are driven by the number of 'averted' HCV infections due to community pharmacy's NSPs which is lower when a higher share of people clear the virus without treatment (see Table 27).

Table 27: Sensitivity analysis #2 - estimated value of NSPs provided by community pharmacy (£m, England, 2015)

	Stakeholder	Impact area / path	Lower bound	Main scenario	Upper bound
Proportion who will clear the virus without treatment			15%	30%	45%
Short term	NHS	Reduction in NSP patients through alternative routes / no treatment (e.g. central clinics, mobile clinics or no treatment)	-£4.9	-£4.9	-£4.9
	NHS	Avoided NHS healthcare costs through a reduction in the number of HCV infections and associated treatment	£177	£145.7	£114.5
	Total		*£172*	*£140.8*	*£109.6*
Long term	Wider society	Avoided social costs through a reduction in drug-related deaths	£624.5 (£31.2 annually)	£514.3 (£25.7 annually)	£404.1 (£20.2 annually)
Total			***£796.5***	***£655.1***	***£513.7***

Source: PwC analysis

The probability of premature death following HCV infection

Existing evidence suggests that 1% to 5% of people infected with HCV will die of cirrhosis or liver cancer.[107] In our main scenario, we use the mid-point of the range (i.e. 3%). In this sensitivity analysis,

[106] WHO (2015)
[107] CDC (2015)

we explore how our results change if we use the lower and upper bound estimates of the proportion of people who, following HCV infection, will develop cirrhosis or liver cancer and die prematurely.

Our results show that changing this assumption to the lower or upper bound of the estimated risk (i.e. 1% and 5%), leads to a variation of 60% less / more respectively in the estimated total value of community pharmacy's NSPs (see Table 28). This is driven by the change in the number of premature deaths 'averted' in the long run and the value of human life to wider society.

Table 28: Sensitivity analysis #3 - estimated value of NSPs provided by community pharmacy (£m, England, 2015)

	Stakeholder	Impact area / path	Lower bound	Main scenario	Upper bound
Risk of premature death			1%	3%	5%
Short term	NHS	Reduction in NSP patients through alternative routes / no treatment (e.g. central clinics, mobile clinics or no treatment)	-£4.9	-£4.9	-£4.9
	NHS	Avoided NHS healthcare costs through a reduction in the number HCV infections and associated treatment	£145.7	£145.7	£145.7
	Total		*£140.8*	*£140.8*	*£140.8*
Long run	Wider society	Avoided social costs through a reduction in drug-related deaths	£118.7 (£5.9 annually)	£514.3 (£25.7 annually)	£909.9 (£45.5 annually)
Total			***£259.5***	***£655.1***	***£1,050.7***

Source: PwC analysis

The prevalence of HCV among IDUs who do not use NSPs

In our main scenario, we use evidence from the UAM survey on the prevalence of HCV among IDUs as our key assumption for the prevalence of HCV among IDUs who do not use NSPs. The UAM survey of HIV and Hepatitis in people who inject drugs aims to measure the changing prevalence of HIV, hepatitis B and hepatitis C in IDUs who are in contact with specialist drug agencies (e.g. NSPs and treatment centres for substitute medicine treatment). This implies that the prevalence of HCV among IDUs, as measured by the UAM, may be a weighted average of those IDUs who use NSPs and those who do not. In this sensitivity analysis, we explore how our results change if we assume that the 49% prevalence of HCV is a weighted average among IDUs who use NSPs and those who do not. More specifically, to estimate the prevalence rate for NSPs users compared to non-users we take the following steps:

- First, we assume that the UAM survey respondents are representative of the total IDU population in England;
- Second, similar to above in this chapter, to estimate the share of IDUs who use NSPs we use information by NICE (2014) that indicates that around 89% of IDUs self-report to have ever used NSPs[108];
- Third, we assume, similar to our main assumption, that IDUs who use NSPs are 48% less likely to be infected by HCV than IDUs who do not use these services[109]; and
- Fourth, we estimate the average prevalence rate for IDUs who do not use NSPs (x) as follows:

$$0.49 = 0.11*(x) + 0.89*(0.52x)$$

$$x = 0.49 / [(0.89*0.52) + 0.11]$$

Our approach implies that the average HCV prevalence is 85.5% and 44.5% for IDUs who do not use NSPs and those who do, respectively. Our results show that when we change our assumption on the prevalence of HCV among IDUs who do not use NSPs as outlined above, the contribution of community pharmacy increases by 75%, driven by the increase in the number of people who require HCV treatment in the short run and who, in the long run, will die prematurely due to diseases related to HCV.

[108] NICE (2014).
[109] Jones et al. (2012). The 95% confidence interval is 25% to 935.

Table 29: Sensitivity analysis #4 - estimated value of NSPs provided by community pharmacy (£m, England, 2015)

	Stakeholder	Impact area / path	Main scenario	Sensitivity (#4)
Prevalence of HCV without NSP			49%	85.5%
Prevalence of HCV with NSP			25%	44.5%
Short term	NHS	Reduction in NSP patients through alternative routes / no treatment (e.g. central clinics, mobile clinics or no treatment)	-£4.9	-£4.9
	NHS	Avoided NHS healthcare costs through a reduction in the number of HCV infections and associated treatment)	£145.7	£254.4
	Total		*£140.8*	*£249.5*
Long term	Wider society	Avoided social costs through a reduction in drug-related deaths	£514.3 (£25.7 annually)	£897.8 (£44.9 annually)
Total			***£655.1***	***£1,147***

Source: PwC analysis

The impact of NSPs on the prevalence of HCV among IDUs who use the services

In our main scenario, we use evidence from the literature on the impact of NSP interventions on the risk of HCV infection among IDUs who use NSPs. We use a study by Turner et al. (2011) which found that IDUs who use NSPs are 48% less likely to be infected by HCV than IDUs who do not use NSPs. The 95% confidence interval around this result was 25% to 93%.

In our main scenario we use the main estimate from this study. In this sensitivity analysis, we explore the impact if we assume that users of NSPs are 25% (lower bound) and 93% (upper bound) less likely to be infected by HCV compared to IDUs who do not use NSPs. Our results show that changing our assumption on the impact of NSPs on HCV prevalence among IDUs to the lower and upper bound estimated effect from the literature (i.e. 37% and 3% reduced probability of infection when using NSPs compared to not using NSPs) leads to a variation of 48% less / 94% more respectively in our estimate of the value of community pharmacy's NSPs (see Table 30). Like our second sensitivity analysis, the results are driven by the number of 'averted' HCV infections attributable to community pharmacy NSPs which is higher when the impact of NSPs is greater.

Table 30: Sensitivity analysis #5 - estimated value of NSPs provided by community pharmacy (£m, England, 2015)

	Stakeholder	Impact area / path	Lower bound	Main scenario	Upper bound
Prevalence of HCV with NSP			37%	25%	3%
Short term	NHS	Reduction in NSP patients through alternative routes / no treatment (e.g. central clinics, mobile clinics or no treatment)	-£4.9	-£4.9	-£4.9
	NHS	Avoided NHS healthcare costs through a reduction in the number of HCV infections and associated treatment)	£75.9	£145.7	£282.3
	Total		£71	£140.8	£277.4
Long term	Wider society	Avoided social costs through a reduction in drug-related deaths	£267.9 (£13.4 annually)	£514.3 (£25.7 annually)	£996.4 (£49.8 annually)
Total			***£338.8***	***£655.1***	***£1,273.8***

Source: PwC analysis

The number of IDUs who used community pharmacy NSPs in 2015

Our estimate of the volume of IDUs who used community pharmacy NSPs in 2015 is higher than estimates derived using figures cited in government reports and other literature. Table 16 illustrates

that, based on publicly available figures, the estimated number of IDUs who used NSP pharmacy services in 2012 / 13 was between 89,060 and 166,100 (compared to our estimate of around 235,000).

In this sensitivity analysis, we explore how the contribution of community pharmacy NSPs would change if the number of IDUs who used the service was smaller. Our results vary widely when we change this assumption. The contribution of community pharmacy NSPs declines by 29% to 62% when we use the public figures rather than those based on our extrapolation from the PharmOutcomes data.

Table 31: Sensitivity analysis #6 - estimated value of NSPs provided by community pharmacy (England, 2015)

	Stakeholder	Impact area / path	Lower bound	Upper bound	Main scenario
	Number of pharmacy NSP clients		89,060	166,100	234,823
Short term	NHS	Reduction in NSP patients through alternative routes / no treatment (e.g. central clinics, mobile clinics or no treatment)	-£3.2	-£4.1	-£4.9
	NHS	Avoided NHS healthcare costs through a reduction in the number of HCV infections and associated treatment	£55.3	£103.1	£145.7
	Total		*£52.1*	*£99*	*£140.8*
Long term	Wider society	Avoided social costs through a reduction in drug-related deaths	£195.1 (£9.8 annually)	£363.8 (£18.2 annually)	£514.3 (£25.7 annually)
Total			***£247.1***	***£462.8***	***£655.1***

Source: PwC analysis

Interpretation of the results

Our analysis is limited by a lack of evaluations of interventions distributing needles and syringes[110] but also the sensitive public health topic of drug misuse including the anonymity of users and illegal use of substances.

Moreover, as illustrated above, our analysis is sensitive to our assumptions and, therefore, results should be interpreted with caution. We focus on the contribution of community pharmacy's NSPs comparing the current situation to a counterfactual where IDUs are still able to access NSPs but from alternative service providers. Our sensitivity analyses illustrate how our results are sensitive to a range of key assumptions with the **short run** contribution of community pharmacy NSPs estimated within a range of **£54.9 million to £277.4 million** depending on the assumptions employed. Moreover, the **total contribution**, including the long run benefits, ranges from **£247.1 million to £1,273.8 million**. Our main estimate of the total contribution of community pharmacy NSPs is **£140.8 million in the short run** and **£514.3 million in the long run**.

Finally, our estimates are likely to be conservative for the following reasons:

- We focus on a narrow set of potential impacts (i.e. the healthcare costs related to treatment of HCV and the social costs related to premature deaths). Our analysis does not account for other impact areas, which may increase the value of the NSPs provided by community pharmacy:
  - *Other BBV infections*: IDUs have a high risk of contracting HIV, HCV and Hepatitis B which are easily transmitted by sharing contaminated injecting equipment. Our current analysis focuses on HCV, the infection of highest concern to the IDU population. Although lower in prevalence among IDUs, HIV and Hepatitis B can also be spread through sharing injecting equipment and pose important public health risks.
  - *Other bacterial infections*: As well as poor nutrition, mental, physical and dental health, many IDUs are vulnerable to a range of bacterial infections because of poor injecting hygiene, non-sterile equipment or contaminated drugs. The acute infections cause health problems which cost the NHS around £47 million annually.[111]

[110] We note that there is some evidence on the impact of NSPs but the focus is on North America and Australia. Due to different political circumstances and type of services, there is limited scope to generalise these findings to the UK setting.
[111] NTA (2007)

  - *Secondary transmission*: Many of these infections can also be contracted through risky sexual behaviour and through pregnancy and childbirth, and so be passed on to the wider public. We do not account for secondary transmission in our analysis.
  - *Lost economic output*: Drug users are less likely to be in employment and more likely to be absent from work which reduces their potential economic output.[112] We did not find any robust evidence to help us assess the scale of the impact of using NSPs compared to not using them.
- The majority of NSPs do not only distribute sterile needles and syringes but also provide wider BBV prevention services, including outreach, distribution of harm reduction materials and counselling and testing. Our analysis does not include the additional benefits that may arise from these services.

[112] Jones et al. (2009)

Supervised consumption services

1. Introduction

This chapter provides our assessment of the value associated with community pharmacy's current role in providing supervised consumption services (SC)[113] for drug users in England. We estimate the value that would be at risk if community pharmacy no longer supplied its current service, using data for 2015.

The chapter is structured as follows:

- Section 2 describes the service currently provided by community pharmacy, including what it means from the service user's perspective, and sets out our assumptions for what would happen from the service user's perspective if community pharmacy did not provide its current service (i.e. the counterfactual);
- Section 3 describes the value that flows from the current activities of community pharmacy in terms of potential avoided costs to the NHS and other parts of the public sector, the service user and wider society and explains the key impacts;
- Section 4 explains our approach to assessing each element of expected value, specifically:
  - How we estimate the number of individuals who benefit from the service currently provided by the pharmacy (the 'volume');
  - How we estimate the value delivered each time the service is provided (i.e. for each individual service user) (the 'value'); and
- Section 5 summarises our key results as well as the results of our sensitivity analysis.

A set of technical appendices provides further details of the methodology and the data sources we use to estimate the value of the SC services provided by community pharmacy in England in 2015.

2. Description of activity

The Home Office estimates that approximately 250,000 to 300,000 problematic drug misusers[114] in England require treatment.[115] Moreover, Britain is experiencing an increase in anabolic steroid use among image-obsessed young men which can have similar health and social consequences to those experienced by users of opiate (e.g. heroin) and/or crack cocaine.[116] Addressing the range of psychological, physical and social issues associated with drug misuse remains a key national and local priority. It is known that problem drug users have a range of health and social problems that impact on different parts of society. It is also clear that the consequences are less, on average, for those drug users in treatment than for those out of treatment.[117]

The Department of Health's Public Health Outcomes Framework for England set out objectives for the public health system in the three years from April 2013 to April 2016. It consisted of four domains[118] and 60 indicators for measuring progress.[119] The Framework reflected the proposals set out in the Drug Strategy 2010[120] and included three drug-related indicators as part of the health improvement domain (successful completion of drug treatment for opiate and non-opiate users and increasing the proportion of people who are assessed for substance misuse when entering prison), illustrating the

[113] Alternatively called 'supervised administration' services.
[114] Throughout this report we use the term drug misusers/users interchangeably. Also, we use the term 'drug' and 'substance' interchangeably.
[115] Department of Health (2005).
[116] We explore this trend further when we assess the contribution of Needle and Exchange programmes in a separate chapter.
[117] Department of Health (2011).
[118] The four domains are: (i) improving the wider determinants of health; (ii) health improvement; (iii) health protection; and healthcare public health and preventing premature mortality.
[119] Department of Health (2016).
[120] Home Office (2010)

importance of providing treatment services to drug misusers. The Public Health Outcomes framework was refreshed in May 2016[121], following a consultation in 2015 revising the three drug-related indicators to:

- Drug and alcohol treatment completion and drug misuse deaths which consists of the following sub-indicators:
  - Successful completion of drug treatment – opiate users
  - Successful completion of drug treatment – non-opiate users
  - Successful completion of alcohol treatment
  - Deaths from drug misuse
- Adults with substance misuse treatment need who successfully engage in community-based structured treatment following release from prison.

The Department of Health groups adult drug-related treatment into four tiers according to the scale of intervention that is required.[122] Our analysis focuses on a subset of Tier 3 interventions (i.e. drug treatment in the community with regular sessions to attend) undertaken as part of a care plan. Prescribing, structured day programmes and structured psychosocial interventions (counselling, therapy, etc.) are always defined as Tier 3. Advice, information and harm reduction can be Tier 3 if they are part of a care plan. In the UK, community-based drug treatment centres are the most common providers of drug treatment services. Community pharmacies also play a key role so that individual service users have maximum choice on where to access their treatment(s).

Our analysis focuses on supervision of substitute treatment such as methadone, the most common treatment for people who use heroin or similar drugs. This typically involves a doctor prescribing a substitute drug – usually methadone or buprenorphine (Subutex®) – as an alternative to the illicit opioid substance.

The provision of supervised consumption of substitute medication is a service commissioned by local authorities in response to local health needs. Services can be based on nationally produced template service specifications or locally designed and negotiated with Local Pharmaceutical Committees (LPCs) at a local level.

The SC service requires pharmacists to supervise the consumption of prescribed medicines (e.g. methadone) at the point of dispensing in the pharmacy to ensure that the dose is consumed by the service user. The aims and intended outcomes of the SC service provided by community pharmacy are (see Figure 11):

- To ensure compliance with the agreed treatment plan across all practitioners and services involved in the structured drug treatment for the individual (e.g. social, health, criminal justice elements)[123] by:
  - Dispensing in specified instalments: the dose may be dispensed for the service user to take away to cover days when the pharmacy is closed; and
  - Ensuring each supervised dose is correctly consumed by the service user for whom it was intended (see top panel of Figure 11).

  The analysis in the chapter focuses on these services, i.e. supervised consumption of substitute medicines to ensure the dose is consumed by the intended user and in appropriate quantities (see 'in scope' in Figure 11).
- To reduce the risk to local communities of:
  - Over- or under-usage of medicines;
  - Diversion of prescribed medicines (e.g. methadone) on to the illicit drugs market; and

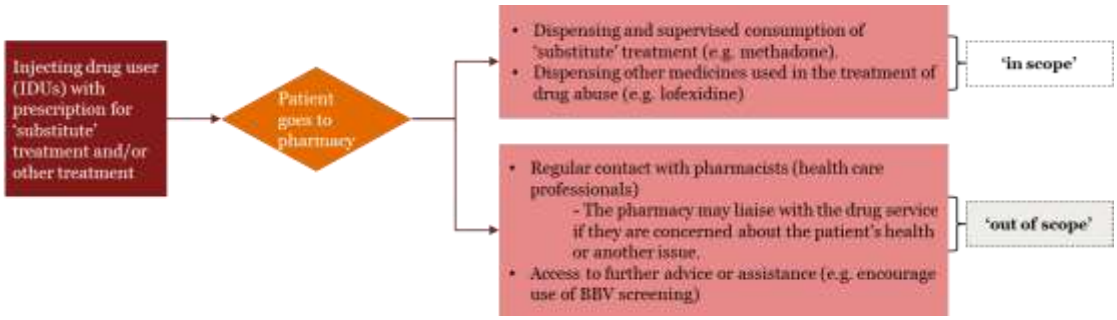
[121] Department of Health (2016).
[122] Department of Health (2005).
[123] Most service users require a range of interventions across a shared care setting to meet their needs. These interventions may be provided by a range of practitioners and services and, thus, most clients will require a degree of co-ordination of their care while in structured drug treatment. It is expected that a designated case worker will lead on monitoring progress against treatment goals and in developing a holistic treatment plan. This involves liaising with GPs who prescribe the medications, pharmacists who may dispense and supervise and other practitioners.

– Accidental exposure to the supervised medicines.[124]

These services are out of scope. Although these services contribute to both avoidable NHS costs due to accidental exposure to supervised medicines (e.g. methadone) which can also be lethal as well as to avoidable costs to other public sector bodies due to the reduction in the sale of prescribed medicines on the black market, it is challenging to quantify these benefits and attribute them to the services provided by community pharmacies (see 'out of scope' in Figure 11).

- To provide service users with regular contact with health care professionals and to help them access further advice or assistance (see lower panel of Figure 11). The service user will be referred to specialist treatment centres or other health and social care professionals where appropriate and with consent.[125] Similar to the services in the second bullet, these services are out of scope because we cannot identify the number of clients who receive advice or are referred to other NHS services and it is methodologically challenging to estimate a link between advice and / or referral to health or societal outcomes due to the dependence on the client's behavioural change. For these reasons, these services are out of scope from our analysis.

Figure 11: Current service user pathway (through community pharmacy)



Source: PwC analysis

Access to treatment in community pharmacy is voluntary and is available to all individuals in receipt of an NHS prescription who have drug-related problems.

We focus on the contribution of community pharmacy SC services in terms of potential avoided costs to the NHS and the public sector. Without the pharmacy service, we assume that drug users would visit an alternative NHS setting that can provide supervised consumption (e.g. a local drug clinic), receive unsupervised substitute treatment through the NHS or not seek substitute treatment at all.

3. Contribution of community pharmacy

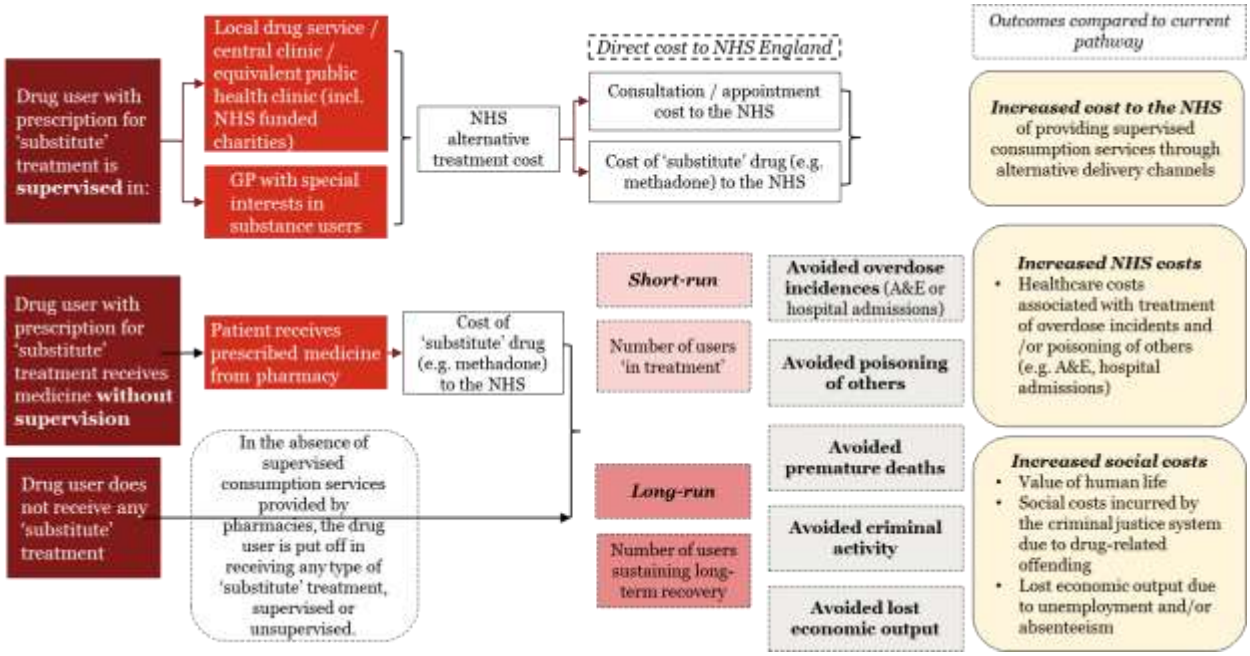
Through its provision of SC services, community pharmacy has the potential to make a positive contribution in three main ways (see Figure 12):

- **By reducing the cost to the NHS of providing SC services** (see top panel of Figure 12): Flexibility in accessing SC services is a key issue and, therefore, the widespread availability of pharmacies may increase the uptake of SC services. This was evidenced in England and Scotland with the introduction of pharmacy services in the late 1990s and the subsequent increase in supervision of methadone.[126] Where the intervention is successful and leads to sustained long term recovery, there is a positive impact on the service user and on society as a whole. And if it is more cost-effective than the alternative delivery channel (e.g. a GP), this represents a potential cost saving for the NHS. If this intervention was not provided at all in the absence of community pharmacy, whilst this would reduce the cost to the NHS of providing treatment, it might also increase healthcare and social care costs associated with drug users who are not in treatment (*see below*).

[124] SC services are intended to help control the illicit drugs market more effectively than unsupervised consumption services where the drug user can sell the prescribed medicine on the secondary market. We do not quantify this value due to lack of robust data and methodological challenges.
[125] PSNC (2016).
[126] Bloor et al. (2007).

- **By reducing the number of drug users out of treatment that would result in avoided costs for the NHS and the public sector in the *short run***: It is expected that, as a result of receiving treatment, most drug users will reduce their drug consumption, commit fewer crimes and report improved wellbeing. This would avert some of the costs that society would otherwise incur if these individuals were not treated. We estimate the number of people who would be 'out of treatment' in the absence of pharmacies but also those community pharmacy clients who would not be retained for an 'effective' period of 12 weeks. This provides an estimate of the number of people treated and not treated. We use various research studies to estimate the costs associated with drug-related health incidences, premature deaths and criminal activities and how these may differ for drug users who are in treatment compared to those who are not. In this way, we assess the contribution of community pharmacy in the short run (i.e. during one year).
- **By increasing the number of drug users who would sustain long term recovery that would result in avoided costs for the NHS and the public sector in the *long run***: Evidence shows that most drug users in the UK have a number of periods in and out of treatment.[127] This implies that treatment cannot be regarded as a one-off event with a clear pattern of before and after the event costs. We estimate the number of users who would be able to sustain long term recovery as a result of the pharmacy intervention. Using estimates of the period of a drug-taking 'career', we assess the average lifetime costs associated with drug misuse.

Figure 12: Counterfactual service user pathway in the absence of community pharmacy services



Source: PwC analysis

4. Approach to estimating contribution of community pharmacy

Our approach to determining the value of the SC services provided by community pharmacy in 2015 involves two elements:

- Estimating the number of times pharmacy has delivered SC services and generated the benefits described earlier (the 'volume'); and
- Estimating the value delivered each time the service is provided (the 'value').

We summarise our approach to each element below; more details are provided in the technical appendices.

[127] Gossop et al. (1998); Coid et al. (2000).

Volume

We estimate that the total number of users of SC services in community pharmacy in England in 2015 was 176,110. This is based on information recorded in the PharmOutcomes database which we use to estimate the average rate of take up of the services by age group and information recorded on the PSNC services database which we use to extrapolate across pharmacy services that were running in 2015. More information on our approach can be found in Appendix 3.

Our estimate is broadly consistent with that of ONS based on the National Drug Treatment Monitoring System which indicate that, in 2013-14, there were 193,198 individuals over the age of 18 in contact with drug treatment providers and GPs in England.[128] The primary drug used was opiates only (47%), followed by opiates & crack (32%), cannabis (9%) and cocaine (5%).

Data on new interventions are also classified by setting; on average, 73% of interventions are delivered in a community setting (e.g. pharmacy or central clinic), 16% in a primary care setting (e.g. GP) and the remainder in residential or unknown settings.[129] We can use these figures to estimate the number of drug users in contact with community based drug treatment providers (i.e. pharmacies or specialist clinics); we estimate this to be between 141,000 (based on the ONS estimates) and 172,000 (based on UK Focal Point estimates).

Moreover, our estimate is also consistent with 2009 estimates from the NTA which showed about 330,000 problem drug users (PDUs) in England (i.e. heroin and crack addicts). Of these, around 75 per cent were in treatment (255,000); 173,000 were in community drug treatment (which includes community pharmacies) and around 82,000 were receiving treatment in prison.[130] Although these figures are from 2009, estimates from UK Focal Point show that, in 2014, there were 293,879 high risk drug users in England, similar to the estimates for 2009[131].[132]

Table 32: Interventions received by clients in treatment 2014-15[133]

Setting	ONS estimates for 'Prescribing' users (weighted average, %)[134]	UK Focal Point estimates
Number of individuals over the age of 18 in contact with drug treatment providers and GPs in England (2013-14)		*193,198 (Source: ONS (2014))*
Community[135]	73% (*141,035*)	89% (outpatient services) (*171,946*)
Inpatient unit[136]	3%	1.4% (inpatient services)
Primary care[137]	16%	2% (GPs)
Residential[138]	1%	
Recovery house[139]	0%	

[128] Clients are counted as being in contact with treatment services if their date of presentation, intervention start, intervention end or discharge indicates that they have been in contact with a provider during the year.
[129] ONS (2014)
[130] NTA (2009).
[131] The 95% confidence interval is 291,029 to 302,146.
[132] UK Focal Point (2015).
[133] ONS (2014) & UK Focal Point (2015).
[134] ONS (2014); own calculations to estimate weighted average.
[135] A structured drug and alcohol treatment setting where residence is not a condition of engagement with the service. This will include treatment within community drug and alcohol teams and day programmes (including rehabilitation programmes where residence in a specified location is not a condition of entry).
[136] An in-patient unit provides assessment, stabilisation and/or assisted withdrawal with 24-hour cover from a multidisciplinary clinical team who have had specialist training in managing addictive behaviours. In addition, the clinical lead in such a service comes from a consultant in addiction psychiatry or another substance misuse medical specialist. The multi-disciplinary team may include psychologists, nurses, occupational therapists, pharmacists and social workers. Inpatient units are for those alcohol or drug users whose needs require supervision in a controlled medical environment.
[137] Structured substance misuse treatment is provided in a primary care setting by a general practitioner, often with a special interest in addiction treatment.
[138] A structured drug and alcohol treatment setting where residence is a condition of receiving the intervention. A residential programme may also deliver an assisted withdrawal programme.
[139] A recovery house is a residential living environment, in which integrated peer support and/or integrated recovery support interventions are provided for residents who were previously, or are currently, engaged in treatment to overcome their drug and alcohol dependence. The residences can also be referred to as dry-houses, third-stage accommodation or quasi-residential.

Setting	ONS estimates for 'Prescribing' users (weighted average, %)[134]	UK Focal Point estimates
Missing & other	6%	6.1% (incl. 0.6% in prisons and 0.7% in low threshold agencies)

Source: PwC analysis

Our estimate of 176,110 users of SC services based in community pharmacies is slightly higher than the number of users of community based SC services (including pharmacies and other specialist clinics) which we estimate to be between 141,000 and 173,000. This difference may be because the latter does not take account of other drug users. Estimates from Crime Survey for England & Wales (CSEW) suggest that in 2012/13 there were around 69,000 people aged 16 to 59 in England who had used anabolic steroids and data suggest that the majority inject. It is likely that some of these individuals receive structured drug treatment as a result of contact with drug workers and/ or community pharmacy.[140]

Value

Figure 12 illustrates the benefits to society of SC services provided through community pharmacy. We focus on three key areas:

1. The avoided costs to the NHS through more cost-effective intervention by community pharmacy (as opposed to SC services being provided through alternative NHS settings);
2. The avoided costs to the NHS through a reduction in the number of individuals not in treatment or in unsupervised treatment; and
3. The avoided costs to other parts of the public sector from a reduction in the number of individuals who are not in treatment or in unsupervised treatment.

The estimated contribution of community pharmacy is conservative as we only focus on the narrow set of impacts outlined above. We do not consider important knock-on effects of drug treatment such as the positive impact on families affected by drug misuse but also the contribution of supervised consumption treatment in reducing the scale and, therefore, negative consequences of sale of prescribed medicines on the black market.

Proportion of individuals across alternative delivery channels

To estimate the avoided costs to the NHS of providing SC services in alternative settings we consider:

- What the service user pathway for individuals who misuse drugs would likely be in the absence of a commissioned service for SC in community pharmacy; and
- The costs to the NHS associated with each alternative setting in terms of consultation / appointment fee and cost of drugs (e.g. methadone) (see Table 33).

Our first step is to estimate what would happen in the absence of SC services being provided by community pharmacy. We use several sources to do this as illustrated in Table 33 and Figure 13. Specifically, we assume that in the absence of SC services being provided by community pharmacy:

- One quarter of those individuals will not be in treatment: this is based on evidence from the National Treatment Agency for Substance Misuse (NTA) that around 75 per cent of opiate users are in treatment, either in community settings or within prison.[141]
- Over half of those individuals (51%) would receive unsupervised 'substitute' treatment (i.e. only go to the pharmacy to have their prescriptions dispensed): our assumption is based on historical evidence from Scotland and England which shows that, following the introduction of pharmacy services for drug users in the late 1990s, supervision of methadone increased from 33% in 1995 to 65% in 2000.[142]; and
- The remaining 24% of individuals would be in similar supervised consumption treatment; 22% in alternative community settings such as local drug clinics and 2% in GP specialist services. The

[140] NICE (2014).
[141] NTA (2009).
[142] Bloor et al. (2007).

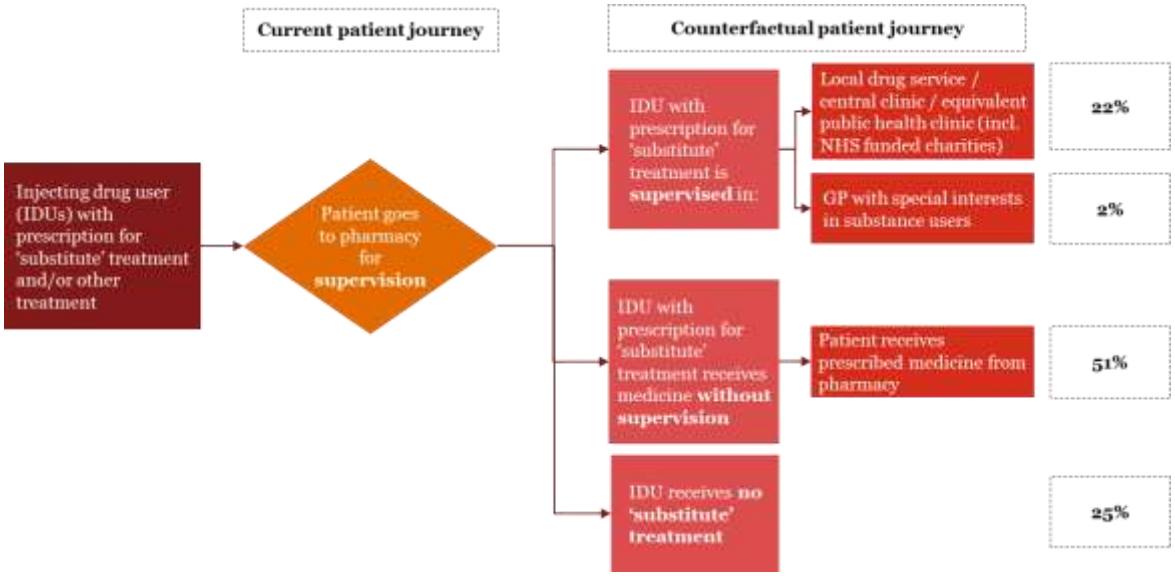
balancing between community setting and primary care settings such as GP is based on annual drug statistics on the share of treatment by setting.[143]

Table 33: Provision of SC services in absence of community pharmacy services[144]

Alternative service providers / delivery channels	%	Volume[145]	NHS cost (£)[146]	Source & calculation
Community pharmacy	*100%*	*176,110*	*£248.6*	*PharmOutcomes & own calculations* *NICE guidance (2007)*
Local drug service / central clinic / equivalent	22%	38,410	£248.6	UK Focal Point on Drugs (2015) & ONS Adult Drug Statistics (2014) Assume the cost to the NHS of providing this service is the same as for pharmacy supervised consumption services
GP with special interests in substance users	2%	4,270	£2,874[147]	UK Focal Point on Drugs (2015) & ONS Adult Drug Statistics (2014) Curtis, 2015
Unsupervised 'substitute' treatment	51%	89,410	£91.2	Bloor et al. (2007) *Note*: we do not account for pharmacists' time to dispense separately. This is included in our estimates.
No treatment	25%	44,030	No direct cost for providing treatment services	NTA (2009)

Source: PwC analysis

Figure 13: Counterfactual scenarios of SC supply in the absence of pharmacy services



Source: PwC analysis

Direct NHS cost of providing the service across alternative settings

To determine the avoided costs to the NHS as a result of SC community pharmacy services, we estimate the average NHS costs associated with the alternative service providers / delivery channels illustrated in Table 33.

[143] ONS (2014) & UK Focal Point (2015). Note that for the purposes of our analysis we focus on community settings such as local drug clinics and GP specialist services. It is likely that some individuals may receive treatment in residential settings. However, given that the share of those individuals at a national level is less than 1%, we do not consider in this report.
[144] All volume figures in this chapter are rounded to the nearest tenth (00).
[145] All volume figures are rounded to the nearest tenth.
[146] The costs estimated refer to an average treatment plan of 77.3 supervisions per person per year.
[147] Assuming the supervision will be led by a nurse in the GP practice; unit cost per nurse led GP consultation estimated to be £36 in 2014/15 (Curtis, 2015).

To do this, we consider two sources of costs to the NHS which accrue in both the current and counterfactual scenarios.

First, we analyse the *average cost of 'substitute' medicine (e.g. methadone)*. To do this, we need to offset the additional cost of providing 'substitute' drugs (e.g. methadone) to the NHS in the current versus the counterfactual scenario. Substitute treatment for drug users is funded by Clinical Commissioning Groups which means that NHSE bears the cost of all 'substitute' medicines supplied to drug users. Although the cost of 'substitute' drugs (e.g. methadone) is paid regardless of whether supervised or not, we assume in our counterfactual that a proportion of current pharmacy service users would fall out of the system. This would produce a cost 'saving' for NHSE in terms of both professional fees and the cost of drugs.

To estimate the cost of 'substitute' medicines dispensed to those in supervised and unsupervised treatment across all delivery channels, we use information on the cost of methadone from NHS Drug Tariff.[148] We adopt the following approach:

- We estimate the average cost of methadone per 1mg using information on the cost of the most common type of methadone drug prescribed from NHS Drug Tariff (i.e. methadone (1mg/ml)).[149]
- We estimate the total dose (in mg) associated with an average treatment episode which we define as 77.3 supervisions per person per year. This is consistent with our basis for estimating consultation fees (i.e. six supervisions per week for a three month period). We then adopt NICE's guidance on the dosage and frequency of methadone treatment.[150] The guidance states that treatment should start with an initial dose of 10-40mg daily, increased by up to 10mg daily (with a maximum weekly increase of 30mg). The usual maintenance dose range is 60-120mg. These assumptions mean that we estimate that a service user on an average treatment of 77.3 supervisions would consume, on average, 6,437mg of methadone across the whole treatment.[151]
- We combine these figures to estimate the total cost of methadone associated with an average treatment plan of around six supervisions per week for a three month period. We estimate that the cost of methadone per service user for a treatment episode of 77.3 supervisions per year was £91.2 in 2015.[152] We assume that this cost would be the same in all delivery channels (i.e. the same type of 'substitute' medicine and the same dose / frequency).

Second, we assess the *average supervision fee* which includes the cost incurred by the NHS in providing SC services across NHS settings. We use publicly available data to estimate the cost across the delivery channels we assume will be used in the counterfactual. We also need to account for any payment received by pharmacies for providing the services (i.e. the consultation fees). This is a cost incurred by the local commissioner which we need to offset when estimating the net benefit of community pharmacy services.

More specifically, to estimate the average consultation fee received by pharmacies, we use information on fees recorded on PSNC's services database. This is drawn from the service specification agreement on remuneration (e.g. the amount to be paid to the pharmacy by the commissioner for each supervision or each service user they supervise). It is important to note that this varies by duration of treatment, frequency and choice of substitute treatment. To estimate the average cost per treatment episode, we take the average number of supervisions per service user as recorded on PharmOutcomes (77.3 per person per year which translates to a three month treatment episode with an average of six supervisions per week) and apply our estimate of the average consultation fee of around £2 per supervision. On this basis, we estimate that the average consultation fee is £157.4 (reimbursement received by pharmacists and specialist clinics providing SC services).

Similarly, we use publicly available data on NHS unit costs to estimate the average consultation fees across the alternative NHS settings (see Table 33 for the sources used). In order to estimate the average cost per treatment episode across these settings we apply the estimated average fee to the

[148] Drug Tariff (2015). We use the cost of methadone (1mg/ml).
[149] Methadone (1mg/1ml) accounted for more than 90% of items prescribed by GPs in England in 2015 (HSCIC, 2016).
[150] NICE (2007).
[151] To estimate this we start by assuming a 10mg dose initially, increased by 30mg each week unit it reaches 90mg which we consider as the average maintenance dose for the remainder of the treatment period.
[152] We uplift for a 5% VAT on the basic Drug Tariff price.

average number of supervisions per person per annual treatment (see above). In terms of average consultation fees:

- For SC users who in the absence of community pharmacies would use SC services provided by GPs with Special Interests, we assume that each supervision would require a nurse-led appointment (£36 per nurse-led GP appointment)[153];
- For SC users who in the absence of community pharmacies would use SC services provided by local drug clinics, we assume that the average consultation fee would be the same as estimated for community pharmacies; and for SC users who in the absence of community pharmacies would receive unsupervised treatment there is no cost for the NHS in relation to consultation fees. The only cost associated with these users is the cost of methadone as estimated above, i.e. £91.2 per person for an average treatment episode.

We estimate that, in the absence of community pharmacy SC services, the NHS would 'save' £13.8 million. This saving is driven by the number of people who, in the absence of pharmacy intervention, would receive no treatment at all and, therefore, would not require the NHS to pay for their treatment. As we illustrate below, however, evidence suggests that that individual drug users who receive no treatment have poorer health, risk premature death and are more likely to commit crimes, all of which lead to increased costs for the NHS, the public sector and the wider society.[154]

Outcomes of treatment, supervised and unsupervised, compared with no treatment

We assume that treatment is similarly effective across settings. This is in line with the NICE evidence which indicates that treatment with both methadone and buprenorphine are similarly effective whether delivered in primary care or in outpatient clinics.[155]

To assess the costs to the NHS associated with treatment of drug-related conditions (e.g. overdose, poisoning of others and premature deaths) as well as the costs of crime committed by drug users we first explore the outcomes associated with drug users who are in treatment compared to those who are not and, where possible, the differences in outcomes for users in supervised and unsupervised treatment. Our overall approach is illustrated in Figure 14.

Table 34 illustrates the key assumptions that we use for different aspects of our valuation approach. More specifically:

- We first want to estimate the share of clients retained in treatment for at least 12 weeks (defined as 'effective' treatment by NICE) and, out of these clients, the share that would have exited treatment successfully (i.e. free of dependence). We use this figure to estimate, out of those users who do not sustain long term recovery (see below), the share who are retained in treatment as healthcare and other costs will differ by treatment status;
- Second, because drug addicts are prone to chronic relapse[156], it is not easy to determine how many clients would then go on to sustain long-term recovery and how far treatment hastens recovery:
  - Estimates from the ONS suggest that the share of treatment clients who exit treatment successfully, i.e. free of dependence, and who after six months have not used drugs, is 30%[157]; and
  - Estimates from the NTA suggest that out of those who exit treatment successfully (i.e. free of dependence), only 49% manage to sustain long-term recover.[158] Therefore, we estimate that around 14.7% of users in treatment will sustain long term recovery (i.e. 49% out of the 30% who exit treatment successfully). We use these figures to estimate the long run contribution of community pharmacy SC services (see below).

[153] Curtis (2015)
[154] Department of Health (2012).
[155] NICE (2007).
[156] Gossop et al. (1998); Coid et al. (2000).
[157] ONS (2015).
[158] NTA (2012)

Table 34: Outcomes associated with treatment / no treatment[159]

Element	%	Source & calculation
% clients retained in treatment for at least 12 weeks	58%[160]	Kouimtsidis et al. (2015)
% of treatments completed free of dependence	30%	ONS Adult Drug Statistics (2015) Alternatively, using data from clients followed over 10 years: 42% completed treatment, 38% exited without completing treatment and 20% were retained as of March 2015.
% of clients in treatment who sustain long-term recovery	49% of those leaving treatment successfully (0.49*0.30 = 0.147)	NTA (2012)
% of drug users who are non-PDUs	17.5%	Frontier (2011)

Source: PwC analysis

Combining the figures presented in Table 34 , we estimate the number of people that fall into each category in the current and counterfactual scenarios (see Table 35). This includes:

- *Number of users retained in treatment* for at least 12 weeks (i.e. an 'effective' treatment period according to NICE[161]). To estimate this, we use the assumptions set out in Table 34 (i.e. that 58% of service users under supervised and unsupervised treatment are retained in treatment for at least 12 weeks). Before applying these assumptions to the number of users in treatment we offset the number who would sustain recovery and, therefore, not need to be retained in treatment (see next bullet). For the counterfactual, we add up the number of people retained in treatment across all alternative delivery channels, i.e. central clinic, GP or medication without supervision.
- *Number of users who sustain recovery* refers to the number of users across the alternative delivery channels who we assume would sustain long-term recovery, i.e. 14.7% of users in treatment, either supervised or unsupervised.
- *Number of problematic drug users (PDUs)/non-PDUs*. Finally, out of those users who do not sustain long-term recovery, a share is assumed to be non-PDU. This is estimated at 17.5% of total users whether or not they are in treatment.[162] This figure includes the number of users who are not in treatment.

Table 35: Outcomes for drug users in the current and counterfactual scenarios (England, 2015)

Alternative service providers / delivery channels	Number of users retained[163]	Number of users who sustain recovery	Number of users who do not sustain recovery (incl. those not in treatment)	*Out of those users who do not sustain recovery*	
				Number of non-problematic drug users	Number of problematic drug users
Community pharmacy	87,130	25,889	150,225	26,289	123,936
Counterfactual	65,340	19,417	156,697	27,422	129,275
Net (counterfactual – current)	*-21,783*[164]	*-6,472*[165]	*6,472*	*1,133*	*5,340*

Source: PwC analysis

Our analysis focuses on four key health and social risks related to drug abuse:

[159] ONS (2014).
[160] We assume that the retention rate to treatment is the same for drugs users who receive supervised and unsupervised 'substitute' treatment. We take the average across the estimated retention rate of supervised (62%) and unsupervised users (54%). We explore how our results are sensitive to this assumption towards the end of the chapter.
[161] NICE (2007).
[162] Frontier (2011).
[163] Taking into account users who would sustain long term recovery.
[164] This figure is negative driven by the lower number of people receiving treatment in the counterfactual scenario, i.e. in the absence of SC pharmacy services and, therefore, a lower number of people retained in treatment.
[165] This figure is negative driven by the lower number of people receiving treatment in the counterfactual scenario, i.e. in the absence of SC pharmacy services and, therefore, a lower number of people sustaining long-term recovery.

- *The cost to the healthcare system of drug-related illnesses* (e.g. overdose): Misuse of drugs is associated with a number of physical and psychological health outcomes including breathing, heart and mental health problems, blood borne diseases and the risk of overdose. For example, unintentional drug overdoses can occur with prescription or illicit opioids such as methadone and heroin use. Overdose and other drug-related health episodes can result in A&E attendance, hospitalisation and/or death. 'Substitute' treatment, supervised and unsupervised, enables better management of the addiction compared to not being in treatment and reduces the risk of drug-related illnesses such as overdose or unintentional poisoning of others.[166]
- *The possibility of premature death*: In 2014, 3,156 people died from drug-related poisoning in England. Evidence suggests that treatment can reduce the risk of premature death by enabling better management of addiction and, therefore, reducing the risk of overdose.[167]
- *The cost of crimes committed by drug users:* Drug misuse is associated with crime in a number of ways. People who depend on drugs may steal in order to fund their addiction: it is estimated that up to half of all acquisitive crime, i.e. domestic burglary, theft of/from a motor vehicle and robbery of individuals or business, is drug-related.[168] Violent crime is also often associated with drug misuse but, for the purposes of this analysis, we focus on non-violent crimes with an economic motive. Research has shown that effective treatment interventions significantly reduce drug-related offending.[169]
- *The wider social cost related to drug use (e.g. employment status, children in need)*: Drug misuse is associated with a range of social consequences including greater likelihood of unemployment and homelessness and a heightened risk to children. Our analysis focuses on the impact of drug use on employment and other social costs such as additional care needed for children who are in need, and considers the impact of treatment on the prevalence of these outcomes. Drug users are more likely to be unemployed or absent from work, resulting in lost economic output.[170] Moreover, drug users who are parents are likely to pose a risk to their children as drug misuse reduces a parent's capacity to provide the necessary practical and emotional care to their children.[171]

Treatment can reduce the incidence of poor health, the risk of premature death and the likelihood of being unemployed and committing criminal offences. We draw on available evidence to develop a set of key assumptions of the impact of treatment on health and social outcomes (see Table 36). As indicated above, we assume that treatment is equally effective across settings. Furthermore, we assume that substitute medicine treatment is just as effective whether supervised or unsupervised. The reason for this is that we did not find any robust evidence of differences between supervised and unsupervised consumption in terms of outcomes.

Although we consider that outcomes will not differ across type of treatment (i.e. supervised or unsupervised), there could be a difference in retention rates with a tendency for SC treatment to be completed more than unsupervised consumption treatment which would imply that SC treatment is more effective. We do not consider this differential treatment effectiveness in our analysis because the evidence on the effectiveness of treatment by type is currently mixed.[172] However, when interpreting the results one should consider these aspects of the analysis. For example, if we believe that SC clients are more likely to be retained, i.e. SC treatment is more effective than unsupervised consumption treatment, our results are likely to be conservative.

Table 36: Differences in the health status, risk of premature deaths and criminal offences

	Treatment (Supervised or unsupervised consumption)	No treatment	Source & calculation
Drug related illnesses and deaths	42% reduction *compared to no treatment*		Frontier (2011); assume that the percentage is the same for drug-related overdose and episodes of poisoning

[166] NICE (2007).
[167] NTA (2012).
[168] DrugScope (2015).
[169] NTA (2012); Keen et al. (2000).
[170] Jones et al. (2009).
[171] NTA (2012).
[172] Kouimtsidis et al. (2015).

	Treatment (Supervised or unsupervised consumption)	No treatment	Source & calculation
Mortality rate (%)	0.15%	0.53%	NTA (2012) & assuming that individuals in treatment are in 'effective' treatment (i.e. at least for 12 months)[173] ONS (2016)[174]
Reduction in criminal activity (%)	33% reduction *compared to no treatment*		NTA (2012) & own calculations
Employment status	19%	16%	ONS Adult Drug Statistics (2015)

Source: PwC analysis

Having estimated the 'volume' of pharmacy activity (i.e. how many individuals there are across the impact areas of interest), we also need to estimate the benefits associated with each impact. We use various literature sources to estimate the costs that would be incurred by the NHS and other parts of the public sector as a result of drug-related health and social impacts such as crime. Table 37 summarises the annual costs associated with drug use. These are drawn from various sources; we highlight in light pink the costs used in our analysis. All the estimates have been adjusted to 2015 prices using data on the GDP deflator from the ONS.[175]

Table 37: Annual costs per drug user not in treatment (in 2015 prices)

Impact area	Sub-impact area	NHS cost	Public sector cost	Source & calculation
Overdose episodes	A&E	£117		New economy (2015) ('A&E attendance – no investigation and no significant treatment')
	Hospital admissions	£1,590		New economy (2015) ('Hospital inpatients – average cost per episode, non-elective admissions)
	Premature deaths			*See below 'value of a life saved'*
Poisoning of others		£564		National Schedule Reference Costs (NSRC) 2014/15
Value of a life saved	Lost output		£651,853	Department for Transport WebTAG guidance documents; updated using GDP deflator
	Human costs		£1,265,578	
	Medical and ambulance costs	£1,135		
Lost economic output (e.g. from being unemployed)			£8,929	Frontier (2011); updated using GDP deflator
Costs associated with non-PDUs	Low estimate		£23,897	Frontier (2011); updated using GDP deflator
	Medium estimate		£37,247	
	High estimate		£50,590	
Home Office (2002) estimates of annual cost per problem Class A drug user				
Health costs (primary care, A&E, inpatients, mental health, drug-related deaths, neonatal services)	Low estimate	£3,727		Home Office (2002); updated using GDP deflator
	Medium estimate	£5,591		
	High estimate	£6,709		
Crime costs (arrest costs, custody costs, criminal justice costs, victim costs) – excludes violent crimes	Low estimate	£17,405		NTA (2012); updated using GDP deflator
	Medium estimate	£23,215		
	High estimate	£28,918		
Other social costs (caring for children in need)	Low estimate	£176		Home Office (2002); updated using GDP deflator
	Medium estimate	£263		
	High estimate	£315		

Source: PwC analysis

For the purposes of our analysis we estimate:

[173] This is a reasonable assumption given that ONS data indicate that around 95% of clients are retained for at least 12 weeks.
[174] ONS (2016).
[175] ONS (2016).

- Short term economic and social costs defined as the benefits and costs incurred by the NHS and the public sector during 2015 (see top panel of Figure 14); and
- Long term economic and social costs defined as the lifetime benefits and costs associated with the contribution of pharmacy SC services (see lower panel of Figure 14).

Throughout our valuation of the short and long term contribution of community pharmacy services, we rely on some key assumptions:

- The impact of treatment on health and social outcomes (see Table 36) is the same whether the 'substitute' drug is supervised or not;
- We assume that a SC treatment does not last for more than 12 months. This is based on NICE guidelines which suggest a duration of 3 to 6 months; and
- We use the assumptions set out in Table 36 to estimate the different costs incurred by the NHS and other parts of the public sector as a result of drug users who are in treatment compared to those who are not in treatment. More specifically, the cost estimates in Table 37 refer to the unit costs related to a drug user not in treatment. For each unit cost, we apply the associated reduction in the health or social outcome (e.g. 33% reduction in criminal activity) to estimate the cost associated with drug users who are in treatment (see Table 38).

Table 38: Estimating the health and social costs per drug user annually: in treatment and not in treatment (2015)

	Not in treatment	% reduction of activity / episodes if in treatment	In treatment
Health costs	£5,591	*42% reduction*	£3,243
Crime costs	£23,215	*33% reduction*	£15,554
Other social costs	£263	*38% reduction*[176]	£164
Lost economic output	£8,929	*16% reduction*	£7,519

Source: PwC analysis

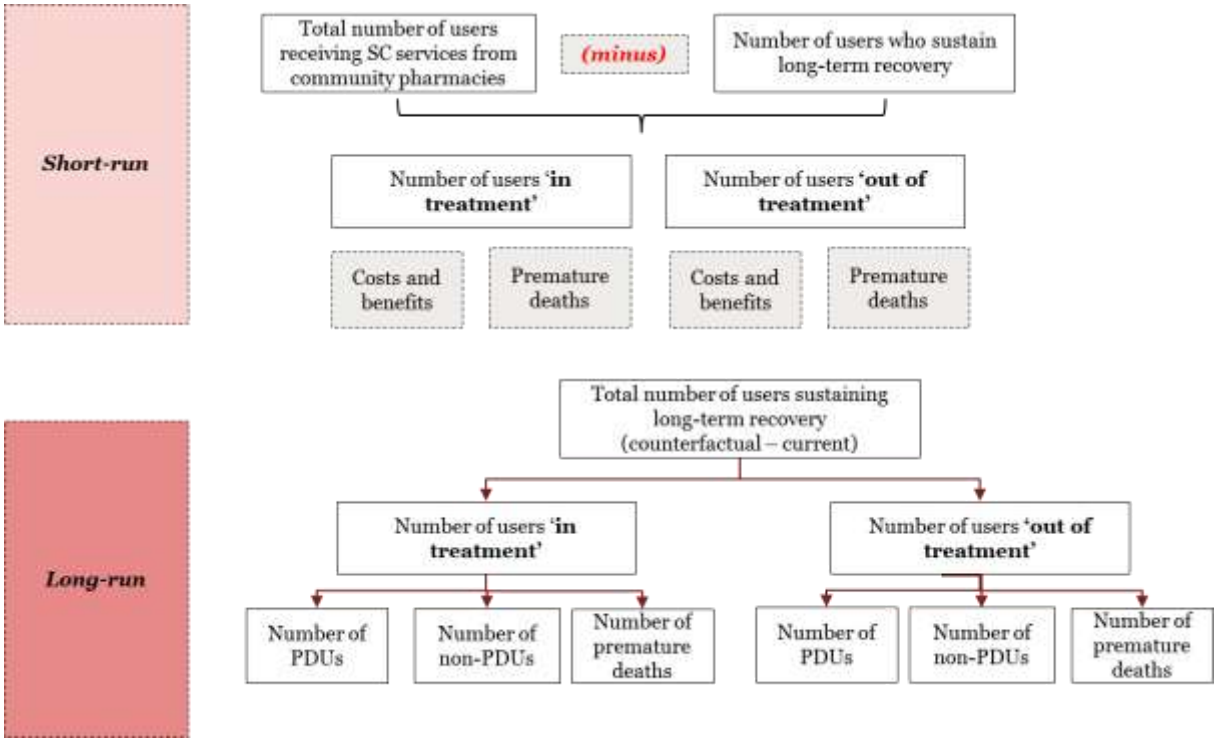
To assess the **short term** impacts, we estimate the number of people 'in treatment' / 'retained in treatment' and those 'not in treatment' in the counterfactual scenario (without community pharmacy's services) compared to the current scenario and then apply the net volume of individuals, i.e. the difference between the two, to the unit costs incurred by the NHS and the public sector.

To assess the **long term** impacts, as illustrated in the lower panel of Figure 14, we consider only the number of drug users who achieve long term recovery in the counterfactual compared to the current scenario, i.e. the incremental number of users who would achieve long term recovery in a scenario where pharmacies provide SC services compared to a scenario where pharmacies no longer provide these services (see Table 35).[177] To put a value on the long term contribution of SC pharmacy services we adopt the following approach:

- We estimate the number of people who go on to sustain long term recovery in the current and counterfactual scenario. We are interested in the difference between the two (i.e. the additional number of people who, most likely, would be unable to sustain recovery in the absence of community pharmacy SC services).
- We develop a scenario for what would happen to those people who sustain recovery in the absence of pharmacy services. To do this, we assume that:
  - 17.5% would be non-PDUs and 82.5% would be PDUs;
  - 58% would be in treatment at any point in time; and
  - Out of those in treatment, 0.15% would experience premature death compared to 0.53% of those out of treatment.
- We estimate the lifetime costs associated with those users who, in the absence of pharmacy services would continue to misuse drugs instead of sustaining a long term recovery.

[176] We assume that the reduction in other social costs is an average across the reduction in health and crime costs associated with treatment compared to no treatment.
[177] We also assume that 15% of all drug users would experience natural remission of their addiction and add to our estimation of the number of people who manage to sustain long-term recovery (Frontier, 2011).

Figure 14: Modelling the short and long run counterfactual



Source: PwC analysis

Following from above, to assess the long term contribution of community pharmacy services, we estimate the lifetime costs that could be avoided by the NHS and other parts of the public sector as a result of pharmacy SC services. To do this, we assume a drug-taking 'career' of 20 years and that treatment reduces the 'career' by 9 years, in line with evidence.[178] To avoid double counting, we also adjust the period during which the benefits will accrue to reflect the age range of users who receive SC services from community pharmacy. We use age data from PharmOutcomes to estimate the share of clients across age groups. Data from PharmOutcomes indicate that 69% of service users are aged 18-40, 30.5% are 41-60 and the rest are 61 and over. We then assume that for individuals who go on to achieve a long term recovery, treatment shortens their drug taking career by 9, 5 and 2 years respectively. Table 39 illustrates the assumptions we use to estimate the lifetime costs from the annual costs we draw from the literature. We then apply a 3.5% annual discount rate. On this basis, we estimate the net present value (NPV).

Table 39: Estimating lifetime costs avoided

Age group / share of sample	Number of years drug taking career has potentially been shortened	Number of individuals sustaining long-term recovery (net)	Source & calculation
Aged 18 to 40 *(69.2%)*	9	-3,806 (2.2% of total pharmacy clients)	PharmOutcomes, NTA (2012), own calculations
Aged 41 to 60 *(30.4%)*	5	-1,670 (0.9% of total pharmacy clients)	PharmOutcomes, NTA (2012), own calculations
Aged 61 and over *(0.4%)*	2	-25 (0.0% of total pharmacy clients)	PharmOutocmes, NTA (2012), own calculations

[178] NTA (2012); Bell et al. (2006).

Source: PwC analysis

5. Key results and sensitivities

Table 40 summarises the overall contribution of community pharmacy to society from providing SC services in England. It is based on combining the volume and value assumptions outlined above.

Table 40: Estimated value of SC services provided by community pharmacy (England, 2015)

Stakeholder	Impact area / path	Element	Volume	Value	Total value (£m)
Short term					
NHS	Reduction in SC service users through alternative routes / no treatment (e.g. central clinics, GP, unsupervised treatment or no treatment)	*Pharmacy*	*176,110*	*£249*	*£43.8*
		Counterfactual 'in treatment'	132,080	£226.9[179]	£30
		Counterfactual 'not in treatment'	44,030	£0	£0
		Net value			**-£13.8**
NHS	Avoided NHS healthcare costs through a reduction in the number of individuals not in treatment / in unsupervised treatment	Net - 'In treatment'	-21,783	£3,243	-£71
		Net - 'Not in treatment'	28,255	£5,591	£158
		Net value			**£87**
	Total				***£73.5***
Public sector	Avoided public sector costs through a reduction in the number of individuals not in treatment / in unsupervised treatment (crime-related costs, social costs related to children)	Net - 'In treatment'	-21,783	£15,719	-£342
		Net - 'Not in treatment'	28,255	£23,478	£663
		Net value			**£321**
Wider society	Avoided societal costs through a reduction in lost economic output	Net - 'In treatment'	-21,783	£7,519	-£164
		Net - 'Not in treatment'	28,255	£8,929	£252
		Net value			**£89**
	Avoided societal costs through a reduction in drug-related deaths	**Net value**	117	£1.9m	**£225**
	Total				**313**
Total					***£708***
Long term (*PDUs*)					
NHS	Avoided NHS healthcare costs through an increase in the number of users who sustain long-term recovery	In treatment		£6,161 to £24,672 (*varies by lifecycle*)	
		Not in treatment		£10,622 to £42,537 (*varies by lifecycle*)	
		Total value	5,340		**£136**
Public sector	Avoided public sector costs through an increase in the number of users who sustain long-term recovery	In treatment		£29,861 to £119,583 (*varies by lifecycle*)	
		Not in treatment		£44,602 to £178,616 (*varies by lifecycle*)	
		Total value	5,340		**£626**

[179] Weighted average of consultation fees & methadone costs by the number of service users seeking SC or unsupervised treatment through each alternative delivery channel.

Stakeholder	Impact area / path	Element	Volume	Value	Total value (£m)
Wider society	Avoided societal costs through a reduction in lost economic output	In treatment		£14,284 £57,203 (*varies by lifecycle*)	
		Not in treatment		£16,962 to £67,929 (*varies by lifecycle*)	
		Total value	5,340		**£279**
Long term (non-*PDUs*)[180]					
NHS / public sector/wider society	Avoided NHS and public sector costs through an increase in the number of users who sustain long-term recovery	**Net value**	1,133	£70,759 to £283,366 (*varies by lifecycle*)	**£280**
Long term					
Wider society	Avoided societal costs through a reduction in drug-related deaths[181]	**Net value**	16	£1.9m	**£30**
Total					**£1,352 (on average, £68 in NPV annually across 20 years)**
Total					***£2,060 (on average, £775 annually across 20 years)***

Source: PwC analysis

We estimate that SC services provided by community pharmacy resulted in an overall contribution to wider society of **£2.1 billion** in 2015. This translates to a contribution of £11,695 per person. . Looking at the **short term**, pharmacy SC services resulted in an annual cost saving to the NHS and the public sector of £708 million driven by more drug users being 'in treatment' when SC services are provided by pharmacies and, therefore, more users achieving a sustained recovery – £73.5 million savings to the NHS – a result of a direct cost 'saving' to the NHS of £13.8 million and an indirect cost increase of £87 million related to healthcare treatment of drug-related illnesses –; £321 million driven by a reduction in criminal offenses and other social costs when users are in treatment; £89 million driven by a reduction in lost economic output due to drug misuse; and £225 million driven by 117 avoided drug-related deaths. Finally, we also assess the potential **long term** contribution of SC services to be £1.35 billion driven by the number of users sustaining long term recovery who, in the absence of being able to access pharmacy SC services, would remain drug users. Assuming that these long run benefits would accrue over a 20 year period, we estimate that the average annual contribution of community pharmacy is **£775 million in NPV** (i.e. £721 million in the short run and an additional £68 million in NPV terms annually over a course of 20 years).

Sensitivities

Our results are sensitive to the assumptions we have made, including:

- The cost of supervised and unsupervised treatment across each delivery channel;
- The estimates of the health and public sector costs related to drug use; and
- How individuals would have responded if community pharmacy did not provide SC services.

We have, therefore, tested the sensitivity of our results to altering each of these assumptions.

The cost of supervised and unsupervised treatment across each delivery channel

Providing treatment for drug users is a cost to the Department of Health. Our 'base case' uses a combination of assumptions and evidence on the reimbursement received by pharmacies per

[180] In the absence of pharmacy services, these users would become non-problematic drug users.
[181] We assume that, in the absence of SC pharmacy services, 75% of those who would remain drug users would be in treatment and the remaining not and apply the estimated mortality rates. We do not discount the value of life saved.

supervision, NHS costs per GP appointment, information on the cost of methadone and NICE guidelines on the suggested dose range per treatment period. We have not found any publicly available data on the cost of 'substitute' treatment, supervised and unsupervised, across the alternative delivery channels.

To assess the robustness of our results, we run sensitivity analysis using cost estimates from two alternative sources as demonstrated in Table 41:

- The first option is based on 2008-9 estimates on unit health care costs for 'methadone maintenance' (i.e. the cost of maintaining a drug-misuser on a methadone treatment programme (Curtis, 2009)).[182]
- The second option is based on calculations using data on GP prescriptions in England from HSCIC.[183] We calculate the average cost of methadone per service user per year using information from HSCIC on the actual cost to the NHS and an estimate of the total number of individuals in receipt of GP methadone prescriptions using PSNC analysis on the average duration of treatment (12.67 days, i.e. the frequency of prescriptions items provided by GPs). We also assume that the average duration of treatment per service user per year is three months; this implies 7.2 prescription items provided by GPs to each service user.

Table 41: Counterfactual scenarios of SC supply in the absence of pharmacy services – alternative cost estimations

	Alternative service providers / delivery channels	NHS cost	Source & calculation
Option 1	Methadone maintenance – cost of maintaining a drug-misuser on a methadone treatment programme	£68 *per week* £1,051 *per treatment of 77.3 supervisions*	New economy (2015) / Curtis (2009) & own calculations Assume cost is the same across all supervised consumption settings
Option 2	Cost of methadone per service user per treatment service user (annual)	*Consultations: as base case scenario* *Cost of methadone: £53.3*	HSCIC GP Practice Prescribing Presentation-level Data (2016) PSNC sample analysis of methadone prescriptions (2012)

Source: PwC analysis

We use these estimates to assess the impact on our results. Our analysis shows that, similar to our 'base case', in the absence of community pharmacy SC services, as people fall out of treatment, this would result in a 'saving' to the NHS. What differs is the magnitude of this saving driven by the higher or lower unit costs. Table 42 shows the impact of this sensitivity result in our final estimates.

Table 42: Sensitivity analysis #1 – NHS cost of supervised consumption treatment across the delivery channels

Stakeholder	Impact area / path	Option 1	'Base case'	Option 2
NHS	Reduction in SC service users through alternative routes / no treatment (e.g. central clinics, GP, unsupervised treatment or no treatment)	-£132.1	-£13.8	-£12.1
Total		***£1,941***	***2,060***	***£2,061***

Source: PwC analysis

The range of estimated health and public sector costs related to drug use

In this sensitivity we explore the impact of the estimated health, crime and social costs. In our base case scenario used to calculate the key results we use the 'medium' estimates. However, as shown in

[182] Sources from the 2009 PSSRU 'Unit Costs of Health and Social Care' publication as this figure was not included in more recent editions. Methadone programmes are generally provided by NHS community drug teams, either based on a hospital site or in the community; a small number of programmes were provided by GP surgeries. The source quotes methadone costs of £26 per service user per week (including the cost of prescriptions, any pharmacist dispensing fees, and any toxicology tests), along with related capital and revenue cost of £33 per service user per week (covering buildings and land, equipment and durables, staff costs, supplies and services and site and agency overheads). However, there is considerable variance in unit costs across the 15 programmes considered for the research ranging from £10 to £137 per week (2008-9 prices).
[183] HSCIC (2016)

Table 37 both the Home Office and the NTA provide a range of estimates, from low to high. In the table below, we present our results using the low and high estimates.

Our sensitivity analysis indicates that the total contribution of community pharmacy SC services ranges from £1,643 million to £2,437 million when we apply low and high estimates of drug-related costs incurred by the NHS and the public sector.

Table 43: Sensitivity analysis #2 – Range of health and social costs associated with drug use

	Alternative delivery channels	Short run	Long run	Total value (£m)
Low estimate	-£13.8	£612	£1,049	***£1,647***
Medium estimate (key scenario)	-£13.8	£721	£1,352	***£2,060***
High estimate	-£13.8	£818	£1,633	***£2,437***

Source: PwC analysis

Proportion of individuals who would not seek treatment if not provided by community pharmacy

In this sensitivity analysis we explore the impact of our assumption regarding the proportion of users who, in the absence of pharmacy SC services, would receive no treatment. In our key scenario we estimated this at 25%. We explore two sensitivity scenarios; one where only 15% would not receive treatment and one where 35% would not. We assume that the remaining users would receive treatment from an alternative NHS channel.

Table 44: Sensitivity analysis #3 - Counterfactual scenarios of SC supply in the absence of pharmacy services[184]

Alternative service providers / delivery channels	No treatment (15%)	No treatment (25%) *Key scenario*	No treatment (35%)
Community pharmacy	*100%*	*100%*	*100%*
Local drug service / central clinic / equivalent	31%	22%	13%
GP with special interests in substance users	3%	2%	1%
Unsupervised 'substitute' treatment	51%	51%	51%
No treatment	15%	25%	35%

Source: PwC analysis

Our results show that changing our input assumption for the number of people who would fall out of treatment to 15% and 35% (compared to 25% in our key scenario) leads to a variation of 39% less / more respectively in the estimated total contribution of community pharmacy SC services.

Table 45: Sensitivity analysis #3 – Proportion of users not receiving treatment

	Alternative delivery channels	Short run	Long run	Total value (£m)
No treatment (15%)	-£4.8	£433	£811	***£1,239***
No treatment (25%) *Key scenario*	-£13.8	£721	£1,352	***£2,060***
No treatment (35%)	-£22.8	£1,010	£1,892	***£2,880***

Source: PwC analysis

Interpretation of the results

It is important to note that our analysis has limitations. Our study is limited by lack of detailed data and the absence of robust evidence that can be used to evaluate the likely effect of treatment across different settings and between supervised and unsupervised treatment. Moreover, our analysis is

[184] All volume figures in this chapter are rounded to the nearest tenth (00).

sensitive to a range of key assumptions as illustrated above and, therefore, results should be interpreted with caution.

In relation to our estimate of the contribution associated with the lifetime of a drug user it is important to note that our analysis is sensitive to key assumptions such as the share of users who in the absence of pharmacy would receive no treatment as well as the range of cost estimates used (e.g. lower or upper bound). Our sensitivity analyses show that the long run contribution of community pharmacy may range from **£1.2 billion to £2.9 billion** depending on the assumptions used. Our key estimate of the total contribution of SC services comes to **£2.1 billion**, including long run considerations. This figure is large, and is mainly driven by the high health, economic and social costs attributed to drug abuse. It is useful to put this figure in context.

- The NTA estimates that drug addiction costs society an estimated £15.4 billion: this includes costs of £13.9 billion due to drug-related crime and around £0.5 billion due to health-related episodes:[185]
  - Using publicly available sources as outlined in Section 4, we can approximate the number of drug users that pharmacy-based SC programmes reach. We start with the number of high risk drug users using the UK Focal Point 2015 report which estimated that, in 2014, there were around 293,879 high risk users in England;
  - Moreover, as discussed above, there is an increased number of people who use anabolic steroids but data are limited. We use evidence from the CSEW which shows that in 2012/13, the prevalence of anabolic steroid use among 16 to 59 year olds in England was 69,012; and
  - Combining the two steps outlined above, pharmacy based SC services reaches slightly less than half (48.5%) of drug users in England. This compares to the contribution of pharmacy based SC services of around 13.4% of the estimated NTA drug addiction costs to society. The figures are not directly comparable but illustrate how the estimated results compare to the NTA cost estimates.

Finally, our estimate is likely to be conservative because we focus on a narrow set of impacts including health, crime and premature deaths. Drug treatment has been shown to have a positive impact on families affected by drug misuse and can reduce the amount of prescribed medicines (e.g. methadone) sold into the illicit drugs market. We do not, however, calculate any of these knock-on benefits from being in treatment due to data limitations and the lack of a clear causal pathway.

[185] NTA (2014).

Self-care support

Minor ailments advice

1. Introduction

This chapter provides our assessment of the value associated with community pharmacy's current role in providing minor ailments advice in England. We estimate the value that would be at risk if community pharmacy no longer supplied its current service, using data for 2015.

The chapter is structured as follows:

- Section 2 describes the service currently provided by community pharmacy, including what it means from the patient perspective, and sets out our assumptions for what would happen from the patient perspective if community pharmacy did not provide its current service (i.e. the counterfactual);
- Section 3 describes the value that flows from the current activities of community pharmacy in terms of potential avoided costs to the NHS, the patient and wider society, and explains the key impacts;
- Section 4 explains our approach to assessing each element of expected value, specifically:
    - How we estimate the number of individuals who benefit from the service currently provided by the pharmacy (the 'volume'); and
    - How we estimate the value delivered each time the service is provided (i.e. for each individual patient) (the 'value'); and
- Section 5 summarises our key results as well as the results of our sensitivity analysis.

A set of technical appendices provides further details of the methodology and the data sources we use to estimate the value of the minor ailments service provided by community pharmacy in England in 2015.

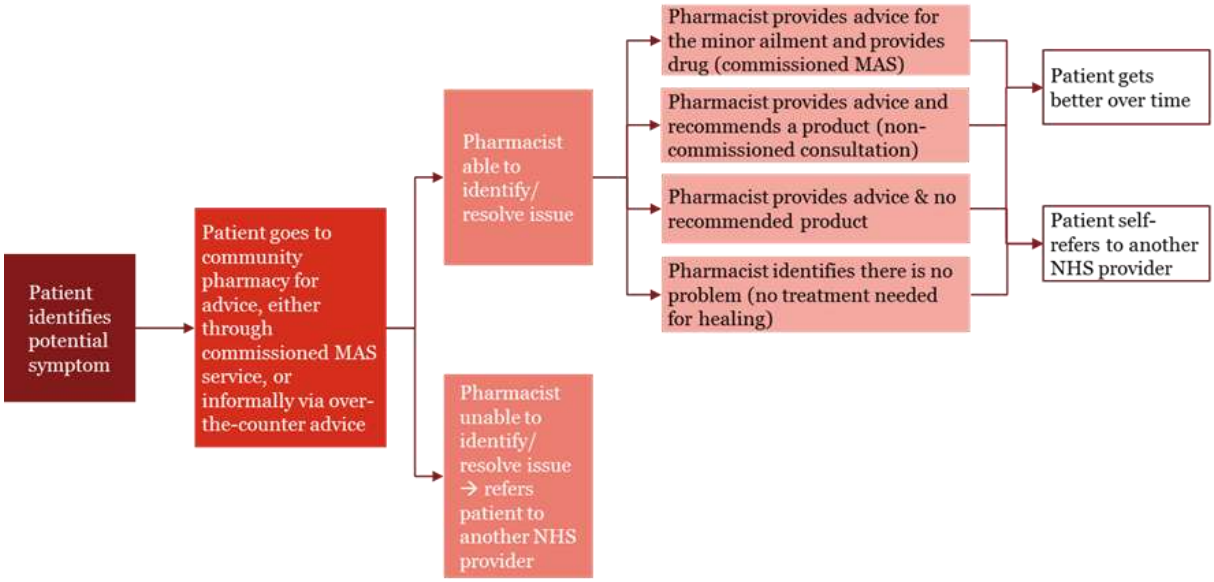
2. Description of activity

Community pharmacy currently provides patients with advice on minor ailments, such as colds, sprains and hay fever. It does this either through a locally commissioned minor ailments service or through over-the-counter advice.

Informal minor ailments advice falls within the NHS Community Pharmacy Contractual Framework (CPCF) as an essential service; specifically, the provision of advice and support by pharmacy staff to enable people to derive maximum benefit from caring for themselves or their families.

This current patient pathway is presented in Figure 15.

Figure 15: Current service user pathway (through community pharmacy)



Source: PwC analysis

If community pharmacy did not provide a minor ailments service, some patients would seek equivalent support from other parts of the health system, in particular GP practices, A&E departments, walk-in-centres and GP out-of-hours clinics (GP OOH). Others may do nothing: whilst this would avoid immediate costs for the NHS, it may be at the expense of future costs for the NHS if patients' symptoms worsened and treatment was later required. And others may opt to pay for a service.

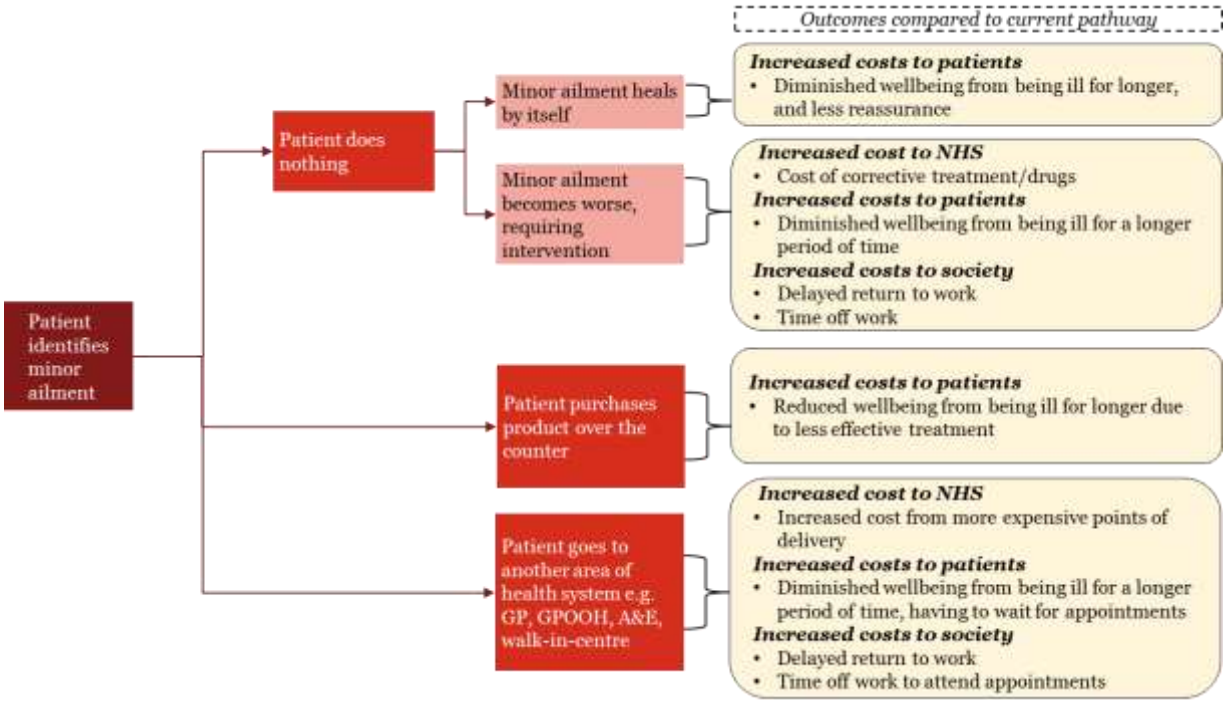
3. Contribution of community pharmacy

Community pharmacy generates value by providing advice on minor ailments because it:

- Avoids the need for GP appointments (or, indeed, other points of delivery such as A&E departments, GP OOH, or walk-in-centres), thus saving the NHS the cost and the patients the additional time burden;
- Accelerates the recovery of patients by providing faster access to treatment (and avoiding the need to wait for, say, an appointment with a GP); and
- Prevents patients' conditions from worsening if they would choose to 'do nothing' if the option of quick and easy access advice from a community pharmacy was not available.

We summarise these impacts in Figure 16 and describe them in more detail below.

Figure 16: Counterfactual service user pathway in the absence of community pharmacy services



Source: PwC analysis

1. For the NHS, the minor ailments service that community pharmacy currently provides:

    a. Reduces the need for a GP appointment, GP OOH consultation, walk-in-centre visit, or A&E attendance;
    b. Reduces future treatment costs for patients who otherwise would have done nothing and, as a consequence, might subsequently develop more severe symptoms; and
    c. Directs patients to the most appropriate alternative NHS provider where a subsequent referral is needed, for example saving the NHS costs in instances where a patient would have gone to A&E when they could have waited for a GP appointment at a lower cost to the NHS.

2. For patients, the minor ailments service that community pharmacy provides:

    a. Saves them time because they do not necessarily have to attend delivery points which take them more time (e.g. GPs, GP OOHs, walk-in-centres or A&E departments);
    b. Leads to a faster recovery if they avoid having to wait for a GP appointment;
    c. Reduces the risk of a worsening condition for those who would have done nothing and developed more advanced symptoms; and
    d. Provides quicker reassurance even if they are not physically ill, and this boosts their wellbeing by reducing anxiety.

3. For wider society, for those who are economically active, the minor ailments service that community pharmacy provides:

    a. Reduces the amount of working time which is lost attending other delivery points such as their GP; and
    b. Enables them to return to work more quickly than they would otherwise have been able to do.

4. Approach to estimating the contribution of community pharmacy

Our approach to determining the value of community pharmacy in England in 2015 involves two elements:

- Estimating the number of times that community pharmacy has delivered minor ailments advice and generated each of the benefits described earlier (the 'volume'); and
- Estimating the value delivered each time the service is provided (the 'value').

We summarise our approach to each element below; more details are provided in the technical appendices.

Volume

To estimate how many times community pharmacy provided minor ailments advice in England in 2015 we rely upon two main sources:

- For commissioned minor ailments services, we use data from the PharmOutcomes database (see Appendix 3 for more details on our approach); and
- For non-commissioned minor ailments advice, we use data from the primary data collection specifically designed for this report (discussed in more detail in Appendix 2).

Commissioned minor ailments services

The PharmOutcomes database collates information on commissioned pharmacy services by allowing community pharmacy teams to keep records of their delivery of locally commissioned services so that payment claims can be automatically created. The data recorded include the number of commissioned MAS consultations by age, and the total number of commissioned MAS consultations. In practice, not all commissioners use PharmOutcomes which means that the data do not cover all commissioned MAS consultations. We, therefore, extrapolate the data that we have to estimate the total number of commissioned MAS consultations provided by community pharmacy in 2015 in England. This approach is outlined in detail in Appendix 3.

On this basis, we estimate that the number of commissioned MAS consultations across England in 2015 was 843,000. We compare this estimate with the results of other extrapolation approaches in Table 46; we later test the sensitivity of our value estimates to these alternative approaches (see Table 62).

Table 46: Estimated number of commissioned MAS consultations in England in 2015 using different extrapolation approaches (million)

Extrapolation method	Estimated number of consultations (million)
Simple average extrapolation (main estimate) (i.e. all services in PharmOutcomes carry equal weight)	0.84
Weighted average extrapolation using number of consultations (i.e. services with more consultations on PharmOutcomes carry more weight)	1.44
Weighted average extrapolation using population size (i.e. services on PharmOutcomes which cover a wider population carry more weight)	0.89
Simple extrapolation by population (i.e. multiplying the number of consultations on PharmOutcomes by the ratio of the whole population covered by commissioned MAS over the population covered by services on PharmOutcomes)	0.84
Simple extrapolation by number of services on PharmOutcomes (i.e. multiplying the number of consultations on PharmOutcomes by the ratio of the total number of commissioned MAS by the number of services on PharmOutcomes)	1.13

Source: PwC analysis

The avoided cost to the NHS from the service provided by community pharmacy is lower in instances where the pharmacist refers the patient to another NHS provider compared to cases where a pharmacist does not refer a patient elsewhere in the health system. For example if a patient would otherwise have gone to a GP, and the community pharmacy refers them to a GP following a consultation, the cost of the GP appointment is not avoided. Conversely, if a patient would otherwise have gone to the GP, and the community pharmacy consultation avoids the need for onward referral, the cost of a GP appointment is avoided.

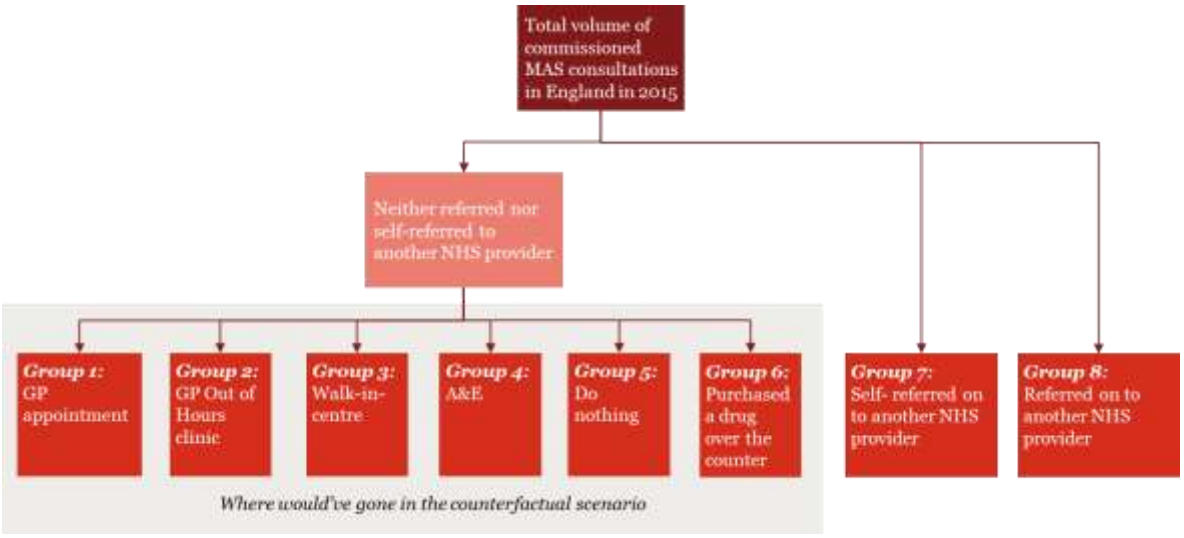
Consequently, we estimate how many of the 843,000 patients were referred on to another point of delivery in the healthcare system as a follow up to their MAS consultation. To estimate the proportion who were referred onwards by the pharmacist, we use data from the PharmOutcomes database which shows that 2% of commissioned MAS consultations led to an onward referral[186]. This implies that there were 15,000 onward referrals following the 843,000 commissioned MAS consultations (i.e. 828,000 consultations did not lead to a referral to another provider by the pharmacist).

Similarly, we also consider how many patients self-refer following their MAS consultation, for example if they do not accept the pharmacist's advice. In these instances, there is no avoided cost for the NHS as the patient is assumed to use the other provider both with and without a minor ailments service. To estimate the volume of patients that self-refer, we use the results of an evaluation of the Birmingham, Solihull & Black Country locally commissioned minor ailment service in February 2015[187] which found that 9% of patients returned to their GP in the days following their MAS consultation. Assuming that this is representative of the population of England as a whole implies that 75,000 of the 828,000 who were not referred to another NHS provider by the pharmacy subsequently self-referred.

For the remaining 754,000 consultations[188] there is an avoided cost to the NHS as patients would have gone to an alternative, potentially more expensive NHS provider if the community pharmacy service had not been available (with the exception of those patients who would have done nothing in the absence of a community pharmacy MAS). Community pharmacy, therefore, affects the need for these additional appointments.

To understand the value that community pharmacy provides, we estimate how many patients would respond to the absence of a MAS in different ways. Figure 17 summarises the possible responses of patients.

Figure 17: Assumed counterfactual groups for commissioned MAS



Source: PwC analysis

Each alternative path gives rise to a different cost to the NHS, so we consider each separately. We use data from PharmOutcomes[189] which asks patients where they would have gone if they had not used the commissioned MAS. The results are presented in Table 47. We apply the proportions to the 754,000 patients that were neither referred nor self-referred to another NHS provider to estimate the expected use of alternative providers. For example, the PharmOutcomes data suggest that 91.6% of patients would have gone to a GP as an alternative to a community pharmacy. This implies that community pharmacy's minor ailments service avoids 691,000 GP appointments. Finally, we allocate

[186] PSNC Briefing (August 2015); we do not extend this assumed proportion to non-commissioned minor ailments consultations.
[187] Pharmacy First –Liberating Capacity (February 2015)
[188] Slight difference due to rounding (828,000 – 75,000 = 754,000)
[189] PSNC Briefing (August 2015)

each possible pathway in the PharmOutcomes data to one of six groups which we use as the basis for our impact estimates:

- GP appointment;
- GP OOH consultation;
- Walk-in centre visit;
- A&E department attendance;
- Do nothing which includes those patients who responded that they would either have 'done nothing', 'gone without medication', 'taken other action' or did not answer the question; and
- Purchase OTC medicine.

Table 47: Alternative pathway for those patients who were not referred, and did not self-refer after their MAS consultation

Alternative pathway	Proportion (%)	Number in England (2015)	Assumed counterfactual group
GP	91.6%	691,000	GP
GP OOH	0.1%	500	GP OOH
Walk-in centre	1.6%	12,000	Walk-in centre
A&E	0.2%	1,000	A&E
Do nothing	0.0%	65	Do nothing
Purchased OTC	1.7%	13,000	OTC
Called NHS 111	0.0%	128	GP OOH
Gone without medication	0.2%	2,000	Do nothing
Other	4.6%	35,000	Do nothing
Did not answer question	0.0%	254	Do nothing
Total	**100.0%**	**754,000**	

Source: PwC analysis; Note: Number in England rounded to nearest 500 where the volume is greater than 500

Table 48 shows the estimated breakdown of the 843,000 consultations which are in each group, applying the assumptions in Table 47. These volumes form the basis for our value estimates for commissioned MAS. For example, we estimate that 81.9% of the 843,000 commissioned MAS consultations were neither referred nor self-referred in the actual scenario and would have gone to a GP in the counterfactual scenario.

Table 48: Estimated used of alternative providers with no community pharmacy minor ailments service (2015)

Alternative provider	Proportion (%)	Number in England ('000, 2015)
1. GP	81.9%	691
2. GP OOH	0.1%	1
3. Walk-in centre	1.4%	12
4. A&E	0.1%	1
5. Done nothing	4.3%	37
6. Purchased OTC	1.5%	13
7. Onward referral	1.8%	15
8. Self-referred	8.8%	75
Total	**100.0%**	**843**

Source: PwC analysis

Non-commissioned minor ailments services

For non-commissioned minor ailments consultations we rely on data from the data collection exercise that was undertaken for this report (see Appendix 2 for more detail). Specifically, all members of the teams in community pharmacies were asked to record each occasion when they provide advice on self-

care or OTC medicines to patients (but not as part of an NHS commissioned MAS or Pharmacy First service).[190] The exercise covered a one week period.

Table 49 shows the overall average number of instances each pharmacy provided different types of advice. We also show the upper and lower bounds of the 95% confidence intervals. We use the average for all pharmacies as our base case and test the sensitivity of our results to the confidence intervals (see Table 59).

Table 49: Average incidence of different community pharmacy responses per pharmacy over one week period

Response type	Average per pharmacy	95% confidence interval – lower bound	95% confidence interval – upper bound
Advice and product supplied, with referral to another healthcare provider	16	13	18
Advice and no product supplied, with referral to another healthcare provider	14	12	16
Advice and product, with no referral to another healthcare provider	74	57	91
Advice and no product, with no referral to another healthcare provider	16	13	18
Total	**120**	**96**	**143**

Source: PwC analysis

We estimate the volume of minor ailments consultations based on data collected by 1,488 pharmacies in June 2016. The number of consultations identified in this is used as the basis for estimating the total volume in 2015. We extrapolate these results across England by multiplying the averages above by 52.14 to annualise the data and then by 11,815, the total number of community pharmacies in England.[191] Our results are presented in Table 50 which shows an estimated 73.7 million non-commissioned minor ailments consultations annually in England in 2015.

Table 50: Estimated annual volume of non-commissioned minor ailments consultations in community pharmacies in England in 2015

Response type	Average per pharmacy annually	Annual volume in England (m)
Advice and product supplied, with referral to another healthcare provider	813	9.6
Advice and no product supplied, with referral to another healthcare provider	730	8.6
Advice and product, with no referral to another healthcare provider	3,877	45.8
Advice and no product, with no referral to another healthcare provider	821	9.7
Total	**6,240**	**73.7**

Source: PwC analysis

In order to establish where there is a direct avoided cost to the NHS, we separate out those instances where patients were either referred to another NHS provider or self-referred to another point of delivery. The top two categories in Table 50 are patients who were referred to a different (NHS) healthcare provider. These sum to 18.2 million. This is a conservative approach as many of the patients within the 'product supplied and referral' group would have been advised to self-refer only if there was no relief of symptoms within a specified number of days. The patients who do get relief within the specified period would, therefore, not self-refer, and hence not incur an additional cost on the NHS.

This approach means that for the 55.5 million remaining consultations the patient was not referred on to another healthcare provider. Again, as with our treatment of commissioned MAS consultations, where a patient is not referred by the pharmacist to another healthcare provider, we assume that 9% would self-refer after their pharmacy consultation, for example because they are not confident about

[190] This includes occasions when a patient/customer asks for a medicine by name, but the pharmacist provides advice on the medicine or the condition it is being used to treat.
[191] NHS Business Services Authority (December 2015)

the advice they receive. We assume, therefore, that 5.0 million out of 55.5 million patients that were not referred to another provider went on to self-refer. This likely overestimates the proportion of patients who self-refer following non-commissioned consultations, given that we later assume that only 25% of patients would have gone to a GP in the counterfactual. This is, therefore, a conservative approach as the avoided costs for those that self-refer are significantly lower than for other counterfactual groups. We test a series of sensitivities around this assumption below (see Table 61).

For the remaining 50.5 million patients who were neither referred nor self-referred to another NHS provider, we estimate how they would have behaved if a MAS had not been provided by community pharmacy so that we can estimate the costs avoided as a result of community pharmacy's actions. We draw on a recent YouGov survey which found that 25% of those that currently go to their community pharmacy for non-commissioned minor ailments advice would have gone to a GP instead.[192] We, therefore, estimate that 12.6 million of the remaining 50.5 million who neither self-refer nor were referred by a pharmacist would have gone to their GP in the absence of community pharmacy minor ailments service.

For the remaining 75% of the 50.5 million who were neither referred nor self-referred, we apply the ratio of other counterfactual routes in relation to GP appointments that we use for commissioned services which is based on the PharmOutcomes data (i.e. the proportions outlined in column 3 of Table 47). For example, 91.6% of commissioned MAS consultations would have gone to a GP in the absence of a minor ailments service and 1.6% would have gone to a walk-in centre. This implies that, for every patient that would have gone to a walk-in centre, 58 would have gone to a GP. Applying this ratio to the 12.6 million patients who we estimate would have gone to a GP (instead of going to a non-commissioned minor ailments service) implies that 0.2 million patients would have gone to a walk-in centre.

The results of our calculation for all the alternative pathways identified in the PharmOutcomes data are presented in Table 51. In total, using this method, we estimate where 2.28% of the 50.5 million would have gone in the counterfactual scenario, in addition to the 25% that would have gone to the GP. For the remaining 72.72% of patients we assume that they would have 'done nothing' if community pharmacy did not provide advice for minor ailments.[193] The proportion of patients assumed to 'do nothing' in the counterfactual is higher for non-commissioned consultations in comparison to commissioned ones. For most commissioned minor ailments consultations (66%)[194], the patient was referred by their GP Practice, knowing that the commissioned service was in place in the local area. There is not a comparative figure for non-commissioned consultations, however one would expect the proportion who were referred by their GP to be significantly lower. Those who self-refer to a community pharmacy are more likely to do nothing in the counterfactual than those who were referred by their GP, for example because they do not perceive their minor ailment to be severe enough to require a GP appointment, given the availability of the community pharmacy. This, therefore, explains the difference in counterfactual proportions between commissioned and non-commissioned minor ailments consultations. In line with the treatment for commissioned services, we then group these counterfactual pathways into the same six assumed counterfactual groups.

Table 51: Counterfactual pathway of those who were not referred, and did not self-refer after their non-commissioned minor ailment consultation

Counterfactual pathway	Proportion for commissioned services	Derived proportion	Derived volume (million)	Assumed counterfactual group
GP	91.6%	25.00%	12.6	GP
GP OOH	0.1%	0.02%	0.0	GP OOH
Walk-in centre	1.6%	0.43%	0.2	Walk-in centre
A&E	0.2%	0.04%	0.0	A&E

[192] Cited in Pharmacy Voice (May 2016)
[193] This methodology is conservative because the proportion of patients who would have gone to a GP in the counterfactual for commissioned minor ailments consultations is high relative to other options since 66% of patients using commissioned minor ailments services are already referred there by their GP's practice (PSNC Briefing, August 2015). This means we would expect them to go to the GP as the alternative (as they have revealed this preference). The proportion that are referred to their community pharmacy is unlikely to be as high for non-commissioned minor ailments consultations, hence other points of delivery will have a higher counterfactual proportion in comparison to visiting the GP.
[194] PSNC Briefing (August 2015)

Counterfactual pathway	Proportion for commissioned services	Derived proportion	Derived volume (million)	Assumed counterfactual group
Done nothing	0.0%	72.72%	36.7	Done nothing
Purchased OTC	1.7%	0.46%	0.2	OTC
Called NHS 111	0.0%	0.00%	0.0	GP OOH
Gone without medication	0.2%	0.06%	0.0	Done nothing
Other	4.6%	1.26%	0.6	Done nothing
Did not answer question	0.0%	0.01%	0.0	Done nothing
Total	**100.0%**	**100%**	**50.5**	

Source: PwC analysis

Applying the assumptions outlined in the final column of Table 51 results in the volumes in the first 6 counterfactual groupings in column 2 of Table 52 below. These volumes are then expressed as a proportion of the total number of non-commissioned minor ailments consultations (73.7m). The final two counterfactual groups are for those where the patient is referred to another NHS provider and those where the patient self-refers to another point of delivery respectively (see above). It is these volumes that form the basis of our impact estimation for non-commissioned minor ailments services. For example 17.1% of the 73.7 million commissioned minor ailments consultations were neither referred nor self-referred in the actual scenario, and would have gone to a GP in the counterfactual scenario.

Table 52: Counterfactual pathway groups for non-commissioned minor ailments consultations

Counterfactual group	Number in England (m) (2015)	Proportion
1. GP	12.6	17.1%
2. GP OOH	0.0	0.0%
3. Walk-in centre	0.2	0.3%
4. A&E	0.0	0.0%
5. Done nothing	37.4	50.7%
6. Purchased OTC	0.2	0.3%
7. Onward referral	18.2	24.7%
8. Self-referred	5.0	6.8%
Total	**73.7**	**100.0%**

Source: PwC analysis

Value

For each of the eight groups outlined in Table 48 and Table 52 we make a series of assumptions to estimate the value of each MAS consultation provided by community pharmacy. The impact values vary by group depending on whether or not the patient was referred (or self-referred) and on what the patient would have done if community pharmacy did not provide advice on minor ailments. In order to determine the contribution of community pharmacy above and beyond the cost of the service provided, we then deduct the cost to the NHS and to patients in the current scenario to arrive at a net impact estimation.

To estimate the value to the NHS of community pharmacy's minor ailments service, we consider the avoided costs had patients instead gone to alternative NHS providers. For those that would have gone to a GP or walk-in centre, the avoided costs are £45 per consultation[195] and £33.49 per consultation[196] respectively. For those that would have gone to a GP OOH appointment the avoided cost is £70.74 per consultation[197] plus £8.53 per NHS 111 call to access a GP OOH appointment.[198] Similarly for each

[195] Curtis (2015); assuming an 11.7 minute consultation, including carbon emissions and direct care staff costs.
[196] Curtis (2012); uplifted to 2015 prices using the ratio of the cost of a GP appointment in 2012 (£43) to the cost of a GP appointment in 2015 (£45); i.e. £32 * (45/43)
[197] £68 uplifted to 2015 price levels using the GDP deflator; NAO (2014)
[198] £8 uplifted to 2015 prices using the GDP deflator; Turner et al. (2012)

avoided A&E visit we use an avoided cost of £68.[199] For all other counterfactual pathways we assume that there is no direct avoided cost to the NHS, for example patients who would have done nothing.

Patients also save time in the current scenario, for example not having to attend a GP appointment which takes more time than a visit to a community pharmacist. In our counterfactual scenario there is, therefore, a cost from the additional time expense for patients. For those in work who can take time off to attend their GP, the cost of the time lost will accrue to society through lost output. For all others, the cost will be borne by the patient as lost leisure time. We estimate that 28.8% of patients who would attend an appointment with their GP in the absence of a community pharmacy MAS would do so at the expense of lost working time (see Appendix 4). For patients going to A&E, a GP OOH clinic or a walk-in centre, we assume that all time lost is leisure time as it is assumed that the primary reason for attending these points of delivery is the accessibility outside of working hours. Given the accessibility and speed of service at a community pharmacy, we also assume that all time to visit a community pharmacy is leisure time.

To value the time saving to patients in each counterfactual scenario we multiply the amount of time saved by the value of time. To estimate the additional cost to patients' time from attending alternative NHS providers, we rely on a range of time estimates as outlined in Appendix 4. For example, we estimate that to book, travel to and from, wait for and attend a GP appointment takes a total of 35.4 minutes. For appointments at the expense of time in work, this is at a cost to society of £18.57, and for all others a cost of £4.16. We take a weighted average of these two figures. For example for the cost to society, we multiply £18.57 by 28.8% to get an average cost per GP consultation of £5.35. To consider only the additional time burden on patients in the counterfactual scenario we deduct the time it takes to attend a community pharmacy MAS consultation (23.0 minutes) in our net benefit calculations in Table 54 below.

Where a patient's recovery is delayed, they may need to take (additional) time off work. We value such time as the average Gross Value Added (GVA) per hour worked.[200] We weight this cost by the proportion of patients to whom this applies, estimating that 2.53% of prescription items have an associated spell of sickness absence[201]. We apply this estimate to the number of minor ailments consultations that would have otherwise been GP appointments, and assume that the extended duration of sickness absence is equal to the average wait for a GP appointment (2.05 days).[202] This results in an average cost per GP consultation of £7.20.

For those patients who are referred to another NHS provider, community pharmacy provides value by directing them to the most appropriate source of treatment, thus saving costs for the NHS from patients who would have gone to a more expensive point of delivery. For example, if a patient would have gone to A&E, but the community pharmacy directs a patient instead to a GP appointment, this would save the NHS money. Similarly, many patients would have done nothing in the counterfactual scenario. In these instances, community pharmacy provides value by preventing the need for future treatment costs when the symptoms become more severe and potentially more costly to correct. Due to the lack of available evidence for both of these impact areas, however, we do not consider the cost or benefit to the NHS from patients who are referred to alternative providers. In practice, in our model and this report henceforth, we, therefore, assume that for patients referred to another NHS provider the cost to the NHS is equal to the benefit provided by community pharmacy.

Finally, we estimate the wellbeing benefits from getting better sooner, including the reassurance that comes with this, for example as a result of not having to wait for a GP appointment. We assume that the compensating equivalent of a day of illness is £9.20.[203] For those patients who would otherwise

[199] New Economy (2015)
[200] £31.50; ONS (March 2016)
[201] We calculate this by dividing the total number of sickness spells in England by the total number of prescription items in England in 2015. To estimate the total number of sickness spells per year, we divide the total number of sickness days per year in England (110 million) by the average number of sickness days per year per worker (4.4) (both taken from ONS (February 2014) with the number of sickness days scaled down from UK to England using 2015 ONS population estimates for the UK and England (ONS, June 2015)). The average number of sickness days per worker per year is used as a proxy for the average duration of a spell of sick leave. We believe this is a reasonable assumption given that 20.6% of all sick days are for minor ailments, the same proportion as minor ailments are out of all GP appointments (PAGB, 2008))
[202] We assume seven hours in a working day and 230 working days in a year
[203] We estimate this using data from Fujiwara, D (2013) (see Appendix 5).

have gone to a GP, we assume that their recovery is delayed by the average waiting time for a GP appointment (i.e. 2.05 days).[204] This implies that cost per patient in terms of wellbeing is £18.86.

For those who would have gone to A&E, we multiply the assumed cost per day of illness by the average duration of an A&E visit, 0.13 days[205] (less the duration of a visit to community pharmacy); hence arriving at a cost to patients of £1.02.[206]

For those that would have done nothing if they had not gone to a community pharmacy we have assumed that they would have been ill for one extra day, on the assumption that their minor ailment would be less severe if it was not worth them waiting for a GP appointment. This is a conservative approach.

Finally, for those who would have gone to a GP OOH appointment, walk-in centre, purchased a drug over the counter, or been referred (or self-referred) to another NHS provider we assume no recovery delay, and hence do not estimate this impact value for these groups.

The overall gross value for each counterfactual group is presented in Table 53. Each column shows the individual impact values for each counterfactual group (as outlined above), with the total value per group (the sum of the individual impact values) given in the bottom row. For example, for those that would have gone to a GP, there is:

- A £45 cost to the NHS from a GP appointment;
- A £18.86 cost to patients wellbeing from a delayed recovery;
- A weighted average £2.96 leisure time cost for having to attend the GP;
- A weighted average £5.35 work time cost for having to attend the GP; and
- A weighted average £7.20 cost from an increased absence spell for those at work due to a delayed recovery.

This gives a total gross counterfactual cost per case of £79.37.

Table 53: Gross value from community pharmacy providing minor ailments consultations (£, 2015)

Stakeholder affected	Impact	GP	GP OOH	Walk-in centre	A&E	Do nothing	OTC	Onward referral	Self-referral
NHS	Avoided appointment	£45.00	£79.27	£33.49	£68.00	-	-	-	-
Patient	Delayed recovery	£18.86	-	-	£1.02	£9.20	-	-	-
	Leisure time lost	£2.96	£8.84	£9.55	£21.50	-	£1.33	-	-
Society	Work time lost to attend appointment	£5.35	-	-	-	-	-	-	-
	Work time saving from delayed recovery	£7.20	-	-	-	-	-	-	-
NHS	Efficient directing of patient to NHS provider	-	-	-	-	-	-	£4.55/ £1.51[207]	-
Total		**£79.37**	**£88.11**	**£43.04**	**£90.52**	**£9.20**	**£1.33**	**£4.55/ £1.51**	**£0.00**

Source: PwC analysis

In order to estimate the net value of the service that community pharmacy provides, we deduct the funding that community pharmacy receives for each minor ailments consultation from the estimated

[204] We derive this using data from the GP Patient Survey (January 2016) to calculate a weighted average of survey responses using the lower bound of time intervals specified.
[205] HSCIC (2015)
[206] This is conservative as it only considers the impact to wellbeing from being ill for 2 hours 40 minutes longer, and not also the inconvenience of having to go to an A&E department.
[207] Benefit from commissioned minor ailment consultation and non-commissioned minor ailment consultation respectively

gross value. For locally commissioned minor ailments consultations, community pharmacy receives an average consultation fee of £4.55[208] as well as the cost of (any) drug supplied (see Table 54).

In addition, community pharmacy implicitly receives funding for non-commissioned minor ailments advice as part of the CPCF. To estimate the funding per consultation we multiply the total community pharmacy funding from Practice Payments in 2015/16 of £565m[209] by the apportionment of this to exempt services for VAT purposes (14%).[210] We then consider only the proportion of funding for self-care support within the exempt services apportionment by multiplying by the proportion of contract funding for exempt services allocated to self-care support (28.4%).[211] Community pharmacies are, therefore, assumed to receive £21.8 million in funding for support for self-care annually. Dividing this by the 73.7 million consultations that we have identified take place in England annually, gives a resultant funding per non-commissioned minor ailment consultation of £0.30. As one would expect, the funding per consultation is lower than the equivalent for commissioned services, for example due to the lower administrative requirement for pharmacy staff.

So that we include only the additional time burden on patients in the absence of a minor ailments service (compared to the current time to visit a community pharmacy), we deduct the time it takes to travel to and attend a community pharmacy minor ailment consultation (23.0 minutes).[212] Because of the wide accessibility of community pharmacy, we assume that this time is at the expense of leisure time. This implies a value of £2.70 per patient.

Our calculations are summarised in Table 54. In a given cell, where two values are given, the first refers to commissioned MAS consultations and the second to non-commissioned MAS consultations. The driving factor behind the difference in net value for commissioned and non-commissioned consultations is the funding that community pharmacy receives for each consultation. Each column presents the estimated cost which is deducted from the gross social benefit per consultation for each pathway. This provides an overall net value per case. For example, we take the gross value per case for those that would have gone to the GP (£79.37) (see Table 53) and then deduct the cost to the NHS of providing the commissioned MAS consultation in a community pharmacy (£4.55) and the cost to patients in attending this consultation (£2.70) to estimate the total net value of £72.12 per commissioned consultation (see Table 54).

Table 54: Net value of each community pharmacy minor ailments consultation by alternative provider (£, 2015)

Stakeholder affected	Impact	GP	GP OOH	Walk- in centre	A&E	Do nothing	OTC	Onward referral	Self-referral
Total gross value		**£79.37**	**£88.11**	**£43.04**	**£90.52**	**£9.20**	**£1.33**	**£4.55/ £0.30**	**£0.00**
NHS	Cost of community pharmacy consultation	£4.55/ £0.30	£4.55/ £0.30	£4.55/ £0.30	£4.55/ £0.30	£4.55/ £0.30	£4.55/ £0.30	£4.55/ £0.30	£4.55/ £0.30
Patient	Time to attend community pharmacy	£2.70	£2.70	£2.70	£2.70	£2.70	£2.70	£2.70	£2.70
Total net value		**£72.12/ £76.37**	**£80.86/ £85.11**	**£35.79/ £40.04**	**£83.28/ £8 7.53**	**£1.95/ £6.20**	**-£5.92/ - £1.67**	**-£2.70/ - £2.70**	**-£7.25/ - £-3.00**

Source: PwC analysis

5. Key results and sensitivities

Main results

Table 55 and Table 56 take the results of our analysis of the volume and value of minor ailments services outlined above and estimate the overall net value that community pharmacy generates by

[208] PSNC Services Database, 20 May 2016; Exempt services: Promotion for Healthy Lifestyles and support for self-care.
[209] PSNC, 2016.
[210] PSNC, 2016. http://psnc.org.uk/funding-and-statistics/funding-distribution/vat/.
[211] PSNC, 2016.
[212] See Appendix 4.

providing minor ailments services, both for commissioned (Table 55) and non-commissioned consultations (Table 56).

In Table 55 each column presents the total net impact for each counterfactual group, broken down by stakeholder. The first row gives the volume of patients in each counterfactual group, as outlined in Table 48. We then multiply this volume by the sum of the impact values accruing to each stakeholder identified in Table 53, less the cost to each stakeholder from the current service provided by community pharmacy, as outlined in Table 54.

For example, consider column 1, i.e. those who were neither referred nor self-referred to another NHS provider and who, in the counterfactual, would have gone to a GP. Table 48 identified 691,000 consultations to which this applies. To derive the total value to the NHS we then multiply this volume by the avoided cost to the NHS in Table 53 (£45) less the cost to the NHS of providing the service through community pharmacy (£4.55). This results in a total net saving to the NHS of £27.9 million for those that would have gone to a GP. Rows 3 and 4 then present the same calculations for the total net avoided cost to patients and wider society respectively across each of the counterfactual groups. The final row presents the sum of these three totals, thus giving a total net impact for each counterfactual group. The final column presents the total net impact to each stakeholder across all counterfactual groups (i.e. the sum of the corresponding row). It can be seen from Table 55 that by providing commissioned MAS, community pharmacy saves the NHS an estimated £27.8 million annually, and society as a whole £49.8 million.

Table 55: Net value of commissioned minor ailments services by counterfactual group (£m, 2015)

	GP	GP OOH	Walk- in centre	A&E	Do nothing	OTC	Onward referral	Self-referral	Total
Volume ('000)	691	1	12	1	37	13	15	75	843
NHS	27.9	0.1	0.3	0.1	-0.2	-0.1	0.0	-0.3	**27.8**
Patient	13.2	0.0	0.1	0.0	0.2	0.0	0.0	-0.2	**13.3**
Society	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**8.7**
Total	**49.8**	**0.1**	**0.4**	**0.1**	**0.1**	**-0.1**	**0.0**	**-0.5**	**49.8**

Source: PwC analysis

Table 56 provides the equivalent calculations for non-commissioned minor ailments consultations, drawing on the volumes identified in Table 52, the impact values outlined in Table 53 and the costs identified in Table 54. By providing non-commissioned minor ailments consultations, community pharmacy saved the NHS an estimated £516.6 million in 2015, and wider society as a whole £1,143.5 million.

Table 56: Net value of non-commissioned minor ailments services by counterfactual group (£m, 2015)

	GP	GP OOH	Walk-in centre	A&E	Do nothing	OTC	Onward referral	Self-referral	Total
Volume ('000)	12,627	14	218	21	37,399	230	18,226	4,995	73,730
NHS	564.5	1.1	7.2	1.4	-11.1	-0.1	0.0	-1.5	**561.6**
Patient	241.4	0.1	1.5	0.4	243.0	-0.3	-49.2	-13.5	**423.4**
Society	158.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**158.5**
Total	**964.4**	**1.2**	**8.7**	**1.8**	**232.0**	**-0.4**	**-49.2**	**-15.0**	**1,143.5**

Source: PwC analysis

Table 57 presents the overall value of community pharmacy's minor ailments service, both from commissioned and non-commissioned consultations. By providing minor ailments consultations, community pharmacy saved the NHS an estimated £590 million in 2015, and wider society as a whole £1,193 million. These figures are net of the funding provided both explicitly and implicitly for these services.

Table 57: Total net value from all minor ailments services (£m, 2015)

	GP	GP OOH	Walk-in centre	A&E	Do nothing	OTC	Onward referral	Self-referral	Total
Volume ('000s)	13,318	14	230	22	37,435	243	18,241	5,070	
NHS	592.4	1.1	7.6	1.5	-11.2	-0.1	0.0	-1.8	**589.5**
Patient	254.6	0.1	1.6	0.4	243.3	-0.3	-49.3	-13.7	**436.7**
Society	167.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**167.1**
Total	**1014.2**	**1.2**	**9.2**	**1.9**	**232.0**	**-0.5**	**-49.3**	**-15.5**	**1,193.3**

Source: PwC analysis

Potential associated health risks

Our earlier analysis assumes that those who would have done nothing if community pharmacy did not provide MAS consultations would recover after one day, on the basis that their ailment is unlikely to be severe given they do not see it as worthwhile to attend the GP.[213] In practice, it is likely that some of these would not recover within one day without intervention. For example the majority take over 4-5 days to recover from cold and flu symptoms, with some taking up to 10 days.[214] As symptoms persist, or even get worse, some will go to their GP or an alternative NHS provider to seek a remedy, thus incurring additional cost to the NHS not captured in our main analysis above.

For the 37.4 million patients who would have done nothing in the absence of a community pharmacy minor ailments service in 2015 (the sum of 'Do nothing' in Table 48 and Table 52), we illustrate the potential implications of incorporating these impacts into our impact estimation in Table 58. For example, if we assume that 5% of the 37.4 million who would have at first done nothing would have subsequently needed a GP appointment (1.8 million patients), this would imply an additional cost to the NHS of £84.2 million. Similarly, if we assume that 0.2% would have gone on to develop serious symptoms which required a stay in hospital at a cost of £1,565[215], this would result in an additional cost to the NHS of £117.2 million.

Table 58: Potential associated health risks for those that would have done nothing (2015)

Assumed of NHS pathway	Cost to NHS per case	Assumed proportion affected	Assumed volume affected ('000s)	Cost saving to NHS (£m)
GP appointment	£45	5.0%	1,872	84.2
		10.0%	3,744	168.5
		15.0%	5,615	252.7
Non-elective inpatient stay in hospital	£1,565	0.1%	37	58.6
		0.2%	75	117.2
		0.5%	187	292.9

Source: PwC analysis

Sensitivity analysis

A key assumption in our analysis of non-commissioned minor ailments consultations is the average number of consultations per pharmacy per week. We use the mean from our primary data collection (see Table 49).

Table 59 shows the sensitivity of our results to this assumption by illustrating the implications if we use the upper and lower bounds of the 95% confidence intervals for each average in Table 49. When adopting the bounds of these confidence intervals the total impact estimate for non-commissioned minor ailment consultations increases/decreases by 22%, and the overall impact estimate increases/decreases by 21%.

[213] This is a conservative assumption as there may be other reasons for why patients would not have gone to their GP; for example they may lack confidence or not enjoy attending their GP, or it may not be as accessible as their local community pharmacy.
[214] Treatyourselfbetter.co.uk (2016)
[215] DH (2015)

Table 59: Sensitivity test - volume of non-commissioned minor ailments consultations per pharmacy per week (£m, 2015)

	Base scenario		Lower sensitivity (95% confidence interval lower bound)		Upper sensitivity (95% confidence interval upper bound)	
	Non-commissioned only	Overall	Non-commissioned only	Overall	Non-commissioned only	Overall
NHS	561.6	589.5	437.1	464.9	686.3	714.2
Patient	423.4	436.7	328.0	341.3	518.8	532.0
Society	158.5	167.1	124.2	132.9	192.7	201.4
Total	**1,143.5**	**1,193.3**	**889.3**	**939.1**	**1,397.8**	**1,447.6**

Source: PwC analysis

Another important assumption made in modelling the counterfactual scenario for non-commissioned MAS consultations is the proportion of patients that were neither referred nor self-referred to another healthcare provider that would have gone to a GP in the absence of community pharmacy. For this we use data from a recent YouGov survey which found that 25% of those that currently go to their community pharmacy for non-commissioned advice would have gone to a GP if not their pharmacist.[216] The effect on our impact estimates had we instead assumed that 20% or 30% of patients would have gone to a GP in the counterfactual scenario is presented in Table 60 below. Had we assumed that 20% would have gone to a GP, the impact from non-commissioned minor ailment consultations would fall by 16% to £964.6 million and the overall impact estimate would fall by 15% to £1,014.4 million.

Table 60: Sensitivity test - proportion of patients who would have gone to a GP without community pharmacy for non-commissioned minor ailment consultations (£m, 2015)

	Base scenario (25% would have gone to GP)		Lower sensitivity (20% would have gone to GP)		Upper sensitivity (30% would have gone to GP)	
	Non-commissioned only	Overall	Non-commissioned only	Overall	Non-commissioned only	Overall
NHS	561.6	589.5	446.0	473.9	677.2	705.8
Patient	423.4	436.7	391.8	405.1	455.0	468.3
Society	158.5	167.1	126.8	135.4	190.2	198.8
Total	**1,143.5**	**1,193.3**	**964.6**	**1,014.4**	**1,322.4**	**1,372.2**

Source: PwC analysis

In estimating the volume of patients within each counterfactual pathway grouping, one of our key assumptions is the proportion of patients who self-refer to another NHS provider immediately following their community pharmacy consultation. We use an assumption of 9% based on an evaluation of the Birmingham, Solihull & Black Country locally commissioned minor ailments service. Sensitivities of this assumption are presented in Table 61 below, had we instead used assumptions of 5% and 15% respectively. Using an assumption of 15% decreases the impact estimation by 8% to £1100.0 million.

Table 61: Sensitivity test - proportion of patients who self-refer after their community pharmacy consultation (£m, 2015)

	Base scenario (9% self-refer)	Lower sensitivity (5% self-refer)	Upper sensitivity (15% self-refer)
NHS	589.5	616.3	549.3
Patient	436.7	464.7	394.6
Society	167.1	174.5	156.1
Total	**1,193.3**	**1,255.5**	**1,100.0**

[216] Cited in Pharmacy Voice, May 2016

Source: PwC analysis

As a final sensitivity test, we look at the implications of using alternative approaches to extrapolating the volume of commissioned minor ailments services, as presented in Table 46. The implications for the total impact from commissioned MAS consultations are presented in Table 62. They show that had we adopted a weighted average extrapolation approach, using the number of consultations as the basis of the weighting (the sensitivity with the highest estimated volume of consultations - 1,444,000), the total impact from commissioned MAS consultations rises by 71% from £49.8 million to £85.3 million. This £35.5 million rise represents a 3% increase on our overall impact estimate of £1,126.0 million.

Table 62: Sensitivity test – alternative approaches to extrapolation of volume of commissioned minor ailments services (£m, 2015)

	Base scenario Simple average extrapolation	**Sensitivity 1** Weighted average extrapolation using number of consultations	**Sensitivity 2** Weighted average extrapolation using population size	**Sensitivity 3** Simple extrapolation by population	**Sensitivity 4** Simple extrapolation by number of services
Volume ('000)	843	1,444	893	836	1,128
NHS	27.8	47.7	29.5	27.6	37.3
Patient	13.3	22.8	14.1	13.2	17.8
Society	8.7	14.8	9.2	8.6	11.6
Total	**49.8**	**85.3**	**52.8**	**49.4**	**66.7**

Source: PwC analysis

Medicines support

Managing prescribing errors/clarifying prescriptions

1. Introduction

This chapter provides our assessment of the value associated with community pharmacy's current role in providing clarification services in relation to prescription scripts with administrative or medical errors in England. We estimate the value that would be at risk if community pharmacy no longer supplied its current service, using data for 2015.

The chapter is structured as follows:

- Section 2 describes the service currently provided by community pharmacy, including what it means from the patient perspective, and sets out our assumptions for what would happen from the patient perspective if community pharmacy did not provide its current service (i.e. the counterfactual);
- Section 3 describes the value that flows from the current activities of community pharmacy in terms of potential avoided costs to the NHS, the patient and wider society, and explains the key impacts;
- Section 4 explains our approach to assessing each element of expected value, specifically:
  - How we estimate the number of individuals who benefit from the service provided by the pharmacy (the 'volume');
  - How we estimate the value delivered each time the service is provided (i.e. for each individual patient) (the 'value'); and
- Section 5 summarises our key results as well as the results of our sensitivity analysis.

A set of technical appendices provides further details of the methodology and the data sources we use to estimate the value of clarification services provided by community pharmacy in England in 2015.

2. Description of service

The NHS Community Pharmacy Contractual Framework (CPCF) requires community pharmacy to dispense NHS prescriptions in a way which enables the items to be used by patients safely and effectively. As part of this obligation, and indeed its duty of care to patients, community pharmacy plays an important role in identifying and addressing errors on prescription scripts. Sometimes these will be straightforward clarifications, for example due to illegible handwriting, whereas in other instances medical errors may be made by the prescriber, such as an incorrect quantity or drug.

An audit undertaken by the Company Chemists' Association (CCA) in 2012 estimated that community pharmacy identified errors in 1.86 items per 1,000 prescribed, either to clarify the prescription or to correct possible errors, and so enable improved medicine management and patient safety in England.[217]

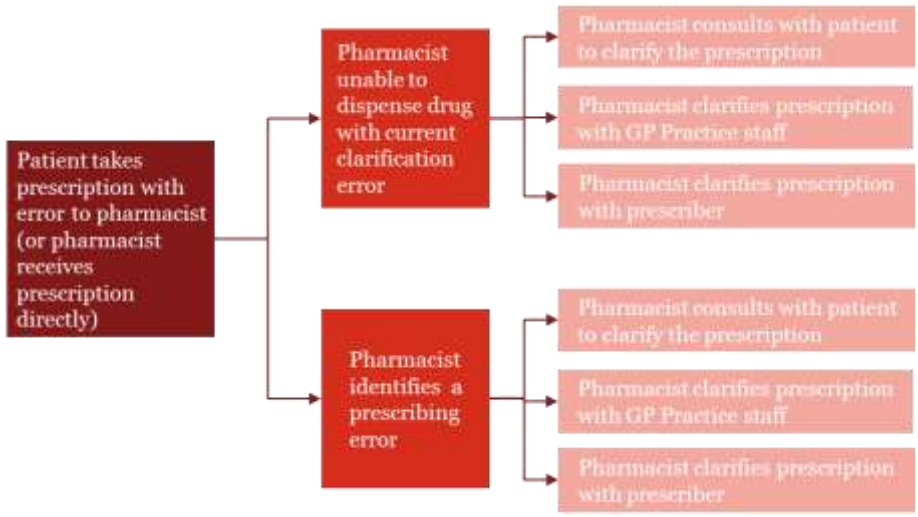
Where an incident is identified, community pharmacy staff may:

- Correct a suspected error by contacting the prescriber or another member of the relevant practice staff by phone or in person; and
- Consult the patient (or their carer) or liaise directly with the prescriber to clarify the prescription.

This current patient pathway is presented in Figure 18.

[217] Pharmacy Voice (April 2012)

Figure 18: Current service user pathway (through community pharmacy)



Source: PwC analysis

Without the interventions of community pharmacy, the unclear or wrong information on the prescription script could result in potentially significant adverse effects on the patient, as well as costs for the NHS. Pharmacists, therefore, play an important role by helping to identify and prevent errors.

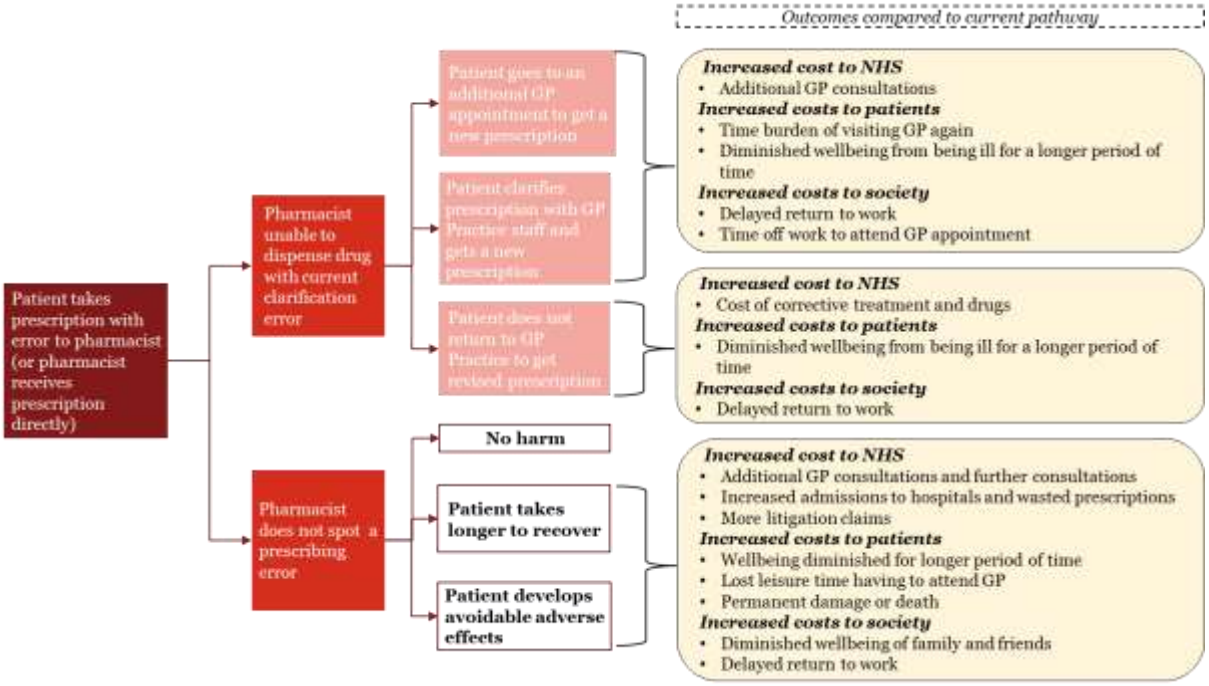
To provide a basis for estimating the value of having a professionally qualified and vigilant dispensing service provided by community pharmacy which does consider whether prescriptions are correct, we compare it to an alternative dispensing service that simply attempts to dispense without seeking to identify or rectify mistakes (the counterfactual). This means that sometimes a prescription will be dispensed (although with mistakes) and other times it will be unable to do so because the prescription precludes that, for example if required information is missing or illegible. So, in this scenario:

- Prescribing errors would go unaddressed and, consequently, some patients may experience delayed recoveries and others may develop adverse side effects; or
- Patients would have to return to the prescriber (typically either a GP or a hospital doctor), or consult other practice staff to seek clarification themselves, and to obtain a corrected prescription before returning to the community pharmacy to have the prescribed item dispensed.

3. Contribution of community pharmacy

Community pharmacy adds value by helping to manage prescriptions, thus reducing the risk of prescribing errors and simplifying the process of clarifying prescriptions. In this way, it reduces the burden on the NHS and improves patients' wellbeing, for example by avoiding any delay to their recoveries. We summarise these impacts in Figure 19 and describe them in more detail below.

Figure 19: Counterfactual service user pathway in the absence of community pharmacy services



Source: PwC analysis

Table 63 summarises the key potential sources of value from reducing prescribing errors and simplifying the process for clarifying prescriptions.

Table 63: Summary of potential value of the role of community pharmacy in managing prescriptions

	Prescribing errors	Clarifying prescriptions
For the NHS	• It reduces the need for additional GP consultations and further corrective prescriptions • In more severe cases, it may avoid additional costs for the NHS, such as those that would arise if the patient needed to be admitted to hospital as a non-elective inpatient • It reduces the costs to the NHS of insurance as it reduces the risk of litigation and/or the need to make compensation payments • It reduces wasted prescriptions where errors mean that the drug would not have the desired effect	• It reduces the need for follow-up appointments with a GP (or hospital doctor) or GP 'Out of Hours' clinic;
For patients	• It reduces the time patients need to spend attending additional GP consultations • It improves patients' wellbeing more quickly and, in some cases, enables them to return to work sooner • In the most severe cases, it avoids the risk of serious harm or even death	• It reduces the time patients need to spend attending additional GP consultations • It reduces the likelihood that some patients could become frustrated and 'give up' on their treatment if they're faced with the prospect of having to return to their GP to obtain a complete or correct prescription: this means they're more likely to collect their medicines and recover their health more quickly with less detriment to their personal wellbeing
For wider society	• In those cases where patients would experience serious adverse effects (or, indeed, die) as a result of prescribing errors, it avoids adverse effects on the wellbeing of close family and friends	• It avoids the lost output of those patients who are in employment and who might need to take time off work to attend an appointment with their GP during their working day: this benefit

	Prescribing errors	Clarifying prescriptions
	• For those in employment, extended illness will reduce their output because it will mean a longer sickness absence and this will reduce national output	accrues to the company for whom they work (and to society through the lost output) • It reduces the potential risk of delay in individuals' recovery (and hence their absence from work)

Source: PwC analysis

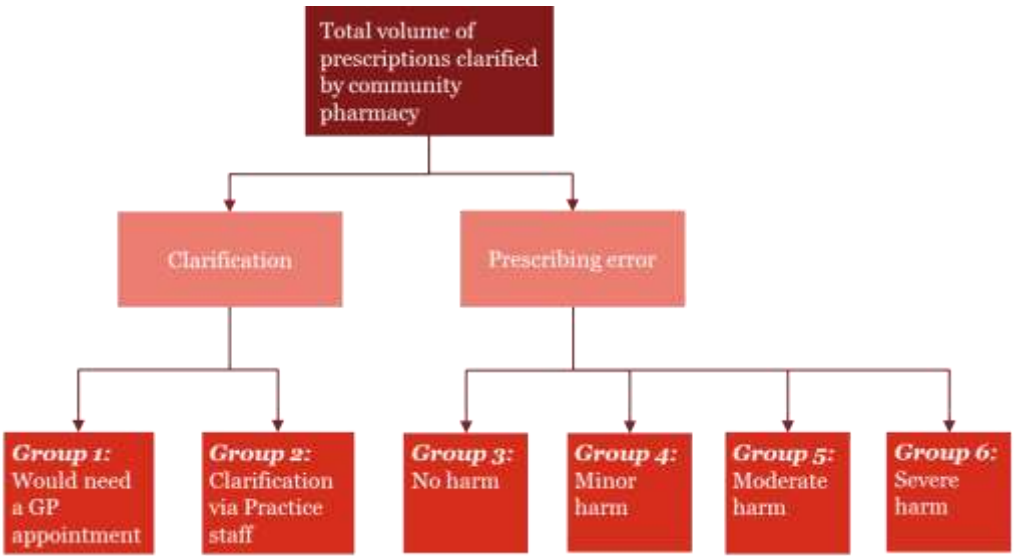
Not all of these impacts readily lend themselves to assessment which is robust. In practice, our analysis does not include:

- The impacts on those patients who 'give up' on their treatment when faced with the prospect of returning to their GP;
- The effects on the wellbeing of family and friends when a patient develops a serious illness as a result of a prescribing error; and
- The increase in insurance premiums for GPs as a result of the increased risk of prescribing errors going unspotted: we only consider the direct pay-out per compensation claim in our assessment as this avoids any double counting as, in practice, higher compensation pay-outs by insurers are likely to be passed on to prescribers through higher future premiums.

These simplifications imply that our estimates of the value of the service that community pharmacy provides in managing patients prescriptions are conservative.

Based on the counterfactual pathways outlined above, and the impact areas which we are able to estimate. We consider six distinct counterfactual groups as outlined in Figure 20.

Figure 20: Assumed counterfactual groups



Source: PwC analysis

4. Approach to estimating contribution of community pharmacy

Our approach to determining the value of community pharmacy in 2015 involves two elements:

- Estimating the number of times community pharmacy deals with incidents where prescriptions require some form of intervention so that they can be safely dispensed and which are likely to generate the benefits described above (the 'volume'); and
- Estimating the value delivered each time the service is provided (the 'value').

We summarise our approach to each element below; more details are provided in the technical appendices.

Volume

To estimate the volume of avoided prescription errors and the number of other instances where community pharmacy intervenes to clarify prescriptions, we rely mainly on the practice based audit undertaken by the CCA in 2012.[218] This is the most recent reliable data.

Over the course of one week, 4,409 community pharmacies recorded the number of times that they identified either an error or a need for clarification of a prescription item. The audit found that, on average, 1.86 items out of every 1,000 were either incorrect or in need of clarification.[219] Applying this rate to the nearly 1 billion items dispensed in England in 2015[220] suggests that 1.84 million required the attention of community pharmacists.[221]

The audit (and other evidence) suggests that some incidents identified by community pharmacists require relatively straightforward administrative clarifications whereas other contain errors such as an incorrect dosage or quantity. In the former case, our counterfactual assumes that the dispenser would not dispense the script and no harm would result to the patient. Instead, the patient is assumed to return to his or her GP to clarify the prescription with either the prescriber or other practice staff.

We can use the CCA audit to distinguish between errors and clarifications in two ways:

- Based on the incident type (e.g. where there is a problem with the drug prescribed or the risk of an interaction); and
- Based on the query type (e.g. where the prescription is illegible or unsigned).

We consider both bases in turn.

Table 64 presents the assumptions we use to make this distinction based on the avoided incident type. Where it is unclear if a type of incident is a simple clarification or a prescribing error we apportion 50% of the category as clarifications. On this basis, we estimate that 59.1% of incidents are prescribing errors and the remainder (40.9%) are clarification errors. This implies that about 1.09 million prescribing errors were avoided as a result of the work of community pharmacy in England in 2015. The maximum and minimum incident proportions from submitting companies in the CCA audit for each category are also presented in Table 64. Sensitivity analysis using these alternative levels are presented in Table 75 and Table 78.

Table 64: Breakdown of clarifications and prescribing errors by incident type

Incident type	% of incidents (overall)	% of incidents (min)	% of incidents (max)	% of incidents assumed to be prescribing errors	Estimated number of prescribing errors ('000s))	Estimated number of clarifications ('000s)
Wrong drug	6.94%	5.24%	8.50%	50%	64	64
Wrong strength	7.45%	5.00%	11.11%	100%	137	0
Wrong quantity	12.56%	10.26%	16.26%	100%	231	0
Wrong dosage form	7.02%	5.13%	11.15%	0%	0	129
Dosage instruction	14.79%	11.66%	24.02%	50%	136	136
Major interaction	3.59%	1.68%	8.16%	100%	66	0
Minor interaction	6.04%	2.19%	18.55%	100%	111	0
Illegal CD Rx	4.47%	2.00%	8.54%	0%	0	82

[218] Pharmacy Voice (April 2012)
[219] This is based on the number of queries identified by community pharmacy. The audit also identified an average of 2.22 incidents per 1,000 items dispensed. The number of incidents identified is greater than the number of queries as one query may involve multiple incidents. For example an illegible prescription may lead to both the wrong drug being prescribed and a minor interaction. We use the volume of queries identified as the basis for our analysis.
[220] 990,363,893 (NHS Business Services Authority, 2015)
[221] The estimated number of prescribed items requiring pharmacy intervention is estimated as (990,363,893 / 1000) * 1.86 = 1,842,077

Incident type	% of incidents (overall)	% of incidents (min)	% of incidents (max)	% of incidents assumed to be prescribing errors	Estimated number of prescribing errors ('000s))	Estimated number of clarifications ('000s)
Other	37.14%	7.62%	55.95%	50%	342	342
Total	**100%**				**1,088 (59.1%)**	**754 (40.9%)**

Source: PwC analysis

An alternative basis for distinguishing clarifications from prescribing errors is by the query type identified in the CCA audit. This approach is outlined in Table 65. On this basis, we classify 28.4% of cases as prescribing errors. The impact estimates when using these alternative classifications are presented in Table 81.

Table 65: Breakdown of issues by clarifications/prescribing errors by query type

Query type	Definition	% of queries (overall)	% of queries (min)	% of queries (max)	% assumed to be prescribing errors	Estimated number of prescribing errors ('000s) (using overall)	Estimated number of clarifications errors ('000s) (using overall)
Off-license	Proposed use of prescribed drug not permitted in drugs' license	3.96%	2.50%	7.98%	50%	36	36
Special	Unlicensed drugs which have been specially prescribed for a patient	8.08%	4.78%	19.92%	50%	74	74
Unsigned Rx	Prescription not signed by prescriber	32.77%	25.92%	59.81%	0%	0	604
Illegible Rx	Prescription unclear (e.g. due to handwriting)	5.57%	2.39%	11.02%	0%	0	103
Patient details missing	Incomplete patient details on script	4.87%	1.45%	11.23%	0%	0	90
Instalment – no start	For controlled drugs – no start instructions	0.49%	0.00%	1.44%	50%	5	5
Instalment – wording	For controlled drugs – wording error	1.58%	0.36%	2.72%	50%	15	15
Other	Miscellaneous	42.67%	13.56%	54.21%	50%	393	393
Total		**100%**				**523 (28.4%)**	**1,319 (71.6%)**

Source: PwC analysis

Since the CCA audit was undertaken in 2012 the use of the Electronic Prescription Service (EPS) has grown significantly. In 2012 it was in its early stages of roll out, but in 2015 30% of items were prescribed using EPS.[222] One advantage of EPS is that many clarification errors are now avoided; for example, a prescription cannot be submitted without a signature. To take account of this change, we scale back the volume of clarification errors identified in the CCA audit by 30% so that we omit items prescribed using EPS. On this basis, if we use incident type to classify issues with prescriptions then the number of clarifications falls from 754,000 to 526,000; if we use query type, the number falls from 1,319,000 to 920,000. We do not scale back the number of prescribing errors due to the growth

[222] NHS Business Services Authority (2015)

in EPS as we assume that these would all still occur even with EPS, for example if the wrong quantity or drug was prescribed.

The scale of these estimates can be compared with other evidence. For example, a study for the General Medical Council in 2012 found that approximately 4.9% of items dispensed by community pharmacies had prescribing or monitoring errors.[223] With over 1 billion items dispensed per year in England[224], this implies that there are roughly 50,000,000 incorrect prescriptions.[225]

Breakdown of clarifications between those requiring a GP appointment and those that would not

Some clarifications can be resolved by liaising with GP Practice staff but others require contact with the prescribers themselves. In our counterfactual scenario, we assume that this would require an additional GP appointment which means that the incurred cost is higher. We, therefore, need to distinguish the 526,000 clarification errors between those that would require a follow-up GP appointment and those that could be resolved by GP Practice staff.

The CCA audit found that the community pharmacist contacted a prescriber (say, a GP) in 60.16% of resolutions[226]. The other 39.84% of cases were rectified with the prescriber's practice team. We use these proportions to estimate the number of patients that would need an additional GP appointment. On this basis, using the volume of clarification errors from our incident type classification, we estimate that 316,000 of the 526,000 clarifications would have required a follow-up GP appointment in 2015.

Table 66: Estimated number of clarifications requiring GP appointment (England, 2015)

Resolved by whom	Proportion	Annual total (based on incident type) ('000s)	Annual total (based on query type) ('000s)
Prescriber	60.16%	316	553
Practice support staff	39.84%	209	366
Total	**100.00%**	**526**	**920**

Source: PwC analysis

Breakdown of prescribing errors by avoided category of harm

The potential consequences of each prescribing error vary significantly and so do the avoided costs to society. We break down the total estimated volume of avoided prescribing errors according to their severity, ranging from 'no harm' to 'severe' using the categorisation of the National Patient Safety Agency (NPSA) (see Table 67). To be conservative, we assume that no patients would have died as a result of a prescribing error; instead, we include these within the 'severe' sub-category. Our estimates of the proportion of errors falling within each category are informed by the CCA audit (which is based on the level of harm that the pharmacist who recorded the incident indicated was avoided as a result of their intervention[227]).

Table 67: Prescribing errors for each category of avoided harm (CCA, 2012)

Category of harm	% of errors	Estimated number of prescribing errors based on incident type ('000s)	Estimated volume of prescribing errors based on query type ('000s)
No harm	79.47%	865	416
Low	12.02%	131	63
Moderate	6.13%	67	32

[223] GMC/University of Nottingham (May 2012)
[224] NHS Business Services Authority (2015)
[225] The number of errors identified in this paper is significantly higher than the CCA/PV paper as the GMC paper forensically examined prescription scripts, whereas the CCA/PV paper considered only realised errors. Therefore only a proportion of the errors identified in the GMC paper would have been picked up in the CCA audit, hence explaining the disparity in annual volumes derived from the two papers
[226] The number of resolutions was higher than the number of incidents, for instance as a single incident may require multiple communications
[227] Some pharmacists are likely to underestimate the avoided harm, hence our impact estimate will be conservative

Category of harm	% of errors	Estimated number of prescribing errors based on incident type ('000s)	Estimated volume of prescribing errors based on query type ('000s)
Severe	1.86%	20	10
Death	0.52%	6	3
Total	**100.00%**	**1,088**	**523**

Source: PwC analysis

Our approach to estimating what proportion of prescribing errors falls into each category of harm is conservative as we use the overall proportion for each category of harm (i.e. including both clarifications and prescribing errors). In practice, we would expect that a disproportionately large share of the 79.47% of incidents reported as leading to 'no harm' would be clarifications. Hence, as we only consider prescribing errors here, we are likely to underestimate the proportion of errors that would cause some level of harm and, thus, would give rise to an impact. Alternative proportions of harm that we could have used are presented in Table 68. We have tested the sensitivity of our impact estimates to these alternative proportions (see Table 79).

Table 68: Alternative categories of harm

Source	No harm	Low	Moderate	Severe	Death	Notes
CCA	79.47%	12.02%	6.13%	1.86%	0.52%	Our main estimate
GMC/University of Nottingham[228]	42.4%		54.0%	3.6%		From a sample of 302; The GMC method ranks errors on a scale of 0-10 ('no harm' to 'death'), and then groups these into minor (0-2), moderate (3-7) and severe (8-10)
NPSA[229]	85.3%	9.8%	4.7%	0.2%	0.0%	Based on actual reported data in 2011; sample of 1,404

Source: PwC analysis

Value

We consider the potential value of each intervention separately. We start by considering the value provided each time community pharmacy is able to clarify a prescription and then assess the value of avoiding potential prescribing errors.

Clarifying prescriptions

Every time a prescription needs clarification, the NHS avoids cost and wider society benefits if we compare the current service that community pharmacy provides with our counterfactual scenario where community pharmacy does not actively manage prescriptions. The value of this service is greater where a patient would otherwise have to return to their GP rather than being able to clarify their prescription with practice staff. We start by presenting the gross benefits of the service that community pharmacy provides. Then, in order to estimate the contribution of community pharmacy over and above the cost of the service provided, i.e. the net value, we deduct the cost to the NHS and to patients in the current scenario.

For those who would require a follow-up GP appointment to clarify their prescription, the counterfactual cost to the NHS is £45 per GP consultation.[230] We do not consider the cost of practice staff time in the counterfactual scenario as this is assumed to be the same amount of time as they currently spend in the actual scenario resolving clarification errors.

Patients also save time in the current scenario as, for example, they do not have to attend a GP appointment. In our counterfactual, there is a cost from the additional time expense for patients going to the GP. For those in work who may need to take time off to attend their GP, the cost of the time lost will accrue to society through lost output, at a cost of £31.50 per hour (see Appendix 4 for a detailed explanation of these time cost estimates). For all others, the cost will be borne by the patient as lost leisure time, at a cost of £7.05 per hour. We estimate that 28.8% of patients who would attend an appointment with their GP in the absence of a community pharmacy managing prescriptions service

[228] GMC/University of Nottingham (May 2012)
[229] Pharmacy Voice (April 2012)
[230] Curtis (2015); we assume that a consultation is 11.7 minutes, including carbon emissions and direct care staff costs.

would do so at the expense of working time. The remainder would forego leisure time. To value the time saving to patients, we multiply the time saved by the value of this time. We estimate the total time taken to book, travel to and from, wait for and attend a GP appointment as 35.4 minutes. Similarly, to visit a GP's practice to clarify a prescription with practice staff, we estimate a total time of 26.9 minutes. Finally, we consider the cost to leisure time from having to return to the pharmacy to collect the prescription; an incremental time cost of 4.4 minutes.

Additionally, we estimate the wellbeing benefits from obtaining access to the appropriate medicines more quickly, for example by avoiding the need to wait for a GP appointment. We estimate that the value of avoiding one day of illness is £9.20.[231] For those patients who would otherwise have gone to a GP, we assume that their recovery would be delayed by the average waiting time for a GP appointment (i.e. 2.05 days).[232] This implies that the value per patient in terms of wellbeing would be £18.86. For patients that would otherwise have to clarify their prescriptions with practice staff, we assume they will be ill for half a day less, thus receiving a benefit in terms of wellbeing equivalent to £4.60. We only consider these wellbeing effects for patients suffering from acute illnesses and not long term conditions. As a proxy for this we use the proportion of prescription items that are not repeat prescriptions (23%)[233]; thus, the average wellbeing cost per avoided GP appointment, for example, is £4.34.

If a patient's recovery is delayed, they may need to take (additional) time off work. We value such time at the average Gross Value Added (GVA) per hour worked (£31.50).[234] To weight this value taking into account patients to whom this applies, we estimate that 2.53% of prescribed items are linked to a spell of sickness absence.[235] We apply this estimate to the number of clarifications that would have otherwise required GP appointments, and assume that the extended duration of sickness absence is equal to the average wait for a GP appointment (2.05 days).[236] This gives an average avoided cost per GP consultation of £7.20.[237] We do not estimate this effect for patients who can clarify their prescription with practice staff as we assume there is no waiting time (i.e. in days) to clarify a prescription with GP Practice staff.

Table 69 summarises separately the counterfactual costs for both patients requiring an additional GP appointment and those who do not. For example, for those who require an additional GP appointment, there is:

- A £45 cost to the NHS from the GP appointment;
- Lost leisure time worth £3.48;
- Reduced wellbeing from delayed recovery equivalent to £4.34 per case;
- Lost output from time spent at the GP Practice of £5.35; and
- Lost output due to a delayed recovery of £7.20.

The total gross value is, therefore, £65.36 for each clarification error where a GP appointment would be required. For those that would not require an additional GP appointment, the corresponding value is £7.90.

[231] Fujiwara, D. (2013); Method discussed in Appendix 5.
[232] Derived from data from the GP Patient Survey (January 2016). Estimated taking a weighted average of survey responses, using the lower bound of time intervals specified.
[233] Petty et al (2014)
[234] ONS (March 2016)
[235] We estimate this by dividing the total number of sickness spells in England by the total number of prescription items in England in 2015 (1 billion (NHS Business Services Authority, 2015). We estimate the total number of sickness spells per year by dividing the total number of sickness days per year in England (110 million) by the average number of sickness days per year per worker (4.4) (both come from ONS (February 2014) and the number of sickness days is scaled down from UK to England using 2015 ONS population estimates for the UK and England (ONS, June 2015). We use the average number of sickness days per worker per year as a proxy for the average duration of a spell of sick leave. We believe this is reasonable given that 20.6% of all sick days are for minor ailments, the same proportion as minor ailments are of all GP appointments (PAGB, 2008)).
[236] We assume 7 hours in a working day and 230 working days in a year.
[237] We assume 7 hour working days.

Table 69: Gross counterfactual impact values for those needing and not needing an additional GP appointment (2015)

Stakeholder	Impact	Additional GP appointment needed	Additional GP appointment not needed
NHS	GP appointment	£45	£0
Patient	Lost leisure time	£3.48	£2.77
	Reduced wellbeing from delayed recovery	£4.34	£1.06
Wider society	Additional time off work for those in employment and allowed to leave work to visit GP	£5.35	£4.07
	Additional time off work for those in employment due to delayed recovery	£7.20	£0
Total		**£65.36**	**£7.90**

Source: PwC analysis

To estimate the net benefit of the service provided by community pharmacy in 2015, we deduct the reimbursement received by community pharmacy as part of the CPCF. We estimate this by multiplying the time spent by pharmacy staff per resolution by the average hourly cost of staff. We use evidence from the 2012 CCA audit which found that the average time per resolution for each incident was 15.41 minutes. This was made up of:

- 7.57 minutes of pharmacist time;
- 6.38 minutes of dispenser time; and
- 1.46 minutes of other staff time.

As we use the volumes of queries (rather than the number of incidents), we uplift these times to estimate the average resolution time per query (since the CCA audit identified 1.19 avoided incidents per query). The uplifted times per staff type per query are 8.57, 7.23, and 1.65 minutes respectively.

Applying the hourly costs of the time of each staff type identified in Appendix 6 results in an overall cost estimate per resolution of £5.57.

To consider only the additional cost to the NHS in the counterfactual scenario, we also deduct the cost of GPs' time in the actual scenario, for example when consulting with the pharmacist over the phone how to resolve the clarification error. The cost of a GP appointment lasting 11.7 minutes is assumed to be £45.[238] We assume that the 7.57 minutes spent by pharmacists resolving the issue is spent entirely liaising with the GP, and the opportunity cost to the GP of this discussion is GP consultation time. Thus, we deduct £29.12 from each clarification error that would have needed a GP appointment in the counterfactual (45 * 7.57/11.7). We assume that where a GP appointment would not be needed in the counterfactual scenario, there would be no GP involvement in the actual scenario. Our assumptions are likely to be conservative in that we effectively assume that patients are just as good at resolving issues with practice staff as pharmacists are. In reality, they will likely be less efficient.

Table 70 takes the gross value estimates from Table 69 and deducts the costs to the NHS in the actual scenario outlined in the paragraphs above to estimate the net impact of each clarification. For example, for clarification errors that would have required a GP appointment, the gross value per case was £65.36 (i.e. these are the gross costs incurred in the counterfactual scenario that are avoided in the actual scenario). We then deduct the cost to community pharmacy in the actual scenario of £5.57 and to the GP of £29.12 to estimate a net value per case of £30.68. For those that do not require a GP appointment the net value is £2.33. It is these values that form the basis of our final impact estimates.

Table 70: Net benefit for each type of clarification (2015)

Stakeholder	Value	Additional GP appointment needed	Additional GP appointment not needed
Gross impact value per case		**£65.36**	**£7.90**
NHS	Cost to community pharmacy	(£5.57)	(£5.57)
NHS	Cost to GP in actual scenario	(£29.12)	(£0)

[238] Curtis (2015)

Stakeholder	Value	Additional GP appointment needed	Additional GP appointment not needed
Total net value		**£30.68**	**£2.33**

Source: PwC analysis

Recognising and addressing prescribing errors

To estimate the value of each prescribing error, we consider the likely implications of each level of severity (see Table 67). We develop a set of assumptions for each level of severity which shape the avoided costs resulting from pharmacists identifying and resolving prescription errors:

- For minor and moderate errors, we assume that a follow-up GP appointment would be needed at an avoided cost of £45 per GP consultation.[239]
- For severe errors, we assume that each patient would be admitted to hospital as a non-elective in-patient and the avoided cost to the NHS would be £1,565.[240]

We then assume that the initial drug prescribed will not have its desired effect given the prescribing error and we assume that for all levels of severity the cost of the ingredients is wasted (this is a real cost to the NHS as in the actual scenario community pharmacy would prevent the incorrect prescription being dispensed). The average net ingredient cost per item is £8.15.[241] Additionally, for moderate errors, we assume that a set of corrective drugs will be required to treat the consequences of the error at a total net ingredient cost of £23.30 (the average cost per GP consultation).[242] We do not estimate this for severe errors as the treatment costs are captured within the cost of the average non-elective inpatient stay.

For severe errors, we include the cost to the NHS of litigation claims by patients who suffer the inconvenience of staying in hospital and, potentially, suffering lasting damage to their health. We assume that all patients who suffer from a severe error will make a claim but that only 30% will be successful.[243] We know that the average pay-out for a successful claim related to a medication error is £58,000.[244] This implies that the average expected insurance pay-out for a severe error is £17,400.

We also estimate the cost to patients' wellbeing as a result of a delayed or extended recovery period:

- For minor errors, we assume that recovery is extended by 2.05 days[245];
- For moderate errors, we assume the recovery is delayed by 5 days; and
- For severe errors, recovery is assumed to be delayed by 2 weeks.

To estimate the value of each category of prescribing error, we multiply the (assumed) duration of the extended recovery period by an estimated value per day in terms of reduced wellbeing (£9.20).[246] For severe errors, we only estimate the wellbeing cost for patients who are unsuccessful in their litigation claim as we assume that the patient will be compensated for the reduction in their wellbeing as part of the pay-out where patients are successful in their litigation. The assumed value of £9.20 per day is particularly conservative for severe errors, as where a patient's health is significantly affected the cost to wellbeing is likely to be greater, for example as a result of having to stay in hospital.

For those in employment, the extended period of absence will also come at a cost to their employer and wider society through sickness leave and lost output. To capture this, for the 43% of people who we estimate are in work[247], for each level of severity, we multiply the extended period of illness by the GVA per worker per day (£220.50).[248] We then scale this back by the proportion of working days in the year (230/365).[249]

[239] Ibid.
[240] DH (2015)
[241] Curtis (2015)
[242] Ibid.
[243] The average MDU successful defence rate is 70% for medication errors (MDU, 2013)
[244] Ibid.
[245] This is the average wait time for a GP appointment (GP Patient Survey, January 2016).
[246] Fujiwara, D. (2013); Method discussed in Appendix 5.
[247] To estimate the proportion of patients in employment, we multiply the proportion of GP consultations in England that are taken by people of working age (57.8%) (HSCIC, 2009) by the employment rate (74.4%) (ONS, February 2016).
[248] We assume 7 hour working days and GVA per hour of £31.50 (ONS, March 2016).
[249] We do not consider weekends, bank holidays and annual leave (assumed to be 25 days per year).

For the 57% of people who we estimate are not in employment, we estimate the value of their lost leisure time from having to visit NHS providers:

- For minor and moderate errors, we estimate this cost to be the time required to attend a GP appointment – 35.4 minutes (see Appendix 4) at a cost per hour of £7.05.
- For severe errors, we assume that patients would spend eight days in hospital and would lose 12 hours of leisure time each day[250] so that 96 hours of leisure time are lost. We only estimate this lost leisure time for patients who are unsuccessful in their litigation claim; the lost leisure time is assumed to be captured in the insurance pay-out for patients who are successful in their litigation claim.

For the 43% of people who we estimate were in employment, for severe errors we estimate the value of their lost leisure time at weekends when in hospital, on the same basis as above. We also include five hours of lost leisure time per weekday.[251]

Table 71 summarises the estimated gross cost for each level of harm in the counterfactual situation. For example, for those who would suffer minor consequences as a result of the prescribing error, there is: a £45 cost to the NHS from the GP appointment, £8.15 in wasted drugs costs, £123.95 in lost time at work, wellbeing costs of £18.86 due to a delayed recovery, and a cost of £2.37 as a result of lost leisure time. This gives an estimated overall cost of £198.33 for each prescription error where a GP appointment is required.

Table 71: Gross cost of prescribing errors by level of severity (£, 2015)

Stakeholder	Impact	No harm	Minor	Moderate	Severe
NHS	Costs of hospital admissions/ GP appointments	£0	£45.00	£45.00	£1,565.00
	Cost of wasted drugs, and corrective drugs for adverse effects	£0	£8.15	£31.45	£8.15
	Insurance and compensation payments	£0	£0	£0	£17,400.00
Patient	Reduced wellbeing from patients delayed recovery and suffering from adverse effects	£0	£18.86	£46.00	£90.16
	Lost leisure time for having to attend a GP appointment/hospital for those not in employment (and for those in employment at weekends and evenings for those in hospital)	£0	£2.37	£2.37	£389.14
Wider society	Reduced national output from time off work for sickness	£0	£123.95	£298.73	£836.45
Total		**£0**	**£198.33**	**£423.55**	**£20,288.90**

Source: PwC analysis

As with clarification errors, in order to estimate the net benefit of the service that community pharmacy provides, we offset the cost to community pharmacy from the time spent by pharmacy staff identifying and resolving each clarification error since we assume that they will be reimbursed for this cost through the payments received as part of the CPCF. As discussed above, we estimate the cost to community pharmacy of resolving each error to be £5.57.

Again, so that we consider only the additional cost to the NHS in the counterfactual scenario, we deduct the cost of GPs' time in the actual scenario, for example when consulting with the pharmacist over the phone how to resolve the clarification error. The cost of a GP appointment is assumed to be £45[252] for an 11.7 minute consultation.

Table 72 uses the estimated gross value in Table 71 and deducts the costs to the NHS actually incurred to estimate the net value of each prescribing error by category of harm. For example, the gross value of each prescribing error that would have minor consequences if it was not spotted is £198.33. We then deduct the cost to community pharmacy in the actual scenario of £5.57 and to the GP of £29.12 to

[250] We use 12 hours per day on the basis of time 'lost' as a result of being in hospital (i.e. we assume half the day is spent in the same way as it would have been out of hospital (e.g. sleeping, eating and washing). It is, therefore, not lost. Eight bed days is the median stay in hospital for serious medical errors (MHRA & NHSE, 2014).
[251] Assuming 7 hours of work and 12 hours of sleep (and other time e.g. commuting) per day.
[252] Curtis (2015)

estimate the net value per case (£163.64). These net values form the basis of our overall estimate of value.

Table 72: Net value of each prescribing error by category of harm (£, 2015)

Stakeholder	Value	No harm	Minor	Moderate	Severe
Gross impact value per case		**£0**	**£198.33**	**£423.55**	**£20,288.90**
NHS	Cost to community pharmacy	£5.57	£5.57	£5.57	£5.57
	Cost to GP in actual scenario	£29.12	£29.12	£29.12	£29.12
Total net value		**£34.69**	**£163.64**	**£388.87**	**£20,254.22**

Source: PwC analysis

5. Key results and sensitivities

Combining the volume and value assumptions in the preceding sub-sections, the tables below present our overall estimates of the value of community pharmacy, first for clarifications and then for prescribing errors. As part of our analysis, we also test the sensitivity of our results to our key assumptions. We then present the combined value estimate for both clarifications and prescribing errors.

Clarifying prescriptions

By combining the volume estimates presented in Table 66 and the net value estimates presented in Table 70, Table 73 below shows the overall contribution of community pharmacy from clarifying prescriptions with GPs and GP Practice staff. We have also separated this by stakeholder.

For example, using incident type as the basis for determining the volume of clarifications, we estimate that there would have been 316,000 instances where a GP appointment would otherwise have been required in 2015 (see Table 66). We then estimate the net avoided cost to the NHS by multiplying this volume by the unit cost taken from Table 69, less the costs incurred by the NHS (in Table 70). We perform similar calculations to estimate the benefits that would accrue to patients and wider society respectively. The final row provides our estimates of the total net value of community pharmacy's work to clarify prescriptions. This shows that by clarifying prescriptions, community pharmacy saved the NHS an estimated £2.1 million in 2015, and society as whole £10.2 million.

Table 73: Estimated value of clarifying prescriptions based on incident type (£m, England, 2015)

Stakeholder	Clarifications requiring a GP appointment	Clarifications not requiring a GP appointment	Total
Volume	316,000	209,000	526,000
NHS	3.3	(-1.2)	2.1
Patient	2.5	0.8	3.3
Society	4.0	0.9	4.8
Total	**9.7**	**0.5**	**10.2**

Source: PwC analysis

If, instead, we use query type to distinguish between clarifications and prescribing errors (as outlined in Table 65), our estimates of the value of community pharmacy change (see Table 74). On this basis, we estimate that the total avoided costs to the NHS arising from community pharmacy's role rises by 76.2% to £3.7 million and the overall value to wider society rises by 74.5% to £17.8 million.

Table 74: Sensitivity test of the impact from clarifying prescriptions, classifying errors as clarifications by avoided query type (£m, England, 2015)

Stakeholder	Clarifications requiring a GP appointment	Clarifications not requiring a GP appointment	Total
Volume	553,000	366,000	920,000
NHS	5.7	(-2.0)	3.7
Patient	4.3	1.4	5.7
Society	6.9	1.5	8.4
Total	**17.0**	**0.9**	**17.8**

Source: PwC analysis

We also test the sensitivity of our results to the volume of errors identified by the CCA audit. Specifically, we examine how our results change if we use the maximum and minimum incident rates across the community pharmacies that responded to the survey (see Table 64). Our results are presented in Table 75. Using the minimum rate reduces the total value by 52.9% to £4.8 million whilst using the maximum rate increases the total value by 55.9% to £15.9 million.

Table 75: Sensitivity test of the impact from clarifying prescriptions when using maximum and minimum audit responses (£m, England, 2015)

Stakeholder	Base scenario	Lower sensitivity (minimum audit responses)	Upper sensitivity (maximum audit responses)
Volume	526,000	249,000	821,000
NHS	2.1	1.0	3.3
Patient	3.3	1.6	5.1
Society	4.8	2.3	7.5
Total	**10.2**	**4.8**	**15.9**

Source: PwC analysis

Recognising and addressing prescribing errors

By combining the volume estimates presented in Table 67 and the net value estimates presented in Table 72, we estimate the value of community pharmacy's role in recognising and addressing prescribing errors based on the expected level of harm. Our results are shown in Table 76 with the value separated by stakeholder. For example, we estimate that there were 131,000 instances where minor consequences were avoided (see Table 67). We then take the net avoided cost to the NHS of each incident (see Table 71) and deduct the costs incurred by the NHS in the actual scenario (see Table 72). This gives an estimated benefit of £2.4 million. We perform similar calculations for each of the other stakeholders (i.e. patients and wider society). The final row gives our estimate of the total net value to society as a result of community pharmacy's role in resolving prescribing errors for each level of avoided harm. Community pharmacy's interventions in relation to prescription errors resulted in an estimated cost saving to the NHS of £466.1 million in 2015, and an overall contribution to wider society of £542.4 million.

Table 76: Estimated value of recognising and addressing prescribing errors based on incident type (£m, England, 2015)

Stakeholder	No harm	Minor	Moderate	Severe	Total
Volume	*865,000*	*131,000*	*67,000*	*26,000*	*1,088,000*
NHS	(-30.0)	2.4	2.8	490.9	466.1
Patient	0.0	2.8	3.2	12.4	18.4
Society	0.0	16.2	19.9	21.7	57.8
Total	**(-30.0)**	**21.4**	**25.9**	**525.0**	**542.4**

Source: PwC analysis

Our main analysis above assumes that no patients will die in the counterfactual scenario if prescribing errors are not spotted. Instead, we group these within the avoided severe consequences group in Table

67). If we had instead assumed that these 6,000 patients would die in the counterfactual scenario, and apply an estimated value of life of £1,919,000[253], there would be an additional cost to society of £10.9 billion.

If we distinguish between clarifications and prescribing errors by query type, rather than incident type (see Table 65), our impact estimate changes. The revised results are shown in Table 77. We estimate that the total avoided cost to the NHS would fall by 51.9% to £224.1m, and the overall impact to wider society would fall by 51.9% to £260.7 million.

Table 77: Sensitivity test of the estimated value of recognising and addressing prescribing errors, classifying errors by avoided query type (£m, England, 2015)

Stakeholder	No harm	Minor	Moderate	Severe	Total
Volume	*416,000*	*63,000*	*32,000*	*12,000*	*523,000*
NHS	(-14.4)	1.2	1.3	236.0	224.1
Patient	0.0	1.3	1.6	6.0	8.9
Society	0.0	7.8	9.6	10.4	27.8
Total	**(-14.4)**	**10.3**	**12.5**	**252.4**	**260.7**

Source: PwC analysis

As with clarifications, we also test the sensitivity of our results to the volume of errors identified by the CCA audit. Specifically, we examine how our results change if we use the maximum and minimum incident rates across the community pharmacies that responded to the survey (see Table 64). Our results are summarised in Table 78. If we use the minimum incident rate across community pharmacies, the estimated total value falls by 46.9% to £288.2 million and if we use the maximum rate, the value increases by 66.4% to £902.6 million.

Table 78: Sensitivity test of the estimated value of identifying and resolving prescribing errors when using maximum and minimum audit responses (£m, England, 2015)

Stakeholder	Base scenario	Lower sensitivity (minimum audit responses)	Upper sensitivity (maximum audit responses)
Volume	*1,088,000*	*578,000*	*1,811,000*
NHS	466.1	247.7	775.8
Patient	18.4	9.8	30.7
Society	57.8	30.7	96.2
Total	**542.4**	**288.2**	**902.6**

Source: PwC analysis

Key assumptions in our approach are the proportions of prescribing errors that fall into each level of avoided harm in the absence of community pharmacy playing its role. Our main estimates rely on the proportions identified in the CCA audit (see Table 67). If we use alternative estimates based on either the GMC report or the NPSA analysis, our estimates of the value of community pharmacy change. These are shown in Table 79. If we adopt the proportions from the GMC report, our estimate of the value of community pharmacy increases by 104.0% to £1,106.7 million whereas using the proportions from the NPSA report means that it falls by 90.4% to £52.3 million.

Table 79: Sensitivity test of the impact from identifying and resolving prescribing errors when using alternative proportions of harm (£m, England, 2015)

Stakeholder	Base case (CCA proportions, 2012)	GMC proportions, 2012	NPSA proportions, 2011
Volume	*1,088,000*	*1,088,000*	*1,088,000*
NHS	466.1	783.7	16.0
Patient	18.4	57.2	5.9
Society	57.8	265.8	30.5

[253] DfT (2015); (uplifted to 2015 prices using GDP deflator)

Stakeholder	Base case (CCA proportions, 2012)	GMC proportions, 2012	NPSA proportions, 2011
Volume	*1,088,000*	*1,088,000*	*1,088,000*
Total	**542.4**	**1,106.7**	**52.3**

Source: PwC analysis

Overall value of clarifying and resolving prescription errors

Table 80 presents the combined value that community pharmacy generates from clarifying prescriptions and identifying and resolving prescribing errors. We estimate that by clarifying prescriptions and resolving prescribing errors, community pharmacy saved the NHS an estimated £468.2 million as a result of its activities in 2015, and contributed £552.6 million to wider society.

Table 80: Overall value of managing prescriptions based on classification by incident type (£m, England, 2015)

Stakeholder	Clarifying prescriptions	Prescribing errors	Total
Volume	526,000	*1,088,000*	*1,614,000*
NHS	2.1	466.1	468.2
Patient	3.3	18.4	21.7
Society	4.8	57.8	62.6
Total	**10.2**	**542.4**	**552.6**

Source: PwC analysis

The estimates in Table 80 use incident type to classify clarifications and prescribing errors. We have also estimated the value of community pharmacy based on query type (see Table 81).[254] On this basis, the avoided cost to the NHS falls by 51.4% to £227.7m, and the overall value falls by 49.6% to £278.5 million.

Table 81: Overall value of managing prescriptions based on classification by query type (£m, England, 2015)

Stakeholder	Clarifying prescriptions	Prescribing errors	Total
Volume	920,000	*523,000*	1,443,000
NHS	3.7	224.1	227.7
Patient	5.7	8.9	14.6
Society	8.4	27.8	36.2
Total	**17.8**	**260.7**	**278.5**

Source: PwC analysis

[254] The difference in the total volume is due to the scaling back of the clarification volume to control for the growth in Electronic Prescription Services.

Medicines adjustments

1. Introduction

This chapter provides our assessment of the value associated with community pharmacy's current support to patients, their families and carers in England, resulting from adjustments made to dispensed prescriptions. We estimate the value that would be at risk if community pharmacy were no longer to supply its current service, using data for 2015.

The chapter is structured as follows:

- Section 2 describes the service currently provided by community pharmacy, including what it means from the patient perspective, and sets out our assumptions for what would happen from the patient perspective if community pharmacy did not provide its current service (i.e. the counterfactual);
- Section 3 describes the value that flows from the current activities of community pharmacy in terms of potential avoided costs to other parts of the health and social care system, including local authorities, and explains the key impacts;
- Section 4 explains our approach to assessing each element of expected value, specifically:
  - How we estimate the number of individuals who benefit from the service provided by the pharmacy (the 'volume');
  - How we estimate the value delivered each time the service is provided (i.e. for each individual patient) (the 'value'); and
- Section 5 summarises our key results as well as the results of our sensitivity analysis.

A set of technical appendices provides further details of the methodology and the data sources we use to estimate the value of services related to medicines adjustments provided by community pharmacy in England in 2015.

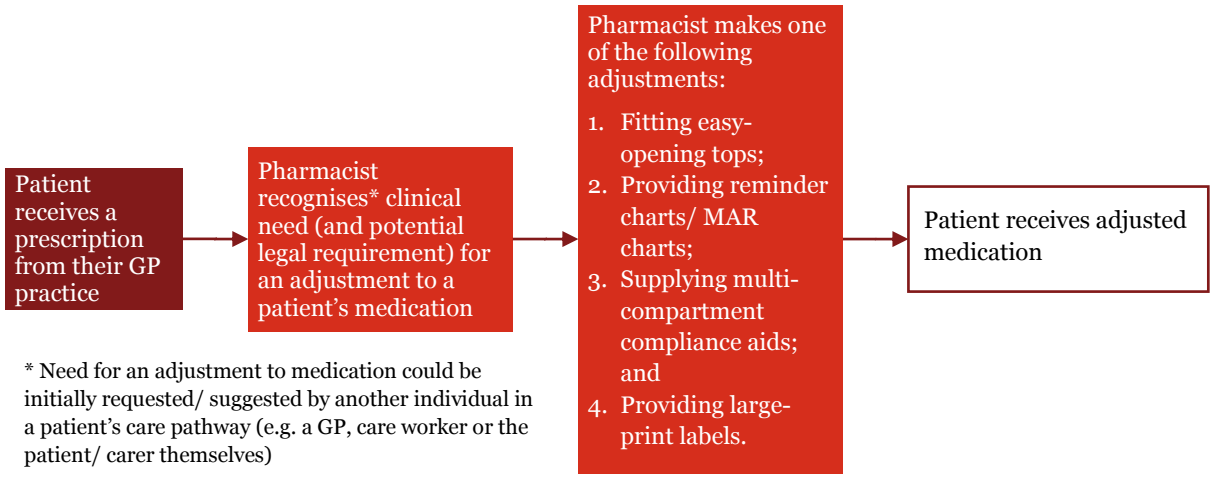
2. Description of activity

When dispensing medication, pharmacists consider whether a patient's condition may impact on their ability to adhere to their medication regimen. If a risk is identified, then pharmacists may adjust the way items are dispensed to aid adherence. There are four main types of adjustment which a pharmacy might make:

1. Fitting easy-opening tops;
2. Providing reminder charts/ Medication Administration Record (MAR) charts;
3. Supplying multi-compartment compliance aids; and
4. Providing large-print labels.

What this means for the patient is outlined in Figure 21.

Figure 21: Current pathway for patients receiving adjustments to their medication (through community pharmacy)



Source: PwC analysis

If a patient has a disability that might otherwise prevent them from using a prescribed medication, then pharmacies have historically taken steps to make it easier for them. More recently, as a result of the Disability Discrimination Act 1995 and the Equality Act 2010, pharmacies are obliged to make 'reasonable adjustments' when they dispense to certain patients[255]. In practice, however, pharmacies continue to make adjustments for patients who would benefit from them but who are not (legally) protected by the legislation because of their disability, or where the adjustment would not fall within the definition of 'reasonable'.

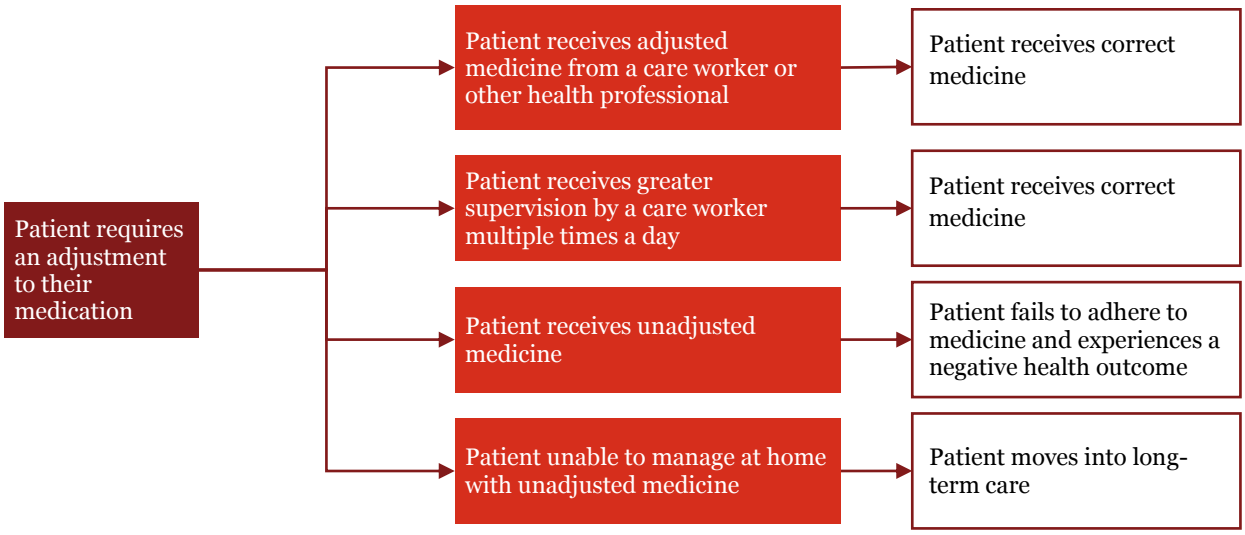
If the pharmacy did not make these adjustments, then there are a range of potential counterfactual scenarios which could occur:

- The adjustment might be made by a carer or care worker (or other health professional);
- The patient's care worker may not be permitted to make the adjustment and, instead, may need to supervise the patient taking their medication each time they take their medication (potentially, multiple times a day to ensure adherence). For the purpose of this assessment, we assume that this role must be fulfilled by a care worker and that patients do not have the option of a carer to perform a similar role;
- The patient may receive the prescribed items from the pharmacy without any adjustment so that they have to cope without the medicine being adjusted at all, resulting in negative effects on their health outcome; and
- In some cases the inability to receive adjusted medicines may jeopardise the patient's ability to adhere to their medicines regimen and this could require a change in their care setting (e.g. they may need to move into long-term care). This change in setting may be preceded by a deterioration in the patient's health, motivating the change in their care setting.

These scenarios are outlined in Figure 22.

[255] Making reasonable adjustments to the provision of services for certain patients was first made a legal requirement following the introduction of the Disability Discrimination Act (DDA) in 1995. This was the forerunner to the Equality Act in 2010. However, pharmacists regularly made similar adjustments prior to the introduction of the DDA (and continue to do so for patients outside of the Equality Act) on the basis of clinical need rather than legal requirement.

Figure 22: Counterfactual patient pathways in the absence of pharmacist adjustments to medicine



Source: PwC analysis

3. Contribution of community pharmacy

In line with our approach for the other services provided by community pharmacy, our counterfactual scenario is based on a likely, next best alternative for the health system in the absence of community pharmacy. As described above, adjustments are made on the basis of clinical need and could, therefore, pose a significant risk to a patient's adherence (and, hence, the health outcome) if they are not made.

As a result, we assume that if community pharmacies did not make the adjustments, the next best alternative would be for care workers to spend more time supporting their patients. If permitted, this could involve them making the adjustments themselves or, instead, by spending more time supervising the patient to mitigate any risk to adherence. In this case, the value provided by community pharmacy is the avoided cost burden on local authorities (and other care providers) who would otherwise have to pay for the care worker support needed. This is a conservative approach, as the costs associated with reduced adherence or movement into long-term care would likely be far greater.

As discussed above, these adjustments may be a legal requirement under the Equality Act for a number of patients. The funding for the pharmacy contractual framework implicitly recognises that meeting this legal requirement imposes a cost on pharmacies. This is reflected in the application of a flat rate fee of 6.6 pence per item dispensed for "contribution in Practice Payment for the Equality Act".[256] As a result, when estimating the value of community pharmacy's activities, we net off the payment received for making these interventions.

4. Approach to estimating the contribution of community pharmacy

Our approach to determining the value of community pharmacy in 2015 involves two elements:

- Estimating the number of times pharmacy delivered the service and generated each of the benefits described earlier (the 'volume') in 2015; and
- Estimating the value delivered each time the service was provided (the 'value').

We summarise our approach to each element below; more details are provided in the technical appendices.

[256] PSNC (2016)

Volume

We estimate the amount of time spent adjusting patients' medication based on a survey of 885 pharmacies, undertaken in May-June 2016. The number of adjustments identified in this survey is used as the basis for estimating the total volume in 2015. This survey asked pharmacies the question:

> *"Over the past two weeks, how many times did you provide the following adjustments to dispensed medicines to aid patient adherence to their medicines regimen:*
> *a) Easy-opening tops*
> *b) Reminder charts/ MAR charts [excluding people in care homes, but including those in sheltered housing without constant care]*
> *c) Multi-compartment compliance aids*
> *d) Large-print labels*
> *e) Other (please state)"*

Our survey results demonstrated that community pharmacies make these type of adjustments regularly: only 5% of pharmacies did not record a single adjustment over the two week period. On average, pharmacies made 63 interventions over two weeks. More than two-thirds of the adjustments involved dispensing using multi-compartment compliance aids. Scaling up the two week responses to a full year suggest that the average pharmacy makes 1,649 interventions in a year. On this basis, we estimate that all 11,815 pharmacies in the England in December 2015[257] undertook about 19.5 million adjustments in 2015.

The average numbers of different interventions per pharmacy over the two weeks are shown in Table 82, alongside our estimate of the total interventions in 2015.

Table 82: Number of pharmacy interventions

Type of intervention	Average number of pharmacy interventions (in fortnight)	Total number of pharmacy interventions in England in 2015 (m)
Easy-opening tops	4	1.1
Reminder charts/ MAR charts	9	2.6
Multi-compartment compliance aids	44	13.6
Large-print labels	1	0.4
Other	6	1.8
Total	**63**	**19.5**

Source: PwC analysis

In addition to the number of adjustments made, the survey also asked:

> *"Over the past two weeks how many additional minutes did you and your colleagues spend making these adjustments, over and above the normal time to dispense the item?"*

Our responses to this question allow us to estimate the average amount of time per intervention. This time is not typically recorded by pharmacies, unlike the number of interventions asked elsewhere in the survey, and as a result there could be more variability and error in the responses received. This risk is tested through a sensitivity test investigating a 95% confidence interval around the average time per intervention. The mean amount of time per intervention arising from the survey was 10.5 minutes. If we apply this estimate to the 19.5 million interventions we estimate in 2015 means that more than 3.5 million hours were spent in pharmacies across all England pharmacies in that year.

Value

As discussed above, if community pharmacy did not provide its current service, we assume that the medication would be managed through greater intervention by a care worker. There are two ways in which this might be provided:

- If permitted, the care worker could make the adjustment; or
- The care worker could provide greater supervision of the patient to mitigate the risk to adherence.

[257] NHS Business Services Authority (December 2015)

To estimate the value of community pharmacy, we also need to consider the reimbursement currently received by pharmacists through the Equality Act. This means we need to determine:

1. The cost of care worker time either to individuals or the local authority, under each of the two counterfactual scenarios outlined above; and
2. The level of payment currently received by pharmacies.

Adjustments made by care workers

The Royal Pharmaceutical Society of Great Britain has produced guidance on the 'Handling of Medicines in Great Britain'[258] which states that:

> *"Some care providers who have been unable to get medicines in MDS have allowed care workers to re-package medicines in compliance aids. This is also known as 'secondary dispensing'. Repackaging of medicines by care workers should not take place in care homes. The risk of making a mistake is too great."*

This indicates that it is appropriate for us to assume that reasonable adjustments (in this case the guidance specifically refers to MDS) may be made by care workers in some cases although this will not always be the case. Where it happens, we assume that the amount of time to make each intervention would be the same as the time taken by pharmacy teams. This may be a conservative assumption as pharmacy teams are likely to be more familiar and experienced in making such adjustments and, hence, might be expected to make them more quickly than care workers, on average. In addition, as suggested by the quotation above, medication adjustments undertaken outside of a pharmacy could also have an increased risk of error, which could have a negative impact on patients' health. Neither the increased time cost, nor the increased risk of error are included within our analysis.

We have seen no evidence which indicates the share of patients for whom care workers would be permitted to make these adjustments. For the purpose of our analysis we assume that this would apply to half of patients.

Data on the cost of care worker time are available from the Personal Social Services Research Unit (PSSRU)[259]. This indicates that the average cost of a face-to-face home care worker is **£24/ hour** (in 2015 prices). Applying this cost estimate to the average time per intervention of 10.5 minutes implies an avoided cost to local authorities of each additional intervention of **£4.20**.

Supervision by care workers

For the other half of patients, we assume that care workers would not be permitted to make the adjustments to medications themselves. In these cases, we assume that care workers would supervise their patients as they take their medicines from the original packaging. Without the availability of an MDS system, this supervision would be required every time a patient needed to take their medication, which could be more than once a day.

In the absence of evidence on the actual amount of additional supervision time that would be required, we assume that this would take the form of 6 minutes additional care worker time each day (2 minutes each for three separate visits during the day). In the interests of prudence, we assume that this time could be combined with an existing visit by the care worker to the patient. If an additional visit was required, the time cost for care workers would be substantially greater (as they would incur additional travel time and costs). As a result, our findings should be seen as conservative estimates of the value generated by community pharmacy.

Assuming that patients currently require interventions on a weekly basis, on average, our assumption would imply that each adjustment, which currently takes an average of 10.5 minutes, would be replaced by 42 additional minutes of care worker time. Applying the average cost of a face-to-face home care worker of **£24/ hour** implies an avoided cost of each additional intervention of **£16.80**.

Additional care worker time, whether required to make adjustments or supervise adherence, could be paid for either by local authorities or patients themselves. Miller et al. (2013)[260] estimate that 20% of

[258] Royal Pharmaceutical Society (2007)
[259] Personal Social Services Research Unit (2015)
[260] Miller et al. (2013)

home care and 45% of residential care home places are self-funded. Weighting these by spending on each type of care (from the same report) implies that 39% of all care worker time is funded by patients or carers. We use this assumption as the basis for determining the share of cost burden faced by local authorities and patients respectively, in the event that pharmacies did not provide this service.

In this counterfactual scenario there would be an avoided cost as MDS devices (such as the multi-compartment tray) would no longer need to be purchased. This cost has not been accounted for on the basis of materiality – NICE (2015)[261] estimate that the average MDS device costs the NHS £0.45. Even if a new device were required each week, this would be only 2-3% of the wage cost of £16.80 per intervention.

Funding received by pharmacies

As some of the cost of providing this service is covered by funding received as a result of the Equality Act (for some patients), we need to offset the funding received by pharmacies to meet the legal requirement of the Act. As noted above, community pharmacies in 2015 received a flat rate of 6.6 pence per item dispensed for "contribution in Practice Payment for the Equality Act".[262] Applying this figure to just over 1 billion items that were dispensed by community pharmacy in 2015[263] leads to a total reimbursement for community pharmacies of **£66.6 million** in relation to these adjustments.

5. Key results and sensitivities

Table 83 summarises the value of the medication adjustments provided by community pharmacy based on the assumptions laid out above. We estimate that the total value in 2015 was **£138.0 million**, which takes the form of either a net reduction in health system costs, or avoided costs to patients and carers.

Table 83: Summary of the estimated value generated by medication adjustments in 2015 (£m, 2015)

Number of interventions	Avoided costs to patients and carers	Avoided local authority cost	Pharmacy reimbursement	Net value
19.5m	£80.3	£124.3	-£66.6	£138.0

Source: PwC analysis

Potential associated health risks

The availability of compliance aids and similar medication adjustments has been shown to have a positive impact on health outcomes (see, for example, Boemi et al. (2014)).[264] In the absence of pharmacists providing such adjustments it is possible that a share of patients would cease to receive them, and would potentially experience a worse health outcome as a result.

To investigate the potential magnitude of this risk, we investigate how health system costs could be affected if patients needed more care because community pharmacy no longer adjusted their medication. These show that the potential impact on NHS cost savings could be highly material – with savings from GP appointments of between **£8.8 million** and **£43.8 million**, from in-patient stays of between **£61.0 million** and **£304.9 million** and from residential care of between **£111.4 million** and **£557.2 million.** Clearly these are quite wide ranges, and are challenging relationships to estimate given the lack of literature, but they serve to demonstrate the scale of the potential impact on the health sector if support for patients' medication regimes by community pharmacy was removed.

These calculations are summarised in Table 84.

Table 84: Summary table for potential health impacts (England, 2015)

Value	Cost to NHS/ Local Authority per case	Assumed proportion affected	Assumed volume affected ('000s)	Cost saving to NHS (£m)
	£45	1.0%	195	8.8

[261] NICE (2015)
[262] PSNC (2016)
[263] NHS Business Service Authority, 2015
[264] Boeni et al. (2014)

Value	Cost to NHS/ Local Authority per case	Assumed proportion affected	Assumed volume affected ('000s)	Cost saving to NHS (£m)
GP appointment		2.0%	390	17.5
		5.0%	974	43.8
Non-elective inpatient stay in hospital	£1,565	0.2%	39	61.0
		0.5%	97	152.5
		1.0%	195	304.9
One year of residential social care	£57,200	0.01%	1.9	111.4
		0.02%	3.9	222.9
		0.05%	9.7	557.2

Source: PwC analysis

Other sensitivity tests

As discussed above, the next best alternative for the health system is that patients receive their medication as they currently do, but with the adjustments having been made elsewhere in the health system. At the moment, aside from some care workers who are permitted to "secondary dispense" into alternative packaging, medication adjustments are almost entirely undertaken within community pharmacies. In the absence of this service, it is possible that, in the long-run, an alternative system of support would be set up so that an appropriately qualified and skilled individual could make the equivalent adjustments to those currently provided by community pharmacies without additional risk to the patient.

Establishing this system could require significant investment in recruitment and training of staff and development of a supporting infrastructure. Below, we outline the potential cost to the health system if a process was set-up such that these adjustments were made by a district nurse. Data from the Personal Social Services Research Unit (PSSRU)[265] suggest that the cost to the health system of an hour of patient-related work by a district nurse, including the cost of achieving the required qualifications, is **£67** (in 2015 prices).

Under this scenario, district nurses would make all 19.5 million adjustments currently made by pharmacies. This would take 3.3 million hours. The results of this intervention would be that the net impact on health system costs of all adjustments being made by district nurses would be **£162.0 million**. This figure is driven by the relative cost of district nurses compared to that of care workers and the direct funding currently received by pharmacies in relation to the Equality Act (2010).

As discussed above, we also run two further sensitivity tests reflecting a 95% confidence interval around the value of time saved per intervention. For these tests we assume:

1. A lower-bound estimate for average time per intervention – 9.3 minutes; and
2. An upper-bound estimate for the average time per intervention – 11.7 minutes.

This sensitivity test provides a range around the mean estimate of **£133.2 million** to **£142.7 million.**

Table 85: Sensitivity tests on the value generated by medicines adjustments (£m, England, 2015)

Sensitivity test	Avoided costs to patients and carers	Avoided health system cost	Pharmacy reimbursement	Total value of impact
Adjustments made by district nurses	-	228.6	-£66.6	162.0
Lower-bound time saving estimate	121.4	78.4	-£66.6	133.2
Upper-bound time saving estimate	127.2	82.2	-£66.6	142.7

Source: PwC analysis

[265] Personal Social Services Research Unit (2015)

Delivering prescriptions

1. Introduction

This chapter provides our assessment of the value associated with community pharmacy's current role in providing or facilitating home delivery of prescriptions in England. We estimate the value that would be at risk if community pharmacy no longer supplied its current service, using data for 2015.

The chapter is structured as follows:

- Section 2 describes the service currently provided by community pharmacy, including what it means from the patient perspective, and sets out our assumptions for what would happen from the patient perspective if community pharmacy did not provide its current service (i.e. the counterfactual);
- Section 3 describes the value that flows from the current activities of community pharmacy in terms of potential avoidable costs to the patients, and explains key impacts;
- Section 4 explains our approach to assessing each element of expected value, specifically:
  - How we estimate the number of individuals who benefit from the service provided by the pharmacy (the 'volume');
  - How we estimate the value delivered each time the service is provided (i.e. for each individual patient) (the 'value'); and
- Section 5 summarises our key results as well as the results of our sensitivity analysis.

A set of technical appendices provides further details of the methodology and the data sources we use to estimate the value of services related to home delivery of prescriptions provided by community pharmacy in England in 2015.

2. Description of activity

Many pharmacies provide a delivery service to take patients' prescriptions to their homes. For the majority of prescription items this is not a service commissioned by NHS England or local authorities. For specified appliances, however, pharmacies are obliged to offer to deliver the appliance to the patient's home and are reimbursed for this service.[266] For all other items, the decision whether or not to deliver is made by the pharmacy as a commercial decision. The service is most commonly provided to patients who would otherwise struggle to travel to the pharmacy themselves and to whom the pharmacist regularly dispenses medicines. The simple pathway for patients who receive home deliveries is outlined in Figure 23.

Figure 23: Pathway for patients who receive home deliveries (through community pharmacy)

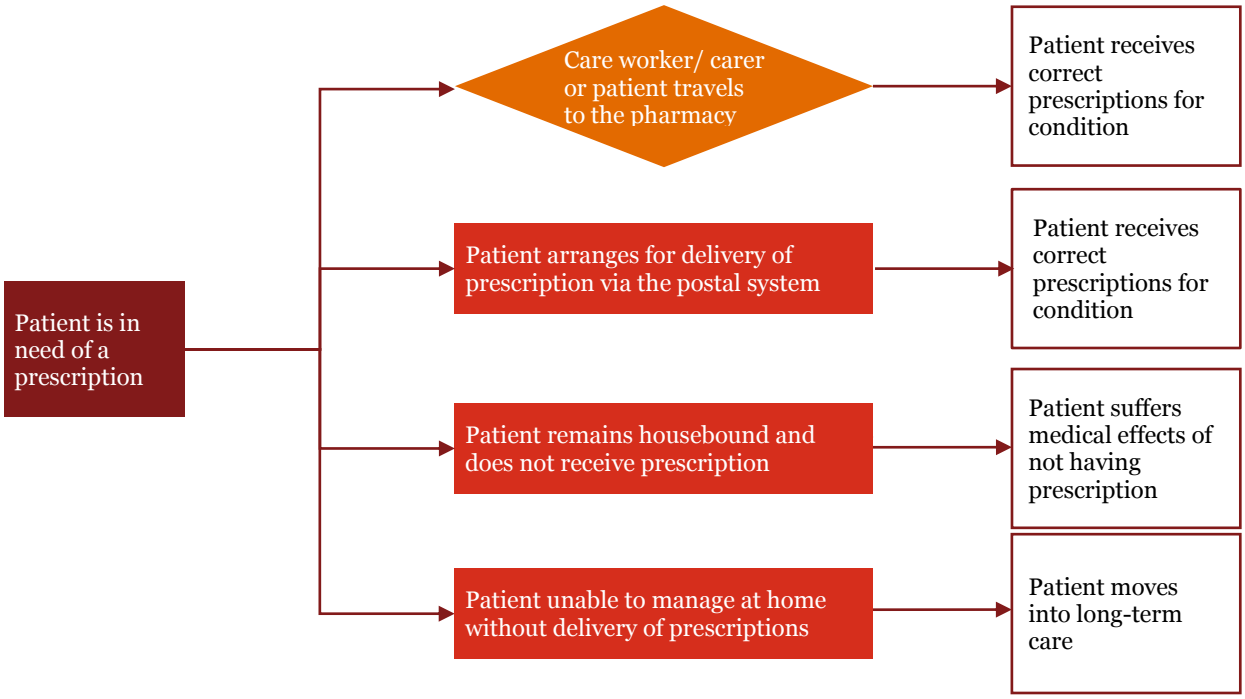
Source: PwC analysis

If the pharmacy did not deliver the prescribed items, the patient would have four options which are illustrated in Figure 24. Under the first of these, the patient (or a carer or care worker) would instead travel to the pharmacy to collect the prescription. Although this would not directly affect the patient's

[266] For a list of specified appliances please see Parts 1XA, 1XB and 1XC of the Drug Tariff

treatment, this would impose a time and, potentially, monetary cost on the patient or carer. If the collection was made by a care worker then this cost would be incurred by the relevant local authority (in the cases where care is provided by the public sector). Alternatively, the patient may arrange and pay for the delivery of the prescription through the postal system. The other two options would be for patients simply not to receive their prescription and/or, at the extreme, if they have particular problems with their mobility, they might need to receive support to improve their mobility or move into long-term residential care. The likelihood of these outcomes would depend heavily on the patient's condition (e.g. whether it is long-term or not) and the medication required. The impact of both of these could be material. This range of counterfactual outcomes is similar to that seen for medication adjustments, another form of medicines support.

Figure 24: Counterfactual patient pathways in the absence of home delivery of prescriptions through community pharmacy



Source: PwC analysis

3. Contribution of community pharmacy

The size and nature of the value of the delivery service provided by community pharmacy depend on which combination of alternatives is assumed in the absence of the pharmacy service. Where the patient, carer or care worker collects the prescription, we assume that the patient (or their carer or care worker) would face additional time and other costs when collecting the prescription, although there would be no change in the health outcome for the patient (as he or she would still obtain their medicine).[267] Some of this cost would be incurred by the relevant local authority where the collection is undertaken by a care worker employed by them.

Under the second scenario, where the patient arranges for delivery via the postal system, there would be no impact on their health but they would bear the financial cost of the delivery.

The impacts of the final two counterfactual scenarios - where the patient fails to receive their prescription or receives support either with mobility, or moves into long-term care - would be broader. Here, the patient would be more likely to experience a negative health outcome, potentially adding cost to the NHS if it leads to increased demand for the services of a GP or an A&E (or

[267] It is also assumed that there is no change in the time taken for the patient to receive the prescription. In practice it is possible that home delivery could either speed up or delay a patient's access to medicine, but the impact of this is not estimated.

equivalent) service. In the extreme, if a patient needed to move into long-term social care, then this would potentially impose a cost on the relevant local authority. Both of these scenarios could also have adverse implications for patient wellbeing. Consequently, the shortfall in value of the third and fourth counterfactual scenarios compared with community pharmacy delivery would be significantly greater than for the first and second counterfactuals.

In order to estimate the value of the impact of home deliveries, we assume that patients would choose a counterfactual scenario whereby they would continue to receive their prescriptions. We make this assumption on the basis that the value of the health system as a whole is maximised where patients receive appropriate medication, and the underlying value of the current operation of community pharmacy is best estimated in this instance by calculating how it efficiently facilitates this compared to the next best alternative methods of delivery of medication.

Of the two counterfactual scenarios under which the patient would still receive their medication (patient collecting from a pharmacy and arranging home delivery), a patient collecting a prescription involves the lower direct cost to the patient. This is demonstrated in sensitivity testing, which shows that the financial cost of paying for delivery of medication exceeds the value of time required for a patient or carer to collect the prescription. The counterfactual scenario we have defined, therefore, represents the 'next best' option for the health system absent community pharmacy delivery, both in terms of preserving the healthcare benefits of drug delivery and in terms of the cost efficiency of that delivery.

In line with other areas of impact, we assume that service provided currently by community pharmacy (i.e. the delivery of prescriptions from a pharmacy to a patient's home) would continue albeit through a different mechanism. This would be the next best alternative for the health system in the absence of community pharmacy. Were this not to be the case, and the absence of a home delivery service were to impact on a patient's medication regimen, the social costs would be significant. As a result, the valuation approach here, which assumes that patients' treatment is unaffected in the counterfactual, should be seen as conservative.

In addition to presenting a conservative counterfactual, we separately demonstrate the potential magnitude of the social impact if there were to be a knock-on health impact. Although not part of the central scenario, the magnitude of these knock-on impacts demonstrate a broader range of social values which could be generated under different assumptions.

4. Approach to estimating contribution of community pharmacy

Our approach to determining the value of community pharmacy associated with home delivery in 2015 involves two elements:

- Estimating the number of times pharmacy has delivered the service and generated each of the benefits described earlier (the 'volume'); and
- Estimating the value delivered each time the service is provided (the 'value').

We summarise our approach to each element below; more details are provided in the technical appendices.

Volume

We estimate the volume of home deliveries based on a survey of 885 pharmacies undertaken in May-June 2016. The number of deliveries identified in this survey is used as the basis for estimating the volume in 2015. The results of this survey are presented and analysed fully in Appendix 1. One of the questions the survey asked pharmacies was:

> *"Over the past two weeks, how many times did you arrange for home delivery of prescriptions? (Please count the number of individual deliveries, not the number of prescription items delivered)"*

The survey results demonstrate that home delivery of prescriptions is a common practice amongst community pharmacies: 89% of pharmacies recorded at least one delivery over the previous two weeks. The average number of deliveries made over the two week period was 150 per pharmacy with a

range from 0 to over 2,000. This volume of deliveries is inclusive of any appliances which pharmacies are obliged to deliver. Any payment received for these deliveries is deducted from the gross estimate of value to generate an estimate of net value. Scaling up the average of 150 deliveries across all community pharmacies gives an estimated average annual number of deliveries per pharmacy of 3,911. Applying this average to all 11,815 pharmacies in England in December 2015[268] implies that 46.2 million deliveries were made in 2015. Even if each delivery relates only to a single script and each script covers an average of 2.02 items[269], these deliveries would represent more than 9% of the 1 billion items dispensed annually.[270] Given that a single delivery could relate to multiple prescriptions, each containing an average of 2.02 items, this estimate should be seen as a lower bound for the share of items delivered annually.

Table 86 provides a breakdown of the estimated proportion of scripts delivered by community pharmacies in 2015 based on the survey results.[271] Our analysis shows that the majority of pharmacies deliver less than 10% of the scripts that they dispense, but there is a wide range across pharmacies.

Table 86: Estimated share of prescriptions delivered in England in 2015

Estimated % of scripts delivered	% of pharmacies
0%	14%
0-9%	56%
10-19%	21%
20-29%	7%
30%+	3%

Source: PwC analysis

Value

As discussed above, we assume as our base case that all the prescriptions which are currently delivered would otherwise be collected by a patient, carer or care worker. The value generated is then through the avoided time and cost of making this journey. Valuing this impact, therefore, requires two assumptions:

- The amount of time spent travelling to collect a prescription; and
- The value of this time, and any associated other costs (e.g. fuel, fares) to the patient, carer or care worker.

We discuss each of them below:

Average time spent travelling to pick up a prescription

In order to estimate the average journey time to pick up a prescription, we use Geographic Information System (GIS) mapping to estimate the average straight-line distance between each household and their nearest pharmacy within England. Our approach is explained in Appendix 4 of our detailed report. We estimate that the average journey time for a patient to a pharmacy, based on the quicker of walking or driving, is 4.6 minutes (or 9.3 minutes for a return journey). We assume that no additional time is needed to collect the prescription within the pharmacy on the basis that this would be the same as the time needed to receive the delivery.

Our journey time estimate is likely to be conservative for patients receiving home deliveries for three reasons:

- The assumption of straight-line distance minimises the potential time cost, and does not account for the availability of walking or driving routes;
- We exclude any additional costs of travel, such as fuel or parking expense. These are outlined in Appendix 4; and

[268] NHS Business Services Authority (December 2015)
[269] NHS Business Services Authority (December 2015)
[270] NHS Business Services Authority (December 2015)
[271] Data on the number of scripts dispensed by each contracting pharmacy come from the NHS Business Services Authority Pharmacy and Appliance Contractor Dispensing Data dataset and these are then converted into fortnightly averages.

- A patient is more likely to receive home deliveries if they cannot access their local pharmacy which, all things being equal, may be because they live further away than average from the local pharmacy.

Value of time and associated costs

The value of time we use to monetise the time savings estimated above is **£7.05/ hour**. This value comes from the DfT's WebTAG guidance[272] and represents the value of leisure time spent travelling (adjusted to 2015 prices). Applying this assumption implies that the value of time per return trip to the pharmacy (taking 9.3 minutes) of **£1.09**.

This value assumes that all prescriptions are collected by patients or carers (i.e. friends and family), rather than paid care workers. We believe that this is a conservative assumption which recognises that patients who currently receive deliveries from pharmacies (rather than via a care worker) may do so because they do not receive regular care visits or because they cannot feasibly collect prescriptions themselves given their current care arrangements. If the prescription was collected by a care worker, estimates from the Personal Social Services Research Unit (PSSRU) suggest that the average cost for a face-to-face home care worker is **£24/ hour**. Applying this assumption would increase the cost per home delivery to **£3.71**.

Compensation received by community pharmacies for making deliveries

To estimate the net contribution of community pharmacy we need to deduct the funding received by pharmacies for undertaking these deliveries. As we outline above, pharmacists are obliged to deliver appliances, and are reimbursed where these deliveries are made. The fee per item[273] delivered is typically £3.40.[274] In total, pharmacies were paid **£13.9 million** in 2015 for delivering appliances.[275] Within our results, we deduct this payment from our estimate of the value in order to determine the net contribution.

All other deliveries we deem to be entirely discretionary, as pharmacies are not obliged to offer this service for free to patients under the terms of the Community Pharmacy Contractual Framework (CPCF).[276] As a result, we do not assume that there would be any change in the funding received by community pharmacy, were this service no longer to be offered.

5. Key results and sensitivities

Table 87 summarises the value of home deliveries based on our assumptions laid out above. We estimate that the gross contribution in 2015 was **£50.4 million**. This is the value of time saved. Deducting the compensation received by pharmacies for delivering appliances leads to a net value generated by community pharmacy of **£17.0 million**.

As discussed above, our analysis assumes that if pharmacies did not offer home deliveries, there would still be home deliveries with no impact on patients' health outcomes through poor medication, and no impacts on the NHS or local authorities through needing to provide alternative arrangements to ensure drug delivery such as mobility support or residential care.

Table 87: Summary of estimated value generated by home deliveries in England in 2015

Impact area	Number of return trips affected (million)	Value per return trip (£)	Gross contribution (£m, 2015)	Compensation received by pharmacies	Net value (£m)
Value of time saved	46.2	1.09	50.4	13.9	36.5
Total			**50.4**		**36.5**

[272] Department for Transport (2015)
[273] PSNC (2016a)
[274] The only exceptions are catheter kits and intermittent self-catheters, for which a fee of £9.30 is paid
[275] PSNC data (2016b)
[276] PSNC (2016c)

Source: PwC analysis

Potential associated health risks

Our analysis assumes that home deliveries have no impact on health outcomes. In practice, we estimate that home deliveries helped patients to avoid 46.2 million return trips to the community pharmacy in 2015 which were intended to facilitate better adherence and improve access to and safe use of medicines. We have identified no existing studies that investigate the direct link between home deliveries and health outcomes, or drivers of health outcomes such as adherence. However, increasing barriers to patients receiving their medication could, in some cases, have this effect.

To investigate the potential magnitude of this risk, we assess the potential costs which would be borne by the health system if some of these deliveries do require patients to receive additional care: either through GP appointments, non-elective in-patient stays or moving into long-term care. Given the uncertainty of the link between home deliveries and health outcomes, we have presented a range of potential impacts based on different assumptions. These are designed to give indicative estimates for the potential scale of the impact. For example:

- If 2% of deliveries avoided a GP appointment, this would save **£41.6 million** to the NHS;
- If 0.5% of deliveries avoided a non-elective in-patient stay this would save **£361 million;** and
- If 0.02% of deliveries avoided a year of residential social care then this would save **£529 million**.

These calculations are summarised in Table 88:

Table 88: Summary of potential health impacts of home deliveries (England, 2015)

Assumed of NHS pathway	Cost to NHS/ Local Authority per case	Assumed proportion of deliveries affected	Assumed volume affected ('000s)	Cost saving to NHS (£m)
GP appointment	£45	0.5%	231	10.4
		1.0%	462	20.8
		2.0%	924	41.6
Non-elective inpatient stay in hospital	£1,565	0.1%	46	72.3
		0.2%	92	144.7
		0.5%	231	361.6
One year of residential social care	£57,200	0.005%	2.3	132.2
		0.01%	4.6	264.3
		0.02%	9.2	528.7

Source: PwC analysis

Other sensitivity tests

We have also modelled the impact of six other sensitivities:

1. Assume a lower-bound estimate for the number of deliveries per pharmacy, based on a 95% confidence interval (137 per fortnight)
2. Assume an upper-bound estimate for the number of deliveries per pharmacy, based on a 95% confidence interval (163 per fortnight)
3. Assume that 11% of collections are done by care workers (paid by the local authority at a cost of £24/hour). Data from Carer's UK[277] suggest that there are 6.8 million carers, and 580,000 people who receive homecare from a care worker. In addition, ONS data suggest that nearly 300,000 people are resident in care homes.[278] Jointly, these data imply that approximately 11% of patients may receive care from a care worker, either through homecare or a care home;
4. Assume that the average driving speed is faster (i.e. that of an A road - 42.7kmph);
5. Assume that the average driving speed is lower (i.e. that of a local street - 19.2kmph); and

[277] Carers UK (2015)
[278] Office for National Statistics (2014)

6. Assume that all patients pay for a home delivery through the postal system. The fee paid to pharmacists per delivery of appliances (£3.40), designed to reimburse the cost which this imposes, is used as a proxy for the cost which would be faced by patients.

Our results are presented below in Table 89. The first two tests demonstrate that, with 95% confidence, the range of benefits driven by the volume of deliveries is between **£12.6 million** and **£21.4 million**. The third of these tests has a more material impact, increasing the impact to **£30.9 million**. In addition, roughly 30% of the gross value under this scenario is avoided local authority costs. This demonstrates the potential for home deliveries to have a material impact on public finances, if some or all of them would otherwise need to be provided by the public sector. In contrast, sensitivity tests 4 and 5 demonstrate a relatively modest impact of adjusting the assumed average driving speed – providing a range of **£16.2 million** to **£24.3 million**. Finally, sensitivity test 6 tests the impact of patients paying £3.40 for each prescription to be delivered by mail, rather than collection. This scenario greatly increases the cost to patients, leading to a substantially larger contribution of **£123.7 million**.

Table 89: Sensitivity tests on the value generated by home deliveries in 2015 (England, £m)

Sensitivity	Benefit to patients	Reduced local authority costs	Total value (2015)	Compensation received by pharmacies	Net value (£m)
Lower-bound volume estimate	46.0	-	46.0	13.9	32.1
Upper-bound volume estimate	54.8	-	54.8	13.9	40.9
11% of collections undertaken by a care worker	44.6	19.7	64.3	13.9	50.4
Higher average driving speed assumption	49.6	-	49.6	13.9	35.7
Lower average driving speed assumption	57.7	-	57.7	13.9	43.8
Patients receive prescriptions via mail order	157.1	-	157.1	13.9	143.2

Source: PwC analysis

Managing drug shortages

1. Introduction

This chapter provides our assessment of the value associated with community pharmacy's current role in providing services to help patients resolve drug shortages in England. We estimate the value that would be at risk if community pharmacy no longer supplied its current service, using data for 2015.

The chapter is structured as follows:

- Section 2 describes the service currently provided by community pharmacy, including what it means from the patient perspective, and sets out our assumptions for what would happen from the patient perspective if community pharmacy did not provide its current service (i.e. the counterfactual);
- Section 3 describes the value that flows from the current activities of community pharmacy in terms of potential avoidable costs to the NHS, the patient and wider society and explains the key impacts;
- Section 4 explains our approach to assessing each element of expected value, specifically:
  - How we estimate the number of individuals who benefit from the service currently provided by community pharmacy (the 'volume');
  - How we estimate the value delivered each time the service is provided (i.e. for each individual patient) (the 'value'); and
- Section 5 summarises our key results as well as the results of our sensitivity analysis.

A set of technical appendices provides further details of the methodology and the data sources we use to estimate the value services related to supporting patients in resolving drug shortages provided by community pharmacy in England in 2015.

2. Description of activity

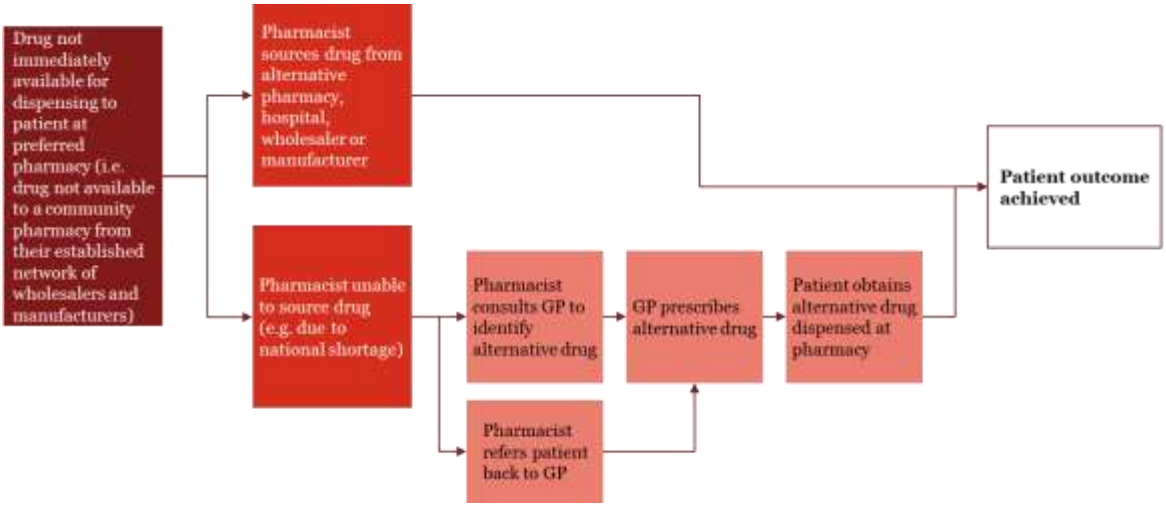
Patients are sometimes unable to obtain the medicine prescribed for them in their preferred pharmacy, for example as a result of domestic or international supply shortages. For instance, in 2012, the All Party Pharmacy Group estimated that 30-40 products (out of the 16,000 licensed preparations) were in short supply in the UK at any given time.[279]

The NHS Community Pharmacy Contractual Framework (CPCF) requires pharmacies to dispense medicines ordered on NHS prescriptions with reasonable promptness. This means that one of the obligations of community pharmacy is to source a patient's prescribed medicines. Typically, where pharmacies experience difficulties in doing this, they resolve them by sourcing medicines from alternative wholesalers or the product manufacturers. Sometimes pharmacists use a wider network of other local pharmacies and hospitals. If none of these alternatives are successful, a pharmacist may consult the prescriber directly to propose or identify substitute medicines, or refer the patient back to their GP.

This current patient pathway is illustrated in Figure 25.

[279] APPG (2012)

Figure 25: Current service user pathway (through community pharmacy)



Source: PwC analysis

To assess the value of this service, we need to determine what would happen if community pharmacy did not source drugs in short supply from the wider network or consult the prescriber directly to identify a substitute on behalf of the patient. For the purpose of our analysis of the counterfactual, we assume that community pharmacies would limit their search activities to their established network of wholesalers and manufacturers to source drugs. If neither could supply the prescribed medicine, we assume that patients would need to search independently in other local pharmacies for the drug and/or return to their GP to obtain an alternative prescription. Consequently, patients would face additional time costs as well as a potential delay in starting or continuing their treatment and, hence, their recovery or ongoing management of their condition.

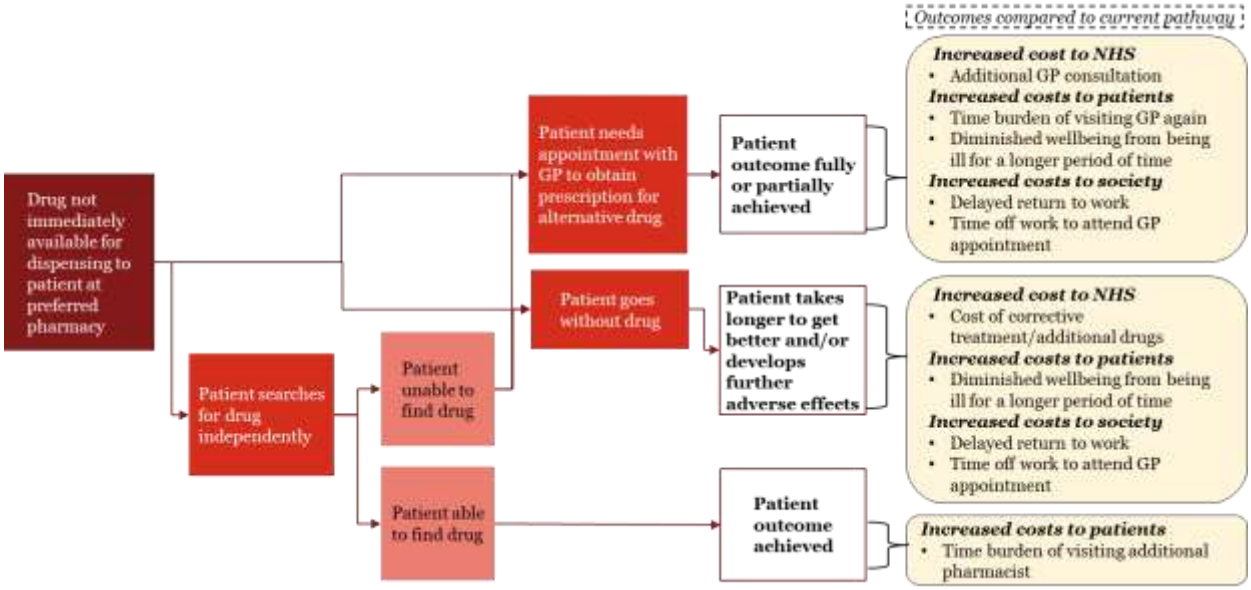
3. Contribution of community pharmacy

Community pharmacy contributes value by helping to resolve drug shortages by:

- Avoiding the need for additional GP appointments, thus saving patients the additional time burden and the NHS the cost of these;
- Avoiding the need for patients to search other pharmacies independently; and/or
- Reducing the risk of further adverse effects developing if patients 'give up' when faced with the prospect of having to return to their GP (or another part of the NHS) and/or search independently for their medicine, thus avoiding NHS treatment costs and maintaining patients' wellbeing.

We summarise these impacts alongside our assumed counterfactual pathways in Figure 26 and outline them in more detail below.

Figure 26: Counterfactual patient pathway in the absence of community pharmacy services



Source: PwC analysis

1. For the NHS:
   a. It reduces the need for additional GP consultations, for example to obtain a prescription for an alternative drug; and
   b. It reduces the cost from any additional treatment that is needed if patients do not adhere to their prescribed treatment when faced with the prospect of either searching for their prescription items independently and/or returning to their GP.
2. For patients:
   a. It reduces the time spent attending additional GP consultations and/or independently searching other pharmacies, especially since patients are likely to be less efficient at this than community pharmacy;
   b. It improves patients' wellbeing more quickly and, in some cases, enables them to return to work sooner;
   c. In the most severe cases where patients cannot collect their prescriptions, it reduces the risk of serious adverse effects; and
   d. It means that patients are less likely to require an alternative medicine which may be less effective and/or less suited to their needs thus benefitting their well-being: for example, if some epilepsy sufferers are not on the optimal medicine for their condition, their chance of seizures increases, thus putting at risk their ability to drive.
3. For wider society:
   a. For those in employment, a more rapid recovery increases their output because it results in less sickness absence; and
   b. For those who are able to remain at work, output will not be lost due to time taken out of work to attend their GP.

4. Approach to estimating the contribution of community pharmacy

Our approach to determining the value of community pharmacy in 2015 involves two elements:

- Estimating the number of times pharmacy has delivered the service and generated each of the benefits described earlier (the 'volume'); and
- Estimating the value delivered each time the service is provided (the 'value').

We summarise our approach to each element below; more details are provided in the technical appendices.

Volume

To estimate how many times drug shortages are resolved by community pharmacists we rely mainly on data from our survey of community pharmacy (see more detail in Appendix 1). Specifically, we asked community pharmacies:

> *"Over the past two weeks, where you could not easily obtain a medicine for a patient (i.e. from one of your regular wholesalers within 24 hours), how many times did you ultimately:*
> *a) Source the item from an alternative wholesaler*
> *b) Source the item from a manufacturer*
> *c) Source the item from another pharmacy*
> *d) Source the item from a hospital*
> *e) Other (please state the source and number of times)*
>
> *Where you were unable to source the medicine for the patient, how many times did you:*
> *a) Refer the patient back to their GP practice*
> *b) Consult the GP directly yourself to obtain a revised prescription without the need for the patient to communicate with the GP practice*
> *c) Take some other action (please specify)"*

Table 90 and Table 91 summarise our survey results.

Table 90 shows the average (mean) number of cases of medicine shortage per pharmacy over a two week period broken down by the way in which a supply was obtained. It also shows our estimate of the total number of such events across all community pharmacies in England in 2015. We estimate the volume of drug shortages based on a survey of 885 pharmacies undertaken in May-June 2016. The number of shortages identified in this survey is used as the basis for estimating the total volume in 2015. These estimates are derived by extrapolating the average number of instances per pharmacy over a two week period to an annual total and then multiplying by the total number of pharmacies in England in 2015 (11,815).[280]

Table 90: Estimated incidence of drug shortages resolved by community pharmacy by form of resolution (2015)

Supply obtained from	Average number per pharmacy in two week period	Number in England (million, 2015)	% in England (2015)
Alternative wholesaler	11.7	3.60	70.9%
Manufacturer	2.1	0.65	12.7%
Another pharmacy	2.6	0.80	15.7%
Hospital	0.0	0.01	0.3%
Other	0.1	0.02	0.4%
Total	**16.5**	**5.07**	**100%**

Source: PwC/PSNC survey, May/June 2016

Table 91 shows the average (mean) number of incidents of medicine shortage per pharmacy over a two week period not resolved by community pharmacy broken down by the action taken. It also shows our estimate of the total number of such incidents across all community pharmacies in England in 2015. These estimates are derived in a similar way to those in Table 90.

Table 91: Estimated incidence of drug shortages not resolved by pharmacy by action taken (2015)

Action taken	Average number per pharmacy in two week period	Number in England (million, 2015)	% in England (2015)
Referred patient to GP	4.0	1.22	41.6%
Consulted GP	5.5	1.69	57.4%

[280] NHS Business Services Authority (December 2015)

Action taken	Average number per pharmacy in two week period	Number in England (million, 2015)	% in England (2015)
Other	0.1	0.03	1.0%
Total	**9.5**	**2.93**	**100%**

Source: PwC/PSNC survey, May/June 2016

To estimate the impact of the service that community pharmacy provides, we consider only those instances where pharmacies resolve the drug shortage and the drug shortage would not have been resolved in our assumed counterfactual. Where a community pharmacy resolves a drug shortage that would not otherwise be resolved, there is an avoided cost. Conversely, if a community pharmacy resolves a drug shortage which would also be resolved in the counterfactual, we assume no avoided cost in our main analysis. In these instances there are however likely to be efficiency benefits from the current service provided by community pharmacy in comparison to the assumed counterfactual. For example if the counterfactual pharmacy only attempted to source the drug from their regular wholesaler, they would be successful on fewer occasions than in the current scenario where multiple wholesalers are typically contacted. Whilst we do not consider the benefits from this group in our main analysis, we do consider their potential scale (see Table 98) under different assumptions. Our main analysis is therefore conservative, whilst the additional analysis of potential health risks outlines a broader range of impacts which could be seen under different assumptions. Finally, where a pharmacist neither sources the prescribed drug nor identifies a close substitute but instead refers the patient back to their GP, the community pharmacy avoids no cost.

On this basis, for each response in Table 90 and Table 91, we assess the value added by community pharmacy based on whether:

- The pharmacy resolved the drug shortage; and
- The drug shortage would have been resolved in the absence of support from community pharmacy (i.e. the counterfactual).

The results of our analysis are summarised in Table 92 which shows the circumstances in which community pharmacy currently adds value which would not be delivered without community pharmacy.

Table 92: Assumptions to determine the proportion of resolutions that would not have been resolved without community pharmacy

Supply obtained from/action taken	Total in England annually (million, 2015)	Resolved by community pharmacy?	Resolved without community pharmacy (i.e. counterfactual)?	Does community pharmacy add value?
Sourced - Alternative wholesaler	3.60	Yes	Yes	No
Sourced - Manufacturer	0.65	Yes	Yes	No
Sourced - Another pharmacy	0.80	Yes	No	Yes
Sourced - Hospital	0.01	Yes	No	Yes
Sourced - Other	0.02	Yes	Yes	No
Action – Referred patient to GP	1.22	No	No	No
Action – Consulted GP	1.69	Yes	No	Yes
Action – Other	0.03	No	No	No

Source: PwC analysis

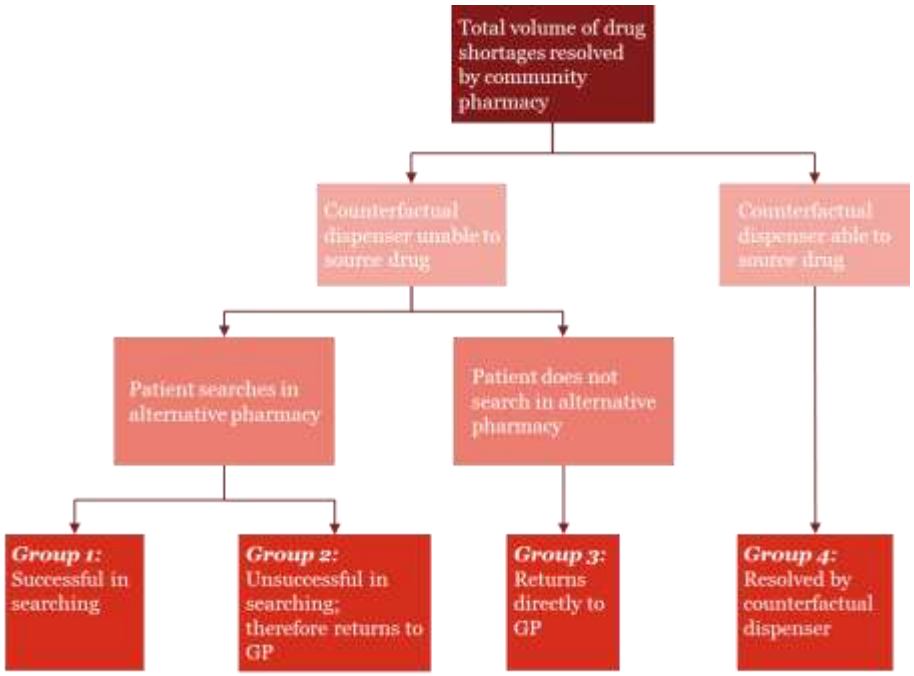
On this basis, we estimate that the number of incidents of drug shortages in England in 2015 resolved by pharmacies that otherwise would not be was 2,495,000 (0.80 + 0.01 + 1.69). We divide these beneficiaries into three groups based on the assumed outcome in the counterfactual:

1. Patients who successfully search alternative pharmacies (Group 1);
2. Patients who unsuccessfully search alternative pharmacies and then return to their GP (Group 2); and

3. Patients who do not search elsewhere but go straight to their GP (Group 3).

This is illustrated in Figure 27.

Figure 27: Assumed counterfactual groups



Source: PwC analysis

We do not consider separately those patients who would 'give up' on securing their medication and would not attempt to get the drug from an alternative source or seek an alternative prescription. The proportion to whom this applies is uncertain although the potential costs associated with delaying recovery (and correcting possible adverse effects) could be significant. This means that our approach is conservative.

To estimate the proportion of patients falling into each of the three groups, we need to make two main assumptions:

- The proportion of patients who attempt to source the drug from an alternative pharmacy; and
- The proportion of these patients that are successful in finding their prescribed drug.

For the first assumption, we use data from the Community Pharmacy Use Survey (2008) conducted on behalf of the Department of Health which found that 38% of people use more than one pharmacy[281]. There is not an equivalent, more recent estimate of this proportion. However, we see no reason why this figure would have materially changed since the 2008 survey. We assume, therefore, that 38% of patients would visit a second pharmacy if their preferred pharmacy did not have their prescribed drug in stock. Geographic Information System (GIS) mapping[282] shows that the straight-line distance to the second nearest community pharmacy is within 1km for 65.0% of households and the mean distance for all households is 1.26km (see Appendix 4 for more details).

For the second assumption, we assume that patients would be as successful as pharmacists in obtaining drugs from alternative sources. We estimate the success rate of pharmacists based on the results of the survey as follows:

$$\frac{Drug\ shortages\ resolved\ by\ pharmacies}{All\ drug\ shortages\ encountered\ by\ pharmacies} = \frac{5.07m}{5.07m + 2.93m} = 63\%$$

[281] Department of Health (January 2008)
[282] Our approach is discussed in detail in Appendix 4.

We estimate that 63% of patients that search alternative pharmacies would be successful. This is likely to overestimate the proportion of successful searches given that patients typically do not have the same knowledge and network as staff in community pharmacies. This means that our estimate of the value of community pharmacy will be conservative as the costs incurred in the counterfactual scenario are greater where a searcher is unsuccessful.

Applying these two assumptions results in the following distribution of patients between the three categories of searchers/non-searchers (see Table 93). The proportion of patients in Group 1 is the proportion who search (38%) multiplied by the proportion that are successful (63%). The proportion in Group 2 is the remainder of those who search (13.9%). Finally, Group 3 is the percentage of people who do not search, 62%. These volumes form the basis of our value estimate.

Table 93: Breakdown of patients by counterfactual pathway

Counterfactual pathway	Proportion	Number of patients (million)
Group 1 - Patients who attempt to source the drug from an alternative pharmacy	24.1%	0.60
Group 2 - Patients who unsuccessfully search alternative pharmacies and, therefore, return to their GP	13.9%	0.35
Group 3 - Patients who do not search elsewhere but go straight to their GP	62.0%	1.55
Total	**100.0%**	**2.50**

Source: PwC analysis

Value

To estimate the value of each drug shortage resolved by community pharmacy, we consider the likely implications for each group of patients outlined in Table 93. We adopt a set of impact values which shape the costs resulting from the counterfactual pathways.

First, for those that require an additional GP appointment, there is a cost to the NHS in delivering the appointment. For this we adopt a value of £45.[283]

Additionally, for patients, there is a time cost from searching in alternative pharmacies and/or attending an extra GP appointment. For those that search in an additional pharmacy for the prescribed drug we estimate a total time loss of 5.9 minutes, costing the patient £0.69 in leisure time.[284]

Similarly, for those that require an extra GP appointment, there is a time loss of 35.4 minutes.[285] For those in work and able to leave work for GP appointments this is assumed to come at a cost to wider society through lost output that could have been produced had the employee been at work. For those not in work, or in work and unable to leave work to attend the GP, the lost time is from an individual's leisure. Additionally, for all patients who require an additional GP appointment there is a cost to leisure time from returning to the pharmacy to collect the revised prescription.[286] Taking a weighted average based on the proportion of time lost to patients and society results in a cost per GP appointment of £3.48, and £5.35 respectively.[287]

Additionally, for patients who have to wait for a GP appointment (for an average of 2.05 days[288]), there is a cost to wellbeing from a delayed recovery of £18.86.[289] To only consider patients with acute illnesses, and not those with long term conditions, we consider this cost only for patients not collecting repeat prescriptions (23%).[290] Thus, the average wellbeing cost per patient needing an additional GP appointment is £4.34.

[283] Curtis (2015); we assume an 11.7 minute consultation, including carbon emissions and direct care staff costs.
[284] Our assumptions which drive this estimate are presented in Appendix 4.
[285] We discuss this in greater detail in Appendix 4.
[286] Due to the accessibility and speed of service in community pharmacy, we assume that all time taken to visit the community pharmacy is leisure time.
[287] We discuss this in greater detail in Appendix 4.
[288] GP Patient Survey (January 2016)
[289] We derive this by multiplying 2.05 days by the cost per day extra of illness of £9.20; our approach is discussed in more detail in Appendix 5.
[290] Petty et al (2014)

Moreover for some patients, this delayed recovery will result in an extended period of absence from work, costing society through lost output. To weight this cost taking into account patients to whom this applies, we estimate that 2.53% of prescribed items are linked to a spell of sickness absence from work.[291] We apply this estimate to the number of GP appointments needed, and assume that the extended duration of sickness absence is equal to the average wait for a GP appointment (2.05 days). This gives an average avoided cost to society per GP consultation of £7.20.[292]

The overall gross value for each counterfactual group is presented in Table 94. Each column shows the individual impact values for each counterfactual group (as outlined above), with the total cost per group (the sum of the individual impact costs) given in the bottom row. For example for those that are unsuccessful searchers there is:

- A £45 cost to the NHS for a GP appointment;
- A £0.69 lost leisure cost to patients from searching in an additional pharmacy;
- A weighted average £3.48 leisure time cost for having to attend the GP;
- A £4.34 cost to patients wellbeing from a delayed recovery;
- A weighted average £5.35 work time cost for having to attend the GP; and
- A weighted average £7.20 cost from an increased absence spell for those at work due to a delayed recovery.

This gives a total gross cost per case of £66.06.

Table 94: Gross impact of resolving drug shortages (£m, 2015)

Stakeholder	Impact	Group 1: Successful searchers	Group 2: Unsuccessful searchers	Group 3: Non-searchers
NHS	Cost of an additional GP appointment	Nil	£45	£45
Patient	Lost leisure time from additional pharmacy visit	£0.69	£0.69	Nil
	Lost leisure time visiting the GP (for those not in employment, or in employment and unable to leave work)	Nil	£3.48	£3.48
	Reduction in wellbeing from delayed recovery	Nil	£4.34	£4.34
Society	Additional time off work (for those in employment and allowed to leave work to visit GP)	Nil	£5.35	£5.35
	Increased time off work from delayed recovery (for those who are in employment and who take time off work)	Nil	£7.20	£7.20
Total		**£0.69**	**£66.06**	**£65.36**

Source: PwC analysis

Due to the uncertainty in estimating the reduction in an individual's quality of life as a result of being on a less effective substitute drug, we have not considered this impact. Our impact estimation is, therefore, conservative.

Moreover, we assume that all patients would attend a follow-up GP appointment. In reality some may visit more expensive points of delivery, such as GP out of hours (GP OOH) services or A&E. Again this is a conservative approach.

In order to estimate the net impact of the service provided by community pharmacy, we offset the cost to the NHS in funding the current service by deducting the costs that community pharmacy and GP Practices incur in the actual scenario from the gross impact calculated in Table 94.

[291] We calculate this by dividing the total number of sickness spells in England by the total number of prescription items in England in 2015, 1 billion (NHS Business Services Authority, 2015). To estimate the total number of sickness spells per year, we divide the total number of sickness days per year in England (110 million) by the average number of sickness days per year per worker (4.4) (Both ONS (February 2014); Number of sickness days scaled down from UK to England using 2015 ONS population estimates of UK and English populations (ONS, June 2015). We use the average number of sickness days per worker per year as a proxy for the average duration of a spell of sick leave.
[292] We assume 7 hour working days and GVA per hour of £31.50 (ONS, March 2016).

Community pharmacy implicitly receives funding for resolving drug shortages as part of the CPCF. As a proxy for the funding per drug shortage resolved we estimate the cost to community pharmacy in providing the service (see Appendix 6). Using this methodology results in a time cost to community pharmacy per drug resolution of 8.05 minutes, equating to a cost of £2.40.

In the cases where GPs are consulted in the actual scenario (1.69 million) we also deduct the cost of GP time from having these discussions. For this we use the cost of a GP appointment (£45) which is based on an assumption of an 11.7 minute consultation.[293] We have assumed that 50% of the 8.05 minutes of resolution time outlined in Appendix 6 is spent liaising with the GP, as pharmacists would typically first attempt to source the drug from their network of contacts, then, if unsuccessful, contact the prescriber.[294] The opportunity cost of the time spent liaising with GPs is assumed to be GP consultation time; we, therefore, deduct £15.47 from each instance where a GP discussion is needed in the actual scenario, or £10.45 from all cases by calculating a weighted average of when GP's are and are not needed.

The resultant net value for each counterfactual pathway is presented in Table 95 below. For example for unsuccessful searchers the gross value per case in Table 94 was £66.06. Deducting the cost to community pharmacy (£2.40) and to the GP Practice (£10.45) results in a total net value per case of £53.21.

Table 95: Net benefit for each group of resolving drug shortages (£, 2015)

Impact value	Group 1: Successful searchers	Group 2: Unsuccessful searchers	Group 3: Non-searchers
Gross value	£0.69	£66.06	£65.36
Cost of pharmacist resource burden (NHS)	£2.40	£2.40	£2.40
Cost of GP resource burden (NHS)	£10.45	£10.45	£10.45
Net value	**£12.16**	**£53.21**	**£52.52**

Source: PwC analysis

5. Key results and sensitivities

By combining the volume and value assumptions outlined above, Table 96 summarises the overall net value that community pharmacy provides by resolving drug shortages. These benefits are broken down according to the stakeholder to which they accrue. For example for the 348,000 unsuccessful searchers identified in Table 93 there is a net benefit per resolution to the NHS of £32.15 (combining the benefits outlined in Table 94 with the costs presented in Table 95). Multiplying this value by 348,000 results in a total saving to the NHS from this group of £11.2 million. Performing similar calculations for patients and society results in impact estimates of £3.0 million and £4.4 million respectively. The sum of these three figures gives a total net value associated with unsuccessful searchers of £18.5 million.

It can be seen from Table 96 that community pharmacies' interventions on drug shortages result in an estimated annual cost saving to the NHS of £53.2 million and an overall contribution to wider society of £92.4 million.

Table 96: Estimated impact from resolving drug shortages (£m, 2015)

	Group 1: Successful searchers		Group 2: Unsuccessful searchers		Group 3: Non-searchers		Total (m)
Volume	601,000		348,000		1,547,000		2.50
Stakeholder	**Net value (£)**	**Total (£m)**	**Net value (£)**	**Total (£m)**	**Net value (£)**	**Total (£m)**	**Total (£m)**
NHS	(12.85)	(7.7)	32.15	11.2	32.15	49.7	53.2

[293] Curtis (2015)

[294] In some instances a pharmacist will go straight to the GP, for example knowing that there is a wider supply shortage. We assume that in these instances the discussion time with the prescriber is the same as when the pharmacy has tried to source the drug from alternative providers.

	Group 1: Successful searchers		Group 2: Unsuccessful searchers		Group 3: Non-searchers		Total (m)
Volume		601,000		348,000		1,547,000	2.50
Patient	0.69	0.4	8.51	3.0	7.82	12.1	15.5
Society	0.0	0.0	12.55	4.4	12.55	19.4	23.8
Total	**(12.16)**	**(7.3)**	**53.21**	**18.5**	**52.52**	**81.2**	**92.4**

Source: PwC analysis

Potential associated health risks

Our analysis assumes that where community pharmacies refer patients back to their GP, no additional impact is generated in terms of improved health outcomes. In practice, without this involvement of community pharmacy, there is a risk that patients who do not have their prescriptions fulfilled in a timely way may 'give up' on their prescribed treatment rather than searching elsewhere or returning to their GP. For many this may lead to no significant harm, but for some it is possible that there could be serious adverse effects.

We have found no existing evidence which enables us to estimate the scale and nature of this risk. Therefore, for the 1.2 million patients who we estimate were referred back to their GP in 2015, we illustrate the potential implications of incorporating these impacts into our calculations in Table 97 below. For example, if we assume that 0.2% of those that were referred to their GP would otherwise have gone on to develop serious symptoms which required a stay in hospital at a cost of £1,565[295], this would have resulted in an additional cost to the NHS of £3.8 million.

Table 97: Potential associated health risks for those that were referred back to their GP

Assumed of NHS pathway	Cost to NHS per case	Assumed proportion affected	Assumed volume affected ('000s)	Cost saving to NHS (£m)
Non-elective inpatient stay in hospital	£1,565	0.1%	1	1.9
		0.2%	2	3.8
		0.5%	6	9.5

Source: PwC analysis

Similarly, our analysis assumes that the counterfactual community pharmacy will always be able to rely on pharmaceutical wholesalers and manufacturers to provide them with rapid deliveries of medicines. In reality, the current supply chain is highly efficient at delivering medicines to the point at which they are dispensed, typically with two deliveries per day to community pharmacies. Table 98, below, assumes a less efficient counterfactual scenario where a proportion of patients whose drug shortage is assumed to be resolved by the counterfactual pharmacy have to wait an extra day to receive their medicines, therefore, delaying the patients' recoveries by a day.[296] For example if this applies to 50% of the 4.3 million drug shortages we assume the counterfactual pharmacy would resolve, there is an additional total cost to patients' wellbeing of £19.6 million.

Table 98: Potential associated health risks for those that the counterfactual pharmacy would resolve

Value	Cost to Patient per case	Assumed proportion affected	Assumed volume affected (m)	Cost saving to Patients (£m)
Cost to patients' wellbeing from a delayed recovery of 1 day	£9.20	25%	1.1	9.8
		50%	2.1	19.6
		100%	4.3	39.2

Source: PwC analysis

Sensitivities

One of the key assumptions that we make in our analysis is the proportion of 'searchers' that are successful when visiting alternative local pharmacies. We assume that patients are as successful as

[295] DH (2015)
[296] At a cost of £9.20 per day (see Appendix 5)

pharmacists, finding the prescribed drug in 63% of instances. As previously discussed, this is likely to underestimate the proportion of patients that require a follow-up GP appointment. Table 99 presents a sensitivity test for this if we assume instead that only 50% of searchers are successful. Making this change increases the value of community pharmacy involvement in resolving drug shortages to the NHS by 10.7% to £58.9 million and the overall impact by 9.0% to £100.7 million.

Table 99: Sensitivity test on proportion of searchers that are successful (England, 2015)

Stakeholder	Total impact (£m) 63% successful	Total impact (£m) 50% successful
NHS	53.2	58.9
Patient	15.5	16.5
Society	23.8	25.4
Total	**92.4**	**100.7**

Source: PwC analysis

In calculating the net impact we make a series of assumptions about the amount of time spent by pharmacies resolving each drug shortage, and the member of staff who undertakes the task. Specifically, we assume that each drug shortage takes 8.05 minutes to resolve (Appendix 6), with 63% of this time being undertaken by dispensing staff, and the remainder by pharmacists. This base scenario and a series of sensitivities are presented in Table 100. When adopting these alternative sets of assumptions the total impact ranges from £86.2 million to £95.0 million.

Table 100: Sensitivity tests on the amount and composition of community pharmacy time resolving drug shortages (England, 2015)

	Base scenario (£m)	Sensitivity 1 (£m)	Sensitivity 2 (£m)	Sensitivity 3 (£m)	Sensitivity 4 (£m)
Time taken	8.05 minutes	5 minutes	5 minutes	15 minutes	15 minutes
% of pharmacist time	37%	25%	50%	25%	50%
NHS	53.2	55.8	55.1	49.0	47.0
Patient	15.5	15.5	15.5	15.5	15.5
Society	23.8	23.8	23.8	23.8	23.8
Total	**92.4**	**95.0**	**94.4**	**88.2**	**86.2**

Source: PwC analysis

As a further sensitivity test, we estimate the effect on our impact estimation when using the lower and upper bounds of the 95% confidence intervals of the average number of drug shortages per pharmacy presented in Table 90. This is presented below in Table 101. It can be seen that by adopting the lower and upper bounds of the confidence intervals, the total impact estimate decreases or increases by 15% respectively.

Table 101: Sensitivity tests using bounds of confidence interval of survey results (England, 2015)

	Main estimate (£m)	Lower bound of confidence interval (£m)	Upper bound of confidence interval (£m)
Number of incidents of drug shortages (million)	2.5	2.1	2.9
NHS	53.2	45.2	61.2
Patient	15.5	13.2	17.7
Society	23.8	20.3	27.2
Total	**92.4**	**78.8**	**106.1**

Source: PwC analysis

As a final sensitivity, we consider the case where our counterfactual pharmacy sources drugs in shortage from other pharmacies and hospitals, in addition to the network of manufacturers and

wholesalers in our base scenario outlined in Table 92 (i.e. where in the counterfactual the dispenser operates more nearly as community pharmacy currently does). This revised set of assumptions is presented in Table 102. The results from this exercise are presented in Table 103 below. It can be seen that under this more advanced counterfactual scenario the total impact estimate decreases by 41.6% to £54.0 million. However, this analysis does not factor in the higher costs of running a more sophisticated counterfactual pharmacy operation than that assumed in our main analysis.

Table 102: Alternative assumptions to determine the proportion of resolutions that would not have been resolved without community pharmacy

Supply obtained from/action taken	Total in England annually	Resolved by pharmacy?	Resolved without community pharmacy? Base scenario	Resolved without community pharmacy? Sensitivity
Sourced - Alternative wholesaler	3,587,000	Yes	Yes	Yes
Sourced - Manufacturer	644,000	Yes	Yes	Yes
Sourced - Another pharmacy	794,000	Yes	No	Yes
Sourced - Hospital	14,000	Yes	No	Yes
Sourced - Other	18,000	Yes	Yes	Yes
Action – Referred patient to GP	1,217,000	No	No	No
Action – Consulted GP	1,681,000	Yes	No	No
Action - Other	29,000	No	No	No

Source: PwC analysis

Table 103: Sensitivity test with an alternative counterfactual scenario (England, 2015)

	Main estimate (£m)	Estimate when using alternative counterfactual scenario (£m)
NHS	53.2	27.5
Patient	15.5	10.4
Society	23.8	16.1
Total	**92.4**	**54.0**

Source: PwC analysis

Sustaining supply of medicines in emergencies

1. Introduction

This chapter provides our assessment of the value associated with community pharmacy's current role in providing non-commissioned emergency supply of medicines services in England. We estimate the value that would be at risk if community pharmacy no longer supplied its current service, using data for 2015.

The chapter is structured as follows:

- Section 2 describes the service currently provided by community pharmacy, including what it means from the patient perspective, and sets out our assumptions for what would happen from the patient perspective if community pharmacy did not provide its current service (i.e. the counterfactual);
- Section 3 describes the value that flows from the current activities of community pharmacy in terms of potential avoidable costs to the NHS, the patient and wider society, and explains the key impacts;
- Section 4 explains our approach to assessing each element of expected value, specifically:
  - How we estimate the number of individuals who benefit from the service provided by the pharmacy (the 'volume');
  - How we estimate the value delivered each time the service is provided (i.e. for each individual patient) (the 'value'); and
- Section 5 summarises our key results as well as the results of our sensitivity analysis.

A set of technical appendices provides further details of the methodology and the data sources we use to estimate the value of the emergency supply of medicines services provided by community pharmacy in England in 2015.

2. Description of activity

The purpose of community pharmacy's emergency supply service is to ensure that local patients and visitors to an area can access an urgent supply of their regular prescription medicines where they would otherwise be unable to do so before they need to take their next dose.

Patients can find themselves needing an emergency supply of their regular medicines for many reasons. For example, results from a recent audit of community pharmacies carried out by NHS England on activity in relation to the emergency supply of medicines indicated that the main reasons patients requested an emergency supply were:

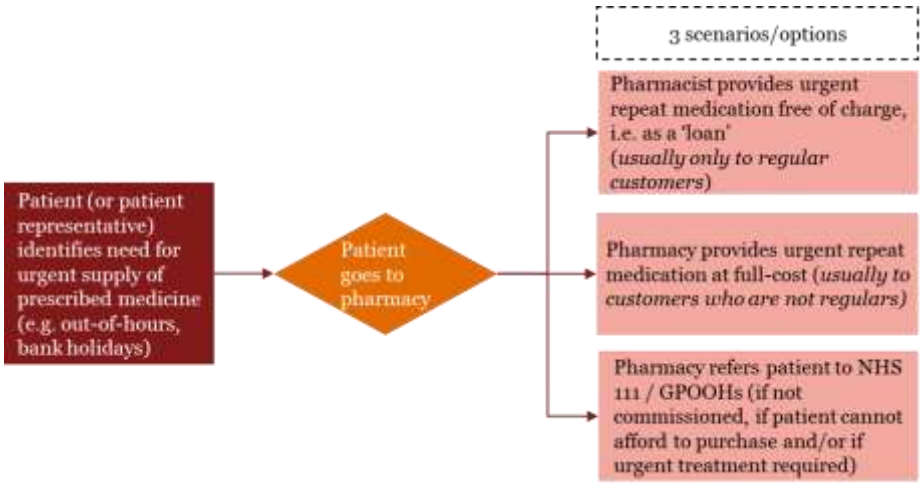
- The prescription was not ordered soon enough by the patient (or their representative) to be ready on the day needed (49%);
- The prescription was not available at the GP practice for the patient (or representative) to collect (26%);
- The patient had lost or misplaced the medicine(s) or prescription (5%);
- The patient was away from home and had forgotten / did not bring sufficient supplies of their medicine(s) with them (5%); and
- The patient was unable to collect their medicines from their usual pharmacy (2%).[297]

Under the Human Medicines Regulations 2012, community pharmacists are legally permitted to provide an emergency supply of prescription only medicines (POMs) at the request of a patient

[297] NHS England (2016). Note that the estimates are drawn from a presentation depicting the audit results in charts as we do not have access to the underlying data.

without a prescription (the patient having previously been prescribed the requested POM).[298] Pharmacists are expected to use their professional judgement on a case-by-case basis to ensure that such a supply is clinically appropriate and all stipulated regulations are met. Traditionally this emergency supply has not been an NHS service and patients may, therefore, be asked to pay the cost of the medicines (a private, non-NHS service) or a supply of the medicines may be loaned (with the quantity provided as emergency supply being deducted from the quantity supplied by the pharmacy on the patient's next NHS prescription – this is generally only done where the patient is a regular customer). The process and outcomes of a request for an emergency supply of medicines on this non-commissioned basis is illustrated in Figure 28. However, in recent years, emergency supply services have been commissioned by the NHS at a local level in order to facilitate appropriate access to repeat medication via community pharmacy. These services, commissioned by NHS England's local teams or Clinical Commissioning Groups (CCGs), aim to reduce demands on GP practices and, in particular, to relieve pressure on urgent and emergency care services by shifting demand from those services to community pharmacies during the out of hours period.

Figure 28: Current patient pathway through community pharmacies (non-commissioned services)

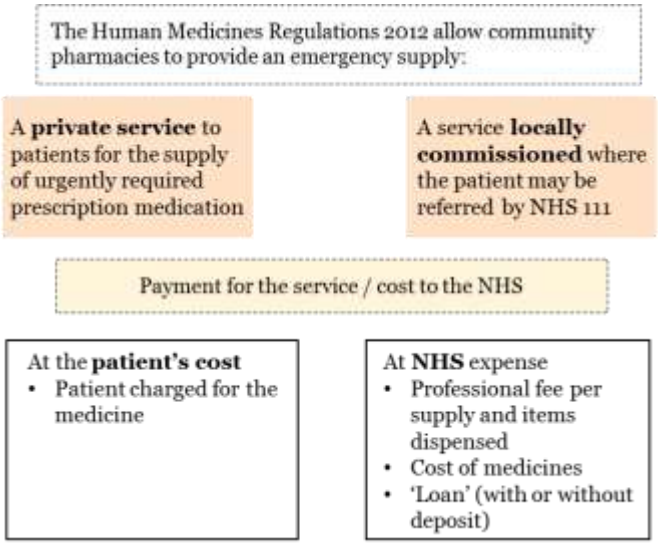


Source: PwC analysis

During 2015, out of the 77 English Local Pharmaceutical Committees (LPCs), 41 LPCs (53%) had at least one emergency supply service commissioned in their area. In many cases these services only covered part of the LPC's geographical area.[299]

[298] Human Medicines Regulations 2012
[299] PSNC (2015)

Figure 29: Emergency supply of medicines services provided by community pharmacies in 2015



Source: PwC analysis

Without access to a commissioned service and/or if the pharmacy will not 'loan' an emergency supply to a regular customer, patients would be required to pay for the emergency supply service (see Figure 29). Where the medicine costs more than a prescription charge, or where the patient is exempt from prescription charges, patients may be deterred from using the pharmacy service. In these cases, the evidence suggests that they often choose to access a GP out of hours (OOH) service, an A&E department or, where available, a GP in-hours service to access their medicines free of charge.[300] For example, an evaluation of the West Yorkshire Pharmacy Urgent Repeat Medicines (PURM) service found that between 2% and 4% of consultations with OOH providers were to request an urgent supply of medication.[301] Out of hours and other urgent care services are expensive and not a suitable vehicle by which to deliver medicines; requests for emergency supply of repeat medications can divert urgent care services from other urgent calls and add an extra barrier / time pressure to doctors in providing care for patients with a higher clinical priority, therefore, putting further pressure on the health system.

For the purposes of our analysis we consider only patients who visited a pharmacy that had not been commissioned to provide an NHS-funded service, with a request for an emergency supply of medicines in 2015. This includes both the supply of medicines where a charge is made as well as the 'loan' of a medication, where no charge is made (a deposit may be held) and the supply is offset against a future NHS prescription. Emergency supplies made at the request of a prescriber or as part of a commissioned service (e.g. PURM) are not included.

Without the service, the expected counterfactual pathway for patients is set out in Figure 30 below. In the absence of an emergency supply service provided by community pharmacy, a patient seeking an emergency supply of medicine would either: visit A&E or another urgent care centre; book an appointment with a GP in hours; or call NHS 111 which would in turn direct them either to the GP OOH service or to a pharmacy commissioned to provide emergency supply of medicines.[302] Some patients would not seek an emergency supply. In the case of high-risk medications, missing a dose(s) could result in a negative impact on the patient's health and need for healthcare treatment (e.g. A&E, GP and/or hospitalisation).

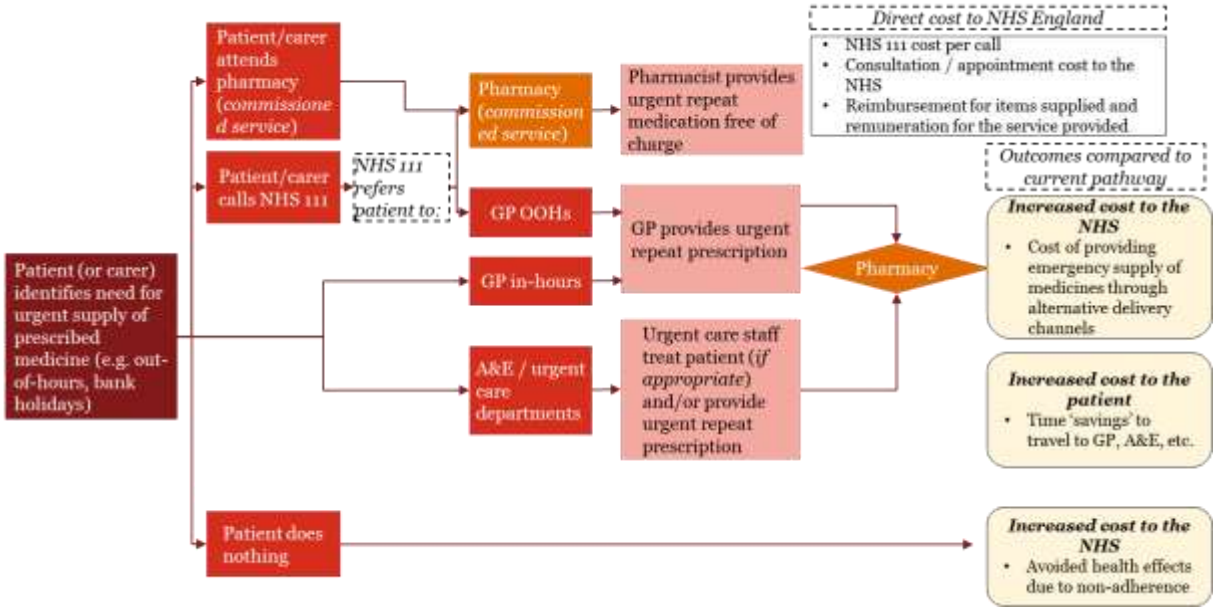
[300] NHS England (2016); Turner et al. (2012).
[301] CPWY (2015).
[302] Although some locally commissioned services allow patients to go directly to the pharmacy, rather than via NHS 111, for the purposes of our analysis we assume that all patients would be referred to the commissioned service via NHS 111. This is due to lack of data on the share of patients who visit a pharmacy with a commissioned emergency supply service directly compared to those who are referred to the service via NHS.

3. Contribution of community pharmacy

By providing an emergency supply of medicines service, community pharmacy has the potential to make a positive contribution in three main ways (see Figure 30):

- **By reducing the cost to the NHS of providing prescriptions for emergency supply of medicines through alternative channels** (see top panel of Figure 30): The emergency supply of medicines service has the potential to reduce pressure on urgent and emergency care services and GP appointments, including at times of high demand, thus saving costs to the NHS. In the absence of an emergency supply of medicines in community pharmacy, patients are likely to request an emergency supply of their medicines through alternative channels, such as A&E, which would impose a cost on the NHS.
- **By reducing travel time for patients who, in the absence of the pharmacy service, would need to travel to alternative NHS settings**: In the absence of the community pharmacy service, some patients will request an emergency supply of medicines through alternative NHS settings such as A&E/urgent care centres or GP OOH services. This would impose a time, and potentially monetary cost, on the patient or their representative. The emergency supply service provided by community pharmacy, therefore, has the potential to save the time it would take for the patient to travel to the alternative NHS settings to request their emergency supply of medicines.
- **By avoiding costs to the NHS related to the health consequences of non-adherence**: If a pharmacist believes that a patient has an immediate need for their prescribed medicine, the pharmacist can provide it without delay and this will mean that they can protect the health of the patient. The easier it is for patients to obtain their medicines when required, the more likely it is that they can continue to manage their condition without recourse to other NHS services. Emergency supply services provided by community pharmacy, therefore, have the potential to improve patients' health outcomes by avoiding unnecessary interruptions to their medication regimen, thus avoiding the need for care and treatment in alternative NHS settings.

Figure 30: Counterfactual patient pathway in the absence of pharmacy



Source: PwC analysis

4. Approach to estimating contribution of community pharmacy

Our approach to determining the value of non-commissioned emergency supply of medicines services provided by community pharmacy in 2015 involves two elements:

- Estimating the number of times pharmacy has delivered the service and generated each of the benefits described earlier (the 'volume'); and
- Estimating the value delivered each time the service is provided (the 'value').

We summarise our approach to each element below; more details are provided in the technical appendices.

Volume

We estimate the number of times that pharmacies assist patients requesting an emergency supply or loan of a medicine based on a survey of 885 pharmacies undertaken in May-June 2016. The number of emergency supply requests identified in this survey is used as the basis for estimating the total volume in 2015 (for more details on the pharmacy survey please refer to Appendix 1).[303] This survey asked pharmacies the question:

> *"Over the past two weeks, how many times did you assist a patient requesting an emergency supply or loan of a medicine by dispensing an emergency supply or loan of a medicine (this does not include emergency supplies at the request of a GP or 'faxed prescriptions'):*
>
> *a) As a loan against a future prescription, free-of-charge, to be deducted from a future dispensing of a prescription for the item*
> *b) As a loan against a future prescription, with a deposit held to be returned against a future dispensing of a prescription for the item*
> *c) As a private transaction where the patient was charged*
> *d) As an NHS commissioned service, e.g. a Pharmacy Urgent Repeat Medicines (PURM) Service*

On average, pharmacies assisted patients requesting an emergency supply 12 times over the two week period. This is equivalent to around 0.4% of all prescription items issued by pharmacies during a typical two week period.[304] Pharmacies supported patients in different ways: 82% of the time they provided a loan against a future prescription, 5% of the time they provided a loan with a deposit, 8% of the time the patient was charged for the medication and the other 8% of the time the pharmacists assisted the patient as part of an NHS commissioned service.

Scaling up the two week responses to a full year suggests that the average pharmacy assists patients requesting an emergency supply or loan of a medicine 325 times in a year. On this basis, we estimate that all 11,815 pharmacies in England in December 2015[305] dispensed an emergency supply or loan of a medicine 3.8 million times (see Table 104). As noted above, however, our analysis focuses on the volume of non-commissioned emergency supply services (i.e. a total of **3.65 million requests** for an emergency supply of medicine across all community pharmacies in England which resulted in a 'loan' or the patient being charged at full rate).

Table 104: Estimated incidence of dispensing an emergency supply or loan of medicine by type of supply[306]

Type of emergency supply	Number of supplies over 2 weeks per pharmacy	Number of supplies per year per pharmacy	Total number of supplies across all pharmacies in England (million)	Share of total supplies (%)
Free of charge loan	10.3	267	3.16	82%
Loan with a deposit	0.6	15	0.18	5%
Patient charged	1.0	26	0.31	8%
Part of a PURM service	0.6	16	0.19	5%
Total (incl. PURM)	12.5	325	3.84	
Total (excl. PURM)	**11.8**	**309**	**3.65**	

Source: PwC analysis, PSNC/PwC (2016)

- As illustrated in Table 104, the results from the pharmacy survey indicate that the majority (87%) of medicines requested are 'loaned' to the patient in anticipation of an NHS prescription (with or

[303] PSNC/PwC (2016)
[304] This is based on an average of nearly 3,500 forms issued each month per pharmacy, representing more than 7,000 items, taken from the NHS Business Services Authority (http://www.nhsbsa.nhs.uk/PrescriptionServices/5045.aspx)
[305] NHS Business Services Authority (http://www.nhsbsa.nhs.uk/PrescriptionServices/5045.aspx)
[306] PSNC/PwC (2016)

without a deposit held). In a few cases (8%), a charge was made. This may have been because the patient was on holiday and had forgotten their medicines and it would not have been practicable to obtain a prescription.

- Our results are broadly consistent with those of the NHS England audit which showed that around 5% of requests by patients were made because the patient was away from home and had forgotten or did not bring sufficient supplies of their medicines, which is the situation where a charge is more likely to occur.[307] Finally, 5% of the time, an emergency supply was provided by the pharmacist as part of a commissioned service (i.e. free of charge to the patient and NHS funded). The low share of supplies made under a commissioned service is consistent with the relatively early stages of NHS funded services with only a few commissioners currently commissioning this service.[308]
- We also have information from an audit carried out by NHS England in 2015 which ran between the two May Bank Holidays with the aim of assessing the level of requests for an emergency supply of medicines, especially around national holidays.[309] The audit showed that, on average, each community pharmacy received 6.25 requests for an emergency supply of medicine during the two week period that included a Bank Holiday.[310] Reasons suggested by PSNC for the differences in the numbers include: lack of response by pharmacies due to busy holiday periods, and lack of recording of loans as emergency supplies by some pharmacies because these are often not considered by pharmacy teams to be emergency supplies (even though they are emergency supplies).
- Later in the chapter we test the sensitivity of our results if we use the 95% confidence intervals for the volume of emergency supplies based on our survey in May-June 2016 as well as the results of the NHS England audit.

Value

Figure 30 illustrates the benefits to society of emergency supply of medicines services provided by community pharmacies. We focus on two key areas:

1. The avoided costs to the NHS through more cost-effective intervention by community pharmacies (as opposed to urgent supply of medicines provided through alternative NHS settings); and
2. The avoided time spent by the patient travelling and attending appointments to alternative NHS settings (e.g. A&E or GP surgeries).

We also note that, as illustrated in Figure 30, the pharmacy service has the potential to improve adherence and, therefore, avoid the need for care and treatment in alternative NHS settings that could arise due to interruptions in the patients' medication regimen (e.g. 2 days without dose(s)). As noted above, an emergency supply of medicines service provided by pharmacies is intended to improve access to and safe use of medicines and facilitate greater adherence to medication. Even though we do not explicitly model this impact, to investigate the potential magnitude of this risk we take a 'ready reckoner' approach to assess the potential costs to the NHS depending on what proportion of patients are affected.

To value the cost savings to the NHS and the patients, we consider:

- The patient pathway for patients requesting an emergency supply of medicines in the absence of a non-commissioned service provided by community pharmacies;
- The costs to the NHS associated with each alternative setting in terms of consultation / appointment fees; and
- The travel time between a patient's home and the NHS setting the patient visits to request an emergency supply in the absence of a non-commissioned pharmacy service.

[307] NHS England (2016), NHS England audit data released to PSNC.
[308] PSNC (2015).
[309] NHS England (2016), NHS England audit data released to PSNC.
[310] The audit ran twice, during the two two-week periods which included the two May Bank holidays in 2015. The average number of requests across these two two-week periods was 6.25 per pharmacy.

Proportion of individuals across alternative delivery channels

The first step in our valuation approach is to establish what the patient would have done in the absence of community pharmacies providing an emergency supply service. Our assumptions are based on the NHS England national audit carried out in 2015.[311] More specifically, we analyse the responses to the following question on the national audit (see Table 105 for the responses):

> *"If the pharmacist is not able to give you a supply of your medicines today what do you think you will do?*
> *a) I will go without my medicine(s)*[312]
> *b) I will contact my GP practice*
> *c) I will contact a GP practice (not my own)*
> *d) I will contact NHS 111 or the GP out of hours service*
> *e) I will go to an urgent care centre (such as A&E, minor injuries unit, etc.)*
> *f) Something else"*

Table 105: "If the pharmacist is not able to give you a supply of your medicines today what do you think you will do?"[313]

Response	Share of responses (%)
"I will go without my medicine(s)"	37.5%
"I will contact my GP practice"	33.5%
"I will contact a GP practice (not my own)"	2%
"I will contact NHS 111 or the GP out of hours service"	11.5%
"I will go to an urgent care centre (such as A&E, minor injuries unit, etc.)	9.5%
"Something else"	6%

Source: PwC analysis

Figure 30 illustrates the alternative patient pathways we consider which include:

- A patient going without medicines until the next prescription is ready;
- A patient requesting a supply from alternative channels:
  - Visiting A&E or another urgent care centre;
  - An appointment with a GP in hours;
  - A visit to the GP OOH services; and
  - A visit to a pharmacy with a commissioned service (including being referred to the pharmacy through calling NHS 111).

Following on from above, we need to establish a counterfactual for the purposes of our analysis based on the results of the NHS audit presented in Table 105. Since we do not consider exactly the same alternatives as those presented in the NHS audit results, we need to make a few assumptions. These are explained below.

First, we assume that the patients who, as evidenced from the NHS audit, would go 'somewhere else' (6% as indicated by the NHS England audit results) would be equally likely to go to one of the alternative pathways we consider. More specifically, 1.2% would go to A&E, 1.2% to GP OOH services, 1.2% to their own GP in-hours, 1.2% would go to a GP in-hours practice (not their own) and 1.2% to a pharmacy with a PURM service.

Second, to estimate the share of people who would go to the GP OOH services or a pharmacy with a commissioned emergency supply service (e.g. PURM) by calling NHS 111, we assume that out of those patients who indicate that they will 'contact NHS 111 or the GP OOHs services' (11.5% as indicated by the NHS England audit results in Table 105), 5% (i.e. around 43% of those contacting NHS 111 or the

[311] NHS England (2016).
[312] The audit provides no additional information on how long a patient would go without their medication. However, since this is a request for an emergency supply of medicines, i.e. when a patient cannot access medicines through normal prescription routes, we assume that the patient would go without their medicines until their prescription was ready, most likely in the next 24 to 72 hours in the worst case scenario.
[313] NHS England (2016). The responses are based on a total of 6,789 pharmacy records.

GP OOHs services) would be referred to a pharmacy and the remaining to the GP out of hours. This is based on the results from the pharmacy survey which indicated that 5% of the times that a pharmacist assists a patient requesting an emergency supply of medicine are part of a commissioned service (see Table 104).

Our analysis shows that, in the absence of an emergency supply of medicine service provided by pharmacies (see Table 106):

- 38.7% would go without their medication: we do not have data on how long patients would remain without their medication but, given that this service is intended for POMs and that, in the majority of the cases, the patient has run out of medicines because they did not order the prescription on time, it is unlikely that the patient would remain without medicines for more than 72 hours;
- 37.9% would arrange an appointment with the GP in hours (of which 94% would contact their own GP and 6% would contact a GP practice which is not their own);
- 10.7% would go to an A&E or other urgent care centre;
- 7.7% would go to the GP out of hours service (GP OOHs), referred to by calling NHS 111; and
- 5% would go to a pharmacy with a commissioned emergency supply service, referred to by calling NHS 111.

NHS cost across alternative delivery channels

To value the increased cost to the NHS of providing this service through alternative channels (in the absence of non-commissioned pharmacy services), we estimate the likely cost to the NHS associated with the counterfactual patient pathways. We use publicly available data to estimate the costs that would be incurred by NHS England or the local commissioner in each alternative pathway (see Table 106). The costs incurred by NHS England include the average cost of a consultation / appointment with different NHS providers (e.g. A&E departments, GPs, NHS 111).

For the purposes of our analysis, we only look at the difference in cost of the delivery vehicle and assume that drug costs are the same. Therefore, we do not estimate the reimbursement received for any medicines supplied (as outlined in the Drug Tariff). Our assumption is driven by the following reasons:

- We do not have information on the type of drugs supplied; and
- The service covers repeat prescriptions supplied in emergencies. As described above, in the majority of cases, the patient is not charged (e.g. loan) and the cost is offset against future NHS prescriptions. Therefore, the cost to the NHS is accounted for within the repeat medicines services. Emergency supply of repeat medicines can lead to more or less than usual number of medicines supplied by pharmacies. For example, those patients who receive an emergency supply of medicines may end up getting that specific dose twice if their normal prescription does not account for the emergency supply. On the other hand, for those patients who in the absence of pharmacy services would go without their medication, their normal prescription may not account for the medicines missed. However, for the purposes of our analysis, we assume that patients will receive the same number of medicines as they would under a normal repeat medicines situation. For example, for patients who in the absence of pharmacy services would go without their medication, we assume they will receive their medication when their prescription is ready through the normal routes (e.g. GP prepares the prescription which is then collected to be dispensed by the pharmacy) and that this prescription will include the missed dose(s).

Finally, we offset any fees currently received by pharmacists for providing an emergency supply service. As our analysis focuses on non-commissioned services, pharmacies do not receive any remuneration for providing an emergency supply of medicines as a 'loan' or charging the patient at full price. Instead, patients can visit a pharmacy to request an emergency supply or loan of their medicines. For loans in anticipation of a future NHS prescription (with or without deposits taken), the additional work (e.g. clinical check, determining evidence of previous supply, dispensing and documentation) undertaken by pharmacists is not remunerated, either by the patient or the NHS. For an emergency supply where a future NHS prescription is unlikely to be obtained, usually for visitors to a locality, a charge is made to the patient to cover the medicine costs as well as a small discretionary amount for administration (this is not a cost incurrent by the NHS as it is a private service).

Although community pharmacy is not reimbursed for providing these services on a non-commissioned basis, we note that the provision of these services is implicitly funded as part of the Community Pharmacy Contractual Framework (CPCF). In the absence of data on the proportion of funding that is accounted for providing these services specifically, we proxy for the funding that pharmacies receive for providing non-commissioned emergency supply services using the funding arrangements in place for commissioned services (i.e. fee per consultation and per item supplied (see Table 106)).

Table 106: Counterfactual scenarios in the absence of pharmacy, % and cost to the NHS, 2015

Alternative delivery channel	Proportion (%)	Reimbursement / direct NHS cost	Source(s)
Pharmacy (not commissioned)	*100%*	*£11.16 per consultation*[314]	*Assumed same as commissioned service, i.e. using commissioned service fees as 'proxy' (excluding cost of NHS 111 call)*
Patient would go without medication	38.7%	No direct cost but may lead to further NHS costs if it affects patients' health	NHS England (2016); revised with assumptions
GP in hours	37.9%	£45 per appointment	NHS England (2016); revised with assumptions Curtis (2015)
A&E / urgent care centres	10.7%	£68 per attendance	NHS England (2016); revised with assumptions New economy (2015) ('A&E attendance – no investigation and no significant treatment')
GP out of hours	7.7%	£70.7 per visit £8.53 per NHS 111 call	NHS England (2016); revised with assumptions NAO (2014); updated using GDP deflator Turner et al. (2012); updated using GDP deflator
Pharmacy (with commissioned services)	5%	£11.16 per consultation[315] £8.53 per NHS 111 call	NHS England (2016); revised with assumptions PSNC Services Database Nazar et al. (2016) Turner et al. (2012); updated using GDP deflator

Source: PwC analysis

Time 'savings' for patients across alternative delivery channels

In order to value the patient and wider society (in terms of time off work) benefits of time 'saved' from travelling to alternative NHS settings and attending appointments, we need to understand the differences in the time to request and travel to obtain an urgent supply of medicines in each of the alternative settings under consideration (see Table 107).

We make some important assumptions across all the alternative channels:

- We estimated the average distance for the relevant journeys using GIS mapping and publicly available sources. A detailed analysis of our approach is provided in Appendix 4;
- We assume that the consultation time across all settings is the same as the average consultation time per GP appointment (i.e. 11.7 minutes). We also assume that the time to collect a prescription or buy medicines in a pharmacy is 2 minutes[316];
- We use publicly available information and make some assumptions on waiting and booking time across the delivery channels (see Table 107 for a summary and Appendix 4 for more details); and
- We assume that the patient will travel to the pharmacy to receive an urgent supply of medicines following their visit to the alternative NHS setting across all alternative delivery channels before travelling back to their home; and

[314] This is based on an average number of 1.58 items dispensed per emergency supply request (Nazar et al., 2016). The commissioned emergency supply of medicines services is based on two payments. In many services a professional fee of £10 is paid for the first medication supplied and a further £2 professional fee for any subsequent medication supplies. The cost of medication is then added to this fee to provide the final remuneration. Using an average of 1.58 items dispensed per request and excluding reimbursement for the cost of medicines, we estimate an average professional fee of £11.16 per request.
[315] Ibid
[316] Curtis (2015)

- We assume that a patient would need to travel twice the distance to reach a pharmacy with a commissioned service.
  - As shown in Table 107 we estimate that an average journey time for a patient to a pharmacy is 4.6 minutes (or 9.3 minutes for a return journey). As described in the introduction, there are only a few commissioners of emergency supply of medicines services locally, i.e. 53% of all LPCs commissioned the service in 2015. Therefore, the distance between a patient's home and a pharmacy with a commissioned service is likely to differ from the distance to their nearest pharmacy. We have found no evidence on the number of pharmacies which, in 2015, were commissioned to provide this service.
  - Our estimate is likely to underestimate the actual cost since the service is currently commissioned in only a few areas of England. Moreover, a recent evaluation of the West Yorkshire PURM service, where the PURM service was introduced in 41 pharmacies across the region, showed that the average distance travelled by patients to access the service from their home was 3.5km (range: 0.25 – 45.2 km) compared to our assumption of around 2 km.[317] Moreover, as for GP OOH services, most patients are likely to access the service through NHS 111.

In this section, we use the following journeys carried out by a patient (or their representative) in the current and counterfactual scenarios:

- From their home (or location during holiday / business trip) to the nearest pharmacy & nearest GP practice with which they are registered;
- From their home (or location during holiday / business trip) to the nearest A&E or other urgent care centre;
- From their home (or location during holiday / business trip) to the nearest GP OOHs services (including the time per NHS 111 call);
- From their home (or location during holiday / business trip) to the nearest pharmacy with a commissioned emergency supply service (including the time per NHS 111 call); and
- From the GP in hours, GP OOHs or A&E department to the nearest pharmacy.

The final step in our valuation is to put a value on this time saving to patients. For those who give up leisure time, we value this time at **£7.05/ hour**: this comes from the DfT's WebTAG guidance and represents the value of leisure time spent travelling (adjusted to 2015 prices).[318] For those who take time off work to visit the GP in hours, we use the average hourly Gross Value Added (GVA) per worker in England which is estimated to be **£31.50/ hour**.[319] This captures the lost output that would have been produced had the employee been at work.

Table 107 summarises the journey, consultation, booking and waiting times relevant to the aforementioned journeys as well as the total value to the patient using the figures described above. We provide more details on our technical approach and data sources used to estimate these times in Appendix 4.

Table 107: Average travel time (and value) to request an emergency supply of medicines across alternative delivery channels

Alternative delivery channel	Time to value (minutes)	Average return journey time	Appointment time[320]	Value (£)[321]	Source(s)
Pharmacy (not commissioned)	• Time to travel to nearest pharmacy	9.3	13.7	£2.70	GIS mapping NHS, March 2016 UK Data Service (2015)

[317] CPWY (2015). The figures are not directly comparable, i.e. 3.5km is not double 2km as we assume. It is important to note that, on average, there were more pharmacies commissioned to provide the service in West Yorkshire that the average English county of local authority because this was intended to be a pilot scheme which would be subject to a formal evaluation.
[318] Department of Transport (2015b)
[319] Sub regional Productivity: Labour Productivity (GVA per hour worked and GVA per filled job) indices by UK NUTS2 and NUTS3 sub regions, ONS, March 2016
[320] This includes consultation, waiting and booking time. Please refer to the technical appendix for more details on the underlying analysis and data sources.
[321] This column is estimated by multiplying the total time by the value of time. We assume that the patient would use their leisure time to visit a pharmacy, A&E or out of hours service. In comparison, the patient would take time off work to visit a GP in hours.

Alternative delivery channel	Time to value (minutes)	Average return journey time	Appointment time[320]	Value (£)[321]	Source(s)
					Department of Transport (2015a) Department of Transport Statistics (2015) Department of Transport (2014)
Patient would go without medication		0		£0	
GP in hours	• Time for GP visit - Book appointment - Travel to GP - Waiting time - Consultation time • Time from GP to pharmacy - Travel - Collection time • Travel from pharmacy to home	11.8	27.9	£3.32 (leisure time) £6.00 (time off work)[322]	GIS mapping HSCIC (2016) UK Data Service (2015) Department of Transport (2015a) Department of Transport Statistics (2015) Department of Transport (2014)
A&E / urgent care centres	• Time for A&E visits - Travel to A&E - Attendance time • Travel from A&E to pharmacy - Travel - Collection time - Travel from pharmacy to home	40	138	£20.91	Roberts et al. (2014)
GP out of hours	• Time per NHS 111 call • Time for GP OOHs - Travel to GP OOHs (assuming physical attendance) - Waiting time - Consultation time • Travel from GP OOHs to pharmacy - Travel time - Collection time • Travel from pharmacy to home	40	30.2	£8.24	Roberts et al. (2014) Turner et al. (2012) Primary care foundation (2012)
Pharmacy (with commissioned services)	• Time per NHS 111 call • Travel to pharmacy with commissioned service - Travel time - Collection time	18.6	23.5	£4.94	Assumption Turner et al. (2012)

Source: PwC analysis

5. Key results and sensitivities

Table 108 summarises the overall contribution of community pharmacy to society from providing non-commissioned emergency supply of medicines services in England in 2015. It is based on combining the volume and value assumptions outlined above.

[322] We assume that 28.8% of patients would take time off work to visit the GP in hours. In all other counterfactuals we assume that all patients would use their leisure time rather than take time off work. Please refer to the Appendix 4 for more details.

Table 108: Estimated value of non-commissioned emergency supply services provided by community pharmacies (England, 2015)

Stakeholder	Impact area / path	Element	Volume (million)	Value	Total value (£m)
NHS	Reduction in NHS costs to delivering emergency supply of medicines through alternative routes (e.g. GP in hours, A&E)	*Pharmacy (non-commissioned)*	*3.65*	*£11.16*	*£40.7*
		Counterfactual	2.24[323]	£50.81[324]	£114.7
		Net value			**£74**
Patient	*Leisure time*: Reduction in patient travel time to reach alternative delivery channels (e.g. A&E, GP OOHs)	*Pharmacy (non-commissioned)*	*3.65*	*£2.70*	*£9.9*
		Counterfactual	2.24[325]	£7.14[326]	£16.0
		Net value			**£6.1**
Wider society	*Time off work*: Reduction in patient travel time to reach GP in-hours	*Pharmacy (non-commissioned)*	*0*	*£0*	*£0*
		Counterfactual	1.4[327]	£6.0	£8.3
		Net value			**£8.3**
Total					**£88.4**

Source: PwC analysis

We estimate that non-commissioned emergency supply services provided by community pharmacies resulted in an overall contribution to wider society of **£88.4 million**. More specifically, the pharmacy services resulted in an annual cost saving to the **NHS of £74 million** as a result of the more cost-effective service provided in a community pharmacy setting as compared to the alternative delivery channels considered in the counterfactual and an annual cost saving to the **patient and the wider society of £6.1 and £8.3 million respectively** as a result of avoided travel time to request an emergency supply of medicines through the alternative delivery channels.

Potential associated health risks

Our analysis above assumes that an emergency supply of medicines has no impact on health outcomes. In practice, we estimate that the non-commissioned emergency supply of medicines services helped 1.4 million patients to avoid interruptions to their medicines regimen on the basis that 39% of patients would go without their medication in the absence of pharmacy services.

As noted, we have identified no existing studies that investigate the direct link between the provision of an emergency supply of medicines by community pharmacy and health outcomes. Nonetheless, we recognise that any barriers to patients receiving their medication could, in some cases, lead to non-adherence and poor health outcomes.

To investigate the potential magnitude of this risk, we have taken an approach where we assess what proportion of patients could be affected by non-adherence and the implied costs to the NHS. Since there is no literature investigating the link between this service and health outcomes we need to make a few assumptions:

- Nazar et al. (2016) conducted an evaluation of an NHS service providing OOH emergency repeat medications to patients self-presenting at community pharmacies and found that of the 3,226 medications supplied under the service, 439 (13.6%) were classed as high-risk medications (i.e. medications that could cause the patient significant harm if used in error such as if the specified dose is missed).[328]
- Many studies have reported medication-related reasons for hospital admissions, with non-adherence frequently featuring as a contributor;[329] and
- A systematic review of drugs causing preventable admissions to hospital reported that, from the 17 studies included, the drugs associated with patient adherence problems which led to admissions

[323] Note that the remaining 1.4 million would go without their medication.
[324] Weighted average of consultation fees by the number of patients requesting an emergency supply through each alternative delivery channel.
[325] Note that the remaining 1.4 million would go without their medication.
[326] Weighted average of time * value by the number of patients requesting an emergency supply through each alternative delivery channel.
[327] We assume that when visiting the GP practice in hours, 28.8% of the time would be time lost off work and the remaining 71.2% would be lost leisure time for those patients (see Appendix 4 for more details).
[328] Nazar et al. (2016)
[329] Howard et al. (2001); Leendertse et al. (2001); Ernst et al. (2001); Chan et al. (2001).

were diuretics, anti-diabetics and anti-epileptics.[330] These drugs were included within the most common medications supplied to self-presenting patients.[331]

Table 109: Potential associated health risks, % of patients affected

	Proportion (%) / Number	Source(s)
Number of patients who would go without medication	1.4 million	NHS England (2016); revised with assumptions PSNC/PwC survey (2016)
Proportion of high-risk medications supplied through emergency supply services by commissioned community pharmacies	13.6%	Nazar et al. (2016)
Number of patients who would experience health effects due to non-adherence	192,110	Calculation using the above two rows

Source: PwC analysis

In summary, the identified high-risk medications could be associated with increased adverse health consequences for patients who miss or delay taking them. Our counterfactual, based on responses to the NHS England 2015 audit, indicates that 39% of patients would have missed or delayed taking their medications but for the service provided by community pharmacy. In many cases this may not lead to significant harm to a patient's health (e.g. missing one dose of aspirin being used for secondary preventative measures) but, for some medications, this could pose a significant patient risk, leading to further GP appointments, visits to A&E or other urgent care centre or, in extreme situations, hospital admissions.

To illustrate the potential cost to the NHS of increased non-adherence, we draw on the source described above and assume that 192,110 out of 1.4 million cases (i.e. 13.6%) would involve supply of a high-risk medication, where going without the medication would likely result in negative health outcomes. We present a range of results associated with the following assumptions:

- **Low-range** - 25% of those patients would require a GP appointment, visit an A&E department or be hospitalised;
- **Medium-range** - 50% of those patients would require a GP appointment, visit an A&E department or be hospitalised; and
- **High-range** - 75% of those patients would require a GP appointment, visit an A&E department or be hospitalised.

The contribution of non-commissioned pharmacy services in relation to avoidable NHS costs due to patient non-adherence are estimated to be in the range of £81 to £242 million (see Table 110).

Table 110: Potential associated health risks, % of patients affected

	Low-range (£ million)	Medium-range (£ million)	High-range (£ million)
Avoided GP appointments	£2.2	£4.3	£6.5
Avoided A&E attendances	£3.3	£6.5	£9.8
Avoided non-elective inpatient stay	£75	£150	£225
Total (£ million)	**£81**	**£161**	**£242**

Source: PwC analysis

Sensitivities

Our results are sensitive to the assumptions we have made, including:

- The 'volume' of emergency supply of medicines in England; and
- The range of estimates of the volume of emergency supplies as identified using the 95% confidence interval.

We have, therefore, tested the sensitivity of our results to altering our assumptions.

[330] Howard et al. (2007)
[331] Nazar et al. (2006).

The 'volume' of emergency supply of medicines in England

Our key scenario uses the PSNC 2016 pharmacy survey to estimate the volume of non-commissioned emergency supply requests resolved by community pharmacies in 2015. As described above, we also have information from the NHS England audit carried out in 2015. The results from the survey (11.8 requests over a two-week period) differ from the audit results (6.25 requests over a two-week period), with possible reasons for this described in the Volume section. The audit results correspond to a total of 1.9 million requests for an emergency supply of medicine across all community pharmacies in England which resulted in a 'loan' or the patient being charged at full rate.[332] This is slightly more than half (52%) of our estimated volume of non-commissioned emergency supply services (3.65 million) based on the PSNC/PwC survey.

In this sensitivity analysis, we explore how the contribution of community pharmacy emergency supply services would change if the number of requests in 2015 were lower, as indicated by the results of the audit. Our results indicate that the contribution of community pharmacy would approximately halve to £46.6 million in 2015 (a 47% reduction). This is driven by the implied smaller number of emergency supply requests assumed to have been received by community pharmacies in 2015.

Table 111: Sensitivity test #1 – Total value of non-commissioned emergency supply services using the estimated volume from NHS England audit (£m, 2015)

Stakeholder	Impact area / path	'Base' scenario	Sensitivity test
NHS	Reduction in NHS costs to delivering emergency supply of medicines through alternative routes (e.g. GP in-hours, A&E departments)	£74	£39
Patient	*Leisure time*: Reduction in patient travel time to reach alternative delivery channels (e.g. A&E, GP OOHs)	£6.1	£3.2
Wider society	*Time off work*: Reduction in patient travel time to reach GP in-hours	£8.3	£4.4
Total		**£88.4**	**£46.6**

Source: PwC analysis

Accounting for the lower and upper range of the estimated volume of emergency supplies provided by pharmacies

We estimate the effect on the contribution of community pharmacies using the lower and upper bounds of the 95% confidence interval around the mean resulting from the average number of emergency supply requests per pharmacy using the PSNC/PwC survey results. Our results show that the total contribution of community pharmacies ranges from £76.2 to £100.6 million, i.e. 14% less or more than our base case scenario where we use the average number of emergency supplies as indicated by pharmacies responding to the survey (see Table 112). This implies that, with 95% confidence, the range of benefits driven by changes in the volume of non-commissioned emergency supplies is between £76.2 million to £100.6 million, based on the PSNC/PwC survey.

Table 112: Sensitivity test #2 – Total value of non-commissioned emergency supply services accounting for the time pharmacies spend dealing with each request (£m, 2015)

Stakeholder	Impact area / path	Lower bound (266 per pharmacy)	'Base' scenario (309 per pharmacy)	Upper bound (352 per pharmacy)
NHS	Reduction in NHS costs to delivering emergency supply of medicines through alternative routes (e.g. GP in-hours, A&E departments)	£63.8	£74.0	£84.2
Patient	*Leisure time*: Reduction in patient travel time to reach alternative delivery channels (e.g. A&E, GP OOHs)	£5.3	£6.1	£7.04
Wider society	*Time off work*: Reduction in patient travel time to reach GP in-hours	£7.2	£8.3	£9.4

[332] In the absence of information about whether or not the service was commissioned we assume that all requests were part of non-commissioned services.

Stakeholder	Impact area / path	Lower bound (266 per pharmacy)	'Base' scenario (309 per pharmacy)	Upper bound (352 per pharmacy)
Total		**£76.2**	**£88.4**	**£100.6**

Source: PwC analysis

Medicines Use Reviews (MUR)

1. Introduction

This chapter provides our assessment of the value of community pharmacy's current role in providing Medicines Use Reviews (MUR) services in England. We estimate the value that would be at risk if community pharmacy no longer supplied its current service, using data for 2015.

The chapter is structured as follows:

- Section 2 describes the service currently provided by community pharmacy, including what it means from the patient perspective, and sets out our assumptions for what would happen from the patient perspective if community pharmacy did not provide its current service (i.e. the counterfactual);
- Section 3 describes the value that flows from the current activities of community pharmacy in terms of potential avoidable costs to the NHS and the patient, and explains the key impacts;
- Section 4 explains our approach to assessing each element of expected value, specifically:
  - How we estimate the number of individuals who benefit from the service provided by the pharmacy (the 'volume');
  - How we estimate the value delivered each time the service is provided (i.e. for each individual patient) (the 'value');

  To do this, we review the available literature on the impact of MUR and similar pharmacist-led medication reviews. A key issue is the heterogeneity of the outcomes identified in this literature which means that it is not currently possible to assess the value of MUR in the same way as other services provided by community pharmacy; and
- Section 5 summarises our key results as well as the results of our sensitivity analysis.

2. Description of activity

An MUR is an Advanced Service within the NHS community pharmacy contractual framework (CPCF). It takes the form of a structured, adherence-based review to help patients use their medicines more effectively.

Initially, three national target patient groups were introduced for MUR in October 2011. A fourth target group was agreed in September 2014 (cardiovascular risk) and implemented from the start of 2015. Currently, the four national target groups are those patients who:

- Take high risk medicines, which are defined on the basis that:
  - They are associated with preventable harm, for example avoidable hospital admissions;
  - Their use could give rise to harm to the patient in the event of omission, overuse or incorrect use and where the benefits of not taking the medicine would be foregone;
  - The type of harm caused by the medicines could be prevented by an MUR and the pharmacist has the skills, knowledge and information needed to deliver it;
- Were recently discharged from hospital who had changes made to their medicines while they were in hospital;
- Suffer from respiratory disease; and
- Are at risk of, or diagnosed with, cardiovascular disease, and are regularly prescribed at least four medicines.

Four groups of 'high risk' medicines are identified based on the British National Formulary:

- NSAIDs (BNF 10.1.1);
- Anticoagulants (including low molecular weight heparin) (BNF 2.8.2 and 2.8.1);
- Antiplatelets (BNF 2.9); and

- Diuretics (BNF 2.2).

From 1st April 2015 community pharmacies must carry out at least 70% of their MUR within any given financial year on patients in one or more of the target groups; previously the target was 50%.

MUR are intended to improve patients' understanding of their medicines and how to use them so as to boost adherence by establishing a patient's current use of their medicines and identifying and resolving any poor use of medicines or any interactions and side effects which may affect adherence.

In providing structured support and guidance relating to a patient's use of a medicine, MUR are broadly similar in their aim to the New Medicine Service (NMS), albeit they have a different format and target different patient groups. This potential crossover is recognised in the service specification, which states that an MUR should not be undertaken on a patient who has received an NMS in the last six months unless the pharmacist believes there are significant potential benefits to the patient.

3. Contribution of community pharmacy

The most direct contribution of an MUR undertaken in a community pharmacy is to improve patients' understanding of their medicine and so boost adherence, whilst also avoiding the need for a patient to seek similar advice elsewhere in the health system.

The direct contribution of MUR could manifest itself in three ways:

- **Reduced cost to the NHS** if:
  - An MUR is a more cost-effective way of providing a patient with guidance about their medicine than say an appointment with a GP or, less commonly, attendance at A&E;
  - An MUR helps to identify issues with a patient's adherence to their medicine and then contributes to resolving them, thus avoiding a subsequent negative health outcome for the patient which could require costly treatment elsewhere in the health system;
- **Improved patient wellbeing** if an MUR has a positive health outcome for the patient which, in addition to avoiding costs for the health system, has a positive impact by increasing patient wellbeing; and
- **Increased productivity and economic output** if the improvement in a patient's health brought about by an MUR means that they take less time off work due to illness.

4. Approach to estimating contribution of community pharmacy

Volume

The volume of MUR undertaken in England is collected by NHS Prescription Services.[333] The latest data show that 3,210,524 MUR were delivered in 2015, an increase of 6% since 2013.

These MUR relate to patients with a range of conditions even though at least 70% must come from four target groups. Table 113 shows the distribution of MUR for targeted patients (who represent 74% of total MUR) by condition for Lloyds Pharmacy. These shares relate to the 433,337 MUR which Lloyds Pharmacy undertook between April 2015 and March 2016, more than 10% of the total.

Table 113: Share of targeted MUR by condition

Condition	Share of targeted MUR (%)
Cardiovascular	32.0%
Respiratory	23.5%
Antiplatelets	12.3%
Diuretics	12.1%
NSAID	10.7%
Anticoagulants	8.8%

[333] NHS Business Services Authority (December 2015)

Condition	Share of targeted MUR (%)
Discharge	0.7%

Source: Lloyds Pharmacy, 2016

The Lloyds Pharmacy data also reveal the number of medicines being taken by the patients receiving MUR: the 433,337 MUR carried out by Lloyds Pharmacy led to a review of more than 2.7 million prescribed medicines, an average of more than 6 per person. If this average was repeated across all 3.2 million MUR undertaken in England in 2015, it would imply that a total 20 million prescribed items were reviewed over the course of the year through MUR.

Value

At a high level, the way in which MUR are expected to deliver value is summarised in Figure 31.

Figure 31: Impact pathway for MUR

Source: PwC analysis

No robust assessment exists of the value generated by MUR along all of this pathway.

Several literature reviews have been undertaken which summarise the evidence on the topic (see, for example, CPA (2014)[334] and Public Health Wales (2011)[335]). These highlight the substantial heterogeneity in the findings of previous studies with regards to the impact of MUR on health outcomes.

The quality of evidence for each of the three steps is mixed. Stronger evidence exists on the early steps: the identification of issues and the improvement of adherence. The primary challenge is to identify the impact on health outcomes (and the associated savings in terms of health costs) which can be attributed to MUR.

Below, we review the evidence available across each of these three steps.

Identification and resolution of issues with use of medicines

The most direct impact of MUR is the identification and resolution of medicine-related issues. The message from previous studies is clear and consistent in demonstrating that MUR are effective in this regard, for example:

- A study by Portlock et al. (2009)[336] of 965 MUR for patients with asthma in 47 community pharmacies in Hampshire found that 1,787 interventions were made (1.85 per patient); and
- A review of pharmacist-led medication reviews (similar to MUR) in patients aged over 65 by Krska et al. (2001)[337] found that 70% of issues related to pharmaceutical care were resolved in patients receiving the review, compared with 14% in a control group.

These findings are replicated in similar services abroad: for example, Messerli et al. (2016)[338] found that pharmacist-led medication reviews in Switzerland identified an average of 1.18 “drug-related problems” per patient.

[334] Centre for Policy on Ageing (2014)
[335] Public Health Wales (2011)
[336] Portlock et al. (2009)
[337] Krska et al. (2001)
[338] Messerli et al. (2016)

This evidence is supported by data from Lloyds Pharmacy[339] which captures their pharmacists' perceptions of the likely outcome of MUR. These data, presented in Table 114, show that pharmacists believe that a substantial number of MUR lead to better understanding of a patient's condition and how and why medicine is taken. For example, if these percentages were seen across all MUR undertaken in 2015, it would imply that approximately 2 million patients had a better understanding of when/ how to take their medicine. Given the heterogeneity of the interventions and the conditions they relate to, it is not necessarily appropriate to use these data to generalise about the impact on the 'average' patient. Nonetheless, they do suggest that MUR have the potential to increase adherence in a material number of patients.

Table 114: Pharmacists' perceptions of the impact of MUR

Positive outcome from the MUR	Share of MUR (%)
Better understanding of the condition being treated	63%
Better understanding of the side effects and how to manage them	48%
Better understanding of when/ how to take the medicine	62%
Better understanding of why they are using the medicine	69%

Source: Lloyds Pharmacy data, 2016

It is clear from this evidence that MUR could influence many patients' use of their medicines. The diverse range of conditions and interventions covered by MUR, however, means that it is difficult to generalise about the scale of the resulting impact. Nonetheless, the scale of the influence suggests that MUR could have a material impact both on patients' adherence and, ultimately, health outcomes and avoided costs in the health system.

Impact on adherence

The primary aim of an MUR is to improve patients' adherence to their prescribed medicines. As discussed in the context of the NMS, improving adherence has been shown to have a substantial positive impact on subsequent health outcomes and levels of engagement with the health system.[340]

Evidence from the literature suggests that adherence typically improves as a result of the MUR. For instance:

- Holland et al. (2008)[341] performed a systematic review of previous evidence and found that positive impacts on adherence were found in 11 out of 14 studies with significant positive effects in seven of them;
- Other studies outside the UK, such as Hatah et al. (2014)[342] and Mehuys et al. (2008)[343], who studied the effect of pharmacist-led medication reviews in New Zealand and Belgium respectively, find similar conclusions.

As highlighted by Holland et al. (2008), studies do not consistently report the impact of the intervention on adherence. This restricts our ability to find a consensus view on the scale of the impact of MUR.

Quantifying and valuing this increase in adherence is challenging, as described above, due to the range of patients, conditions and medication to which MUR relate. This is demonstrated by the range of conditions shown in Table 113.

Impact on health outcomes and health system costs

The primary measure of the impact of an MUR is the change in health outcomes and the associated health system costs. There is consistent evidence that MUR result in a substantial number of interventions for patients and that adherence is positively affected. As discussed above, it is known that adherence to medication is an important determinant of health outcomes which means that there are reasonable grounds for expecting that MUR should improve health outcomes. This has the

[339] Lloyds Pharmacy data, 2016
[340] See, for example, World Health Organisation (2003)
[341] Holland et al. (2008)
[342] Hatah et al. (2013)
[343] Mehuys et al. (2008)

potential to reduce the cost burden on the NHS and local authorities as well as to improve wellbeing for patients and productivity in wider society.

The existing evidence from the literature does not support this. There is no consistently-estimated and significant link between MUR and subsequent health outcomes. For example:

- Geurts et al. (2012)[344] reviewed nine studies of medication reviews and found that only in two did the level of hospital admissions fall (not significantly in one case) and one instance of a significant increase in admissions; and
- Similar conclusions are reached in Hinchliffe (2010)[345] and Lenaghan et al. (2007)[346].

This lack of clear evidence from the literature on the link between MUR and health outcomes is at least partly driven by the methodological challenges that need to be overcome to identify this link robustly. Krska et al. (2007)[347] investigated whether hospital admissions (the typical 'health outcome' metric used in the studies discussed above) was a reasonable metric for assessing the impact of a medication review such as an MUR. They found that only 13% of admissions to hospital could have been affected by changes in pharmaceutical care. As a result, they concluded that hospital admissions may not be a sufficiently sensitive outcome measure for evaluating the impact of pharmacist intervention. More generally, this reflects the difficulty in robustly isolating the role of MUR in avoiding a substantial and sporadic negative health outcome like a hospital admission.

It should be noted, however, that several studies find positive results:

- Desborough et al. (2012)[348] reviewed the Norfolk Medicines Support Service and found that on average each patient cost the health service £307 less in the six months following the MUR, compared to the previous six months. This saving is estimated as the difference between the health system costs in the sixth months prior to the MUR, and the six months following. Were some of the patients to improve their adherence in the absence of an MUR (in order to qualify for the study they were identified as "non-adherent"), then these savings would be reduced; and
- Armour et al. (2007)[349] and Sorensen et al. (2004)[350] showed significant positive health outcomes from schemes based on pharmacist-led medicine reviews in Australia.
- We note that the level of engagement between pharmacist and patient in the final two studies was more substantial than would be expected as part of an MUR although its principle was similar.

In addition, for each of the conditions outlined in Table 113 there is a range of evidence relating to the impact on adherence and subsequent health outcomes. Considering asthma, for example, Baglole et al. (2007)[351] found that following an MUR, the share of patients whose asthma was 'not controlled' fell from 59% to 45%. The impact on the NHS and wider society of reducing incidence of exacerbations of asthma could be material. Evidence suggests that asthma causes a 'direct cost to the NHS of £1 billion and an indirect cost to society, due to time off work and loss of productivity, of £6 billion'.[352]

Similarly, the Royal Pharmaceutical Society has identified that up to 20% of patients experience "adverse drug events" after discharge.[353] Currently, post-discharge MUR represent just 0.7% of all MUR (based on the data from Lloyds Pharmacy in Table 113) and only 0.14% of the 365,200 hospital admissions in Lancashire in 2013/14 resulted in a post-discharge MUR.[354] Other evidence from the literature suggests, however, that the benefit per patient in this category could be substantial. As part of a study in Newcastle, pharmacists reported that nearly 90% of patients had a better understanding of their medicine following a post-discharge MUR, with 8% of patients having experienced an adverse drug reaction since leaving hospital.[355] A study looking at the Discharge Medicines Review service in

[344] Geurts et al. (2012)
[345] Hinchcliffe (2010)
[346] Lenaghan et al. (2007)
[347] Krska (2007)
[348] Desborough et al. (2012)
[349] Armour et al. (2016)
[350] Sorensen et al. (2004)
[351] Baglole et al. (2007)
[352] NHS Commissioning Board (2013)
[353] Royal Pharmaceutical Society (2012)
[354] Royal Pharmaceutical Society (2014)
[355] Health Service Journal (2016)

Wales, a variant of the MUR, found that for every £1 spent on the service, £3 in health system resources were saved through reduced A&E attendances, hospital admissions and drug wastage.[356]

Finally, some substantial positive effects have also been seen in more local, targeted studies of the impact of MUR on specific conditions:

- Jerram (2009)[357] demonstrates a material reduction in health costs in relation to asthma on the Isle of Wight; and
- Cree (2010)[358] finds similar positive results with regards to patients taking anti-depressants in Bristol.

As noted, the key challenge with these studies comes in drawing generalisable conclusions from local, condition-specific benefits to a wider valuation of the service, but they do provide evidence of the potential magnitude of the impact which MUR can generate.

5. Conclusions

Overall, it is clear that MUR have a material positive impact on patients' understanding of their conditions and medications and this has a positive impact on adherence. Due to the range of conditions and medicines which MUR cover, it is not possible to quantify the consequent impacts on health outcomes. Furthermore, studies which have looked directly at the impact of MUR on health outcomes have not consistently been able to find a significant impact.

[356] Hodson et al. (2014)
[357] Jerram (2009)
[358] Cree (2010)

New Medicine Service (NMS)

1. Introduction

This chapter provides our assessment of the value of community pharmacy's current role in providing the New Medicine Service (NMS) in England. We estimate the value that would be at risk if community pharmacy no longer supplied its current service, using data for 2015.

The chapter is structured as follows:

- Section 2 describes the service currently provided by community pharmacy, including what it means from the patient perspective, and sets out our assumptions for what would happen from the patient perspective if community pharmacy did not provide its current service (i.e. the counterfactual);
- Section 3 describes the value that flows from the current activities of community pharmacy in terms of potential avoidable costs to the NHS and the patient, and explains the key impacts;
- Section 4 explains our approach to assessing each element of expected value, specifically:
  - How we estimate the number of individuals who benefit from the service provided by the pharmacy (the 'volume');
  - How we estimate the value delivered each time the service is provided (i.e. for each individual patient) (the 'value'); and
- Section 5 summarises our key results as well as the results of our sensitivity analysis.

A set of technical appendices provides further details of the methodology and the data sources we use to estimate the value of NMS services provided by community pharmacy in England in 2015.

2. Description of activity

The NMS provides patients with guidance and support when first taking medicine for a long-term condition. The service consists of three phases:

- Patient engagement: a patient presents a prescription and initial advice is given to them about the medicine and its use;
- Intervention: the patient has a consultation 7 to 14 days later to address any issues or questions either with the treatment, or the patient's self-management of their condition, and to agree next steps; and
- Follow-up: the patient then has a final consultation 14 to 21 days later to discuss any new or continuing problems with the treatment, and the success of any interventions made in stage 2.

The service is limited to patients requiring medicine for one of four conditions/ therapy areas: asthma and chronic obstructive pulmonary disease (COPD), type 2 diabetes, antiplatelet/anticoagulant therapy and hypertension. Research by the Department for Health in 2012 demonstrated that, excluding depression, these areas represent the majority of long-term conditions suffered by patients in England.[359] In 2015, more than 800,000 patients completed the service.

Without intervention, there is substantial evidence that many patients fail to take medicine as directed. A literature review undertaken as part of a University of Nottingham study into the NMS found that about 25% of medicines prescribed for long-term conditions are not taken as directed.[360] Adherence is particularly low in the conditions covered by the NMS, such as COPD (33% adherence), asthma (67%) and diabetes (78%). A range of studies has shown poor adherence to have a substantial negative impact on health outcomes, patient wellbeing and healthcare costs.[361]

Poor adherence to medication can occur for a number of reasons, including patients' lack of understanding about their condition or treatment, forgetfulness and stress or anxiety.[362] The NMS

[359] Department for Health (2012)
[360] Elliott et al. (2014)
[361] See, for example, Iuga and McGuire (2014)
[362] World Health Organisation (2013)

provides both patients and pharmacists with the structure and guidance to monitor medicine usage and provide appropriate support and intervention when needed.

Without the service, patients would be likely only to present at a pharmacy with questions about their medication once they had already experienced negative health outcomes – this is likely to be later than the proactive intervention offered by the NMS. Patients experiencing such negative health outcomes could request or require treatment from a more costly source of care, such as their GP practice or A&E. In the event of a substantial negative health outcome a patient may require a hospital admission or similar treatment.

3. Contribution of community pharmacy

Through the NMS, community pharmacy has the potential to deliver value in three distinct areas:

- **Reduced cost to the NHS in achieving health outcomes**: The NMS provides the opportunity for early intervention regarding medicine-related issues with a patient's treatment. Where an intervention is successful (resulting, for example, in improved adherence or a change in a patient's medication), this could have a positive impact on health outcomes. Where this intervention is more cost effective than the alternative treatment pathway for the patient, the NMS will represent a cost saving for the NHS. Further NHS cost savings could be achieved as a result of the service identifying ineffective prescribed medicines and reducing medicine wastage.
- **Improved patient wellbeing as a result of improved health outcomes:** In addition to more cost-effective treatment, intervention through the NMS could lead to more positive health outcomes for the patient. Where this occurs, the improved health outcome will lead to improved patient wellbeing.
- **Increased economic output as a result of improved workforce health:** Finally, poor health limits a patient's ability to work productively, for example through a requirement to take time off work for illness. As a result, for those patients who are in work, the NMS may improve health outcomes which could increase economic output.

For the purpose of this analysis we have considered only the value generated through reduced cost to the NHS (the first impact area above), as the evidence is strongest in this area. We have also considered the impact of improved patient wellbeing (the second impact area) in the sensitivity analysis. The impact on economic output is not considered for two reasons:

- It is not clear from the data how many of the patients using the service are in employment, or the impact the intervention has on their ability to work; and
- There is risk of double-counting between the impact on economic output and wellbeing (as some of the increased wellbeing may arise from an ability to increase economic output, and hence increase earnings). This occurs because the wellbeing impact is valued through changes in QALYs, and some of the value derived for each additional QALY may be driven by an associated increase in productivity[363].

For reasons of prudence and accuracy, therefore, the third impact area is not quantified.

4. Approach to estimating contribution of community pharmacy

Volume

The volume of completed NMS programmes (those for which payment is received) is provided on a monthly basis by the NHS Business Services Authority. These data demonstrate that 817,700 NMS were completed in 2015. This excludes any instances where the full service was not completed (e.g. the engagement and intervention phases were delivered but not the follow-up). As a result, it is a conservative estimate of the activity undertaken by pharmacies, although given the relatively short duration of the service and the financial incentive for pharmacies to complete all three phases, we would expect a relatively low rate of attrition.

[363] This issue does not occur with measures of wellbeing which explicitly exclude any income effect, such as Fujiwara (2013).

Value

The most robust and detailed study of the impact of the NMS was undertaken in 2014 by the University of Nottingham.[364] We use this analysis as the basis for the estimation of impact from NMS programmes undertaken in 2015. This quantitatively assessed the impact on health outcomes and system costs of 504 patients: 253 received the current practice and 251 received the NMS. This study yielded a number of key over-arching findings:

- Adherence increased from 65% to 75% between the control and treatment groups.
- Excluding the cost of the service, mean NHS costs fell by nearly 20% from £260.87 to £215.16 for patients in the NMS pathway. This gives a benefit per patient of **£45.71** which falls to **£21.11** once the cost of the service is included.
- Analysis based on the impact of increased adherence as a result of the intervention found that patients would experience an average increase of 0.06 Quality-Adjusted Life Years (QALYs) as a result of the service over the course of a lifetime.

For the purpose of the core result we have applied only the estimate of the reduced cost of the service, as this benefit was observed in the patients studied. The impact on QALYs, which relies on the average relationship between adherence and health outcome over a lifetime, is used as the starting point for a sensitivity test.

5. Key results and sensitivities

Table 115 summarises the result of extending the impacts identified in the University of Nottingham study to all 817,700 patients who completed the NMS in 2015. It shows that the service is estimated to have generated **£17.3 million** in health system cost savings net of the cost of delivery (which was £20.1 million – hence the gross value was £37.2 million). As a result of the interventions made through the NMS, it is estimated that in 2015 an additional **80,135** patients appropriately adhered to their prescription.

Table 115: Summary of impacts generated by the NMS in England in 2015

		NMS	Counterfactual	Difference
Adherence	Average	75%	65%	10%
	Total	610,822	530,687	80,135
Health system cost	Per patient	£239.76	£260.87	£21.11
	Total	£196.1m	£213.3m	£17.3m

Source: PwC analysis

As a result of the relatively small sample in the study, the estimate of NHS cost savings was generated with a wide confidence interval. Cost savings per patient ranged from -£58.01 to £100.24 with 95% confidence. The bottom end of this range implies that, even before the cost of the intervention is accounted for, patients using the NMS cost the NHS more than those who do not. By contrast, the top end of the range implies a return for the NHS in cost savings in excess of five times the cost of the intervention. Intuitively, and in opposite directions, neither of these values is particularly realistic. Applying this 95% range per patient to the total recipients of the NMS in 2015 gives a total range of benefits from **-£47.4 million** to **£82.0 million**.

As described above, the study also estimated an average lifetime improvement of 0.06 QALYs per patient. This value was generated through observing the impact of the intervention on adherence with a number of key medicines and combining it with separate analysis of the impact of adherence on health outcomes over a lifetime.

Donaldson et al. (2011)[365] estimate that the value of a QALY ranges from £18,000 to £40,000. Applying this assumption, inflated to 2015 prices, gives a lifetime benefit per patient of **£1,200-£2,600**, or approximately **£1.0-2.1 billion** across all NMS patients in 2015. Like the University of Nottingham study, this assumes that the impact of the NMS on adherence is permanent and persistent at the level seen at the end of the study period. The findings from Donaldson et al. (2011)

[364] Elliott et al. (2014)
[365] Donaldson et al. (2014)

are based on the value of an additional QALY in the year of the study. In practice, many of the QALYs from increased adherence may occur many years in the future – HM Treasury's Green Book[366] advises discounting any future benefits at a rate of 3.5% per year. It is not possible to tell from the analysis undertaken by the University of Nottingham the year in which the improved QALYs are experienced on average. However, even if we were to assume that they occurred 20 years in the future, the value remains highly material at a discounted present value of **£0.5-1.1 billion** for all NMS patients in 2015.

[366] HM Treasury (2011)

Appendix 1 – PSNC/PwC Pharmacy survey

Introduction

For several of the community pharmacy services within the scope of our assessment, no reliable data exist on the number of times that each pharmacy provides the service. In part, this is because the funding of the services is not outcome-based (i.e. they are Essential Services under the Community Pharmacy Contractual Framework) or the services are provided at the discretion of the pharmacy and there is no funding allocation from government. For these services, we need a basis for estimating the scale of pharmacy activity. Consequently we, with PSNC, issued an online survey asking community pharmacies a series of answer questions relating to their activity over a two week period. The survey was open from 19th May to 7th June 2016 (which includes a Bank Holiday (30th May 2016), although we do not believe this has a material impact on the results).

Questionnaire

The survey asked the following eight questions:

Medicines adjustments:

1. *Over the past two weeks, how many times did you provide the following adjustments to dispensed medicines to aid patient adherence to their medicines regimen:*

    a) *Easy-opening tops*
    b) *Reminder charts/ MAR charts [excluding people in care homes, but including those in sheltered housing without constant care]*
    c) *Multi-compartment compliance aids*
    d) *Large-print labels*
    e) *Other (please state) [For online design – include 3 free text boxes with accompanying number field]*
2. *Over the past two weeks how many additional minutes did you and your colleagues spend making these adjustments, over and above the normal time to dispense the item?*

Delivery of prescriptions:

3. *Over the past two weeks, how many times did you arrange for home delivery of prescriptions? (Please count the number of individual deliveries, not the number of prescription items delivered)*

4. *Did you receive any remuneration for any of these deliveries?*

    a) *Yes*
    b) *No*

If Yes, please state the total amount received over the past two weeks:

Repeat prescriptions:

5. *Over the past two weeks, how many times did you do each of the following:*

    a) *Re-order/request and collect a repeat prescription from a GP practice on behalf of a patient*
    b) *Collect a repeat prescription from a GP practice, where the pharmacy has not re-ordered it*

Drug shortages:

6. *Over the past two weeks, where you could not easily obtain a medicine for a patient (i.e. from one of your regular wholesalers within 24 hours), how many times did you ultimately:*

    a) *Source the item from an alternative wholesaler*
    b) *Source the item from a manufacturer*

c) *Source the item from another pharmacy*
d) *Source the item from a hospital*
e) *Other (please specify)?*

7. *Where you were unable to source the medicine for the patient, how many times did you:*

a) *Refer the patient back to their GP practice*
b) *Consult the GP directly yourself to obtain a revised prescription without the need for the patient to communicate with the GP practice*
c) *Take some other action (please specify)? [For online design – include 3 free text boxes with accompanying number field]*

Emergency supply of medicines:

8. *Over the past two weeks, how many times did you assist a patient requesting an emergency supply or loan of a medicine by dispensing an emergency supply or loan of a medicine:*

a) *As a loan against a future prescription:*
   – *Free-of-charge, to be deducted from a future dispensing of a prescription for the item*
   – *With a deposit held to be returned against a future dispensing of a prescription for the item*

b) *As a private transaction where the patient was charged*
c) *As an NHS commissioned service, e.g. a Pharmacy Urgent Repeat Medicines (PURM) Service*

Below, we summarise the responses to each question and then outline the results of a series of tests of the distribution of respondents.

Survey results

In total, 885 community pharmacies responded to the online survey and Table 116 summarises the results. It shows both the average (mean) number of times an activity was undertaken by a community pharmacy and the 95% confidence intervals around this mean. The confidence interval represents the range within which we are 95% certain that the actual mean lies.

We use these results to estimate the scale of community pharmacy activity in 2015. This is an important input to our assessment of the value of the relevant services.

Table 116: Average number of times activity undertaken by a community pharmacy over two week period

Response type	Average per pharmacy	95% confidence interval – lower bound	95% confidence interval – upper bound
Reasonable adjustments:			
Easy-opening tops	3.6	2.9	4.4
Reminder charts/ MAR charts (excluding people in care homes, but including those in sheltered housing without constant care)	8.5	6.7	10
Multi-compartment compliance aids	44	39	50
Large-print labels	1.1	1.0	1.3
Other	5.8	3.1	8.6
Average amount of time spent making adjustments over two weeks	665	575	754
Deliveries:			
Number of deliveries	150	137	163
Re-ordering prescriptions:			
Pharmacy re-orders and collects prescription	272	251	293
Pharmacy collects prescription, without re-ordering	197	173	221
Drug shortages			
Sourced from alternative wholesaler	12	10	13

Response type	Average per pharmacy	95% confidence interval – lower bound	95% confidence interval – upper bound
Sourced from manufacturer	2.1	1.6	2.6
Sourced from another pharmacy	2.6	2.2	3.0
Sourced from hospital	0.0	0.0	0.1
Sourced from other	0.1	0.0	0.1
Unable to source: refer to GP	4.0	3.5	4.4
Unable to source: speak to GP	5.5	4.7	6.2
Unable to source: other	0.1	0.0	0.2
Emergency prescriptions			
Provided free of charge as a loan	10	9.1	11
Provided as a loan with a deposit	0.6	0.3	0.8
Patient was charged for prescription	1.0	0.8	1.2
Provided as part of a PURM service	0.6	0.4	0.8

Source: PSNC/PwC analysis

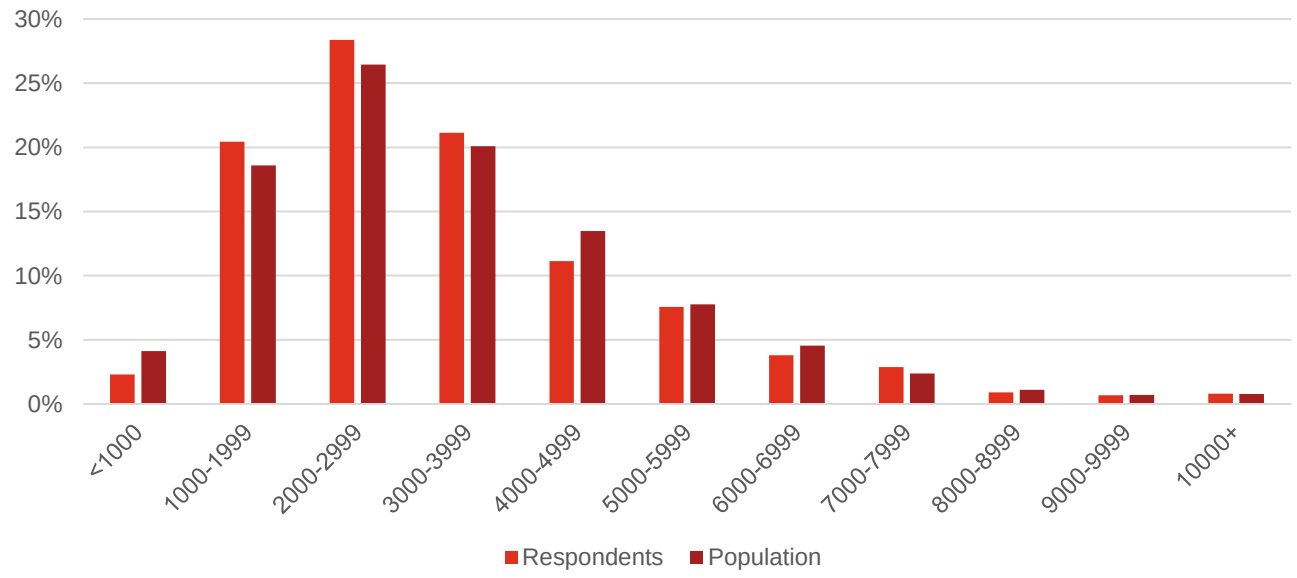
Respondent profile

The survey was made available to community pharmacies through a variety of channels including the PSNC website, e-mail communication and newsletters. In order to understand how representative the responses received are of the population of community pharmacies, we compare the characteristics of the respondents with the population as a whole.

First, we use the number of monthly scripts to compare the distribution of the size of pharmacies amongst our respondents to the overall population. This is shown in Figure 32.

Although the profile of our respondents appears comparable to that of the overall population, a Chi-squared test generates a p-value of 0.10. This means that there is a difference between the distribution of our responses and that of the population at the 5% significance level. Nonetheless, we choose not to reweight the responses to reflect the imbalance in the responses: we do not believe this has a material impact on our results.

Figure 32: Distribution of survey respondents by size of pharmacy (number of monthly scripts dispensed)



Source: Pharmacy and Appliance Contractor Dispensing Data, NHS Business Services Authority, November 2015, PSNC/PwC analysis

Second, we compare the composition of our respondents by type of pharmacy to the population distribution; specifically the proportions of community pharmacies that are:

- CCA members (part of a large multiple);
- Members of the Association of Independent Multiple Pharmacies (AIMp);
- Regional multiples; and
- A small companies (1 to 9 pharmacies).

This is shown in Table 117. Again, the community pharmacies which responded appear broadly in line with the population as a whole. However, the results of a Chi-squared test show that we can reject the null hypothesis that the distribution of our responses is not significantly different to the population at the 1% significance level. Nonetheless, we choose not to reweight the responses to reflect the imbalance in the responses: we do not believe this has a material impact on our results.

Table 117: Distribution of survey respondents by type of pharmacy

Pharmacy type	Proportion of respondents (%)	Proportion of population (%)
CCA Member	30%	46%
AIMp	17%	10%
Regional multiple	6%	3%
Small (1 to 9)	37%	41%
Total	**100%**	**100%**

Source: PSNC/PwC analysis

Third, we compare our results by type of pharmacy across each of the questions (see Table 118). Across all the questions the results are consistent, with any variation typically within the 95% confidence interval outlined above. Based on this consistency, we do not adjust our results to account for the pharmacy type.

Table 118: Average number of times activity undertaken by a community pharmacy over two week period by type of pharmacy

Response type	Overall	CCA	AIMp	Regional multiple	Independent
Reasonable adjustments:					
Easy-opening tops	3.6	3.4	3.8	3.8	3.8
Reminder charts/ MAR charts (excluding people in care homes, but including those in sheltered housing without constant care)	8.5	9.1	7.4	5.8	8.8
Multi-compartment compliance aids	44	40	55	52	44
Large-print labels	1.1	1.1	0.9	1.0	1.3
Other	5.8	7.3	3.7	2.4	5.4
Average amount of time spent making adjustments over two weeks	665	653	647	891	629
Deliveries:					
Number of deliveries	150	140	153	133	164
Re-ordering prescriptions:					
Pharmacy re-orders and collects prescription	272	271	276	186	288
Pharmacy collects prescription, without re-ordering	197	203	212	201	188
Drug shortages					
Sourced from alternative wholesaler	12	11	11	14	12
Sourced from manufacturer	2.1	1.6	2.3	2.6	2.4
Sourced from another pharmacy	2.6	2.6	2.9	2.4	2.5
Sourced from hospital	0.0	0.1	0.0	0.1	0.0
Sourced from other	0.1	0.0	0.0	0.0	0.2
Unable to source: refer to GP	4.0	4.1	4.1	3.3	4.0
Unable to source: speak to GP	5.5	5.1	4.9	4.9	6.1
Unable to source: other	0.1	0.1	0.1	0.5	0.1
Emergency prescriptions					

Provided free of charge as a loan	10.3	9.4	9.7	9.5	12
Provided as a loan with a deposit	0.6	0.7	0.4	1.3	0.5
Patient was charged for prescription	1.0	1.0	1.1	0.9	1.1
Provided as part of a PURM service	0.6	0.5	0.7	0.6	0.7

Source: PSNC/PwC analysis

Finally, we compare the geographic distribution of our respondents to that of the population (see Table 119). This shows that our respondents are broadly representative of the overall population, with no single region or cluster of regions representing a disproportionately large share of out respondents. However, the results of a Chi-squared test show that we can reject the null hypothesis that the distribution of our responses is not significantly different to the population at the 1% significance level. Nonetheless, we choose not to reweight the responses to reflect the imbalance in the responses: we do not believe this has a material impact on our results.

Table 119: Geographic distribution of survey respondents

Area	Proportion of respondents (%)	Proportion of population (%)
Cheshire, Warrington & Wirral	3%	3%
Durham, Darlington And Tees	3%	2%
Greater Manchester	6%	6%
Lancashire	6%	3%
Merseyside	3%	3%
Cumbria, Northumberland, Tyne & Wear	4%	4%
North Yorkshire And Humber	3%	3%
South Yorkshire And Bassetlaw	2%	3%
West Yorkshire	4%	5%
Arden, Herefords & Worcester	2%	3%
Birmingham & The Black Country	3%	6%
Derbyshire And Nottinghamshire	4%	4%
East Anglia	3%	4%
Essex	2%	3%
Hertfordshire & South Midlands	4%	5%
Leicestershire & Lincolnshire	4%	3%
Shropshire And Staffordshire	4%	3%
North East London	3%	6%
North West London	5%	4%
South London	7%	6%
Bath, Gloucestershire, Swindon & Wiltshire	2%	2%
Bristol, N Somerset, Somerset & S Gloucestershire	2%	3%
Devon, Cornwall & Isles Of Scilly	3%	3%
Kent And Medway	2%	3%
Surrey And Sussex	7%	5%
Thames Valley	3%	3%
Wessex	4%	4%

Source: PSNC/ PwC analysis

Appendix 2 – PSNC/PwC Data collection

Introduction

One of community pharmacy's important roles is to provide advice to patients in relation to minor ailments. Sometimes this is provided as a (locally) commissioned service, but often it is not. No data exist on the scale of community pharmacy activity. Consequently, with PSNC, we undertook a data collection exercise whereby all members of the teams in community pharmacies were asked over a one week period to record each occasion when they provide advice on self-care or OTC medicines to patients (but not as part of an NHS commissioned minor ailment or Pharmacy First service).[367]

The data collection was carried out between 1st and 7th June 2016 so that the results would not be affected by the Bank Holiday in England on 30th May 2016. All community pharmacies were asked to complete the data collection form and submit their results via an online portal which was open until 15th June 2016.

Data collection form

The data collection form completed by community pharmacies is presented in Figure 33.

Below, we summarise the responses and then outline the results of a series of tests of the respondents' distribution.

[367] This included occasions when a patient/customer asks for a medicine by name, but the pharmacist provides advice on the medicine or the condition it is being used to treat.

Figure 33: Data collection template

PSNC data collection form - Advice on self-care/OTC medicines (1st-7th June 2016)

Step 1: Brief all members of the pharmacy team (including locums) on the use of this form for the period **Wednesday 1st June to Tuesday 7th June (inclusive).**

Step 2: All members of the pharmacy team should record in the table below each occasion they provide advice on self-care or OTC medicines (but not as part of an NHS commissioned minor ailment or Pharmacy First service). This includes occasions when a patient/customer asks for a medicine by name, but you also provide advice on the medicine or the condition it is being used to treat.

Please record in the appropriate box below, using a 'five bar gate' tally approach (𝍸):

Advice given **AND** product supplied		Advice given and **NO** product supplied	
WITH a referral to another healthcare provider	**NO** referral to another healthcare provider	**WITH** a referral to another healthcare provider	**NO** referral to another healthcare provider
Total: (A)	Total: (B)	Total: (C)	Total: (D)

Step 3: After Tuesday 7th June, work out the total for each column and write the bottom row of the table.

Step 4: Visit www.psnc.org.uk/pwc and complete the online form to provide your results to PSNC and PricewaterhouseCoopers **by 10th June 2016**. You will need to know your pharmacy F-code and postcode to complete this step. You will also be asked if your pharmacy provides an NHS commissioned minor ailment / Pharmacy First service.

Source: PSNC/PwC, 2016

Results of the data collection

In total, 1,488 community pharmacies (12.6% of the population) completed the data collection template.

The overall results from this data collection are presented in Table 120. It shows both the average (mean) number of times an activity was undertaken by a community pharmacy and the 95% confidence intervals around this mean. The confidence interval represents the range within which we are 95% certain that the actual mean lies.

Table 120: Average (mean) number of instances of community pharmacy providing advice over a one week period

Response type	Average per pharmacy	95% confidence interval – lower bound	95% confidence interval – upper bound
Advice and product supplied, with referral to another healthcare provider	16	13	18
Advice and no product supplied, with referral to another healthcare provider	14	12	16
Advice and product supplied, with no referral to another healthcare provider	74	57	91
Advice and no product, with no referral to another healthcare provider	16	13	18
Total	**120**	**96**	**143**

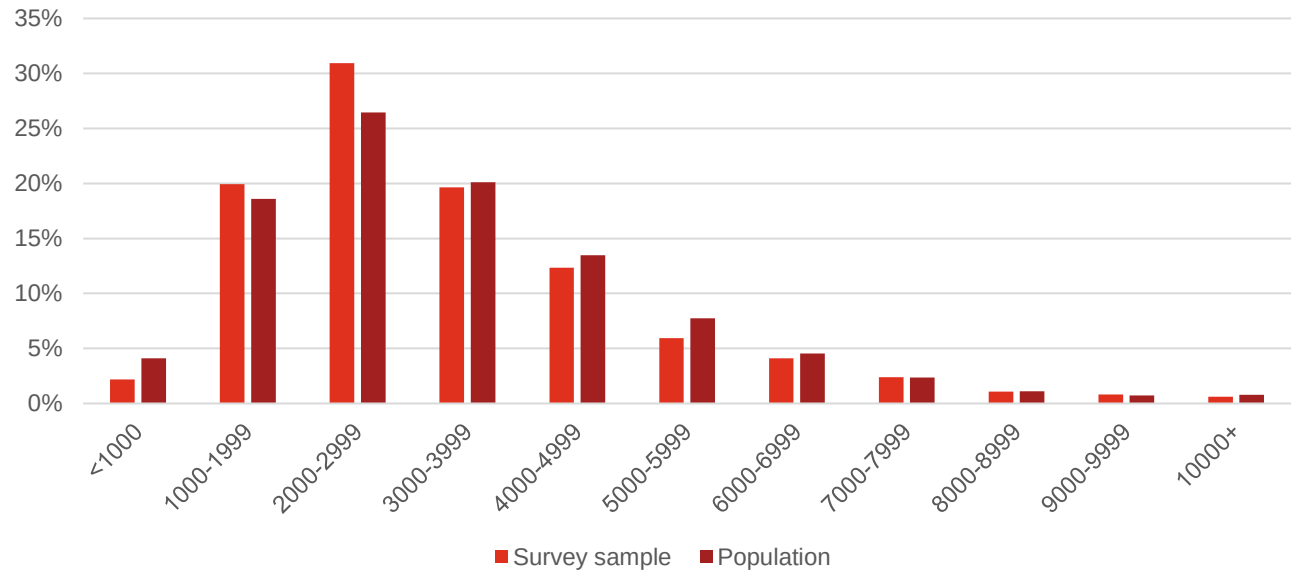
Source: PSNC/PwC analysis

Respondent profile

To test the reliability of our results and the distribution of our respondents, we undertake a series of tests.

First, we compare the distribution of the size of community pharmacies responding to the data collection with the overall population of community pharmacies using the number of monthly scripts as a proxy (see Figure 34). The distribution of respondents appears similar to the overall population although the results of a Chi-squared test show that we can reject the null hypothesis that the distribution of our responses is not significantly different to the population at the 1% significance level. Nonetheless, we do not believe that this has a material effect on our results.

Figure 34: Distribution of data collection respondents by size of pharmacy (number of monthly scripts dispensed)



Source: Pharmacy and Appliance Contractor Dispensing Data, NHS Business Services Authority, November 2015; PSNC/PwC analysis

We also distinguish between those community pharmacies with and without a commissioned minor ailment service. As Table 121 shows, the average (mean) for both groups falls within the 95% confidence interval. We use the overall average (mean) to estimate the value of the minor ailments service.

Table 121: Average (mean) number of instances of community pharmacy providing advice over a one week period with and without a commissioned minor ailment service

Response type	All pharmacies	All pharmacies providing commissioned MAS	All pharmacies not providing commissioned MAS
Advice and product supplied, with referral to another healthcare provider	16	16	15

Response type	All pharmacies	All pharmacies providing commissioned MAS	All pharmacies not providing commissioned MAS
Advice and no product supplied, with referral to another healthcare provider	14	15	13
Advice and product supplied, with no referral to another healthcare provider	74	76	73
Advice and no product, with no referral to another healthcare provider	16	18	14
Total	**120**	**124**	**116**

Source: PSNC/PwC analysis

We also compare the composition of our respondents by type of pharmacy to the population as a whole, specifically the proportions of community pharmacies that are:

- CCA members (part of a large multiple);
- Members of the Association of Independent Multiple Pharmacies (AIMp);
- Regional multiples; and
- Small companies (with 1 to 9 pharmacies).

Our respondents appear broadly in line with the population distribution (see Table 122) although, again, the results of a Chi-squared test mean that we can reject the null hypothesis that the pattern of our responses is not significantly different to the population at the 1% significance level. Nonetheless, we do not believe that this has a material effect on our results.

Table 122: Distribution of data collection respondents by type of pharmacy

Pharmacy type	Proportion of respondents (%)	Proportion of population (%)
CCA Member	36%	46%
AIMp	17%	10%
Regional multiple	5%	3%
Small (1 to 9)	43%	41%
Total	**100%**	**100%**

Source: PSNC/PwC analysis

We then compare our results by type of pharmacy (see Table 123). The results are consistent across all types of pharmacy and, as a result, we do not feel the need to weight the results to take account of the pharmacy type.

Table 123: Average (mean) number of instances of community pharmacy providing advice over a one week period by type of community pharmacy

Response type	Overall	CCA	AIMp	Regional multiple	Independent
Advice and product supplied, with referral to another healthcare provider	16	15	13	13	17
Advice and no product supplied, with referral to another healthcare provider	14	14	14	12	15
Advice and product supplied, with no referral to another healthcare provider	74	77	72	63	75
Advice and no product, with no referral to another healthcare provider	16	16	20	11	15
Total	**120**	**112**	**129**	**99**	**122**

Source: PSNC/PwC analysis

As a final check of our results we compare the geographic distribution of our respondents to that of the population as a whole (see Table 124). The profile of our respondents appears consistent with that of the wider population but the results of a Chi-squared test show that we can reject the null hypothesis that the distribution of respondents is not significantly different to the population at the 1% significance level. Nonetheless, we do not believe that this has a material effect on our results.

Table 124: Geographic distribution of data collection respondents

Area	Proportion of respondents (%)	Proportion of population (%)
Cheshire, Warrington & Wirral	3%	3%
Durham, Darlington And Tees	2%	2%
Greater Manchester	6%	6%
Lancashire	5%	3%
Merseyside	2%	3%
Cumbria, Northumberland, Tyne & Wear	3%	4%
North Yorkshire And Humber	3%	3%
South Yorkshire And Bassetlaw	3%	3%
West Yorkshire	4%	5%
Arden, Herefords & Worcester	2%	3%
Birmingham & The Black Country	4%	6%
Derbyshire And Nottinghamshire	6%	4%
East Anglia	4%	4%
Essex	1%	3%
Hertfordshire & South Midlands	8%	5%
Leicestershire & Lincolnshire	5%	3%
Shropshire And Staffordshire	3%	3%
North East London	4%	6%
North West London	4%	4%
South London	7%	6%
Bath, Gloucestershire, Swindon & Wiltshire	3%	2%
Bristol, N Somerset, Somerset & S Gloucestershire	2%	3%
Devon, Cornwall & Isles Of Scilly	2%	3%
Kent And Medway	2%	3%
Surrey And Sussex	7%	5%
Thames Valley	2%	3%
Wessex	3%	4%

Source: PSNC/PwC analysis

Appendix 3 - Estimating the volume of locally commissioned services

Introduction

This section summarises our approach to estimating the number of beneficiaries of four locally commissioned services offered by community pharmacies:

- Emergency hormonal contraception services (EHC);
- Needles and syringe programmes (NSP);
- Supervised consumption services (SC); and
- Minor ailments services (MAS).

We define the volume of beneficiaries of each service as follows:

- **EHC**: Number of EHC supplies provided by community pharmacies in 2015;
- **SC / NSP**: Number of (injecting) drug users who used SC or NSP services provided by community pharmacies in 2015; and
- **MAS**: Number of MAS consultations provided by community pharmacies on a commissioned basis in 2015.

Approach to estimating the scale of provision

Our approach is based on information recorded in the PharmOutcomes database.[368] The database collates information on commissioned pharmacy services. It is a web-based system designed to help community pharmacies provide services more effectively and make it easier for commissioners to audit and manage these services. The system allows pharmacy teams to record their locally commissioned services and means that payment claims can be automatically created on a regular basis.

For the purposes of our analysis, we use PharmOutcomes data only on services recorded on the standard service template (for each of the four specified services). We make use of the following data as recorded on PharmOutcomes:

- **EHC**: number of consultations by age, number of EHC supplies and day-of-the-week the supply is provided;
- **SC**: number of individual users of the SC service by age, total number of supervisions by day of the week;
- **NSP**: number of individual users of the NSP service by age, total number of NSP supplies by day of the week; and
- **MAS**: number of commissioned MAS consultations by age, total number of MAS consultations.

In addition, we use PSNC's services database to identify all the local areas where the service was provided by community pharmacies in 2015.

Our analysis is based on a subset of services provided by community pharmacies for two reasons:

- We use PharmOutcomes data to estimate an average rate of take up of each service (*see below for more details on our approach*). However, only a subset of service providers use the PharmOutcomes database to record the number of services provided and, therefore, PharmOutcomes does not allow us to identify all areas where the specified service was running in 2015; and

[368] By collating information on pharmacy services, PharmOutcomes allows local and national level analysis and reporting on the effectiveness of commissioned services, helping to improve the evidence base for community pharmacy services. The system is flexible in that it allows the Commissioner to design services within PharmOutcomes which can then be made accessible to community pharmacies commissioned to provide that service. Moreover, services can be designed from scratch, or can be based on a suite of national or local templates which other commissioners have designed and have made available for use on the system. PharmOutcomes is provided by Pinnacle Health LLP in partnership with PSNC. The PharmOutcomes data used for the purposes of this analysis are based on services that are recorded on the templates provided by the system. (Source: PSNC)

- We use the PSNC services database to identify all areas where the service was running in 2015. However, services are recorded on the PSNC database only if the commissioner provides the information which means that our estimation of the volume is based on a set of services that were running in 2015 and were recorded on either PharmOutcomes or PSNC.

Overview of approach

In summary, in order to estimate the volumes, we adopt the following 'extrapolation' approach:

- We estimate the rate of take-up of each service provider by age by combining data on the number of consultations / individual clients by age, as recorded on PharmOutcomes, with the patient population (i.e. population in the relevant local authority or county)[369];
- We then use information from PharmOutcomes and the PSNC services database to identify all areas where the service was available in 2015; and
- We apply the average rate of take-up of the service by age (estimated using the service providers for whom data is recorded on PharmOutcomes) to the patient population across all areas where the service was available in 2015 (identified through the PSNC services database).

Detailed approach

Our approach to estimating the scale of service provision in 2015 involves using data from PharmOutcomes, the PSNC services database and population statistics from ONS. Below, we explain the steps involved in our approach:

Step 1 is to identify all the areas where the service was available in 2015 and map the areas to the appropriate local authorities or counties. We identified three categories of areas:

- Group 1, where service providers are recorded on both PharmOutcomes and PSNC services database;
- Group 2, where services are only recorded on the PSNC services database; and
- Group 3, where services are only recorded on PharmOutcomes.

Step 2 is to estimate the rate of take-up of the services by provider for different age groups using data from PharmOutcomes and ONS population data by local authority or county and age.

Rate of take-up (by age and by commissioner) = # of consultations (or number of individual service users) by age and by commissioner / number population by age in the relevant local authority

Table 125 illustrates the calculation as performed for EHC consultations.

Table 125: Estimating the rate of EHC take-up (Step 2)

Commissioner of EHC services	Local authority	EHC consultations		Female population		Rate of take-up	
		Aged 20	Aged 21	Aged 20	Aged 21	Aged 20	Aged 21
Commissioner #1	Local authority #1	38	39	1,248	1,359	3.0%	2.9%
Commissioner #2	Local authority #2	201	178	2,355	2,203	8.5%	8.1%

Source: PwC analysis

Steps 1 and 2 are common across all services.

There are some potential limitations to our approach:

All services

Not all patients included in the PharmOutcomes data provide their age: This implies that we use data recorded on PharmOutcomes for the subset of service providers for which data is available by age group. The reason for this variance in data from service providers includes a desire for anonymity and differing requirements across Commissioners and PGD (Patient Group Direction). We extrapolate based on the PharmOutcomes data where information on age is recorded which covers 50 to 83% of all data recorded on PharmOutcomes data (depending on the service).

[369] For EHC the patient population is the female population (by age) in the relevant local authority or county; for the other three services, the patient population is the total population (by age) in the relevant local authority or county.

EHC

Need to scale EHC consultations to estimate EHC supplies ('the volume'): The EHC data by age are available for EHC consultations (123,120 consultations are recorded on PharmOutcomes) rather than EHC supplies (115,173 supplies recorded on PharmOutcomes). We scale down consultation to supplies by using a scaling factor of 115,173/123,120 (number of EHC supplies / number of EHC consultations).

NSP/SC

Not all commissioners cover all age groups: Although some service providers record information on the user of the service, they do not record their age (or do so only for a share of the service users). To address this concern, we use data on the users of the service for which age was provided to estimate the average proportion of users in each age group. We then apply the estimated proportions to the total number of individual users where information on age was not recorded. Our approach assumes that the age distribution of NSP and SC clients is the same across local authorities and counties.

MAS

Need to scale individuals to estimate number of consultations: The MAS data by age are available for individuals using MAS (232,597 individuals are recorded on PharmOutcomes), where there are 331,254 consultations recorded on PharmOutcomes so we scale up from individuals to consultations using a factor of 331,254/232,597 (number of consultations / number of individuals).

Step 3 involves estimating the (weighted) average rate of take-up of services by age group across the services covered by the PharmOutcomes database. The weighted average estimated uses weights based on the number of consultations (or individuals) recorded by each service provider divided by the total number of consultations (or individuals) recorded on PharmOutcomes. A weighted average take-up rate is calculated for EHC and SC services where a larger share of service providers are recorded on PharmOutcomes (more than 30%), whereas a simple average is calculated for NSP where only a small share of service providers are recorded on PharmOutcomes.[370] A simple average is also used for MAS driven by a variability across the rates of take-up for different service providers which may be due to unobservable factors we cannot account for (e.g. extent of GP referrals to pharmacies for MAS consultations).

It is important to note that the PharmOutcomes data used to estimate the rate of take-up covers only a subset of service providers who commissioned the service in 2015 (i.e. as identified through the PSNC services database). More specifically:

- For EHC, we estimate the weighted average rate of take-up using data recorded on PharmOutcomes from 44 service providers (34%) out of 131 areas where the service was commissioned in 2015 (as identified through the PSNC services database);
- For SC, we estimate the weighted average rate of take-up using data recorded on PharmOutcomes from 54 service providers (41.5%) out of the 130 areas where the service was commissioned in 2015;
- For NSP, we estimate the average rate of take-up using data recorded on PharmOutcomes from 17 service providers (15.3%) out of the 111 areas where the service was commissioned in 2015; and
- For MAS, we estimate the average rate of take-up using data recorded on PharmOutcomes from 25 service providers (35%) out of the 72 areas where the service was commissioned in 2015.

Table 126 illustrates the calculation as performed for EHC consultations.

Table 126: Estimated rates of take-up of EHC services by age group (Step 3)

	Total number of EHC consultations	Weight (% of total)	15	16	17	18	19	20	21-25
Commissioner #1/Local authority #1	*567*	*0.69%*	0.00%	0.02%	0.02%	0.01%	0.01%	0.02%	0.01%
Commissioner #2/Local authority #2	*1977*	*2.40%*	0.05%	0.17%	0.27%	0.43%	0.30%	0.20%	0.17%
Commissioner #3/Local authority #3	…	…	…	…	…	…	…	…	…
(Weighted) average rate			1.92%	5.26%	7.01%	10.98%	10.62%	10.55%	7.70%

[370] The weighted average implies that services with a greater volume of consultations or individual users, as recorded on PO, carry more weight. A simple average implies that all services, irrespective of the volume of patients or consultations benefitting from them, carry the same weight.

	Total number of EHC consultations	Weight (% of total)	15	16	17	18	19	20	21-25
of EHC services take-up									

Source: PwC analysis

In **Step 4**, we extrapolate from the areas covered by the PharmOutcomes database to all areas where the services were available in 2015 using the (weighted) average rate of take-up of the services by age group and ONS population data by local authority and/or county and age. To do this, we estimate the total number of patients who used the service across England in 2015 by multiplying the size of the local population by age (using estimates from ONS) in the relevant areas by the (weighted) average rate of take-up by age group (Step 3). The total number of patients using the services in 2015 is then calculated by summing across all age groups.

Our extrapolation approach is based on two key assumptions:

- Each pharmacy that provides the specified services 'serves' the population in the same local authority or county; and
- The rate of service take-up by the patient population is the same across all local authorities in England but differs across age groups.

Appendix 4 - Valuing time savings

Introduction

For many of its services, part of the value of community pharmacy lies in its role enabling patients, carers or care workers to access health services more easily and conveniently. First, it avoids the need to make journeys to and from points at which health services are delivered, such as GPs' practices, A&E departments, walk-in centres and pharmacies. Second, it also avoids the need to take time booking, waiting for and having consultations.

In order to calculate the scale of this contribution, we need to estimate the amount of time saved as a result of services performed by community pharmacy and value this saving. This Appendix outlines our approach to this valuation and summarises the values which we use throughout the report.

Average distance and average journey time

Table 127 summarises the (average) distances and travel times which we apply in our analysis to quantify the value of community pharmacy. Below, we explain the methods and sources used to generate each of these values.

Table 127: Common assumptions & sources about distances and journey times

Journey description	Distance (one-way)	Travel time (one-way)
Home to pharmacy for consultation	1km (2km –pharmacy with a commissioned emergency supply service)	4.6 minutes
Home to pharmacy without consultation	1km	4.6 minutes
Pharmacy to next nearest pharmacy	0.8km	3.9 minutes
Home to GP surgery for appointment with GP	1.04km	4.7 minutes
Home to GP surgery for consultation with GP practice staff	1.04km	4.7 minutes
Home to A&E / urgent care centre	7.2km	23.5 minutes
Home to GP out-of-hours (GP OOHs)	7.2km (*assumption*: same as for A&E)	23.5 minutes
Home to walk-in centre	7.2km (*assumption*: same as for A&E)	23.5 minutes
GP surgery to pharmacy	0.5km	2.4 minutes
A&E / GP OOHs to pharmacy	3.6km	11.9 minutes
Call to NHS 111 (patient)	n/a	n/a
Sources	GIS mapping using NHS Business Services dataset & UK Data Service Census Quality Watch, 2014 (for A&E and GP OOHs)	Approach converting straight-line distance to average journey time DfT estimates of average walking and car travel speed

Source: PwC analysis

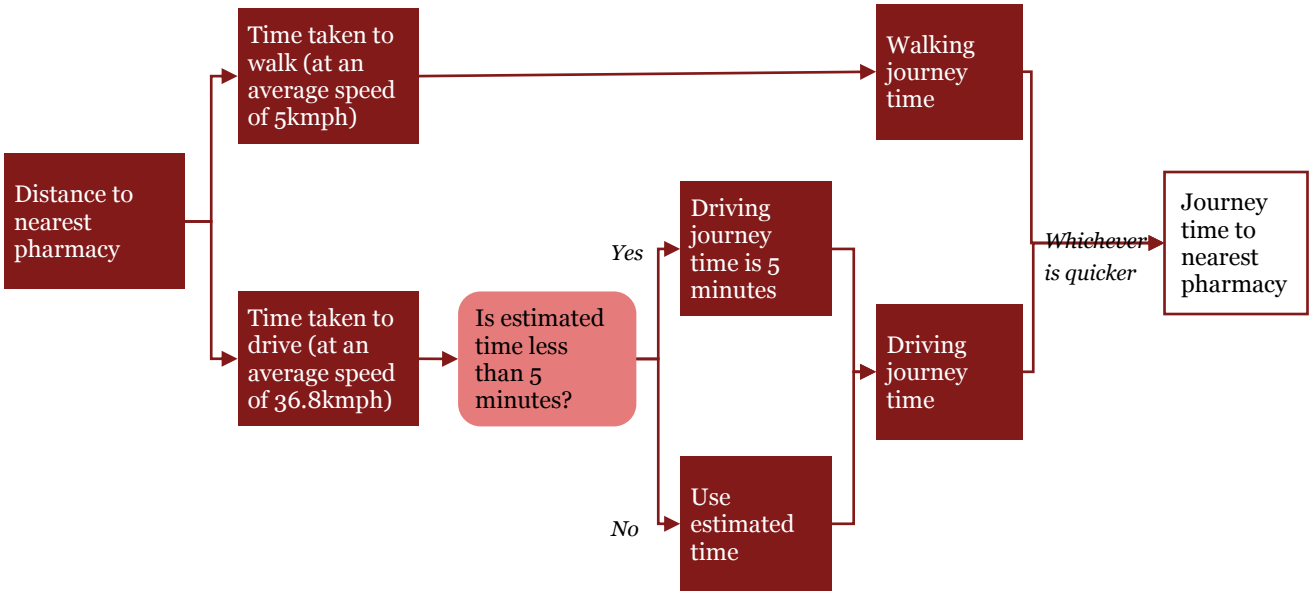
Our approach to estimating the average journey time between two points (e.g. a pharmacy and the nearest GP) consists of two steps:

- Estimating the distance travelled; and
- Translating this distance into an average time which is required for the purposes of valuation.

The first step is specific to each journey type: we deal with each individually below. The second step is, however, consistent across journey types.

Our method covers only walking and travelling by car as jointly they represent nearly 90% of all trips made.[371] Alternative modes of transport, such as public transport or bicycle, are not explicitly modelled. We use estimates from the Department for Transport's (DfT) guidance on average walking speed (5 kmph[372]) and average driving speed (36.8 kmph - the average speed on a minor road)[373] to estimate the average journey time for either walking or driving. In line with further DfT guidance[374], we assume that the minimum journey time for a journey that uses a car is five minutes (i.e. if the journey would take less than five minutes by car, we assume that an alternative mode, e.g. walking, would be used). We assume that households will choose the fastest mode. Our method is summarised in Figure 35.

Figure 35: Approach to estimating average journey time



Source: PwC analysis

Patient's home to nearest pharmacy

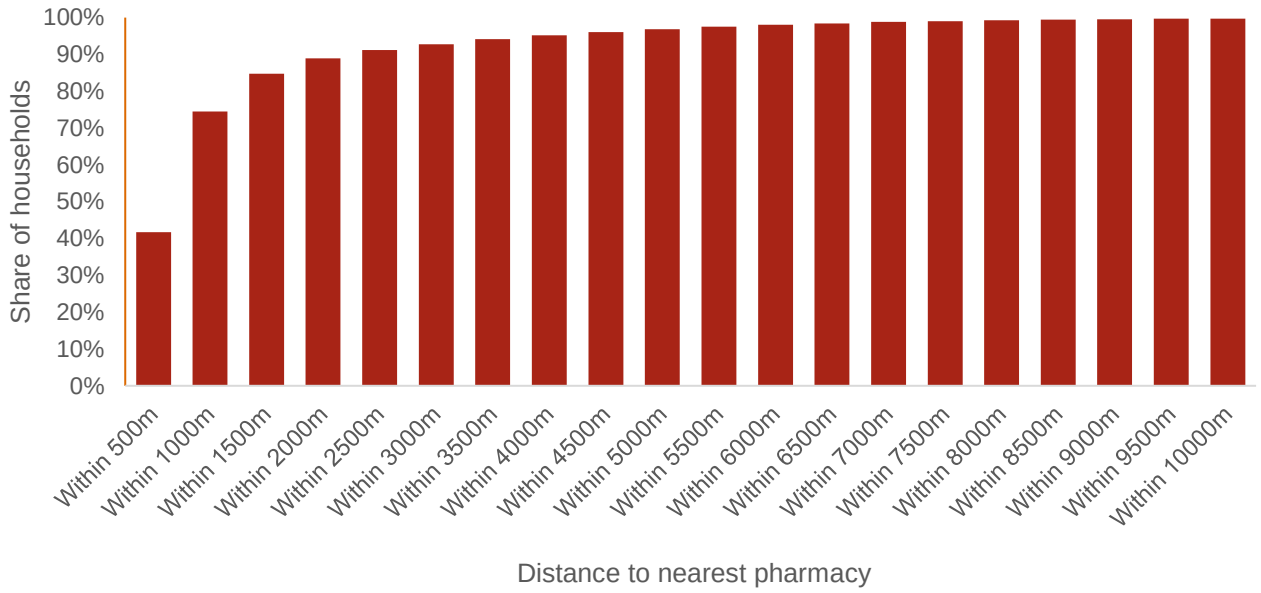
To estimate the average journey time to a community pharmacy, we use geographic information system (GIS) mapping to estimate the average straight line distance. This is a conservative estimate of the distance to a pharmacy as it represents the lower-bound of the journey length.

The location of pharmacies in England is based on its postcode (as listed in the NHS Business Services Authority Pharmacy and Appliance Contractor Dispensing Data dataset[375]). Population distribution estimates for 2014 are used. These are the most recent year available and come from the UK Data Service Census Boundary Data at the Lower Super Output Area (LSOA) level.[376] On this basis, we estimate the distance between each household and the nearest pharmacy. Our results are shown in Figure 36.

Our analysis gives a mean straight-line distance to the nearest community pharmacy for households in England of just over 1km. Although three-quarters of households have a pharmacy within 1km, however, the mean is brought up by a small number of households who have to travel substantially longer distances (e.g. 3% of households are more than 5km from their nearest pharmacy).

[371] https://www.gov.uk/government/statistical-data-sets/nts07-car-ownership-and-access
[372] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427098/webtag-tag-unit-a5-1-active-mode-appraisal.pdf
[373] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/488365/journey-time-statistics-access-to-services-notes-and-guidance.pdf
[374] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/488365/journey-time-statistics-access-to-services-notes-and-guidance.pdf
[375] http://www.nhsbsa.nhs.uk/PrescriptionServices/5045.aspx
[376] https://census.ukdataservice.ac.uk/use-data/guides/boundary-data

Figure 36: Cumulative proportion of households with a pharmacy within given distance bands



Source: PwC analysis

This distribution of distances is similar to that estimated by Frontier Economics as part of its report for the Office of Fair Trading in 2003 as part of the investigation into pharmacy services in Great Britain.[377] This analysis found that approximately 45% of households had a community pharmacy within 500 metres and nearly 80% had a pharmacy within 1km.

Having estimated the average straight-line distance, we then estimate the average journey time using the approach outlined in Figure 35. On this basis, we estimate that the average journey time for a single trip by a patient to a pharmacy is 4.6 minutes (or 9.3 minutes for a return journey). We also estimate that 87% of households live within a 20-minute walk of a pharmacy. Our results are consistent with those of Hall et al. (2015)[378] who investigated access to community pharmacy services in England and found that 89% of households live within a 20-minute walk of a pharmacy.

Patient's home to nearest GP practice

Our approach to estimating the distance between a patient's home and their nearest GP practice is similar to that for the nearest pharmacy. Again, we use GIS mapping to calculate the average straight-line distance between each household and the nearest GP practice within England, recognising that this will underestimate the distance which must actually be travelled between two points.

The location of each GP practice in England is based on its postcode (as listed in the Health and Social Care Information Centre General Medical Practices dataset[379]). Population distribution estimates (for 2014, the most recent year available) come from the UK Data Service Census Boundary Data at the Lower Super Output Area (LSOA) level[380]. This analysis provides an average distance between each household and their nearest GP practice of 1.04km.

This distance is then converted into an average journey time using the approach described in Figure 35. We estimate an average journey time for a patient to a GP practice of 4.7 minutes (or 9.5 minutes for a return journey). As discussed previously, as this is based on the straight-line distance (not the most direct walking or driving route), it will be a conservative estimate of the time saved. In addition, it assumes that every household is registered at the GP practice which is closest to them.

[377] https://assets.digital.cabinet-office.gov.uk/media/555de41b40f0b666a20000ec/oft609.pdf
[378] http://dro.dur.ac.uk/15414/1/15414.pdf
[379] http://systems.hscic.gov.uk/data/ods/datadownloads/gppractice
[380] https://census.ukdataservice.ac.uk/use-data/guides/boundary-data

Patient's home to nearest A&E or other urgent care centre

We use estimates from a recent study from Quality Watch on the average distance between a person's home and the A&E department they attended.[381] The authors estimate that the mean distance between a person's home and the A&E department they attended was 7.2 km (or 14.4 km for a return journey).

Using the approach outlined in Figure 35, we estimate that the average journey time for a patient to the nearest A&E department is 23.5 minutes (or 47 minutes for a return journey).

Patient's home to nearest GP out of hours (GP OOH) services (incl. time per NHS 111 call)

In 2012, out of hours services changed with the gradual introduction of the NHS 111 service which now handles incoming calls from patients across the country providing the 'front-end' of most GP OOH services.[382] GP OOH services provide urgent primary care when GP surgeries are closed, from 06:30 pm to 08:00 am on weekdays and all day at weekends and on bank holidays. GP OOH usually operate from A&E departments or urgent care centres, including minor injury units or walk-in centres.[383]

For the purposes of our analysis, we assume that all GP OOH contacts would require the patient to travel to a location such as an A&E department or urgent care centre (e.g. minor injury units or walk-in centres). The NAO report on GP OOH services estimated that around 10% of GP in hours 'opted in' to provide GP OOH services which corresponds to around 790 sites in England (2013 figures). [384] It is important to note, however, that when an NHS 111 call handler assesses that a patient needs urgent primary care they may:

- Arrange for a clinician from the OOH GP service to call the patient back and conduct a further clinical assessment;
- Book the patient an appointment to the nearest OOH clinics; or
- Arrange for an OOH GP to visit the patient at home.

On this basis, we assume that the distance between a patients' home and the nearest GP OOH service is the same as the distance between a patients' home and the nearest A&E department.

Patient's home to nearest NHS walk-in centre

Like trips to GP OOH services, in the absence of specific evidence, we assume that the distance from a patient's home to the nearest NHS walk-in centre is the same as the distance between a patient's home and the nearest A&E department estimated by Quality Watch. In 2014, there were around 230 walk-in centres[385], broadly in line with the number of A&E departments, estimated to be around 200[386].

GP practice to nearest pharmacy

We estimate the distance between a GP practice and a pharmacy in a similar way to the distance between a patient's home and a GP practice. The location of pharmacies in England is determined using its postcode (as listed in the NHS Business Services Authority Pharmacy and Appliance Contractor Dispensing Data dataset[387]). The location of each GP practice in England is also determined using its postcode (as listed in the Health and Social Care Information Centre General Medical Practices dataset[388]).

This analysis shows that the nearest community pharmacy is, on average, 0.5km from each GP practice. The time required to make this journey can again be estimated using the same method as described in Figure 35, which takes account of estimates of both the average driving and walking time. This gives an approximate journey time of 2.4 minutes.

A&E / GP OOHs to pharmacy

To estimate the distance between A&E and GP OOHs sites to the nearest pharmacy we apply the relative distance between a patients' home to their nearest GP practice and the distance between the GP practice and

[381] Roberts et al. (2014)
[382] NAO (2014)
[383] NHS England (2016b)
[384] NAO (2014)
[385] Primary care foundation (2012)
[386] Roberts et al. (2014)
[387] http://www.nhsbsa.nhs.uk/PrescriptionServices/5045.aspx
[388] http://systems.hscic.gov.uk/data/ods/datadownloads/gppractice

the nearest pharmacy (i.e. 1.98). This means that we assume that the distance between A&E or GP OOH services and the nearest pharmacy is 3.6km with a corresponding journey time of 11.9 minutes.

Pharmacy to next nearest pharmacy

To estimate the distance from one community pharmacy to the next nearest pharmacy we use a similar approach to that from a patient's home to their nearest pharmacy. The location of pharmacies in England is determined using its postcode (as listed in the NHS Business Services Authority Pharmacy and Appliance Contractor Dispensing Data dataset). Using GIS analysis we are able to calculate the mean straight line distance between a community pharmacy and the next nearest. Our analysis shows that the next nearest pharmacy is, on average, 0.83km away from each pharmacy. Using the method outlined in Figure 35, this translates to an average one way journey time of 3.9 minutes.

Average consultation time

In addition to the time spent travelling, the services provided by community pharmacy may also avoid the need for patients to spend time having consultations (as well as time booking them and waiting for them). This has a positive effect in two ways: it avoids time being wasted and it may enhance wellbeing.

The times required for each of these activities are set out in Table 128. Below, we explain the methods and sources used to generate each of these values. These are typically based on assumptions provided in the literature, the sources of which are summarised in the table. Where literature is not available, in the interest of being able to quantify the impact of community pharmacy we have needed to make prudent assumptions.

Table 128: Assumptions about average time taken for different journeys

Activity	Consultation time	Waiting time	Booking time
Pharmacy consultation	11.7 minutes (*assumption*: same as GP consultation)	2 minutes (assumption)	0 minutes
Pharmacy visit (without consultation)	0 minutes	2 minutes (assumption)	0 minutes
GP appointment	11.7 minutes	12.2 minutes	2 minutes (assumption)
Consultation with GP practice staff	15.41 minutes	2 minutes (assumption)	0 minutes (*assumption*)
Home to A&E / urgent care centre	136 minutes		
Call to GP out-of-hours (GP OOHs)	11.7 minutes (*assumption*: same as GP consultation)	6.7 minutes	9.75 minutes (NHS 111 call)
Visit to walk-in centre	11.7 minutes (*assumption*: same as GP consultation)	22.5 minutes (using midpoint)	0 minutes
Call to NHS 111 (patient)			9.75 minutes (using the midpoint of the estimated range)
Sources	GP Patient Survey (Jan 2016) HSCIC (2015) Turner et al. (2012)	Primary care foundation (2012) Curtis (2015) Monitor (2014)	Turner et al. (2012) CCA audit (2012)

Source: PwC analysis

Consultation time

To value the time savings to the patients we need to make a few assumptions on the amount of time spent in consultation with the pharmacist, doctor or other healthcare staff in the respective NHS delivery settings. To value the cost of a GP consultation we use NHS estimates by Curtis et al. (2015).[389] The cost of a GP appointment (with the practice doctors) is estimated to be £45; this is based on a duration of 11.7 minutes per GP appointment.

For the purposes of our analysis we assume that the duration of the consultation is the same across all settings for each pharmacy service under consideration. For example, we assume that a GP appointment with a patient seeking advice and / or treatment for a minor ailment will last 11.7 minutes. Similarly, a consultation with the pharmacist, GP OOH or walk-in centre healthcare staff will also last 11.7 minutes.

[389] Curtis et al. (2015)

What differs in terms of consultation time is the amount of time a patient will spend at an A&E department and the amount of time a consultation with a GP practice staff (as compared to an appointment with a doctor in the GP practice) lasts. More specifically, in relation to A&E, we adopt the estimated duration of time per visit; this was estimated to be 2 hours and 16 minutes in 2014 - 2015.[390] Moreover, in some cases such as managing prescription errors or clarifying prescriptions, patients may consult with a GP practice staff rather than the GP doctor. For this type of consultations we assume that the duration of consultation with a GP practice staff is 15.41 minutes; this estimate is based on results from an audit undertaken by the Company Chemists' Association (CCA) in 2012 on the amount of time pharmacy staff spend on resolving clarification errors with patients.[391]

Waiting time

As illustrated in Table 128, we also account for the amount of time patients spend waiting for an appointment or consultation across the alternative NHS settings. Our estimates are based on public sources and / or assumptions. Using estimates from the GP Patient Survey (2016), we assume that the average waiting time for a GP appointment with a doctor in the practice (i.e. from the time the patient arrives for their appointment to the time that they will be seen by the GP) is 12.2 minutes.[392] Similarly, using other sources, we assume that the average waiting time for a GP OOH appointment and a consultation at a walk-in centre is 6.7 minutes[393] and 22.5 minutes[394] respectively. Finally, for the purposes of our analysis, we assume that, on average, patients wait 2 minutes for a pharmacy consultation or prescription request as well as for a consultation with a GP practice staff (other than the doctors in the practice).

Booking time

Finally, we account for the time that patients spend booking their appointments with the respective healthcare staff. This is only relevant for GP in and out of hours services. For GP in hours, we assume that the patient spend around 2 minutes booking an appointment (usually via the phone or online). For the GP OOHs we use estimates of the amount of time per NHS 111 call. Patients are referred to GP OOH services through NHS 111 and, therefore, we need to estimate the average time for each NHS 111 call. The NHS 111 evaluation found that call episode times ranged from 6.5 to 13 minutes, with the shortest time in the ambulance service-provided site.[395] Due to lack of detailed data on the time per call related to specific incidences, we use the mid-point of 9.75 minutes to value the pharmacy services; i.e. estimated booking time for a GP OOH appointment.

Value of time

Finally, once we have identified the quantity of time saved as a result of the services performed by community pharmacy, we then apply standard assumptions to value this time. We use two values of time (outlined in Table 129):

- The value of leisure time (£7.05/hr, DfT); and
- The value of working time (£31.50/hr, ONS).

The value of leisure time is based on surveys which analyse the willingness of consumers to pay to save leisure time. The value of working time is based on the average Gross Value Added (GVA) per worker in England. This accounts for the output that could have been produced by employees had they been at work.

For each service type we then make an assumption, also summarised in Table 129, about the proportion of time saved which is leisure time, and the proportion which is working time. Our assumption is based on when the service is accessed.

Due to the accessibility and speed of service in a community pharmacy it is assumed that all time spent travelling to and attending a community pharmacy is leisure time.

For urgent care centres (A&E, GP OOH, walk-in centres, NHS 111) it is assumed that the primary reason for attending these points of delivery is the accessibility outside of working hours. Therefore, we assume that all

[390] HSCIC (2015)
[391] Pharmacy Voice (April 2012)
[392] GP Patient Survey (January 2016)
[393] Primary care foundation (2012)
[394] Monitor (2014)
[395] Turner et al. (2012)

time attending these providers is leisure time. This likely underestimates the cost to patients/society as the cost of leisure time is less than the cost of work time; hence it is a conservative assumption in our impact estimates.

Finally, when visiting the GP Practice we assume that for those in work, and able to leave work for GP appointments, the cost of lost time accrues to society through lost output. To estimate this proportion we multiply the proportion of GP appointments used by people of working age (57.8%)[396] by the employment rate (74.4%)[397] by the proportion of people who are able to leave work to attend the GP (67%).[398] 28.8% of GP visits are, therefore, at the expense of work time. For prescribing errors (where harm would have been caused) we assume that all patients are allowed time off work to attend the GP. For this service, 43.0% of GP appointments are at the expense of work time. For the GP surgery to pharmacy journey, all time lost is assumed to be leisure time.

Table 129: Common assumptions & sources for value of time

Journey description	Value of leisure time	Value of work time	Proportion of leisure vs. work
Home to pharmacy for consultation	£7.05/h		0% lost work time
Home to pharmacy without consultation	£7.05/h		0% lost work time
Pharmacy to pharmacy	£7.05/h		0% lost work time
Home to GP surgery for appointment with GP	£7.05/h	£31.50/h	28.8% lost work time (43.0% lost work time if all employees are allowed to take time off to visit GP)
Home to GP surgery for clarification with GP practice staff	£7.05/h	£31.50/h	28.8% lost work time (43.0% lost work time if all employees are allowed to take time off to visit GP)
Home to A&E / urgent care centre	£7.05/h		0% lost work time
Home to GP out-of-hours (GP OOHs)	£7.05/h		0% lost work time
Home to walk-in centre	£7.05/h		0% lost work time
GP surgery to pharmacy	£7.05/h		0% lost work time
Call to NHS 111 (patient)	£7.05/h		0% lost work time
Sources	DfT WebTAG Data book (2015)	ONS (2016)	Calculation based on: - 57.8% of GP appointments used by working age people (HSCIC, 2009); - 74.4% employment rate, (ONS, February 2016); - 33% not able to leave work for GP appointment (GP Patient survey, Jan 2016)

Source: PwC analysis

Valuation areas not assessed

We have restricted the above analysis to the opportunity cost of the time taken, either to leisure or business travellers. This omits the financial cost of car travel, such as the cost of fuel and maintenance. It also omits the externalities caused by road transport, specifically noise, accidents and emissions. DfT's WebTAG framework provides guidance on how to value each of these areas.

By way of example, the formula provided by the DfT for estimating fuel costs is as follows:

$$L = \frac{a}{v} + b + c.v + d.v^2$$

Where:

$L =$ fuel consumption (litres per kilometre)

$v =$ average speed (kilometres per hour)

[396] HSCIC (2009)
[397] ONS (February 2016)
[398] GP Patient Survey (January 2016)

And, for a petrol car:

$a = 1.12$

$b = 0.04$

$c = -0.0001$

$d = 0.000002$

Applying these assumptions to a car travelling at 36.8kmph, the average speed on a minor road, gives an approximate fuel consumption per kilometre of 0.075 litres. Multiplying this by a cost per litre of 34.9p (in 2015 prices)[399], again derived from DfT's WebTAG framework, gives an approximate cost per kilometre of 2.6p. Applying this value to the average car journey from home to pharmacy of 1.4km, based on our analysis, gives an approximate fuel cost per car trip of 3.6p. Our analysis suggests that 32% of patients would travel to pharmacy on foot – for these passengers no additional cost would be felt.

Combining all of the above analysis, we would estimate that fuel costs add, on average just 2.4p to the average journey from home to pharmacy (weighted between those who travel by car and on foot). By comparison, the time cost of the average journey would be 55p, more than 20 times as large. Although not demonstrated here, if the above calculations are repeated for non-fuel costs, or externalities such as accidents and noise, similarly small estimates of cost per trip are estimated.

As well as being relatively immaterial in magnitude, in comparison to the value of time, the size of these effects are very sensitive to a number of key assumptions: the share of journeys made by car, the average speed and distance travelled by car and the type of road transport used (e.g. petrol vs diesel engine). Given the uncertainties around each of these assumptions, we have opted not to attempt to robustly estimate the magnitude of these effects. Instead, we estimate only the time cost of journeys made but recognise that this is a conservative assumption.

[399] This excludes fuel duty and VAT, which would be returned to government and hence neutral from the perspective of value.

Appendix 5 – Valuing wellbeing

Introduction

This appendix sets out our approach to estimating the value patients attach to a reduction in their wellbeing as a result of an extra day of ill health.

Approach

We draw on research by Daniel Fujiwara (2013)[400] who used data from the British Household Panel Survey to estimate the value individuals attach to a change in their subjective wellbeing following various life events. Drawing on evidence from small lottery winners, Fujiwara estimates the value of these reductions in wellbeing (i.e. the monetary equivalent) by estimating the amount of money that would compensate the individual.

Results

One of the adverse events that Fujiwara considers is poor health over the past 12 months in comparison to people of the same age.[401] Applying the reduction in subjective wellbeing that Fujiwara estimates arises as a result (only) of ill health to Fujiwara's 'compensating equivalent' model leads to an estimate of the value of poor health over a year of £3,360.

To estimate the cost per day of poor health we divide this annual cost by the number of days in the year. This gives an average value of £9.20 per day.

Our approach assumes someone who is comparatively less healthy than the average for their age is ill on every day in the year. In reality they may only be ill on some days. On the days when they are ill their wellbeing will be affected by more than the daily average of £9.20; hence, we might expect the value of the reduction in wellbeing for each day of illness to be greater than £9.20.

[400] Fujiwara, D. (2013).
[401] Specifically, patients in the BHPS were asked: "Please think back over the last 12 months about how your health has been. Compared to people of your own age, would you say that your health has on the whole been: excellent, good, fair, poor, very poor, don't know", ISER (2016).

Appendix 6 - Pharmacy staff time and costs

Introduction

To estimate the net benefit of the services provided by community pharmacy, we sometimes need to deduct the cost to the NHS in funding these services. For some services, community pharmacy receives a direct fee, for example for locally commissioned minor ailments service consultations. For Essential Services, where community pharmacy receives funding as part of the Community Pharmacy Contractual Framework (CPCF), we need to estimate the cost to the NHS of these services being provided.

For some services there is a comparable funding estimate such as a commissioning fee per consultation for a similar locally commissioned service (e.g. for non-commissioned emergency supply of repeat medicines). We use this as a proxy for the cost. There is no such estimate for the services to manage prescriptions and resolve drug shortage provided by community pharmacy. As a proxy for the cost of the intervention, we multiply the amount of time spent by community pharmacy staff per intervention by the hourly cost for each member of staff.

Approach

Valuing staff time

To estimate the value of the time of community pharmacy staff, we use the median gross hourly pay for different types of worker from the Annual Survey of Hours and Earnings (ASHE)[402]:

- £20.79 for pharmacists;
- £10.57 for pharmaceutical technicians; and
- £7.74 for other pharmacy assistants.

To calculate the average hourly cost per worker, we uplift these rates by 25% to take into account employers' National Insurance and pension contributions as well as other on-costs. This the same assumption as the one used in the most recent Cost of Service Inquiry.[403] This results in hourly costs of £25.99, £13.21 and £9.68 respectively.

Time taken

Managing prescriptions

To estimate the amount of time spent by community pharmacy resolving each clarification or prescribing error, we use evidence from the 2012 CCA audit[404] which found that the average time per resolution for each incident was 15.41 minutes. This was made up of:

- 7.57 minutes of pharmacist time;
- 6.38 minutes of dispenser time; and
- 1.46 minutes of other staff time.

As we use the volumes of queries as opposed to incidents, we then uplift these times to calculate the average resolution time per query, given that the CCA audit estimated 1.19 avoided incidents per query. The uplifted time per staff type per query is, therefore, 8.57, 7.23, and 1.65 minutes respectively.

We then apply the hourly costs to the time per staff type for each intervention to arrive at an overall cost estimate per resolution of £5.57.

[402]Median gross hourly pay including overtime for the tax year ending April 2015 (for all employees on adult rates whose pay for the survey pay-period was not affected by absence), (ONS, 2015); We use the median as a measure of the 'typical' pharmacy salary rather than the mean which may be skewed by the distribution of incomes.
[403] Assuming on-costs of 25%.
[404] Pharmacy Voice (April 2012).

Drug shortages

To estimate the amount of time spent by community pharmacy resolving each drug shortage, we use data from a 2012 PSNC survey[405] which found that on average each community pharmacy spent 1.74 hours a week trying to resolve drug shortages.[406] Over a two week period pharmacists deal with an average of 26 drug shortages which equates to 8.05 minutes per resolution.

We then estimate the proportion of time per resolution which is undertaken by dispensing staff and by pharmacists themselves. Specifically, we assume that all administrative searching of other sources is conducted by dispensing staff, however all other actions, such as contacting the prescriber, are completed by pharmacists. This means that 63% of cases are assumed to be resolved by dispensing staff and 37% by pharmacists. Hence, we assume that 63% of each 8.05 minute resolution is dispensing staff time and 37% is pharmacist time.

Applying the cost per hour of time for each type of staff gives an average cost per resolution of £2.40.

[405] DJS Research (for PSNC) (November 2012).
[406] Derived by taking the midpoint of the time brackets of survey responses, and 3.5 hours for the upper bracket (over 3 hours).

References

Public health

Emergency hormonal contraception services

Anderson C, Blenkinsopp A. 2006. "Community pharmacy supply of emergency hormonal contraception: a structured literature review of international evidence". Human Reproduction 21, 272–284.

Brown, S.S. et al. 1995. "The Best Intentions: Unintended Pregnancy and the Well-Being of Children and Families", Institute of Medicine (US) Committee on Unintended Pregnancy, National Academies Press, US: Washington DC.

Cameron ST, Glasier A. 2013. "Identifying women in need of further discussion about the decision to have an abortion and eventual outcome". Contraception. 2013; 88:128–32.

Carson, C. et al. 2011. "Effect of pregnancy planning and fertility treatment on cognitive outcomes in children at ages 3 and 5: longitudinal cohort study". BMJ 2011; 343: d4473.

Curtis, L. 2015. "Unit Costs of Health and Social Care 2015".

Department of Health. 2013. "A framework for sexual health improvement in England", March 2013.

Department of Health. 2015. "National Schedule Reference Costs (NSRC) 2014/15", November 2015.

Department of Health. 2015. "Abortion Statistics 2014".

Department of Health. 2015. "Birth Statistics 2014".

Department for Transport. 2015. "WebTAG Data book, 2015".

Family Planning Association (FPA). 2014. "Emergency contraception survey", Sexual Health Week, 15-21 September 2014.

Glasier, A.F. et al. 2010. "Ulipristal acetate versus levonorgestrel for emergency contraception: a randomised non-inferiority trial and meta-analysis", The Lancet. 2010; 375: 555-62.

HSCIC (Health & Social Care Information Centre), 2009. "Consultations Report 20 – QRESEARCH calendar year consultations 2008".

HSCIC (Health & Social Care Information Centre). 2014. "Prescription Cost Analysis (PCA) for England", 2014.

HSCIC (Health & Social Care Information Centre). 2015. "Hospital Episode Statistics (HES) for England", 2014/15.

HSCIC (Health & Social Care Information Centre). 2015. "NHS Immunisation Statistics for England", 2014-15.

Lakha F. and Glasier A. 2006. "Unintended pregnancy and use of emergency contraception among a large cohort of women attending for antenatal care of abortion in Scotland", The Lancet. 2006; 368: 1782–1787.

National Audit Office (NAO), 2014. "Out-of-hours GP services in England. Department of Health and NHS England", September 2014.

NHS Business Services Authority. 2015. "Drug Tariff"

Monitor. 2014. Walk-in centre review: final report and recommendations, Monitor, 2014.

New Economy. 2015. "Unit Cost Database – Version 1.4".

PharmOutcomes web-based system, Pinnacle Health Partnership LLP in partnership with PSNC, 2016.

Shohel et al. 2014. "A systematic review of effectiveness and safety of different regimens on levonorgestrel oral tablets for emergency contraception", BMC Women's Health. 2014; 14:54.

Thomas C.M., Cameron S. 2013. "Can we reduce costs and prevent more unintended pregnancies? A cost of illness and cost-effectiveness study comparing two methods of EHC", BMJ Open. 2013; 3:e003815.

Turner, J. et al. 2012. "Evaluation of NHS 111 pilot sites: Final Report", The University of Sheffield, August 2012.

Office of National Statistics (ONS). 2015. "HMRC Tax and NI receipts 2014/15".

Office of National Statistics (ONS). 2015. "Benefit Expenditure 2014/15".

Office of National Statistics (ONS). 2015. "Child benefit statistics 2014/15".

Needle and syringe programmes

Centers for Disease Control and Prevention (CDA). 2016. "Hepatitis C FAQs for the Public", May 2016.

Centers for Disease Control and Prevention (CDA). 2001. "Updated US public health services guidelines for the management of occupational exposure to HBC, HCV and HIC and recommendations for post exposure prophylaxis", Morbidity and Mortality Weekly Report, 50(RR11): 1- 42.

Crime Survey for England & Wales (CSEW). 2013. "Drug misuse: findings from the 2014 to 2015 Crime Survey for England and Wales", July 2013.

Curtis, L. 2015. "Unit Costs of Health and Social Care 2015".

Department of Health. 2005. "Models of Care for Treatment of Adult Drug Misusers".

Department for Transport. 2015. "WebTAG Data book, 2015".

Department for Transport. 2008. "WebTAG guidance documents"

Hay, G., dos Santos, A.R. and Worsley, J. 2013. "Estimates of the Prevalence of Opiate Use and/or Crack Cocaine Use, 2011/12: Sweep 8 report", Liverpool John Moores University.

Home Office. 2010. "National Drug Strategy: Reducing Demand, Restricting Supply, Building Recovery", December 2010.

Hulse G., English D., Milne C. & Holman C. 1999. "The Quantification of Mortality Resulting From the Regular Use of Illicit Opiates", Addiction 94: 221–9.

Jones, A. et al. 2009. "The Drug Treatment Outcome Outcomes Research Study (DTORS): Final outcomes report", 3rd edition.

Jones, L., Bates, G, and McVeigh, J. 2012. "Update of NICE Guidance PH18 on NSP. Qualitative and quantitative review updates: Final report", Liverpool John Moores University.

King et al. 2014. "Estimating prevalence of injecting drug users and associated heroin-related death rates in England by using regional data and incorporating prior information", Journal of the Royal Statistical Society, 177: Part 1, pp. 209-236.

Ksobiech K. 2004. "Return Rates for Needle Exchange Programs: A Common Criticism Answered", Harm Reduction Journal 1:2.

Makwana, N. and Riordan, F. 2005. "Prospective study of community needle stick injuries", Arch Dis Child, 2005:90:523-524.

Manchester Laboratory. 2016. "Dried Blood Spot testing: Price list and Turn Round times – 2015/16"

Martin N, Vickerman P, Miners A, Foster G, Hutchinson S, Goldberg D, et al. 2011. "Cost effectiveness of hepatitis C virus antiviral treatment for injection drug user populations", Hepatology 2011; 55:49–57.

National Treatment Agency for Substance Misuse (NTA). 2007. "The NTA's 2005 survey of needle exchanges in England", April 2007.

New Economy. 2015. "Unit Cost Database – Version 1.4".

NICE (National Institute for Health and Clinical Excellence). 2014. "Guidance: Needle and Syringe programmes (PH52)".

Office of National Statistics (ONS). 2014. "Adult Drug Statistics from the NDTMS, 2013/14".

Office of National Statistics (ONS). 2016. "Deaths related to drug poisoning in England and Wales: 2014 registrations".

Patruni, B., Nolte, E. 2013. "Hepatitis C: A projection of healthcare and economic burden in the UK", A report prepared for Hepatitis C Trust by RAND Europe.

PharmOutcomes web-based system, Pinnacle Health Partnership LLP in partnership with PSNC, 2016.

Public Health England (PHE). 2015. "Shooting Up: Infections among people who inject drugs in the UK, 2014", November 2015.

Public Health England (PHE). 2015. "Hepatitis C in the UK: 2015 report", July 2015.

PSNC. 2016. Services database. [Accessed online]

Select Committee on Environmental Audit. 2004. Minutes of Evidence: Memorandum from Environmental Campaigns Ltd (ENCAMS), February.

Turner, K., Hutchinson, S., Vickerman, P. et al. 2011. "The impact of needle and syringe provision and opiate substitution therapy on the incidence of hepatitis C virus in injecting drug users: pooling of UK evidence", *Addiction* 106, pp. 1978–1988.

UK Focal Point. 2015. "United Kingdom Drug Situation – 2015 Edition". Annual Report to the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA).

World Health Organisation (WHO). 2015. "Hepatitis C".

Supervised consumption services

Bell J, Burrell T, Indig D, & Gilmour S. 2006. "Cycling in and out of treatment; participation in methadone treatment in NSW, 1990-2002", Drug and Alcohol Dependence, 81; 55-6.

Bloor, R. 2007. "Supervised methadone in Staffordshire and Shropshire: a study of factors associated with key outcome variables". National Treatment Agency for Substance Misuse, NHS.

Coid, J., Carvell, A., Kittler, Z., Healey, A. and Henderson, J. 2000. "Opiates, Criminal Behaviour, and Methadone Treatment", London: Home Office.

Curtis, L. 2009. "Unit Costs of Health and Social Care 2009".

Curtis, L. 2015. "Unit Costs of Health and Social Care 2015".

Department of Health. 2005. "Models of Care for Treatment of Adult Drug Misusers".

Department of Health. 2011. "A summary of the health harms of drugs".

Department of Health. 2015. "Public Health Outcomes Framework", Public Health England.

Department of Health. 2016. "Government response to the consultation *Refreshing the Public Health Frameworks (2015)*", Public Health England.

DrugScope. 2015. "How much crime is drug related?" [Available online]

Frontier Economics. 2011. "Specialist Drug and Alcohol Services for Young People – A cost benefit analysis". A report for the Department for Education.

Gossop M, Marsden J, Stewart D, Lehmann P, Edwards C, Wilson A, Segar G. 1998. "Substance use, health and social problems of service users at 54 drug treatment agencies. Intake data from the National Treatment Outcome Research Study", British Journal of Psychiatry, 173:166-171.

Health & Social Care Information Centre (HSCIC), 2016. 'GP Practice Prescribing Presentation-level Data', January – December 2015.

Home Office. 2002. "The economic and social costs of Class A drug use in England and Wales, 2000".

Home Office. 2010. "National Drug Strategy: Reducing Demand, Restricting Supply, Building Recovery", December 2010.

Jones, A. et al. 2009. "The Drug Treatment Outcome Outcomes Research Study (DTORS): Final outcomes report", 3rd edition.

Keen, J. et al. 2000. "Can methadone maintenance for heroin-dependent patients retained in general practice reduce criminal conviction rates and time spent in prison?", *The British Journal of General Practice*, 50(450), pp. 48-49.

Kouimtsidis, D. et al. 2015. “Is supervised consumption an expensive barrier to substation treatment? Results from SUPER C trial”, NHS Foundation Trust.

National Health Service (NHS) England and Wales. 2015. “Amendments to the Drug Tariff”, July.

National Treatment Agency for Substance Misuse (NTA). 2006. “Best practice guidance for commissioners and providers of pharmaceutical services for drug users”, NHS.

National Treatment Agency for Substance Misuse (NTA). 2009. “The story of drug treatment”, NHS.

National Treatment Agency for Substance Misuse (NTA). 2012. “Estimating the crime reduction benefits of drug treatment and recovery”, NHS.

National Treatment Agency for Substance Misuse (NTA) 2014. “Why invest? How drug treatment and recovery services work for individuals, communities and society”, NHS.

New Economy. 2015. “Unit Cost Database – Version 1.4”.

NICE (National Institute for Health and Clinical Excellence). 2007. “Final Appraisal Determination – methadone and buprenorphine for the management of opioid dependence”.

NICE (National Institute for Health and Clinical Excellence). 2014. “Guidance: Needle and Syringe programmes (PH52)”.PharmOutcomes web-based system, Pinnacle Health Partnership LLP in partnership with PSNC, 2016.

Royal Pharmaceutical Society in Scotland. 2009. “Methadone: A Briefing Paper from the Royal Pharmaceutical Society”

Office of National Statistics (ONS). 2014. Adult Drug Statistics from the NDTMS, 2013/14.

Office of National Statistics (ONS). 2016. Deaths related to drug poisoning in England and Wales: 2014 registrations.

UK Focal Point. 2015. “United Kingdom Drug Situation – 2015 Edition”. Annual Report to the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA).

Self-care support

Minor ailments advice

Curtis, L. 2012. “Unit Costs of Health and Social Care 2012”.

Curtis, L. 2015. “Unit Costs of Health and Social Care 2015”.

Department of Health. 2015. “National Schedule Reference Costs (NSRC) 2014/15, November 2015”.

Fujiwara, D, 2013. “General Method for Valuing Non-Market Goods Using Wellbeing Data: Three-Stage Wellbeing Valuation”, Fujiwara, D., 2013.

GP Patient Survey, January 2016. “GP Patient Survey”, January 2016, NHS England.

Health & Social Care Information Centre (HSCIC). 2015. “NHS A&E attendances, 2014-15”, HSCIC.

National Audit Office (NAO), 2014. “Out-of-hours GP services in England”. Department of Health and NHS England, September 2014.

NHS Business Services Authority. 2015. Pharmacy and Appliance Contractor Dispensing Data, NHS Business Services Authority, January 2015 - December 2015.

New Economy. 2015. “Unit Cost Database – Version 1.4”.

Office of National Statistics (ONS). 2014. “Full Report: Sickness Absence in the Labour Market, February 2014”, February 2014.

Office of National Statistics (ONS). 2015. “England population mid-year estimate”, June 2015.

Office of National Statistics (ONS). 2016. “Sub regional Productivity: Labour Productivity (GVA per hour worked and GVA per filled job) indices by UK NUTS2 and NUTS3 sub regions”, March 2016.

PAGB. 2008. “Driving the self-care agenda”, Annual Review, 2008.

Pharmacy First –Liberating Capacity. 2015. “Pharmacy First –Liberating Capacity, Birmingham, Solihull & the Black Country”, February 2015.

Pharmacy Voice. 2016. “Dispensing Health Equality”, Pharmacy Voice, May 2016.

PSNC Briefing. 2015. “PSNC Briefing 045/15: Analysis of Minor Ailment Services Data”, August 2015.

Treat Yourself Better. 2016. “Treatyourselfbetter.co.uk”, (accessed 17/06/2016).

Turner, J. et al. 2012. “Evaluation of NHS 111 pilot sites: Final Report”, The University of Sheffield, August 2012.

Medicines support

Managing prescribing errors/clarifying prescriptions

Curtis, L. 2015. “Unit Costs of Health and Social Care 2015”.

Department of Health. 2015. “National Schedule Reference Costs (NSRC) 2014/15”, November 2015.

Department for Transport. 2015. “WebTAG Data book, 2015”.

Fujiwara, D. 2013. “General Method for Valuing Non-Market Goods Using Wellbeing Data: Three-Stage Wellbeing Valuation”, Fujiwara, D., 2013.

MDU. 2013. “50% increase in medication errors”, MDU, October 2013.

GMC/University of Nottingham, May 2012. “Investigating the prevalence and causes of prescribing errors in general practice”, GMC/University of Nottingham, May 2012.

NHS Business Services Authority. 2015. Pharmacy and Appliance Contractor Dispensing Data, NHS Business Services Authority, January 2015 - December 2015.

GP Patient Survey, January 2016. “GP Patient Survey”, January 2016, NHS England.

Health & Social Care Information Centre (HSCIC). 2009. “Trends in Consultation Rates in GP Practice”, HSCIC, September 2009.

MHRA & NHSE, 2014. “Improving medication error incident reporting and learning”, MHRA and NHS England, March 2014.

Office of National Statistics (ONS). 2014. “Full Report: Sickness Absence in the Labour Market, February 2014”, February 2014.

Office of National Statistics (ONS). 2015. “England population mid-year estimate”, June 2015.

Office of National Statistics (ONS). 2016. “October-December 2015, ONS, Regional Labour Market”, February 2016.

Office of National Statistics (ONS). 2016. “Sub regional Productivity: Labour Productivity (GVA per hour worked and GVA per filled job) indices by UK NUTS2 and NUTS3 sub regions”, March 2016.

PAGB. 2008. “Driving the self-care agenda”, Annual Review, 2008.

Petty et al. 2014. “The scale of repeat prescribing – time for an update”, Petty, D., Zermansky, A., and Alldred, D. February 2014.

Pharmacy Voice, April 2012. “Practice Based Audit: Analysis”, Pharmacy Voice, April 2012.

Medicines adjustments

Boeni, F., Spinatsch, E., Suter, K., Hersberger, K and Arnet, I. 2014. “Effect of drug reminder packaging on medication adherence: a systematic review revealing research gaps”. Systematic reviews, 2014 3:29

Curtis, L. 2015. “Unit Costs of Health and Social Care 2015”.

Miller, C., Bunnin, A. and Rayner, V. 2013. “Older people who self-fund their social care: a guide for health and wellbeing boards and commissioners”

NHS Business Services Authority, 2015. “Pharmacy and Appliance Contractor Dispensing Data”

PSNC. April 1 2016. “April 2016 Establishment and Practice Payments”. [Accessed online]

PSNC/PwC. 2016. Survey of community pharmacies, May-June 2016.

Royal Pharmaceutical Society. 2010. “The Handling of Medicines in Social Care”

Delivering prescriptions

Carers UK. 2015. “Valuing Carers 2015: The rising value of carers’ support”. Bucker, L. and Yeandle, S.

Department for Transport. 2015. “WebTAG Data book, 2015”.

NHS Business Services Authority. 2015. “Drug Tariff”

NHS Business Services Authority. 2015. “Pharmacy and Appliance Contractor Dispensing Data”

Office for National Statistics (ONS). 2014. “Changes in the Older Resident Care Home Population between 2001 and 2011”

PSNC. 2016a. “Dispensing Appliances”. [Accessed online]

PSNC. 2016b. “Community Pharmacy Contractual Framework”. [Accessed online]

PSNC/PwC. 2016. Survey of community pharmacies, May-June 2016.

Managing drug shortages

APPG. 2012. “Report of the APPG Inquiry Into Medicines Shortages”, All-Party Pharmacy Group, May 2012.

Curtis, L. 2015. “Unit Costs of Health and Social Care 2015”.

Department of Health. 2008. “Community Pharmacy Use: Quantitative and Qualitative Research”, Continental Research on behalf of Department of Health, January 2008.

Department of Health. 2015. “National Schedule Reference Costs (NSRC) 2014/15”, November 2015.

Fujiwara, D. 2013. “General Method for Valuing Non-Market Goods Using Wellbeing Data: Three-Stage Wellbeing Valuation”, Fujiwara, D., 2013.

GP Patient Survey. 2016. “GP Patient Survey”, January 2016, NHS England.

NHS Business Services Authority. 2015. “Pharmacy and Appliance Contractor Dispensing Data”, NHS Business Services Authority, January 2015 - December 2015.

Office of National Statistics (ONS). 2014. “Full Report: Sickness Absence in the Labour Market, February 2014”, February 2014.

Office of National Statistics (ONS). 2015. “England population mid-year estimate”, June 2015.

Office of National Statistics (ONS). 2016. “Sub regional Productivity: Labour Productivity (GVA per hour worked and GVA per filled job) indices by UK NUTS2 and NUTS3 sub regions”, March 2016.

Petty et al. 2014. “The scale of repeat prescribing – time for an update”, Petty, D., Zermansky, A., and Alldred, D. February 2014.

Sustaining supply of medicines in emergencies

Chan M., Nicklason F., Vial J. 2001. “Adverse drug events as a cause of hospital admission in the elderly”, International Medical Journal 2001;31: 199–205.

Community Pharmacy West Yorkshire (CPWY). 2015. “West Yorkshire Pharmacy Urgent Repeat Service (PURM) Service: Service evaluation, November 2014 – April 2015”.

Curtis, L. 2015. “Unit Costs of Health and Social Care 2015”.

Department of Health. 2013. “Pharmaceutical Services Direction (Amendment) 2013”.

Department for Transport. 2015. “WebTAG Data book, 2015”.

Ernst F., Grizzle A. 2001. “Drug-related morbidity and mortality: updating the cost-of-illness model”, Journal of American Pharmaceutical Association, 2001; 41:192–9.

Health & Social Care Information Centre (HSCIC). 2016. “GPs, GP Practices, Nurses and Pharmacies”, May 2016.

Howard R., Avery A., Howard P., et al. 2003. “Investigation into the reasons for preventable drug related admissions to a medical admissions unit: observational study”, Quality Safe Health Care, 2003;12:280–5.

Howard R., Avery A., Slavenburg S., et al. 2007. “Which drugs cause preventable admissions to hospital? A systematic review” British Journal of Clinical Pharmacology, 2007;63:136–47.

Leendertse A., Egberts A., Stoker L., et al. 2008. “Frequency of and risk factors for preventable medication-related hospital admissions in the Netherlands” Archives of Internal Medicines, 2008;168:1890–6.

Morecroft C., Stokes L., Mackridge A., et al. 2014. “An evaluation of the role of community pharmacists in optimising safe and appropriate medicines use in response to patient requests for emergency supplies: Emergency Supply of Prescription-only Medicines (ESoPoMs)”, Liverpool John Moores University, 2014.

National Audit Office (NAO). 2014. “Out-of-hours GP services in England”. Department of Health and NHS England, September 2014.

Nazar, H. et al. 2016. “Summative service and stakeholder evaluation of an NHS-funded community Pharmacy Emergency Repeat Medication Supply Service (PERMSS)”, British Medical Journey Open 2016;6: :e009736.

New Economy. 2015. “Unit Cost Database – Version 1.4”.

NHS Business Services Authority Pharmacy and Appliance Contractor Dispensing Data dataset, March 2016.

NHS Cornwall and Isles of Scilly. 2013. “Local Pharmacy Accredited Service: Service Contract for Supply of Urgent Repeat Medicines by Patient Group Direction via Community Pharmacy”

NHS England. 2015. “Urgent Repeat Medication Requests: Guide for NHS 111 Service”, March 2015.

NHS England. 2016. “2014/15 Community pharmacy contractual framework national audit: Emergency supply of medicines”, NHS England audit data released to PSNC, March 2016.

NHS England. 2016. “Urgent and emergency care services in England”. NHS Choices.

Office of Fair Trading (OFT). 2003. “The control of entry regulations and retail pharmacy services in the UK”. A report of an OFT market investigation by Frontier Economics.

Office of National Statistics (ONS). 2014. “Full Report: Sickness Absence in the Labour Market, February 2014”, February 2014.

Office of National Statistics (ONS). 2015. “England population mid-year estimate”, June 2015.

Office of National Statistics (ONS). 2016. “Sub regional Productivity: Labour Productivity (GVA per hour worked and GVA per filled job) indices by UK NUTS2 and NUTS3 sub regions”, March 2016.

PSNC. 2015. “PSNC Briefing 044/15: Analysis of Emergency Supply services – commissioned during 2014/15 in England”, August 2015.

PSNC. 2015. “National audit 2014/15”, March 2015.

PSNC. 2016. “Think Pharmacy prospectus: Emergency supply of medicines”, February 2016.

PSNC/PwC. 2016. Survey of community pharmacies, May-June 2016.

Roberts, A. et al. 2014. “Focus On: Distance from home to emergency care”. Quality Watch, February 2014.

Statutory Instruments. 2012. The Human Medicines Regulations 2012. No. 1916. London: The Stationery Office, 2012.

Todd et al. 2015. “Access all areas? An area-level analysis of accessibility to general practice and community pharmacy services in England by urbanity and social deprivation”. BMJ Open, 2015;5: e007328.

Turner, J. et al. 2012. “Evaluation of NHS 111 pilot sites: Final Report”, *The University of Sheffield*, August 2012.

Medicines Use Reviews (MUR)

Stewart K. 2007. “Pharmacy Asthma Care Program (PACP) improves outcomes for patients in the community”, Thorax. 62:496-502.

Centre for Policy on Ageing. March 2014. “The effectiveness of Community Pharmacy Medication (Medicine Use) Reviews”

Cree, N. 2010. “Depressed patients can gain from directed MUR”. Pharmaceutical Journal 285: 581.

Geurts, M., Taslma, J., Brouwers, J. and de Gier, J. 2012. “Medication review and reconciliation with cooperation between pharmacist and general practitioner and benefit for the patient: a systematic review”. British Journal of Clinical Pharmacology 74 (1):16-33

Hatah, E., Braund, R., Tordoff, J. and Duffull, S. 2014. “A systematic review and meta-analysis of pharmacist-led fee-for-services medication review. British Journal of Clinical Pharmacology 77 (1):102-115

Health Services Journal. 24 May 2016. “The Newcastle upon Tyne Hospitals NHS Foundation Trust Delivering seamless transfer of pharmaceutical care: an innovative pharmacy e-referral system linking secondary and primary care”

Hinchliffe, A. 2011. “Medicines use review by community pharmacists” Public Health Wales

Hodson, K., Blenkinsopp, A., Cohen, D., Longley, M., Alam, M., Davies, P., Hughes, L., James, D., O’Brien, C., Smith, M. and Turnbull, L. March 2014. “Evaluation of the Discharge Medicines Review Service”.

Holland, R., Desborough, J., Goodyer, L., Hall, S., Wright, D. and Loke, Y. 2008 “Does pharmacist-led medication review help to reduce hospital admissions and deaths in older people? A systematic review and meta-analysis”, British Journal of Clinical Pharmacology 65 (3):303-316

Jerram, P. 2009. “Medication Use Reviews reduce asthma admissions”. Pharmacy Management 25: 13-16

Krska, J., Cromarty, J., Arris, F., Jamieson, D., Hansford, D., Duffus, P., Downie, G. and Seymour, D. 2011. “Pharmacist-led medication review in patients over 65: a randomized, controlled trial in primary care”, Age and Ageing. 2001 May; 30(3): 205-11.

Krska, J., Hansford, D., Seymour, D. and Farquharson, J. 2007 “Is hospital admission a sufficiently sensitive outcome measure for evaluating medication review services? A descriptive analysis of admissions within a randomised controlled trial”, International Journal of Pharmacy Practice 15 (2):85-91

Lenaghan, E., Holland, R. and Brooks, A. 2007 “Home-based medication review in a high risk elderly population in primary care – the POLYMED randomised controlled trial”, Age and Ageing 36:292-297

Lloyds Pharmacy. 2016. “MUR dataset”

Mehuys, E., Van Bortel, L., De Bolle, L., Van Tongelen, I., Annemans, L., Remon, J and Brusselle, G. 2008. “Effectiveness of pharmacist intervention for asthma control improvement”, The European Respiratory Journal 2008 April; 31(4):790-9

Messerli, M., Blozik, E., Vriends, N. and Hersberger, K. 2016. “Impact of a community pharmacy-led medication review on medicines use in patients on polypharmacy – a prospective randomised controlled trial”. BMC Health Services Research. 2016 April 23; 16(1):145

NHS Business Services Authority, 2015. “Pharmacy and Appliance Contractor Dispensing Data”

NHS Commissioning Board. 2013. “2013/14 NHS Standard Contract for Respiratory: Severe Asthma (adult)”

Portlock, J., Holden, M. and Patel, S. 31 January 2009. “A community pharmacy asthma MUR project in Hampshire and the Isle of Wight”, The Pharmaceutical Journal (Vol 282).

Royal Pharmaceutical Society. 2012. “Keeping patients safe when they transfer between care providers – getting the medicines right: Final report”.

Royal Pharmaceutical Society. 2014. “Hospital referral to community pharmacy: An innovators’ toolkit to support the NHS in England”.

Sorensen, L., Stokes, J., Purdie, D., Woodward, M., Elliott, R. and Roberts, M. 2004. "Medication reviews in the community: results of a randomized, controlled effectiveness trial", British Journal of Clinical Pharmacology 58 (6): 648-664

World Health Organisation, 2003. "Adherence to Long-Term Therapies: Evidence for action"

New Medicine Service (NMS)

Department for Health. 2012. "Long Term Conditions Compendium of Information"

Donaldson, C., Baker, C., Mason, H., Jones-Lee, M., Lancsar, E., Wildman, J., Bateman, I., Loomes, G., Robinson, A., Sugden, R., Prades, J., Ryan, M., Shackley, P. and Smith, R. 2011. "The social value of a QALY: raising the bar or barring the raise?", BMC Health Services Research, 2011; 11:8

Elliott, R., Boyd, M., Waring, J., Barber, N., Mehta, R., Chuter, A., Avery, A., Tanajewski, L., Davies, J., Salema, N., Latif, A., Gkountouras, G., Craig, C. and Watmough, D. 2014. "Understanding and Appraising the New Medicines Service in the NHS in England (029/0124)", University of Nottingham

HM Treasury. 2011. "The Green Book: Appraisal and Evaluation in Central Government"

Iuga, A. and McGuire, M. 2014. "Adherence and health care costs", Risk Management and Healthcare Policy. 2014; 7: 35-44

World Health Organisation, 2003. "Adherence to Long-Term Therapies: Evidence for action"

Appendices

Curtis, L. 2015. "Unit Costs of Health and Social Care 2015".

Department for Transport. 2015. "WebTAG Data book, 2015".

DJS Research, 2012. "Pharmacy Attitudes to Future Services", DJS Research (on behalf of PSNC), November 2012.

Fujiwara, D, 2013. "General Method for Valuing Non-Market Goods Using Wellbeing Data: Three-Stage Wellbeing Valuation", Fujiwara, D., 2013.

GP Patient Survey. 2016. "GP Patient Survey", January 2016, NHS England.

Health & Social Care Information Centre (HSCIC). 2009. "Trends in Consultation Rates in GP Practice", HSCIC, September 2009.

Health & Social Care Information Centre (HSCIC). 2015. "NHS Accident and Emergency Attendances, 2014-15", HSCIC, 2015.

ISER. 2016. "BHPS User Documentation – Questionnaires and Showcards", ISER, 2016.

Monitor. 2014. "Walk-in centre review: final report and recommendations", Monitor, 2014.

National Audit Office (NAO). 2014. "Out-of-hours GP services in England". Department of Health and NHS England, September 2014.

NHS Business Services Authority. 2015. Pharmacy and Appliance Contractor Dispensing Data, NHS Business Services Authority, November 2015.

Office of National Statistics (ONS). 2014. "Full Report: Sickness Absence in the Labour Market, February 2014", February 2014.

Office of National Statistics (ONS). 2015. "England population mid-year estimate", June 2015.

Office of National Statistics (ONS). 2015. "Table 14.5a, Annual Survey of Hours and Earnings (ASHE)".

Office of National Statistics (ONS). 2016. "Sub regional Productivity: Labour Productivity (GVA per hour worked and GVA per filled job) indices by UK NUTS2 and NUTS3 sub regions", March 2016.

Pharmacy Voice, April 2012. "Practice Based Audit: Analysis", Pharmacy Voice, April 2012.

PSNC/PwC. 2016. Survey of community pharmacies, May-June 2016.

Turner, J. et al., 2012. “Evaluation of NHS 111 pilot sites: Final Report”, The University of Sheffield, August 2012.