Epidemiology of postnatal care and antidepressant treatment in postpartum women:

Evidence from Primary Care Electronic Health Records.

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Doctor of Philosophy Thesis

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Declaration

I, Holly Christina Smith confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signed: _____

Abstract

Background: Childbirth is a common event, but little is known about how women use primary care services after childbirth. The aims of this thesis were to understand the primary care use of women in the year after childbirth and to determine the duration of antidepressant treatment in women with postnatal depression.

Methods: Two studies utilised information from UK primary care Electronic Health Records (IQVIA Medical Research Database (IMRD)) to estimate prevalence of postnatal checks, primary care consultation rates and determine the most common health needs and treatments prescribed to women in first year after childbirth. Two further studies, a systematic review and a cohort study using IMRD, investigated the duration of antidepressant treatment in women with postnatal depression.

Findings: The first two studies demonstrated that women consult on average 4.8 times per year and that most women (95%) had at least one consultation in the year after childbirth. The most common reasons for consulting were for a postnatal visit or check, for monitoring (e.g blood pressure reading), and to access contraception. Only half of women (56%) had a record of a postnatal check, and younger and more deprived women were less likely to have this check.

Part two of this thesis found that 13% of women initiated antidepressant treatment in the year after childbirth, with a median treatment duration of 6.5 months. Younger and more deprived women were more likely to have a postnatal antidepressant prescription but shorter treatment duration. Most notably, women with an antidepressant prescription during pregnancy were seven times more likely to have a postnatal prescription and longer treatment duration (9.6 vs 5.5 months).

Conclusions: Work from this thesis provides a valuable baseline from which to evaluate more recent postnatal care policy changes and steps to expand the current provision of primary care support for women after childbirth should be consider.

Impact Statement

Childbirth is a common event, around 800,000 women give birth in the UK each year. There have been vast improvements in women's survival and overall health during pregnancy and birth; however, women's health and care after childbirth has received less research focus. UK national guidelines outline the postnatal primary care women should receive, but very little is known about the services used in reality. Studies are needed which describe and examine women's primary care service use following childbirth and the long-term trajectory of common postnatal health conditions, such as postnatal depression.

Work from this thesis has contributed to addressing these research gaps. I identified patterns of primary care use in women in the first year after childbirth using a large, and representative dataset of over 300,000 women. I have shown that while the majority of women consult primary care services at least once in the year after childbirth, only around half (56%) had a record of a postnatal check – this is a planned appointment all women should have 6-8 weeks after childbirth to support their recovery. I also found that younger and more deprived women were less likely to have this check. These findings were published in BMJ open and have received 10 citations in less than three years and were also highlighted in eight news stories at the time of publication. The evidence generated in this study has the potential to improve clinical practice and in-turn patient care by highlighting subsets of women who are missing out on their postnatal check. General practitioners (GPs) can use these findings to target these groups of women for further care. These findings could also be used to inform clinical guidelines on postnatal care and can serve as a baseline to evaluate any future guideline or policy changes. Additionally, my research identified the most common reasons why women use primary care services in the year after childbirth and this information can be used by GPs to better plan for the postnatal needs of the women in their practice.

Work from this PhD identified that younger, more deprived women and those with a history of antidepressant treatment were most likely to have postnatal antidepressant treatment. These findings can be used to identify women at higher risk of postnatal depression during pregnancy and provide an opportunity to give extra monitoring and support to these women. Additionally, I identified the typical duration of antidepressant treatment in women with postnatal depression (6.5 months). This

provides valuable new information for women and GPs to make more informed decision making around treatment options for postnatal depression.

Lastly the work in this PhD has led to several different outputs, including further funding, published papers and a video animation which encourages women to seek support for their postnatal mental wellbeing. This animation was launched in 2022 and as of June 2023, has roughly 3,300 views on Vimeo, around 9,000 views on Instagram, over 5,500 views on Twitter and more than 200 interactions on LinkedIn. This could lead to more women seeking support for their postnatal mental health.

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Firstly, I would like to thank my primary supervisor, Irene Petersen. For her unending guidance and wisdom not only in supporting me through this thesis but also in life. I am grateful for her patience, her dedication to her students, her extensive research expertise, and her friendship.

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I am very grateful to the many women who have shared their experiences of pregnancy, childbirth and beyond with me, and who serve as a source of continued inspiration for this research. Additionally, I am thankful to the National Institute for Health Research (NIHR) School for Primary Care Research (SPCR) who have provided funding for this work.

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To my husband, my biggest supporter. Thank you for pushing me to submit MSc/PhD applications when I didn't believe in myself.

Lastly, my darling son Beck, who made me a mama during this PhD. You have my heart.

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Chapter 4

5. e-Signatures confirming that the information above is accurate (this form should be co-signed by the supervisor/ senior author unless this is not appropriate, e.g. if the paper was a single-author work)

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Date:

30 June 2023

Supervisor/ Senior Author

Irene Petersen

Date

02/07/2023

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Disseminated work from this thesis

One manuscript has been published based on work presented in Chapter 4:

- Smith HC, Saxena S, Petersen I. Postnatal checks and primary care consultations in the year following childbirth: an observational cohort study of 309 573 women in the UK, 2006–2016. *BMJ Open* 2020;10:e036835. doi: 10.1136/bmjopen-2020-036835

One manuscript based on work presented in Chapter 8 has been prepared and is presently being submitted to a journal, titled:

- Initiation and duration of antidepressant treatment in parents with maternal or paternal postnatal depression: a cohort study using UK primary care data. Smith HC, Saxena S, Schartau P, Petersen I.

Two further publications have been published based on work which initially began as part of this thesis and developed into separate projects which I have published while completing my PhD:

- Smith HC, Saxena S, Petersen I. Maternal Postnatal Depression and Completion of Infant Immunizations: A UK Cohort Study of 196,329 Mother-Infant Pairs, 2006–2015. *J Clin Psychiatry* 2022;83(4):20m13575
- Smith HC, Petersen I, Schartau P. Association of Recent Fatherhood With Antidepressant Treatment Initiation Among Men in the United Kingdom. *JAMA Netw Open.* 2023;6(5):e2316105. doi:10.1001/jamanetworkopen.2023.16105

I have presented three research posters at the annual conference for the International Society for Pharmacoepidemiology 2020 based on work from this thesis.

Lastly, I developed a Patient and Public Involvement and Engagement video animation related to the work in this thesis as detailed in Chapter 10:

- Smith HC, Buff Motion. Mental Wellbeing After Childbirth. [Online]. Vimeo: Brighton; 2022 [Accessed 20 June 2023]. Available from: https://vimeo.com/675641887

List of abbreviations

ACU	*Acceptable Computer Usage*
AHD	*Additional Health Data*
AMR	*Acceptable Mortality Rates*
ATC	*Anatomical Therapeutic Chemical*
BNF	*British National Formulae*
CASP	*Critical Appraisal Skills Program*
CBT	*Cognitive Behavioural Therapy*
CI	*Confidence Interval*
CPRD	*Clinical Practice Research Datalink*
EHR	*Electronic Health Records*
EPDS	*Edinburgh Postnatal Depression Scale*
GP	*General Practitioners*
HR	*Hazard Ratio*
IAD	*Inter-Arrival Density*
IMRD	*IQVIA Medical Research Database*
IRR	*Incident Rate Ratio*
IQR	*Inter-Quartile Range*
LMP	*Last Menstrual Period*
MOAIs	*Monoamine Oxidase Inhibitors*
NHS	*National Health Service*
NICE	*National Institute for Clinical Excellence*
NIHR SPCR	*National Institute for Health Research School for Primary Care Research*
ONS	*Office for National Statistics*
PHQ-9	*Patient Health Questionnaire*
PPIE	*Patient and Public Involvement and Engagement*
PRISMA	*Preferred Reporting for Systematic reviews and Meta-analyses*
PTSD	*Post-traumatic stress disorder*
PVI	*Postcode Variable Indicator*
RECORD	*Reporting of studies using observation routinely collected data*
SMI	*Serious mental illness*
SSRI	*Selective Serotonin Re-uptake Inhibitors*
TCAs	*Tricyclic antidepressants*
THIN	*The Health Improvement Network*
UK	*United Kingdom*
WHO	*World Health Organisation*
WTD	*Waiting Time Distribution*

In this thesis I use the terms 'woman', ‘women’ or 'mother' throughout. These should be taken to include people who do not identify as women but are pregnant or have given birth, thus encompassing all birthing people.

1. Background on the health and care of women after childbirth

1.1 Chapter overview

In this chapter, I will provide an overview of women's postnatal health needs and the care available to women in the UK following childbirth.

1.2 Introduction

In the United Kingdom (UK), around 770,000 women give birth each year (1). Over recent decades, important advances in research and clinical practice have led to clear improvements for women's health and survival during pregnancy and childbirth (2). However, it is generally accepted that postnatal care has received less focus than antenatal care (3,4). As such, the health needs of women after childbirth and determining how well they are being met are not thoroughly understood. This is despite growing evidence that poor postnatal health can have long-term implications for women, their babies and families (5–7). This lack of focus on postnatal health and care is also reflected in women's experiences. Women typically report lower satisfaction with postnatal care compared to antenatal care, feel they need more postnatal support than they received and often feel unprepared for their own health experiences after childbirth (8–11).

Historically, it was anticipated women would recover from pregnancy within the first six to eight weeks after childbirth (the puerperium) (12) and much of the research and clinical care had focused on this time window. However, there is increasing evidence that women have ongoing health needs throughout the first year after childbirth (13) and beyond (7,14).

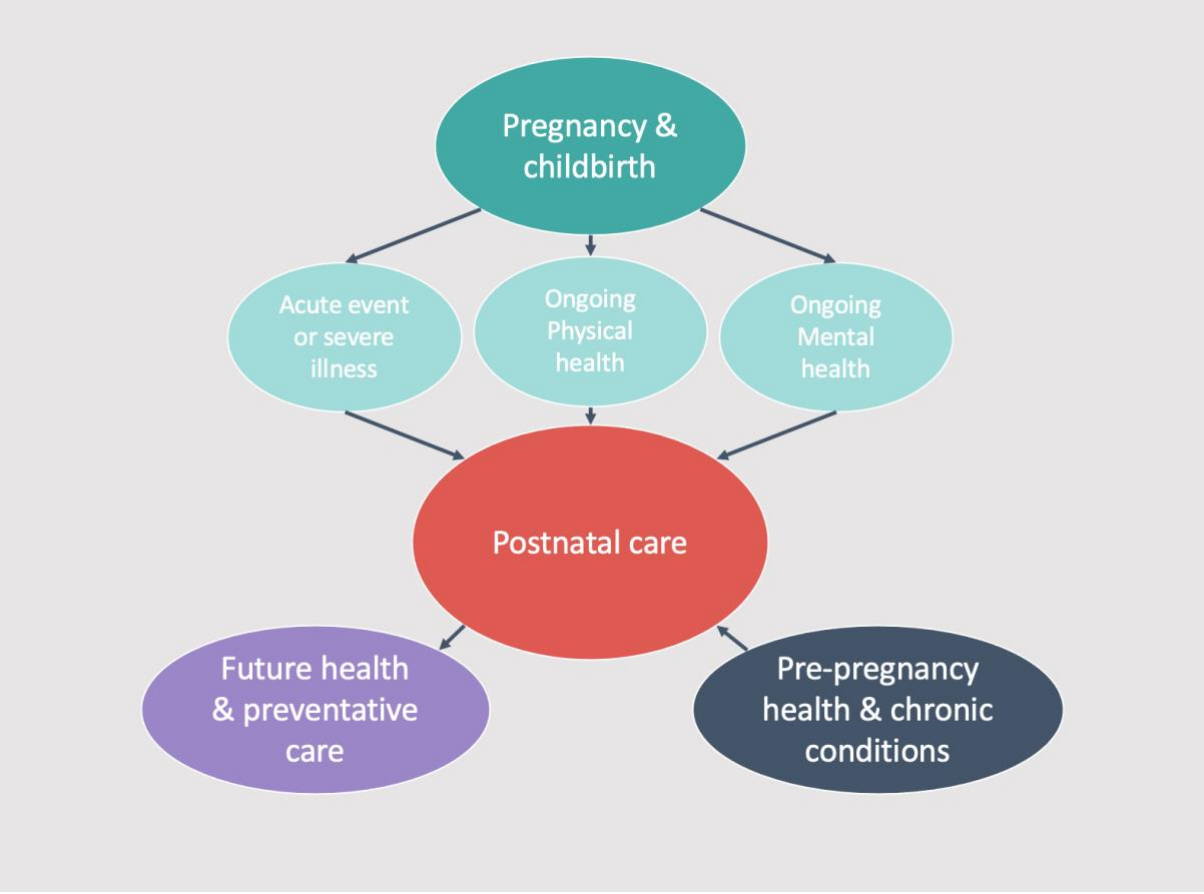
In this thesis, the postnatal period is defined as the first year after childbirth and will be the primary time window of interest.

1.3 Women's healthcare needs after childbirth

Giving birth is often a life changing event and may impact the health of women in many ways. As such, the postnatal health needs of women are numerous and varied (Figure 1.1). They can arise as a result of pregnancy and childbirth, be due to pre-existing and chronic conditions, or relate to future preventative care. Studies estimate that between 47% and 83% of women will report at least one health problem around eight weeks postpartum (15–17) and women experience on average 2 to 6 health problems or conditions in the postnatal period (18). However, this may be an underestimate as many women do not report symptoms or may be reluctant to seek support (19,20).

The following section summarises the most common or most severe health needs women are known to experience after childbirth.

Figure 1.1: Overview of women's postnatal health needs



1.3.1 Related to pregnancy and childbirth

1.3.1.1 Acute events or severe illnesses

Maternal death is now a very rare event in the UK. However, there remains marked variation by ethnic group, age and social deprivation (21). In 2015-17, 9.2 women per 100,000 died during or within the first six weeks of childbirth (22). This risk is greater in Asian and Black women, more deprived women and older women. The most common direct causes of maternal death in this window are thrombosis or thromboembolism, haemorrhage, sepsis, and pre-eclampsia /eclampsia (22,23). Whilst very serious, the risk of these conditions usually passes within a few days or weeks of childbirth and typically resolves before women are discharged from hospital following childbirth. Death by suicide is also an important cause of direct maternal mortality, but as this risk persists across the entire postnatal period, it is considered as an ongoing mental health need in the section *1.3.1.3.* Between six weeks and up to one year after childbirth, maternal mortality rates are higher than in the puerperium. In 2015-17, 13.7 per 100,000 women died in this period (22).

1.3.1.2 Ongoing physical health needs

Many of the common physical health needs women experience after childbirth will be less severe but some can contribute to long-term morbidity and negatively affect quality of life (24). The most common physical postnatal health needs or symptoms are thought to be fatigue, pain, sex-related concerns, haemorrhoids and constipation, breast problems and incontinence (16,18,23,25–29). A 2008 review (18) aimed to summarise the prevalence of these conditions in studies up to 2006. They found fatigue or tiredness was present in 15-76% of women. In relation to pain, backache was present in over 40% of women, approximately 20% of women experienced headaches, 36%-79% of those who had a caesarean incision reported wound pain, and perineal pain was present in 22%-46% of women. Sex-related concerns were prevalent in over 10% of women. The highest estimate of haemorrhoids indicated they occurred in up to 36% of women and constipation ranged from 7% to 27% of women. With regards to breast problems, a small number of included studies surveyed incidence of sore nipples and found them to occur in 15% to over 50% of women. Mastitis or infections were not explicitly reported in this

review. It is thought that around a third of women experience urinary incontinence and potentially 16% of women have faecal incontinence.

While all of these conditions are generally thought to be commonplace, the prevalence estimates for each condition varies greatly by postnatal follow-up time, sample size, country of study and mode of delivery used in individual studies. No new systematic reviews have been conducted since 2008, but findings from more recent studies are consistent with these estimates and suggest many of these symptoms are still commonplace (30–32). The risk factors for developing each condition also varies. The risk of incontinence, sexual problems and perineal pain is often related to mode of delivery (16,27,31). For some conditions, such as breast problems or wound pain, the symptoms may resolve within a few weeks of childbirth and may not require further medical intervention. Some, such as sex-related concerns, may need advice, information provision or signposting to support self-care. While other more severe conditions, such as incontinence, may require an examination, referral for further investigation, or prescribed treatment. The link between depression and poor physical health has been established, with fatigue and headaches being more common in those with depression (13).

1.3.1.3 Ongoing mental health needs

Supporting women to have good mental health after childbirth has become an increasingly prominent part of postnatal care. It is estimated that 10 to 20% of women will develop a mental illness during pregnancy or in the postnatal period (4,33,34). Depression and anxiety are the most common conditions in the first year after childbirth. Up to 20% of women will experience postnatal depression (35–38) and around 10% will experience a postnatal anxiety disorder (39); however, estimates vary widely by study design, follow-up period, diagnostic definition and country. The risk of postnatal depression is thought to be greater in younger women, those who are more socially deprived and those with previous depression (40–42). Depression and anxiety can develop suddenly, may present together, and symptoms can range from mild to more severe. Some women may self-treat or seek peer support, but others will need medical intervention, such as antidepressant or anxiolytic treatment and/or psychological therapy. Around 1 in 8 women with postnatal depression will use antidepressant treatment in the postnatal period (40).

Additionally, it is estimated around 1-2% of women experience post-traumatic stress disorder (PTSD) following childbirth, which is often linked to events during pregnancy or delivery (43). For women with other mental health conditions, including panic disorders, obsessive-compulsive disorder and eating disorders, the postnatal period can be a time of increased risk of relapse or worsening of symptoms (33,44).

Alongside these conditions, a small number of women will experience a serious mental illness (SMI). Postnatal SMI conditions include postpartum psychosis, schizophrenia, schizoaffective disorder and bipolar disorder. For those with a past history, symptoms can re-emerge or be exacerbated following childbirth, but these conditions can also occur in those with no previous history (34,45). It is estimated that postpartum psychosis affects 1- 2 in every 1,000 women in the postnatal period (46,47). While relatively rare, these conditions present a very serious risk to women and potentially to their infants. Death by suicide remains one of the prominent causes of maternal mortality and having a SMI is a known risk factor. In 2015-17, 0.9 maternal deaths per 100,000 women in the first six weeks after childbirth were attributed to psychiatric causes. Death by suicide is the second most common cause of maternal mortality (18% of deaths) between six weeks and one year after childbirth (22). Women with an SMI may require more intensive care and treatment following childbirth, particularly to support them to care for a new baby. Some women (such as those with postpartum psychosis) may be admitted to hospital or a psychiatric facility for additional care (45).

1.3.2 Pre-existing health and chronic conditions

Having a pre-existing or chronic mental or physical condition (a condition that typically lasts a year or longer and impacts on a person's life; common examples include arthritis, asthma or diabetes (48)) before or during pregnancy can add complexity to a woman's postnatal health. Improvements in healthcare, advances in fertility treatment and rising age of mothers, means that women are increasingly likely to have existing complex health needs before pregnancy, which could include one or more chronic conditions (1,4). Having some underlying health conditions can increase the risk of morbidity or mortality. This is starkest when considering all causes of maternal death. Cardiac disease is the most common cause of maternal death during pregnancy and up to six weeks after childbirth, with 2.10 deaths per 100,000 women in 2015-17 (22). It is thought that having a cardiac condition before

pregnancy, obesity and older age can contribute to this risk. Neurological conditions, including epilepsy and stroke, are also increasingly linked to maternal mortality. Separate from mortality, some women may experience a relapse or worsening of their condition following childbirth (49). This is likely to be exacerbated by women stopping ongoing medication for a chronic condition during pregnancy and potentially in the postnatal period if breastfeeding. For example, many women will discontinue psychotropic drug, asthma and epilepsy treatment (50–53). These women may need to review their condition and treatment/management strategy following pregnancy and birth. Lastly, some women have conditions which arise or were identified during pregnancy. For example, up to 5% of women develop gestational diabetes (54) and 8-10% of women will be affected by hypertension during pregnancy (55) which may require ongoing management and review after childbirth.

1.3.3 Future health and preventative care

The postnatal period has been identified as a good time to address health-related lifestyle factors, such as smoking, alcohol and illicit drugs use, and physical activity or diet, as women are in frequent contact with health care professionals and may have had positive behaviour change during pregnancy (56,57). It is also essential that women access information and advice relating to contraception, returning to periods, smear tests and some vaccinations (58). Contraceptives are an important health need after childbirth as many women seek to avoid repeat or unwanted pregnancies. This may be particularly pertinent for younger mothers who are at particular risk in the UK (59). Other social and safeguarding needs, such as experiencing intimate partner violence, are also an important consideration for postnatal healthcare, as women may be particularly vulnerable after childbirth due to changes in relationship roles and being in the home more (60). Identifying those at risk of domestic abuse and providing support has clear implications for a woman's long-term health and wellbeing.

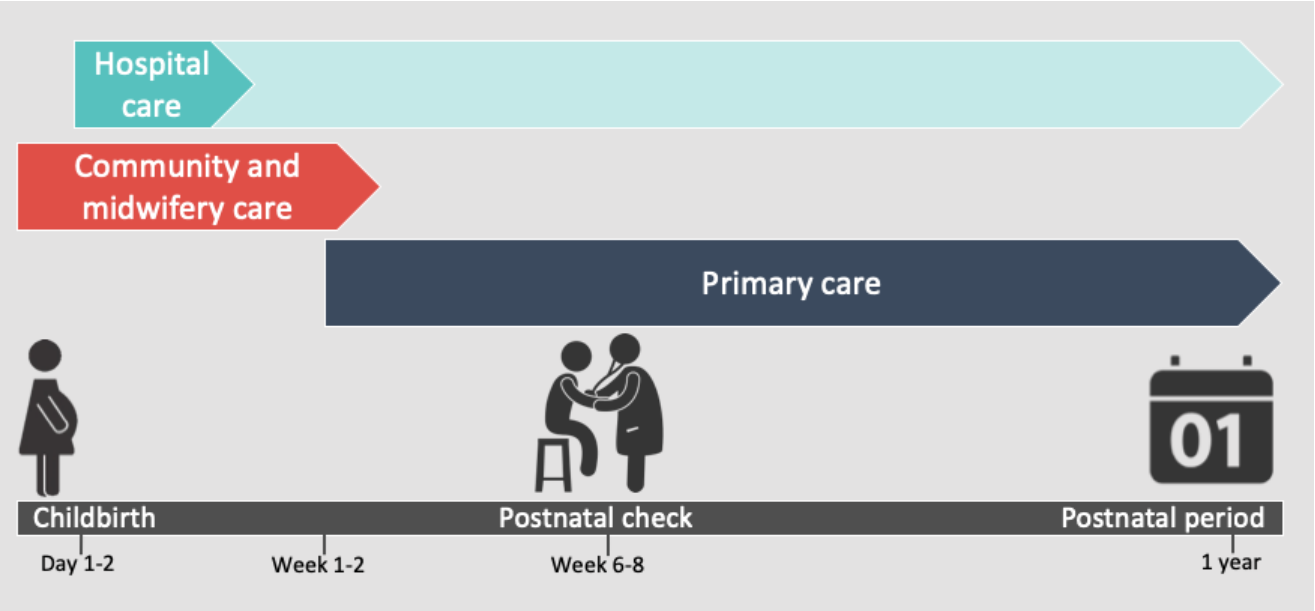
1.4 Healthcare available to women after childbirth

Many women will need to access services to receive support with their postnatal health and recovery from pregnancy and childbirth. The timing and amount of postnatal care women require will depend on the individual and their health needs. In the UK, healthcare is free at the point of delivery for all residents as part of the National Health Service (NHS). Primary care is typically the first point of contact and

is largely delivered in general practices including General Practitioners (GP), nurses, health visitors and other health care professionals.

The following section summarises the organisation and responsibility of postnatal care available to women in the UK (Figure 1.2).

Figure 1.2: Organisation of postnatal health services



1.4.1 Early postnatal care

In the UK, most women (97.2%) give birth in a hospital setting (61) and are typically discharged home 1-2 days after childbirth (62), although this may be longer for those who have a caesarean section or complex delivery. As they would at any other time, women can use hospital care in an emergency or for referred care through their GP. For the first few days and weeks after childbirth, women have access to midwives & health visitors through community services (63). They are responsible for supporting the women with feeding, new-born checks, women's initial recovery from childbirth and how they are coping with a new baby (64). This care typically involves home visits and telephone support. Some women are seen more often and for longer depending on their needs. They are then discharged to the care of their GP and responsibility returns to primary care.

1.4.2 Postnatal check

As part of their follow-up in primary care, women are invited to a postnatal check with their GP 6-8 weeks after birth (65). This check is recommended by National Institute for Health and Care Excellence (NICE) and the World Health Organisation (WHO) as

part of routine postnatal care (23,66). The maternal postnatal check provides a unique and timely opportunity for new mothers and health care professionals to evaluate their mental and physical health, and assess how women are recovering after pregnancy and birth (23). The postnatal check is an important moment where women and primary care health professionals can discuss lifestyle factors (such as diet and exercise) and preventative care needs (such as contraception). GPs also play a role in supporting parents to cope with managing day-to-day care and minor illness of infants and identifying safeguarding concerns for new mothers and their babies. During the check, GPs may carry out a number of assessments or examinations, refer women on for further care or prescribe treatment. Typical consultations might include a blood pressure check, obtaining weight and height measurements, collecting urine samples, and conducting tear, wound and breast examinations (58). All women should be asked about their mood and mental wellbeing at any postnatal contact (34) and the postnatal check is a crucial opportunity to identify postnatal depression (40). The postnatal check is considered the end of the formal healthcare pathway for women after childbirth with no more planned care scheduled. However, they can continue to seek support as needed after this.

1.4.3 Quality of postnatal care

Access to postnatal care is key for women's short-term survival and wellbeing, and long-term health and recovery following childbirth. For example in countries where women have universal access to structured postnatal care in the days and weeks after childbirth, women typically have lower maternal mortality and morbidity rates (2,67,68). As such, formal planned postnatal care is universally recommended by the WHO (66). Despite this, there is no universal agreement on the best timing and content of postnatal care, and owing to a lack of evidence-based research this has historically been informed by clinical experience and historical models of care (69). In the UK, a number of national guidelines seek to provide an outline of best practice for the health and care of women following childbirth. These key guidelines cover postnatal care in the first 8 weeks after birth, postnatal mental health, management of diabetes, weight management and nutrition (23,34,54,70,71).

1.5 Thesis justification

High quality postnatal care has the potential to support women's long-term health and recovery following childbirth, but there is a clear need for more robust evidence and research to support the organisation and provision of this care. There is some understanding about the vast and varied health needs women have after childbirth, however, this research has not been exhaustive. The dearth of longitudinal research on women's postnatal health can be in part owing to the challenges in recruiting a large cohort of mothers, especially pregnant women or those with new-borns, for primary research studies. These challenges could be due to the practical issues of attending research studies with a new-born - including logistics and lack of time. A lack of interest at this time may also be a factor as women will be preoccupied with the task of new motherhood and they may be reluctant to participate in anything which may impact on their health or the health of their new-born. In contrast, electronic health records from primary care have proven to be an excellent resource to overcome this challenge and gain further insight to women's health and treatment use after childbirth as this information is captured during women's routine care. In addition, the responsibility for most postnatal care lies primarily within general practice in the UK and thus is the ideal setting to investigate the broad range of postnatal health and care needs. While national guidelines outline the postnatal primary care women should receive, very little is known about how the services are actually used, who accesses them and the reasons for accessing them. Thus, further studies are needed to describe and explore women's primary care service use following childbirth.

1.6 Chapter Summary

This chapter summarised the reasons why women may need healthcare after childbirth, provided an outline of the organisation of the UK postnatal care and detailed the justification for this thesis research.

In the next chapter I will build on this background information and outline the studies to be carried out in this thesis.

2. Aims and Objectives

2.1 Chapter overview

In this Chapter I will outline the key aims, objectives and study plans for this thesis.

2.2 Overarching aims and objectives

2.2.1 Aims

The thesis is divided into two parts. Below I describe the aim of each part.

Part I: To understand the primary care use of women in the UK in the postnatal period.

Part II: To determine the duration of antidepressant treatment in women with postnatal depression.

2.2.2 Objectives

The studies of this PhD will address each of the following objectives:

I. Estimate prevalence of postnatal checks and primary care consultation rates for women in first year after childbirth.
II. Determine the most common health care needs documented and treatments prescribed to women in the first year after childbirth.
III. Investigate the typical duration of antidepressant treatment in women with postnatal depression.
IV. Examine, in women first prescribed antidepressant treatment in the postnatal period, the duration of antidepressant treatment and factors associated with discontinuation.

2.3 Outline of the thesis

A summary of the subsequent thesis chapters is outlined below:

Part I:

Chapter 3: This chapter provides an overview of IQVIA Medical Research Database (IMRD) which is the data source to be used in three studies in this thesis in chapters 4, 5 and 8. I will also justify my use of electronic health records to investigate the aims of this thesis.

Chapter 4: This chapter describes a cohort study which draws on data from IMRD to examine the prevalence of postnatal checks and primary care consultations for women in the first year after childbirth.

Chapter 5: This chapter details a descriptive study which explores the most common postnatal clinical issues and medical complaints using the symptoms, diagnoses and medications documented in women's primary care consultations in the first 100 days after childbirth. This study draws on data from IMRD.

Part II:

Chapter 6: This chapter outlines a rationale for focusing on postnatal depression in the second part of this thesis and provides background information on postnatal depression and antidepressants to give additional context for chapters 7 and 8.

Chapter 7: This chapter describes a systematic review of the literature undertaken to investigate duration of antidepressant treatment in women with postnatal depression.

Chapter 8: This chapter details a cohort study which draws on data from IMRD to investigate women who are prescribed antidepressant treatment in the postnatal period; the duration of that treatment; and factors associated with discontinuation.

Chapter 9: This chapter summarises the key findings of the studies outlined in Part I and Part II of this thesis, with a discussion on the implications of these finding for research, policy and practice and suggestions for future research.

Chapter 10: This chapter outlines the patient and public involvement and engagement (PPIE) work that I undertook throughout this thesis and how it informed my work.

2.4 Chapter summary

This chapter provided an outline of this thesis including the aims and objectives to be investigated. The following chapter provides and overview of the main data source to be used in this thesis.

3. Setting, data source and the pregnancy cohort

3.1 Chapter overview

In this chapter, I will justify my use of an observational study design using electronic health records to investigate women's postnatal health. I will then describe IMRD which is the data source to be used in chapters 4, 5 and 8; and provide an overview of the pre-existing IMRD pregnancy cohort that I will draw on for this research and outline its strengths and limitations.

3.2 Setting

3.2.1 UK Primary Care

In the UK, health care is free at the point of delivery for all residents as part of the NHS. Primary care is typically the first point of contact for patients and is largely delivered by GPs and other health care professionals (nurses and health visitors) within a practice. In the UK GPs are responsible for women's health following the early days after childbirth. As part of this, GPs provide women with support with their mental and physical health and can prescribe treatments – such as antidepressants, antibiotics and other pharmaceutical and non-pharmaceutical treatments. Some treatments are initiated by specialists, but prescribing is continued in primary care e.g. antipsychotics and antiepileptics. As the responsibility for most postnatal care lies within general practice in the UK, this is the ideal setting in which to investigate the range of postnatal health and care needs and treatments that women may have.

3.2.2 Time period

In this PhD I will explore the postnatal care of women who gave birth between 1st January 2006 and 31st December 2015. This time period was chosen as it covers the time in which the NICE guideline *"Postnatal care up to 8 weeks after birth. NICE clinical guideline 37"* was launched in 2006 up to the end of the latest year that data were available in my department when I started this research (2015).

3.3 Use of Primary Care Electronic Health records for research into postnatal care

There has been a lack of longitudinal research into women's postnatal health. This can be in part owing to the challenges in recruiting large cohorts of mothers, especially pregnant women or those with new-borns, for primary research studies. There are clear ethical implications to exposing new-borns and recent mothers to

different interventions and new mothers will face challenges in being able to practically participate in research. As such, primary studies in this area can be expensive and onerous for participants, and therefore different approaches are needed. Electronic health records (EHRs) from primary care have been used successfully to overcome these challenges allowing us to explore healthcare in recent mothers without the burdens of participating in primary studies. EHRs are a digital record of information relating to a patient's health and care (72). This information is recorded during health encounters for the primary purpose of providing patient care. Owing to their longitudinal and detailed nature as a secondary purpose, pseudonymised versions of EHR have been widely used for epidemiological and observational health research.

3.4 Data source

3.4.1 Why use IQVIA Medical Research Database (IMRD)?

In this PhD research, I will draw on one of the largest UK primary care electronic health record databases, IMRD – previously called The Health Improvement Network (THIN). As of December 2016, IMRD contained anonymised electronic health records for 16 million registered patients from 730 practices across the UK (73). This is roughly 10% of UK practices (74). Using IMRD is advantageous as it is a large database which is broadly representative of the UK population in terms of demographics, chronic disease and mortality. However, slightly more people live in more affluent areas compared to the general population (23.5% in IMRD compared to 20% nationally) (75). Whilst other Primary Care research databases exist in the UK, such as the Clinical Practice Research Datalink (CRPD), IMRD was ultimately chosen as my supervisors were experienced with its usage; there was access and support to use it within my department at UCL; and there was a pre-existing pregnancy cohort which I could readily draw on for my research.

3.4.2 Description and structure of IMRD

IMRD contains patient-level information on demographics, prescribing, symptoms, procedures, prevention, lifestyle factors and diagnostics. When patients register with a GP practice which contributes to IMRD, they are assigned a unique ID within that practice. This allows information on each person to be linked across different data stored within the practice and over calendar time. Patient records are anonymised before data are provided to IMRD, but can still be linked via the anonymised ID

'patid' and are structured into different files according to information type that include:

- **Patient records** – contain personal demographic information including year of birth (month and year of birth for children), sex, date of practice registration, date of practice transfer and date of death.
- **Medical records** – contain information on symptoms, diagnoses and referrals to secondary care. Diagnostic and symptomatic information are categorised using Read codes, a comprehensive clinical coding system (76), alongside the date the entry was made. Read codes are organised hierarchically from more general to more specific terms. An example for postnatal depression is shown in Table 3.1.

Table 3.1: Structure of Read codes using the example of mental health disorders and 'postnatal depression'

Level	Description	Read code
1	Mental disorders	E
2	Neurotic, personality and nonpsychotic disorders	E2
3	Neurotic disorders	E20
4	Neurotic depression reactive type	E204
5	Postnatal depression	E204.11

- **Additional Health Data (AHD) records** – contain prevention and lifestyle information, including height, weight, smoking status, vaccinations, some pregnancy information (such as date of last menstrual period (LMP) used to estimate duration of a pregnancy) and laboratory results. AHD codes are used to classify prevention and lifestyle information. These codes can be up to 10 digits, for example an entry categorising an entry as LMP date has an AHD code '1048000000'; a data field within this AHD record will then include the LMP date for this individual.

- **Therapy records** – contain prescribing information including the generic name of the medication and date of prescription. The dosage, duration and quantity prescribed may also be included where information is available. Prescriptions are categorised according to the British National Formulary (BNF) classification system (77). The BNF is a hierarchical reference system used to categorise medicines prescribed in the UK. An example for Selective serotonin re-uptake inhibitors (SSRIs) is included in Table 3.2.

Table 3.2: Structure of British National Formulary (BNF) codes using the example 'Selective serotonin re-uptake inhibitors'

Level	Description	BNF code
1	Central nervous system	04
2	Antidepressant drugs	04.03
3	Selective serotonin re-uptake inhibitors	04.03.03

- **Postcode Variable Indicator (PVI) records** – contain socioeconomic information at the postcode linked area level including socioeconomic status, ethnicity and pollution levels.
- **Consultation records** – contain information on primary care consultations, including date of consultation, type of consultation (for example telephone consultation, at-home consultation or in-practice consultation etc.) and the duration of the consultation.
- **Staff records** – contain information of the staff member recording the information and includes sex and role (for example GP, nurse etc.).
- **Practice records** – contain practice level information including the area the practice is located in and practice level data quality measures. These are described in further detail below (section *3.7.1*). Further, the practice records provide information on when the practice first and last contributed data to IMRD.

The linkage between different data files and across time allows us to capture a comprehensive picture of someone's care. It is worth noting that not all fields will be

fully complete for each patient and record and data quality criteria always need to be considered (section 3.7.2).

Socioeconomic information is captured through a Townsend score stored in individual-level PVI records. People are assigned to a quintile from 1 to 5, with 1 indicating living in the least deprived areas and 5 indicating living in the most deprived areas. Townsend score provides a measure of material deprivation based on a combination of where a person lives, unemployment, car ownership, home ownership, and household overcrowding (78). In the cohort used in this thesis, the Townsend quintiles are derived from information captured in the 2001 UK census and linked to households via postcodes by the data providers (73). It is possible that people who live in new-build housing estates which are assigned a postcode created after the 2001 census have missing Townsend scores. This is a limitation of the Townsend score; however, this is the only measure of socioeconomic information provided in IMRD. How the Townsend score distribution of women in this thesis vary in relation to national statistics is explored in section 3.5.1.

3.4.3 Code lists

The hierarchical nature of both Read codes and BNF codes allows us to identify specific symptoms, diseases and/or treatments in both specific and broader terms using systematic methods. A common way to do this is to create code lists in collaboration with colleagues who have the relevant expertise in primary care and data management to identify individuals with the exposures of interest (79). For some conditions/exposures it is necessary to use different approaches/algorithms to identify the individuals of interest. For example, to identify an individual with an alcohol problem we would need to examine their medical records to identify those who have a Read code indicating that they have an alcohol problem and likewise we would examine their AHD records to identify those who have records of high alcohol consumption. For other conditions we would develop an algorithm that involves searches of both medical and therapy records. For example, some individuals would receive pharmacological treatment for depression, but not have a Read code for a depression diagnosis in their records. While IMRD uses Read codes and BNF codes, other databases may use different coding systems. For example, The Anatomical Therapeutic Chemical (ATC) code is often used to capture prescribing information, particularly for international research (80). Read codes are also

becoming more obsolete in EHRs as primary care transition to use SNOMED CT which is considered to be the most comprehensive clinical terminology which can be used to classify health terms (81).

3.4.4 Ethical approval and data permissions

Access to IMRD is given on a study-by-study basis and approval is provided by an independent committee upon review of a protocol. Approval for my use of IMRD was received from the IQVIA Scientific Review Committee on 28/08/2020 and 10/04/2019 for Scientific Review Committee protocol number: 20SRC052 and Protocol number: 19THIN013 respectively. IMRD is a registered trademark of Cegedim SA in the UK and other countries. Reference made to IMRD database is intended to be descriptive of the data asset licensed by IQVIA.

3.5 Pregnancy cohort

A cohort of women who have given single live birth has previously been identified within IMRD (82) and I will draw on this cohort in chapters 4, 5 and 8. In this cohort, births and date of childbirth were identified using a combination of an antenatal record, delivery record, postnatal care record, date of last menstrual period, or birth of a child matched to mother's record. This pre-existing cohort of women excludes more complex births, including multiple deliveries (twins, triplets etc.) and pregnancies with a known miscarriage, termination or stillbirth. This cohort contains information on approximately 650,000 pregnancies/childbirths identified between 1990 and 2016. This cohort has previously been used to explore the risks and benefits of psychotropic medication in pregnancy (82); to investigate the occurrence and treatment of postnatal depression (40,83); and to identify fathers at risk of paternal postnatal depression (42).

3.5.1 Representativeness of the IMRD pregnancy cohort

To investigate how representative women identified in the IMRD pregnancy cohort is of all pregnant women in the UK, I have provided a comparison between the IMRD cohort included in this thesis between 2006-2016 and available national birth statistics for key characteristics (Table 3.3). These data draw from the Office for National Statistics (ONS) live births in England and Wales in 2017 dataset (84) and NHS digital maternity statistics for England 2017 (62). I have used national data from

2017 to provide a snapshot as deprivation information was not published prior to 2017 so a longitudinal comparison was not possible.

This comparison demonstrates that the IMRD cohort is broadly representative of all women who gave birth in terms of age distribution and mode of delivery (Table 3.3). Thus, 56 - 60% of the women who gave birth were between 25 – 34 years in both IMRD and in the national statistics data. However, the IMRD cohort has a clear under-representation of women from the most deprived areas (Table 3.3). This finding confirms a previous study which explored the representativeness of IMRD of the UK population as a whole (75).

Additionally, the IMRD cohort excludes those with more complex births. Other data sources demonstrate that both stillbirths and multiple deliveries are relatively rare (15.9 out of every 1,000 women giving birth in England and Wales had a multiple birth in 2016 and 4.4 per 1,000 births were a stillbirth) (85). It is also expected that women who have complex births such as these would receive additional follow-up in specialist care and so would not represent the usual pathway back to primary care services. It is unlikely that excluding these from my study would alter the broad understanding of typical postnatal health; however, these groups have not been well investigated and future studies should explore whether these women have different experiences of postnatal care.

Table 3.3: Baseline comparing characteristics of IMRD pregnancy cohort 2006-2016 to national statistics of all women who gave birth in 2017(1,2)

Characteristic	IMRD pregnancy cohort 2006-2016, N (%)		Characteristic	National statistics N (%)
Overall	309,573			679,106[1]
Maternal age (years)			Maternal age (years)[1]	
15-19	9,568 (3.1)		<20	20,358 (3.0)
20-24	43,116 (13.9)		20-24	97,506 (14.4)
25-29	77,698 (25.1)		25-29	190,028 (28.0)
30-34	98,269 (31.7)		30-34	216,787 (31.9)
35-39	64,171 (20.7)		35-39	125,114 (18.4)
40-44	15,908 (5.1)		40-44	26,956 (4.0)
45-49	843 (0.3)		45-49	2,357 (0.3)
Townsend Score quintile			Index of Multiple Deprivation (IMD)[1]	
1 – least deprived	58,583 (21.1)		10 – least deprived	46,907 (6.9)
2	53,656 (19.4)		9	53,341 (7.9)
3	62,023 (22.4)		8	56,573 (8.3)
4	58,506 (21.1)		7	58,381 (8.6)
5 – most deprived	44,346 (16.0)		6	62,819 (9.3)
Missing	32,459		5	65,758 (9.7)
			4	72,895 (10.7)
			3	80,647 (11.9)
			2	86,529 (12.7)
			1 – most deprived	95,120 (14.0)
			Unknown	136
Overall	309,573			626,203[2]
Mode of delivery			Mode of delivery[2]	
Vaginal delivery	75,506 (76.3)		Vaginal delivery	438,924 (71.2)
Caesarean	23,426 (23.7)		Caesarean	177,793 (28.8)
Unknown	210,641		Unknown	9,486

1 – data for maternal age and deprivation from Office for National Statistics (ONS) live birth statistics for England and Wales in 2017.
2 – data for mode of delivery from NHS digital maternity statistics for England 2017-18. Proportions exclude unknown or missing categories.

3.6 Strengths and limitations of using IMRD for observational research

There are several advantages of using IMRD to conduct research into women's postnatal health. Firstly, the considerable size of the IMRD pregnancy cohort (N~650,000) allows me to include a large cohort of women who have recently given birth without the higher costs associated with primary studies and without the burden

of participation on new mothers which should mitigate any recruitment and retention issues experienced in primary studies. The large size also allows me to conduct more detailed subgroup analysis. Secondly, owing to the detailed and longitudinal nature of IMRD, I am able to capture information related to the birth, pregnancy or prior to pregnancy in my studies and to explore the impact these may have on postnatal health – for example the mode of delivery or a prior history of antidepressant treatment. Thirdly, using data from primary care EHRs minimises the impact of recall and selection bias. Previous studies exploring women's postnatal health typically use survey designs which may be subject to recall and selection bias. The 'real-world' patient experience captured in IMRD reflects the care which took place in a broad cohort of women.

There are also some limitations with using IMRD. Firstly, only women who are registered with a GP and engage with primary care services will be captured in my studies. However, the vast majority of people in the UK are registered with a GP (86) and it will be a very small minority of pregnant women who are not registered. Secondly, only information which is documented in a woman's record is known. Different health needs may be discussed during consultations but not be recorded in her health records. This could be particularly apparent for postnatal care as no part of this pathway is financially incentivised which may limit comprehensive documentation. IMRD does contain free text fields which may include further relevant information, but it requires specific ethical permission to access these and can be extremely resource intensive to analyse, particularly for a large cohort of women. In addition, items are only included in IMRD if they are raised or addressed during a consultation. As many postnatal symptoms can be sensitive (such as incontinence or sexual function) women may not raise these during consultations or they may not have time to raise all their concerns which means the community prevalence/burden of all postnatal health needs may not be captured in primary care records. Thirdly, as I can only investigate what is recorded, the context to these records cannot be explored. For example, I could identify that someone stopped having prescriptions for a medication, but I don't know if this is because their symptoms resolved or if they stopped because of another reason, such as having negative side effects. Lastly, IMRD is subject to data quality issues such as missing or incorrect information.

3.7 Data quality, missing data, analysis and reporting guidelines

3.7.1 Data quality considerations when using IMRD

In this thesis I took a number of steps to mitigate for potential data quality issues. First, data quality criteria were applied at a GP practice level. The two specific measures are the acceptable computer use (ACU) and acceptable mortality rates (AMR). ACU is the date a practice was continuously entering on average at least two therapy records, one medical record and one AHD record per patient per year (6). This measure is important as some practices didn't use their computer systems fully in the 1990's and so EHRs would only be capturing partial information on its patients. AMR is the date a practice has comparable mortality rates to the rest of the UK, given the size and demographics of the practice (7). In this thesis data from IMRD were only included from practices after they met both of these criteria. Second, record specific data quality criteria fields which exist within IMRD were used. Individual data records (including patient, medical and therapy records) include a quality field which indicates the integrity of the record including if there is missing or invalid information. Only records which were of an acceptable quality were included.

3.7.2 Missing data

In addition to data quality issues, a number of variables in this thesis were subject to missing data. In terms of key demographic variables, roughly 10% of the IMRD pregnancy cohort had a missing Townsend score (Table 3.3). In this instance, deprivation scores were likely missing due to these women living in homes with newer postcodes which cannot be assigned a Townsend score rather than missing data being related to key variables of interest to my research (such as postnatal care). I included those with a missing Townsend score in descriptive analysis to describe the extent of this but exclude those with missing Townsend when adjusting for deprivation in model analysis and thus I conducted complete case analysis (87). In addition to deprivation, I derived several variables from the dataset which will be subject to missing data, these are mode of delivery, parity (number of childbirths identified in IMRD) and smoking status. These will be subject to missing data as I could only assign these to a category where information was available from my pre derived cohort. Missing information here is assigned to an 'unknown' category. These variables again were included in descriptive analysis, but I did not adjust for these in model analyses, nor did I exclude any women if they had missing data for

these variables. Relevant issues relating to missing data which impacts on interpreting results will be discussed in individual study chapters and Appendix A.

3.7.3 Analytical approach

As part of my regression model analyses in Chapters 4, 5 and 8 I include GP practice as a random-effects term. This is to *account* for possible clustering of my outcomes by GP practice and to provide a model which best fit my data. It was not an objective of this thesis to specifically investigate this practice-level variation. However, I have included key results relating to this for relevant models alongside a brief explanation in Appendix D.

Throughout this thesis I report point estimates of variables/outcomes of interest and include 95% confidence intervals to provide an estimate of uncertainty for these values. I do not however report p values, this is due to the nature of using a very large dataset and the likelihood that many results will be statistically significant simply because there are a lot of data rather than necessarily indicating meaningful results. This practice of not reporting p values when analysing such large datasets has largely been adopted by the medical research community to minimise the risk of misusing or misinterpreting key findings (88–90).

3.7.4 Reporting guidelines

Chapters 4, 5, and 8 which drew on data from IMRD were written according to the principles set out in “Reporting of Studies using Observational Routinely-collected Data” (RECORD) statement (91). This checklist outlines best practice for reporting of observational studies. The systematic review in chapter 7 was conducted and reported in accordance with Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines (92).

3.8 Chapter Summary

In this chapter I outlined my justification for using EHRs to investigate women’s postnatal health. I described my primary dataset (IMRD) and the pre-existing pregnancy cohort that I will draw on. In the next chapter I will conduct a study using this cohort to investigate women’s primary care use in the year after childbirth.

Part I: Understanding the primary care use of women in the UK in the postnatal period.

4. Study I: Postnatal checks and primary care consultations in the year following childbirth: an observational cohort study of 309,573 women in the UK, 2006-2016

4.1 Chapter overview

In this chapter, I will draw on primary care electronic health records from IMRD and the pregnancy cohort described in Chapter 3 to examine the prevalence of postnatal checks and primary care consultations for women in the first year after childbirth. This will allow me to understand how women are using primary care services after childbirth and in particular the uptake of the routine postnatal check.

4.2 Background

While postnatal care is largely provided within general practice in the UK, there is limited current information on the real-world primary care use by women after childbirth. In particular, there is sparse information on the use and content of the postnatal check. The handful of studies investigating this have been limited to survey or questionnaire design, which are liable to recall and selection bias. From these previous cross-sectional surveys from 1995 and 2010-2014, it would appear that up to 90% of women attend their postnatal checks, but selection bias of survey participants may overestimate this figure (93–95). Electronic health records offer an alternative way to explore this issue without such limitations. I found no contemporary studies showing patterns of postnatal primary care use for women across the first year after childbirth. The aim of this study is to better understand the primary care use of women after childbirth.

4.2.1 Objectives

- Describe the characteristics of women in the study (including age, socioeconomic status, mode of delivery and parity)
- Calculate primary care consultation rates for the first year after childbirth
- Determine how many women had a planned postnatal check; and if likelihood of having a check and consultation rate varies by women's characteristics.

4.3 Methods

4.3.1 Study population

Drawing on the cohort described in section 3.5, in this study, I included women aged 15 to 49 years who gave birth between 1st January 2006 and 31st December 2015.

Women who had been registered at a practice for less than six months were also excluded. Women were followed-up for 12 months to identify their primary use after each childbirth, censoring for maternal death or practice transfer. It was possible for women to have multiple childbirths in this study.

4.3.2 Definition of variables

4.3.2.1 Postnatal check

I identified a postnatal check as any consultation at the time of the check (typically weeks 6-8) which had a specific Read code (beginning with '62R' or '62S') or AHD code ('1044100000' or '1044000000') identifying it as a postnatal visit and/or check. Some women may receive this check slightly earlier or later, and on reviewing the data this window was expanded to weeks 5-10 after birth to include a peak in consultations. I identified substantial variation in the use of these codes by practices and change over time (data not shown). Therefore, I used a second and more sensitive approach where I assumed any consultation at the time of the routine appointment (weeks 5-10) was an opportunity for a postnatal check. The results of this second approach are included in Appendix B.

4.3.2.2 Consultations

A primary care consultation was defined as any direct contact between women and a healthcare professional taking place: in practice, in a patient's home or by telephone. It was assumed only one consultation took place each day for each woman, therefore multiple records on the same date were grouped.

4.3.2.3 Patient and childbirth characteristics

I stratified my analysis by maternal age, parity, Townsend score (described previously), smoking status, year (two-year bands) and mode of delivery. Women were assigned to five-year bands according to their age. I used information in the mother's records as well as children registered within the same household at the time of birth to assign parity (categorised as: First, Second, Third or higher, or Unknown). I used Townsend score quintiles whereby each woman is assigned to one of five groups of deprivation, from least to most deprived. I assigned woman's smoking status as 'current smoker' (record of smoking at any time in the year after childbirth), 'past smoker' (record of smoking or being an ex-smoker in the two years prior to childbirth and not a current smoker), 'non-smoker' or 'unknown'. Mode of

delivery was determined using the identifying pregnancy/childbirth codes and was broadly grouped into ‘caesarean’, ‘vaginal’ and ‘unknown’ based on classifications developed previously (82).

4.3.3 Statistical analysis

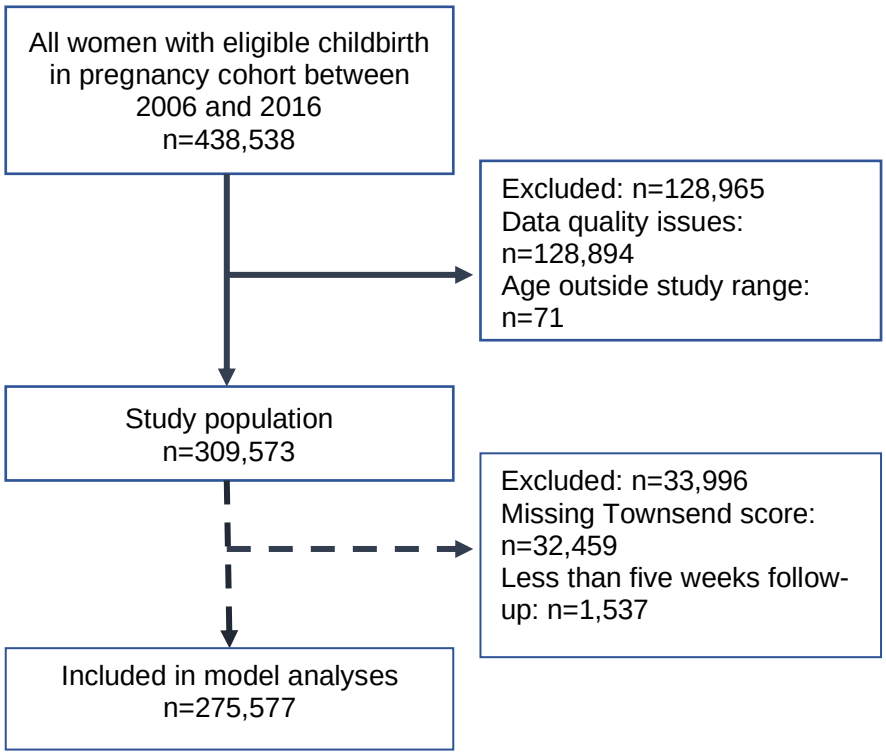
I derived a table to show characteristics of women at childbirth. I calculated the crude consultation rate as the total number of consultations per total person-years, stratified by characteristics. To explore variation across the first year, consultation rate was calculated as the number of consultations on each day with number of women registered with a practice on that day as the denominator. Women who died or transferred practice were censored from the denominator each day. To examine those who had a postnatal check, firstly I calculated the crude proportion of women with the outcome in each patient strata. To explore variation by characteristic in more detail, I examined the likelihood of having a postnatal check between 5-10 weeks in women with at least five weeks follow-up and complete deprivation (Townsend score) information. I developed mixed-effects Poisson models to estimate how the likelihood of having a postnatal check between weeks 5-10 varied by maternal age, Townsend score, mode of delivery, parity, smoking status and year. Three models were developed: unadjusted, age-adjusted and age-deprivation adjusted. Results are presented as Incident Rate-ratios (IRRs) and 95% Confidence Intervals (CI). Practice and woman (as a woman can have multiple childbirths in this study) were included as random effects terms, and the log of follow-up time (between weeks 5-10) was included as an offset. All analyses were conducted using Stata V.16 (StataCorp, College Station, Texas, USA).

4.4 Results

4.4.1 Participants

Between 1st January 2006 and 31st December 2016, I identified 438,538 eligible childbirths in the pregnancy cohort within IMRD. Study inclusion and exclusion criteria were applied to these records and that resulted in a final sample of 309,573 childbirths (Figure 4.1).

Figure 4.1: Flow diagram showing application of study inclusion and exclusion criteria



4.4.2 Characteristics of women

I identified 309,573 childbirths in this study related to 241,662 women. At childbirth, a third of the women were aged 30-34 years (31.7%). There were 21.1% in the least deprived Townsend quintile compared 16.0% in the most deprived (which is similar to the overall distribution in IMRD). Three quarters of women who had a record of delivery method had a vaginal delivery (76.3%) and the rest had a caesarean birth (23.7%). Nearly half were a first birth n=149,639 (48%) and n=69,355 (22%) were a second birth. Half of women were non-smokers n=143,349 (46.3%), compared to n=34,634 (11.2%) being a current smoker (Table 4.1).

Table 4.1: Characteristics of women at childbirth and number with a postnatal check

Characteristic	All women n	Record of postnatal check in weeks 5-10 n (% across the row)
Overall	309,573	174,061 (56.2)
Maternal age (years)		
15-19	9,568	4,599 (48.1)
20-24	43,116	21,763 (50.5)
25-29	77,698	42,417 (54.6)
30-34	98,269	57,308 (58.3)
35-39	64,171	38,154 (59.5)
40-44	15,908	9,347 (58.8)
45-49	843	473 (56.1)
Townsend Score quintile		
1-least deprived	58,583	36,752 (62.7)
2	53,656	32,326 (60.3)
3	62,023	35,413 (57.1)
4	58,506	31,601 (54.0)
5-most deprived	44,346	21,138 (47.7)
Missing	32,459	16,831 (51.9)
Mode of delivery		
Vaginal delivery	75,506	46,634 (61.8)
Caesarean	23,426	14,384 (61.4)
Unknown	210,641	113,043 (53.7)
Parity		
First	149,639	84,010 (56.1)
Second	69,355	39,269 (56.6)
Third or higher	20,113	10,781 (53.6)
Unknown	70,466	40,001 (56.8)
Smoking status		
Current smoker	34,634	18,199 (52.6)
Past smoker	85,592	47,464 (55.5)
Non-smoker	143,349	82,420 (57.5)
Unknown	45,998	25,978 (56.5)
Year group		
2006-2007	63,793	36,863 (57.8)
2008-2009	66,319	38,124 (57.5)
2010-2011	66,478	37,897 (57.0)
2012-2013	63,180	34,896 (55.2)
2014-2015	49,803	26,281 (52.8)

4.4.3 Postnatal check

Overall, just over half of the women in the study (56%) had a postnatal check, i.e. n=135,512 (44%) had no such record (Table 4.1). In this crude analysis, younger women and those from the most deprived areas were less likely to have a postnatal check (48% of those aged 15-19 years vs 59.5% of those aged 35-39 years; and 47.7% of those from the most deprived area vs 62.7% from the least).

After excluding those with less than five weeks of follow-up information or missing deprivation information (see Appendix A), 275,577 women were included in additional analysis (Figure 4.1). Those aged 15-19 years were 12% less likely (IRR=0.88, 95% CI: 0.85-0.91) to have a postnatal check between weeks 5-10 relative to women aged 30-35 years (Table 4.2). Similarly, women from the most deprived areas were 10% less likely (IRR=0.90, 95% CI: 0.88-0.92) to have a postnatal check relative to those from the least deprived areas. Differences across other characteristics were less pronounced; and, adjusting for age, and age and deprivation, had little impact on differences across these other characteristics. The same trend across age and deprivation was identified when using a more sensitive approach to identify a potential postnatal check (any consultation between weeks 5-10), but with a higher proportion of women (78.7%) having a consultation (see Appendix A).

4.4.4 Primary care consultations

Following the 309,573 childbirths, the majority (94.7%, n=293,049) of women had at least one direct consultation in the year after childbirth. I identified 1,427,710 direct consultations, with women consulting on average 4.8 times/person-year (Table 4.3). The largest differences in consultation rate compared to the average is seen in those who had a caesarean delivery (7.7/ person-year, 95% CI: 7.7-7.8) and in current smokers (5.9/ person-year, 95% CI: 5.9-5.9). Consultation rates were broadly similar across other characteristics.

Table 4.2: Mixed-effects Poisson estimates of the likelihood of having a postnatal check by age, Townsend score, mode of delivery, parity, smoking status and year group; unadjusted, and adjusted for age and deprivation

Characteristic	n (%)	Record of postnatal check in weeks 5-10	
		Unadjusted: IRR (95% CI)	Age & deprivation adjusted: IRR (95% CI)
Overall	275,577		
Maternal age (years)			
15-19	8,704 (3.2)	0.88 (0.85-0.91)	0.89 (0.87-0.92)
20-24	38,503 (14.0)	0.92 (0.91-0.94)	0.93 (0.92-0.95)
25-29	68,751 (25.0)	0.97 (0.96-0.98)	0.97 (0.96-0.99)
30-34	86,889 (31.5)	1	1
35-39	57,533 (20.9)	1.00 (0.99-1.02)	1.00 (0.99-1.01)
40-44	14,428 (5.2)	0.99 (0.97-1.01)	0.99 (0.97-1.01)
45-49	769 (0.3)	0.96 (0.87-1.05)	0.96 (0.87-1.05)
Townsend Score quintile			
1-least deprived	58,304 (21.2)	1	1
2	53,370 (19.4)	0.99 (0.98-1.01)	1.00 (0.98-1.01)
3	61,681 (22.4)	0.97 (0.95-0.98)	0.97 (0.96-0.99)
4	58,165 (21.1)	0.95 (0.93-0.97)	0.96 (0.95-0.98)
5-most deprived	44,057 (16.0)	0.90 (0.88-0.92)	0.92 (0.90-0.93)
Mode of delivery			
Vaginal delivery	68,202 (76.6)	1	1
Caesarean	20,828 (23.4)	1.02 (1.00-1.04)	1.01 (0.99-1.03)
Unknown	186,547	0.99 (0.97-1.01)	0.99 (0.97-1.01)
Parity			
First	132,164 (48.0)	1	1
Second	62,535 (22.7)	0.99 (0.98-1.01)	0.98 (0.97-0.99)
Third or higher	18,504 (6.7)	0.95 (0.93-0.97)	0.94 (0.92-0.96)
Unknown	62,374 (22.6)	0.96 (0.95-0.97)	0.95 (0.94-0.96)
Smoking status			
Current smoker	31,494 (11.4)	0.94 (0.92-0.95)	0.96 (0.95-0.98)
Past smoker	76,941 (27.9)	0.96 (0.95-0.97)	0.96 (0.95-0.98)
Non-smoker	126,497 (45.9)	1	1
Unknown	40,645 (14.8)	0.95 (0.94-0.97)	0.95 (0.93-0.96)
Year group			
2006-2007	58,606 (21.3)	1	1
2008-2009	60,212 (21.9)	0.99 (0.98-1.01)	0.99 (0.98-1.01)
2010-2011	59,183 (21.5)	1.00 (0.99-1.02)	1.00 (0.99-1.02)
2012-2013	55,099 (20.0)	0.99 (0.97-1.00)	0.99 (0.97-1.01)
2014-2015	42,477 (15.4)	0.95 (0.94-0.97)	0.95 (0.94-0.97)

Abbreviations: IRR – incidence rate ratio, CI – confidence interval.
Practice and woman are included as random effects terms in all models.
Models exclude women with less than five weeks of follow-up information and missing Townsend score

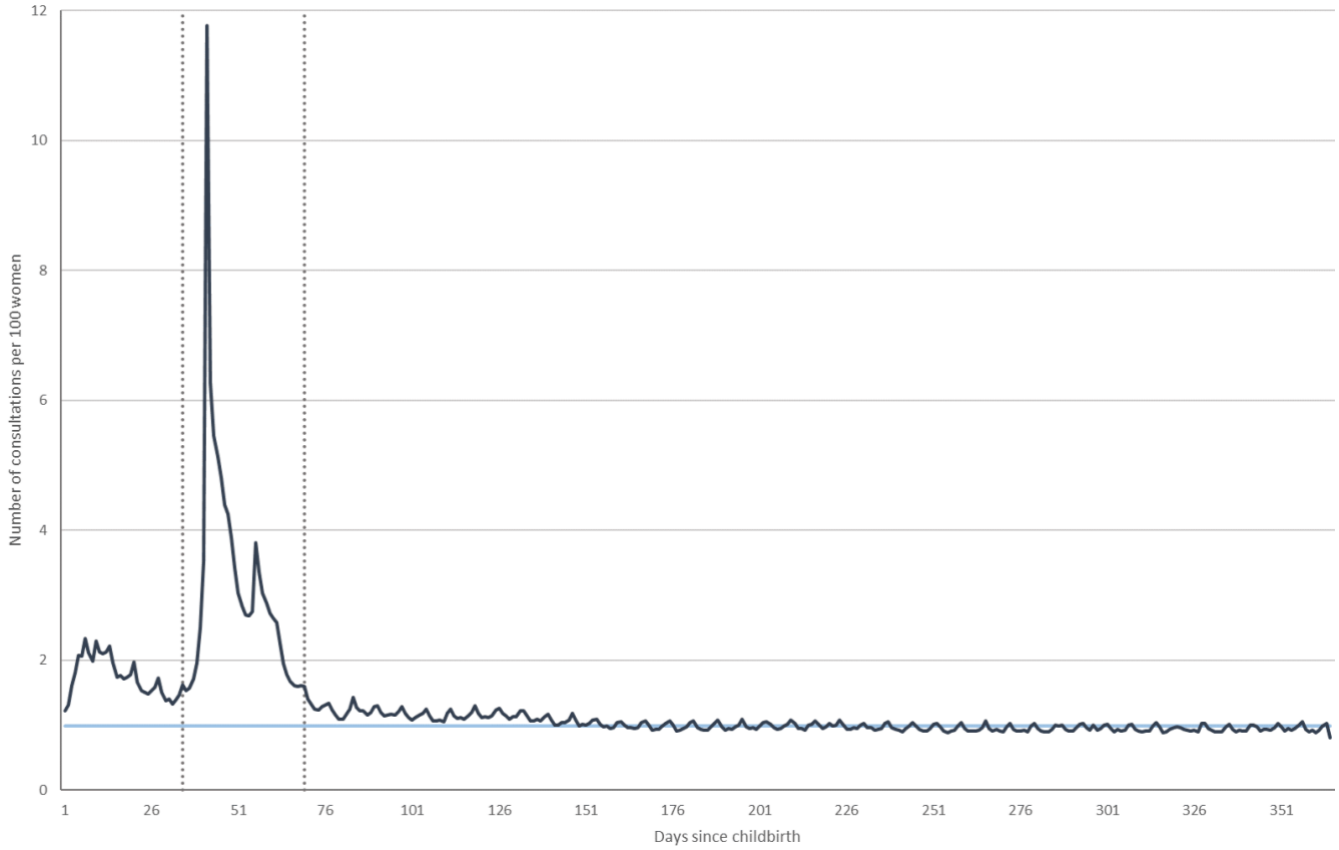
Table 4.3: Crude consultation rate per/ person-year, by characteristic

Characteristic	Number of consultations	Person-years	Rate of consultations per person-year (95% CI)
Overall	1,427,710	299,688	4.8 (4.8-4.8)
Maternal age (years)			
15-19	46,087	9,135	5.0 (5.0-5.1)
20-24	211,905	41,212	5.1 (5.1-5.2)
25-29	371,051	74,994	4.9 (4.9-5.0)
30-34	437,873	95,385	4.6 (4.6-4.6)
35-39	283,912	62,581	4.5 (4.5-4.6)
40-44	72,941	15,561	4.7 (4.7-4.7)
45-49	3,941	821	4.8 (4.7-5.0)
Townsend Score quintile			
1-least deprived	269,502	57,128	4.7 (4.7-4.7)
2	242,798	52,137	4.6 (4.6-4.7)
3	285,632	59,972	4.8 (4.7-4.8)
4	274,005	56,420	4.9 (4.8-4.9)
5-most deprived	212,965	42,609	5.0 (5.0-5.0)
Missing	142,808	31,422	4.5 (4.5-4.6)
Mode of delivery			
Vaginal delivery	511,769	73,251	7.0 (7.0-7.0)
Caesarean	176,199	22,743	7.7 (7.7-7.8)
Unknown	739,742	203,694	3.6 (3.6-3.6)
Parity			
First	655,616	144,425	4.5 (4.5-4.6)
Second	304,482	67,373	4.5 (4.5-4.5)
Third or higher	100,156	19,722	5.0 (5.0-5.1)
Unknown	367,456	68,168	5.4 (5.4-5.4)
Smoking status			
Current smoker	201,192	34,045	5.9 (5.9-5.9)
Past smoker	403,203	82,292	4.9 (4.9-4.9)
Non-smoker	656,620	139,161	4.7 (4.7-4.7)
Unknown	166,695	44,190	3.8 (3.8-3.8)
Year group			
2006-2007	302,645	61,803	4.9 (4.9-4.9)
2008-2009	318,827	64,356	5.0 (4.9-5.0)
2010-2011	315,752	64,396	4.9 (4.9-4.9)
2012-2013	285,875	60,974	4.7 (4.7-4.7)
2014-2015	204,611	48,159	4.2 (4.2-4.3)

Abbreviations: CI – confidence interval

Across the first year after childbirth, the consultation rate was highest between weeks 5-10, with a peak of 11.8 consultations/ 100 women in week six, coinciding with the postnatal check. Following this, the consultation rate fell to an average of 1 consultation/ 100 women (Figure 4.2).

*Figure 4.2: Women's consultation rate on each day in the first year following childbirth**



**Dotted lines indicate weeks 5 and 10, horizontal line indicates consultation rate after week 10.*

4.5 Discussion

4.5.1 Main findings

I found that just over half of the women had a record of a postnatal check, which means four in 10 women (44%) may have missed out. Teenage women (aged 15-19 years) were 12% less likely to have a postnatal check compared with women aged 30-35 years, and those living in the most deprived areas were 10% less likely to have a check compared to women from least deprived areas. Women consulted on average 4.8 times per year (95%CI: 4.8-4.8) in the year after childbirth and 94.7% of women had at least one consultation in the year after childbirth. Those who had a caesarean delivery and smokers had higher than average consultation rates (7.7 times per women per year and 5.9 times per women per year respectively). Across the first year, the consultation rate is highest in week six with a peak of 11.8 consultations/ 100 women, which coincides with the postnatal check. After week 10 the consultation rate is flat with 1 consultation/ 100 women on each day.

4.5.2 Study strengths and weaknesses

This is among the largest representative population-based studies to date of postnatal care in the first 12 months. The use of electronic health records provides a reflection of real-world clinical practice allowing us to explore use of the postnatal check in a broad population (not reliant on patient participation). As with all studies of electronic health records however, I am limited by what has been recorded in a woman's record which could mean patient, birth and consultation characteristics may be missing or not accurate. I also recognise the limitations in using Read codes/AHD codes only to identify a postnatal check as there is variation in the use of these by general practice and genuine checks may not be coded as such in primary care data. To account for this, I repeated this analysis using a more sensitive definition of a postnatal check (any consultation in week 5-10). While I found a larger proportion (78.7%) having been in contact with primary care, the overall trends in terms of the sociodemographic information were consistent between the two approaches.

4.5.3 Findings in relation to previous studies

Previous studies estimate that 85% to 91% of women in England have a postnatal check (93,94); however only 56% of women in my study had evidence of having one. I would expect the estimates in my study to be lower as I used electronic health records that capture a broader picture of real-world practice compared with previous

studies that may have been subject to selection and recall bias. When using a more sensitive approach, where I considered any consultation in weeks 5-10 as evidence of a postnatal check, my findings are closer to those of previous studies, although I am aware that not all of these consultations would have covered topics meant for the postnatal check. It is likely the true number of women having a check lies between my two estimates. I also identified that those from more deprived areas were less likely to have a postnatal check, which supports previous findings (95). The consultation rate of 4.8 per person per year identified in my study is comparable to that found by others. Wang et al found that in 2010 the crude consultation rate for women aged 21-39 years was 4168 per 1000 person-years (95% CI: 4162 to 4174) and for women aged 40-57 years was 4389 per 100 person-years (95% CI: 4383-4395) which is broadly in line with my findings (96).

There are several possible explanations for my finding of a low uptake of postnatal checks. It is possible that women do not want or feel they need advice from GPs; or invitations from the GP are not taken up either because women do not respond to them or may find it difficult to access appointments. Alternatively, a lack of recording in electronic health records may explain the apparently low rate of postnatal checks.

4.5.4 Implications of findings and future research recommendations

It is encouraging to find the majority of women return to primary care at least once in the year after childbirth; however, it is concerning that four in 10 women did not have a structured postnatal check. In UK, approximately 770,000 women give birth each year (1), my estimates (44%) then suggest up to 338,800 women may be missing this key check. The postnatal period is a potentially vulnerable time for women and there could be serious consequences of not identifying women at risk of poor health or harm after childbirth (21). The postnatal check has been shown to be a key contact to identify serious health needs such as postnatal depression, which affects 1 in 6 women after childbirth (82). It also provides protected time and opportunities to improve women's health and wellbeing through preventative interventions, such as timely access to contraception, advice about weight management or diet following gestational weight gain, or support to stop smoking (23). My finding that younger women and those from more deprived areas are less likely to have a check is particularly important, as they may be most likely to benefit. For example, contraceptive uptake is particularly low in younger and more deprived groups (59),

and offering timely access to contraceptives through the postnatal check could lead to fewer unwanted or repeat pregnancies for these women.

My findings suggest that there is a need to implement systems for follow up of women who have declined or missed a postnatal check. Thus, there is a need for better promotion of the benefits of attending the postnatal check at other times in the maternity pathway; such as during midwife or health visitor appointments, in hospital or birth units, or at other GP maternity and baby check-ups. Additionally, there are currently no known financial or quality-based incentives to document primary care activity in the postnatal period. This could lead to variation in services and under-reporting of activity. It is vital to improve the documentation of this care to better understand women's use of the postnatal check, more broadly their health needs and service use after childbirth, and ultimately to improve care. I recommend more research to explore the reasons behind the low uptake of postnatal checks, for example to understand if women chose not to attend their check and the reasons why, or if non-attendance is due to practical difficulties, such as not being able to access or book appointments.

Lastly, in this study my focus was on who had a postnatal check, and while NICE outlines the content of these appointments, few studies have explored what health needs are actually covered. This should be explored through further research to better understand what content, delivery, timing and frequency of postnatal checks are most effective for women and if attending a postnatal check leads to better outcomes.

4.6 Conclusion

Four in 10 women have no record of receiving a postnatal check within the first 10 weeks after giving birth; this is despite the majority of women returning to primary care at least once in the year after childbirth. Teenagers and those from the most deprived areas are among the least likely to have a check. I estimate up to 338,800 women per year in the UK may be missing these opportunities for timely health promotion and to have important health needs identified after childbirth.

4.7 Chapter summary

In this chapter I have provided results from a cohort study using IMRD which explored women's primary care consultations in the year after childbirth and

attendance of the postnatal check. In the next chapter I will explore these consultations further, by investigating the reasons why women use primary care services after childbirth.

5. Study II: Common postnatal clinical events or health needs: a descriptive study of 925,712 primary care contacts

5.1 Chapter overview

In this chapter, I will draw on primary care electronic health records from IMRD and the primary care consultations identified in Chapter 4 to describe the most common postnatal clinical issues and medical complaints using the symptoms, diagnoses and medications documented in women's primary care consultations in the first 100 days after childbirth. This will allow me to explore the reasons why women use primary care services and potentially identify common health needs in the first few months after childbirth.

5.2 Background

Studies estimate that between 47% and 83% of women will report at least one clinical issue around eight weeks postpartum (15–17) and women will experience on average 2 to 6 health needs in the year after childbirth (18). Though this may be an underestimate as women do not always report symptoms or may be reluctant to seek support for certain health needs. Previous studies have found that the most common physical postnatal health needs or symptoms are: fatigue, pain, sex-related concerns, haemorrhoids and constipation, breast problems and incontinence (15–18). While these studies provide some information on the most severe and most common postnatal health needs women experience, these studies typically use self-reported survey methods which may be subject to selection or recall bias; have only included physical health needs or have limited sample sizes (~N=1,000). The use of EHRs from primary care would allow me to add to this literature by utilising real-world clinical information to explore a broad range of clinical events and health needs from a large cohort of women. While previous studies typically include information across the first year after childbirth, I identified in Chapter 4 that the level of primary care consultations in my dataset were elevated in the first two – three months after childbirth and relatively low for the rest of the year. A such, in this study I will focus on this time of high care use and examine consultations from the first 100 days after childbirth only. The aim of this study was to describe the most common clinical events or health needs documented in women's primary care EHRs in the first 100 days after childbirth.

5.2.1. Objectives

- Identify the most common symptoms, diagnoses and medications recorded in women's primary care EHRs in the first 100 days after childbirth and group them into distinct clinical events or health needs.
- Explore how these clinical events or health needs vary by patient characteristic and over time.

5.3 Methods

5.3.1 Definition of variables

5.3.1.1 Primary care contacts

Drawing on the primary care consultations identified in Chapter 4, I included all primary care contacts from the date of childbirth up to 100 days after childbirth in this chapter. A primary care contact was defined as any direct encounter between a patient and healthcare professional taking place: in practice, in a patient's home or by telephone; or a prescription issued to a patient. These contacts can be recorded as a consultation or a prescription entry. Multiple consultations and/or prescriptions on the same date were grouped into one contact per women per day.

5.3.1.2 Categorising health topics in primary care contacts

From these postnatal records, I extracted diagnostic, symptomatic information and prescriptions issued. Diagnostic and symptomatic information is contained within consultations and is categorised using Read codes, here Read codes were grouped by their first 3 digits (Read code stem) and prescription information was detailed using BNF codes and were grouped by BNF sub-chapter (e.g. 4.3.3). Extracting this information resulted in a long list of codes and it was clear that many of these related to the same clinical event or health need and that grouping these together into distinct categories would be more meaningful for my analysis. For example, a Read code for postnatal depression "E204.11" could be grouped with a BNF code for an SSRI antidepressant prescription "4.3.3". Thus, I categorized this long list of codes into meaningful 'clinical events or health needs' by adapting established methodology which has been used extensively to create medical and drug code lists (79).

First, key words and known synonyms were identified from the descriptions of the most commonly occurring Read code stems and BNF subchapters. Using the example above, the words ‘depression’ and ‘low mood’ were identified alongside ‘antidepressant prescriptions’. Second, entries which I identified as relating to the same clinical event or health need were grouped together, in this example they formed ‘Depression or low mood’. This process was continued until all Read code stems and all BNF sub-chapters which occurred more than 5,000 times had been assigned to a group. Other entries were less common and so were not further categorised or reported on. Where entries could fit into more than one group, e.g. ‘advice about contraceptives’ a subjective decision was taken to assign these to the most specific group, in this case ‘contraceptives’ rather than ‘education, advice or counselling’. Lastly, the code lists which made up these groups were reviewed by a GP to ensure codes were assigned to the most relevant group and that the groupings made clinical sense. See Appendix B for a full list of codes and groups. These clinical event or health need groups were also further grouped into the following broader categories: acute events or illness; ongoing mental or physical symptoms or conditions (which likely relate to pregnancy or childbirth); pre-existing conditions (conditions which do not directly relate to pregnancy or childbirth); preventive, future health; and other (for example a type of consultation) (Figure 1.1).

5.3.2 Statistical analysis

The incidence of the most common clinical event or health needs are given as a rate of the total number of contacts and the total number of women separately. Incidence rates are given per 100 contacts or per 100 women and 95% CIs were calculated. I stratified the analysis by maternal age, parity, Townsend score, smoking status, calendar year (2-year bands) and mode of delivery. I compared how contact rate varies across the first 100 days; this is given as a count per 100 contacts on each day. To explore the most common clinical events or health needs documented at the time of the postnatal check, I restricted this analysis to include only records between 5 and 10 weeks after childbirth and present the ten most common as a line chart. Lastly, random-effects Poisson regression was used to determine likelihood of having a consultation documenting each of the most common health topics in women’s primary care contacts in the first 100 days by each patient characteristic (age group, social deprivation, parity, mode of delivery, smoking status and year-

group). Unadjusted and fully-adjusted estimates are presented as IRR and 95% CIs. To account for clustering by GP practice, they were included as a random-effects term.

All analyses were conducted using Stata V.16 (StataCorp, College Station, Texas, USA).

5.4 Results

5.4.1 Contacts

For the 309,573 childbirths included in Chapter 4; 643,128 consultations and 595,976 prescriptions were identified resulting in a total of 925,712 contacts of care in the first 100 days after childbirth. Grouping the most common Read code stems and BNF sub-chapters resulted in a list of 23 common clinical events or health needs (Table 5.1). Of all primary care contacts, 81.2% (n=751,439) contained one or more of these clinical events or health needs.

5.4.2 Common postnatal health topics

In the 100 days after childbirth, the most common clinical event or health need documented in women's primary care contacts was for: a postnatal check or visit (60.6% of women, 95% CI: 60.4-60.7); monitoring – such as a blood pressure, height or weight measurement (49.9% of women, 95% CI: 49.7-50.0); contraception (49.7% of women, 95% CI: 49.5-49.9); infection (29.6% of women, 95% CI: 29.5-29.8); lifestyle factors – such as alcohol use, smoking status, diet or exercise (23.8% of women, 95% CI: 23.6-23.9); symptoms or treatments affecting the skin (18.5% of women, 95% CI: 18.4-18.7); and pain (12.3% of women, 95% CI:12.2-12.4) (Table 5.1). The most common clinical event or health need by number of contacts related to a postnatal check or visit (21.7% of contacts, 95% CI: 21.6-21.8), monitoring (21.0% of contacts, 95% CI: 20.9-21.1), contraception (19.8% of contacts, 95% CI: 19.7-19.9) and infection (14.7% of women, 95% CI: 14.6-14.7).

Table 5.1: The most common clinical events or health needs documented in women's primary care contacts in the first 100 days after childbirth

Clinical event or health need	Number of women	Rate per 100 women (95% CI)	Number of contacts	Rate per 100 contacts (95% CI)
Total	309,573	-	925,712	-
Acute event or illness				
Infection	91,766	29.6 (29.5-29.8)	135,613	14.7 (14.6-14.7)
Ongoing mental or physical symptoms or conditions				
Monitoring (blood pressure, Pulse rate, temperature etc.)	154,328	49.9 (49.7-50.0)	194,422	21.0 (20.9-21.1)
Symptoms or treatments affecting the skin	57,350	18.5 (18.4-18.7)	79,173	8.6 (8.5-8.6)
Pain (gastrointestinal, backache or headache, etc.)	37,974	12.3 (12.2-12.4)	55,594	6.0 (6.0-6.1)
Anaemia or blood disorder	28,240	9.1 (9.0-9.2)	34,455	3.7 (3.7-3.8)
Constipation	22,576	7.3 (7.2-7.4)	28,483	3.1 (3.0-3.1)
Depression or low mood	22,568	7.3 (7.2-7.4)	47,209	5.1 (5.1-5.1)
Haemorrhoid or anal abscess	21,818	7.1 (7.0-7.1)	26,451	2.9 (2.8-2.9)
Breast & breastfeeding related	21,493	6.9 (6.9-7.0)	25,597	2.8 (2.7-2.8)
Sleep-related, tiredness or fatigue	1,393	0.5 (0.4-0.5)	1,444	0.2 (0.2-0.2)
Pre-existing conditions				
Rheumatic disease	27,016	8.7 (8.6-8.8)	32,293	3.5 (3.4-3.5)
Asthma	13,560	4.4 (4.3-4.5)	22,352	2.4 (2.4-2.5)
Allergy symptom or treatment	10,265	3.3 (3.3-3.4)	12,889	1.4 (1.4-1.4)
Thyroid disease or hypothyroidism	6,590	2.1 (2.1-2.2)	13,369	1.4 (1.4-1.5)
Diabetes	6,351	2.1 (2.0-2.1)	10,195	1.1 (1.1-1.1)
Epilepsy	1,901	0.6 (0.6-0.6)	4,499	0.5 (0.5-0.5)
Cardiovascular disease	1,901	0.6 (0.6-0.6)	3,630	0.4 (0.4-0.4)
Preventive, future health				
Contraception	153,876	49.7 (49.5-49.9)	183,260	19.8 (19.7-19.9)
Lifestyle factors (alcohol, drug use, smoking, diet or exercise)	73,538	23.8 (23.6-23.9)	80,335	8.7 (8.6-8.7)
Education, advice or counselling	43,373	14.0 (13.9-14.1)	51,331	5.6 (5.5-5.6)
Cervical examination	27,000	8.7 (8.6-8.8)	28,341	3.1 (3.0-3.1)
Vaccinations	8,522	2.8 (2.7-2.8)	9,481	1.0 (1.0-1.0)
Other				
Postnatal check or visit	187,455	60.6 (60.4-60.7)	200,769	21.7 (21.6-21.8)

5.4.3 Primary care contacts by characteristic

Those who had a caesarean delivery were 39% more likely to have a contact relating to acute events or illnesses (infections) (unadjusted IRR: 1.39, 95%CI: 1.36-1.44), 8% more likely to have a contact relating to an ongoing mental or physical symptom or condition (unadjusted IRR: 1.08, 95% CI: 1.06-1.10) and 54% more likely have a contact relating to a pre-existing condition (unadjusted IRR: 1.54. 95%CI: 1.49-1.59) compared to those with a vaginal delivery (unadjusted IRR: 1-reference category) (Table 5.2). Current smokers were 11% more likely to have a contact relating to acute events or illnesses (unadjusted IRR: 1.11, 95%CI:1.09-1.13); 16% more likely to have a contact relating to a pre-existing condition (unadjusted IRR: 1.16, 95%CI: 1.13-1.19); and 21% more likely to have a contact relating to preventative, future health (unadjusted IRR: 1.21, 95%CI: 1.19-1.22) compared to non-smokers (unadjusted IRR: 1-reference category). Contacts for pre-existing conditions increased with age and deprivation (unadjusted IRR: 0.89, 95%CI: 0.83-0.91 for those aged 15-19 years compared to unadjusted IRR: 1.20, 95%CI: 1.04-1.39 for those aged 45-49 years; and unadjusted IRR: 1-reference category for those in the least deprived quintile compared to unadjusted IRR: 1.12, 95%CI: 1.08-1.15 for those in the most deprived quintile). Rates of contacts relating to preventative, future health were higher in younger women (unadjusted IRR:1.08, 95%CI: 1.06-1.11 in women aged 15-19 years and unadjusted IRR:1.13, 95%CI: 1.11-1.14 in women aged 20-24 years compared to unadjusted IRR:0.87, 95%CI: 0.85-0.89 in women aged 40-44 years and unadjusted IRR:0.77, 95%CI:0.70-0.85 in women aged 45-49 years) these are compared to women aged 30-34 years (unadjusted IRR: 1-reference category). These findings were similar in the fully adjusted models and were broadly similar across other categories and variables (Table 5.2). These patterns are also similar when comparing how rates of common health topics varies by characteristic (Table 5.3).

Table 5.2: Unadjusted and fully-adjusted mixed-effects Poisson estimates of the likelihood of women having a primary care contact documenting the most common health topic in the first 100 days after childbirth, by patient characteristic*

Characteristic	Models, IRR (95% CI)									
	Acute event or illness		Ongoing mental or physical symptoms or conditions		Pre-existing conditions		Preventive, future health		Other (Postnatal check or visit)	
	Unadjusted	Fully adjusted*	Unadjusted	Fully adjusted*	Unadjusted	Fully adjusted*	Unadjusted	Fully adjusted*	Unadjusted	Fully adjusted*
Maternal age (years)										
15-19	1.03 (0.99-1.07)	1.00 (0.96-1.04)	0.97 (0.95-1.00)	0.92 (0.90-0.95)	0.89 (0.83-0.91)	0.78 (0.74-0.82)	1.08 (1.06-1.11)	1.01 (0.98-1.04)	0.92 (0.89-0.95)	0.91 (0.89-0.94)
20-24	1.00 (0.98-1.02)	0.98 (0.95-1.00)	0.99 (0.98-1.01)	0.96 (0.95-0.98)	0.88 (0.83-0.91)	0.81 (0.79-0.84)	1.13 (1.11-1.14)	1.06 (1.05-1.08)	0.94 (0.92-0.95)	0.94 (0.92-0.95)
25-29	1.01 (0.99-1.03)	1.00 (0.98-1.02)	1.00 (0.99-1.02)	0.99 (0.98-1.00)	0.95 (0.92-0.97)	0.91 (0.89-0.93)	1.09 (1.08-1.10)	1.06 (1.04-1.07)	0.98 (0.96-0.99)	0.98 (0.96-0.99)
30-34	1	1	1	1	1	1	1	1	1	1
35-39	1.00 (0.98-1.03)	1.00 (0.98-1.02)	0.99 (0.98-1.00)	1.00 (0.98-1.01)	1.07 (1.05-1.10)	1.08 (1.06-1.11)	0.92 (0.91-0.93)	0.93 (0.92-0.94)	1.01 (1.00-1.02)	1.01 (1.00-1.02)
40-44	1.03 (1.00-1.07)	1.03 (0.99-1.06)	1.00 (0.98-1.02)	1.00 (0.98-1.02)	1.21 (1.16-1.25)	1.21 (1.17-1.25)	0.87 (0.85-0.89)	0.88 (0.86-0.90)	1.00 (1.00-1.02)	1.00 (0.98-1.02)
45-49	0.94 (0.83-1.07)	0.93 (0.81-1.05)	1.02 (0.94-1.10)	1.02 (0.94-1.11)	1.20 (1.04-1.39)	1.20 (1.04-1.38)	0.77 (0.70-0.85)	0.79 (0.72-0.87)	0.97 (0.89-1.06)	0.98 (0.89-1.06)
Townsend Score quintile										
1-least deprived	1	1	1	1	1	1	1	1	1	1
2	1.00 (0.98-1.03)	1.00 (0.98-1.02)	1.01 (0.99-1.02)	1.01 (0.99-1.02)	1.02 (0.99-1.05)	1.03 (1.00-1.06)	1.02 (1.00-1.03)	1.00 (0.99-1.02)	0.99 (0.98-1.01)	1.00 (0.98-1.01)
3	1.01 (0.99-1.03)	1.00 (0.98-1.02)	1.02 (1.00-1.03)	1.01 (1.00-1.03)	1.06 (1.03-1.09)	1.07 (1.04-1.10)	1.05 (1.03-1.06)	1.01 (0.99-1.02)	0.97 (0.96-0.99)	0.98 (0.97-1.00)
4	1.01 (0.99-1.03)	1.00 (0.97-1.02)	1.02 (1.01-1.04)	1.02 (1.00-1.03)	1.08 (1.05-1.11)	1.11 (1.07-1.14)	1.07 (1.05-1.08)	1.01 (0.99-1.02)	0.96 (0.95-0.98)	0.98 (0.96-1.00)
5-most deprived	0.99 (0.97-1.04)	0.97 (0.95-1.00)	1.01 (0.99-1.03)	1.01 (0.99-1.03)	1.12 (1.08-1.15)	1.16 (1.12-1.19)	1.06 (1.04-1.08)	0.98 (0.97-1.00)	0.92 (0.91-0.94)	0.94 (0.93-0.96)
Missing	1.01 (0.98-1.04)	1.01 (0.98-1.04)	1.02 (1.00-1.04)	1.02 (1.00-1.04)	1.06 (1.03-1.10)	1.10 (1.06-1.14)	1.04 (1.02-1.07)	1.01 (0.99-1.03)	0.99 (0.97-1.01)	1.01 (0.99-1.03)
Mode of delivery										

	Vaginal delivery	1	1	1	1	1	1	1	1	1	1
	Caesarean	1.39 (1.36-1.44)	1.39 (1.36-1.43)	1.08 (1.06-1.10)	1.08 (1.06-1.10)	1.54 (1.49-1.59)	1.50 (1.46-1.55)	0.99 (0.97-1.01)	1.01 (0.99-1.03)	1.02 (1.00-1.04)	1.01 (0.99-1.03)
	Unknown	1.00 (0.97-1.02)	0.99 (0.97-1.02)	0.98 (0.96-0.99)	0.97 (0.96-0.99)	1.05 (1.02-1.08)	1.04 (1.01-1.07)	0.97 (0.95-0.98)	0.96 (0.95-0.98)	0.98 (0.96-1.00)	0.98 (0.96-1.00)
Parity											
	First	1	1	1	1	1	1	1	1	1	1
	Second	0.96 (0.95-0.98)	0.97 (0.96-0.99)	0.95 (0.94-0.96)	0.95 (0.94-0.96)	0.94 (0.92-0.96)	0.93 (0.91-0.95)	0.97 (0.96-0.98)	1.01 (1.00-1.02)	1.00 (0.99-1.01)	0.99 (0.98-1.01)
	Third or higher	0.98 (0.96-1.01)	0.98 (0.96-1.01)	0.93 (0.91-0.95)	0.93 (0.91-0.94)	0.99 (0.95-1.02)	0.94 (0.91-0.98)	0.93 (0.91-0.95)	0.97 (0.95-0.98)	0.98 (0.96-1.00)	0.97 (0.95-0.99)
	Unknown	0.96 (0.95-0.98)	0.96 (0.95-0.98)	0.94 (0.93-0.95)	0.94 (0.93-0.95)	0.96 (0.94-0.98)	0.93 (0.91-0.95)	0.94 (0.93-0.96)	0.97 (0.96-0.98)	0.97 (0.96-0.98)	0.97 (0.96-0.98)
Smoking status											
	Current smoker	1.11 (1.09-1.13)	1.12 (1.10-1.15)	1.05 (1.03-1.06)	1.06 (1.04-1.07)	1.16 (1.13-1.19)	1.20 (1.17-1.23)	1.21 (1.19-1.22)	1.19 (1.17-1.21)	0.97 (0.95-0.98)	0.99 (0.97-1.00)
	Past smoker	1.04 (1.03-1.06)	1.04 (1.03-1.06)	0.98 (0.97-0.99)	0.98 (0.97-0.99)	1.02 (1.00-1.04)	1.03 (1.01-1.05)	1.00 (0.99-1.01)	1.00 (0.99-1.91)	0.96 (0.95-0.97)	0.97 (0.96-0.98)
	Non-smoker	1	1	1	1	1	1	1	1	1	1
	Unknown	0.90 (0.88-0.92)	0.90 (0.89-0.92)	0.87 (0.86-0.88)	0.88 (0.87-0.89)	0.76 (0.74-0.78)	0.74 (0.72-0.76)	0.70 (0.69-0.72)	0.72 (0.71-0.73)	0.95 (0.94-0.97)	0.95 (0.94-0.96)
Year group											
	2006-2007	1	1	1	1	1	1	1	1	1	1
	2008-2009	0.99 (0.97-1.01)	0.99 (0.97-1.01)	1.00 (0.99-1.01)	0.99 (0.98-1.01)	0.99 (0.96-1.01)	0.97 (0.95-1.00)	1.04 (1.02-1.05)	1.02 (1.01-1.04)	0.99 (0.98-1.00)	0.99 (0.98-1.00)
	2010-2011	1.01 (0.99-1.03)	1.00 (0.98-1.02)	0.99 (0.98-1.00)	0.99 (0.97-1.00)	0.96 (0.94-0.99)	0.95 (0.93-0.97)	1.04 (1.03-1.06)	1.03 (1.02-1.05)	0.99 (0.97-1.00)	0.99 (0.97-1.00)
	2012-2013	1.02 (1.00-1.04)	1.02 (1.00-1.04)	0.97 (0.96-0.99)	0.97 (0.96-0.99)	0.95 (0.93-0.98)	0.94 (0.92-0.97)	0.99 (0.98-1.01)	0.99 (0.98-1.00)	0.97 (0.95-0.98)	0.97 (0.95-0.98)
	2014-2015	0.94 (0.92-0.96)	0.94 (0.92-0.97)	0.94 (0.92-0.95)	0.94 (0.93-0.95)	0.88 (0.86-0.91)	0.88 (0.86-0.91)	0.93 (0.92-0.94)	0.94 (0.93-0.96)	0.93 (0.92-0.95)	0.93 (0.92-0.95)

*Adjusted for age, Townsend score, mode of delivery, parity, smoking status and year group. GP Practice is included as a random effects term.

Table 5.3: The most common health topic documented in women's primary care contacts in the first 100 days after childbirth, by patient characteristic

Characteristic	Number of contacts	Rate per 100 contacts (95% CI)				
		Acute event or illness	Ongoing mental or physical symptoms or conditions	Pre-existing conditions	Preventive, future health	Postnatal check or visit
Overall	925,712	14.7 (14.6-14.7)	45.5 (45.4-45.6)	10.3 (10.2-10.3)	30.2 (30.1-30.3)	21.7 (21.6-21.8)
Maternal age (years)						
15-19	28,159	15.0 (14.6-15.4)	43.9 (43.3-44.5)	9.0 (8.7-9.3)	35.5 (35.0-36.1)	19.8 (19.4-20.3)
20-24	128,051	14.3 (14.1-14.5)	45.3 (45.0-45.6)	9.1 (9.0-9.3)	35.9 (35.7-36.2)	20.1 (19.9-20.4)
25-29	232,764	14.7 (14.5-14.8)	46.0 (45.8-46.2)	9.8 (9.6-9.9)	33.2 (33.0-33.4)	21.2 (21.0-21.3)
30-34	290,529	14.9 (14.7-15.0)	45.7 (45.6-45.9)	10.5 (10.4-10.6)	29.0 (28.8-29.2)	22.6 (22.4-22.7)
35-39	193,151	14.6 (14.4-14.7)	45.2 (45.0-45.5)	11.0 (10.9-11.2)	25.7 (25.5-25.9)	22.5 (22.3-22.7)
40-44	50,230	14.5 (14.2-14.8)	45.3 (44.8-45.7)	11.9 (11.6-12.2)	23.4 (23.1-23.8)	21.1 (20.8-21.5)
45-49	2,828	12.2 (11.0-13.4)	46.8 (45.0-48.6)	12.4 (11.2-13.6)	19.9 (18.4-21.4)	19.5 (18.1-21.0)
Townsend Score quintile						
1-least deprived	174,012	15.1 (14.9-15.2)	43.4 (43.1-43.6)	9.5 (9.4-9.6)	28.4 (28.1-28.6)	23.8 (23.6-24.0)
2	159,247	14.9 (14.7-15.1)	44.2 (44.0-44.5)	9.8 (9.6-9.9)	29.3 (29.1-29.6)	23.5 (23.3-23.7)
3	186,314	14.7 (14.6-14.9)	45.3 (45.1-45.5)	10.3 (10.1-10.4)	30.3 (30.1-30.5)	21.9 (21.7-22.1)
4	176,141	14.4 (14.3-14.6)	46.8 (46.6-47.1)	10.5 (10.4-10.7)	31.4 (31.2-31.6)	20.9 (20.7-21.1)
5-most deprived	135,566	14.0 (13.8-14.1)	48.0 (47.8-48.3)	11.4 (11.2-11.6)	31.8 (31.6-32.1)	18.5 (18.3-18.7)
Missing	94,432	14.8 (14.5-15.0)	46.3 (46.0-46.6)	10.4 (10.2-10.6)	30.3 (30.0-30.6)	20.6 (20.3-20.8)
Mode of delivery						
Vaginal delivery	255,731	12.3 (12.1-12.4)	40.8 (40.6-41.0)	8.1 (8.0-8.2)	29.2 (29.0-29.4)	22.0 (21.8-22.1)
Caesarean	98,287	15.5 (15.3-15.7)	42.0 (41.7-42.4)	10.7 (10.5-10.9)	23.7 (23.4-24.0)	17.6 (17.4-17.9)
Unknown	571,694	15.6 (15.5-15.7)	48.3 (48.1-48.4)	11.2 (11.1-11.3)	31.8 (31.7-31.9)	22.3 (22.2-22.4)
Parity						
First	449,967	14.8 (14.7-14.9)	47.1 (46.9-47.2)	10.3 (10.2-10.4)	30.4 (30.3-30.5)	21.4 (21.2-21.5)
Second	200,600	14.8 (14.7-15.0)	44.7 (44.5-45.0)	10.3 (10.1-10.4)	31.0 (30.8-31.2)	22.7 (22.5-22.9)
Third or higher	60,816	14.5	44.1	10.9	29.3	21.0

		(14.2-14.8)	(43.7-44.5)	(10.7-11.2)	(28.9-29.6)	(20.7-21.4)
Unknown	214,329	14.1 (14.0-14.3)	43.5 (43.3-43.7)	10.0 (9.9-10.2)	29.4 (29.2-29.6)	21.6 (21.4-21.8)
Smoking status						
Current smoker	117,802	14.3 (14.1-14.5)	46.2 (45.9-46.5)	11.5 (11.3-11.6)	37.6 (37.3-37.8)	18.4 (18.2-18.7)
Past smoker	262,905	14.7 (14.6-14.8)	45.1 (44.9-45.3)	10.4 (10.3-10.5)	30.5 (30.3-30.7)	20.9 (20.8-21.1)
Non-smoker	426,835	14.6 (14.5-14.7)	46.3 (46.1-46.4)	10.4 (10.3-10.5)	30.1 (30.0-30.3)	22.2 (22.1-22.4)
Unknown	118,170	15.1 (14.9-15.3)	43.1 (42.9-43.4)	8.3 (8.2-8.5)	22.6 (22.4-22.8)	24.7 (24.4-24.9)
Year group						
2006-2007	191,326	14.6 (14.4-14.7)	45.1 (44.9-45.4)	10.4 (10.3-10.6)	29.6 (29.4-29.8)	23.7 (23.5-23.9)
2008-2009	201,220	14.4 (14.3-14.6)	45.5 (45.3-45.7)	10.2 (10.1-10.3)	31.0 (30.8-31.2)	22.2 (22.1-22.4)
2010-2011	199,990	14.8 (14.7-15.0)	45.9 (45.7-46.1)	10.2 (10.0-10.3)	31.5 (31.3-31.7)	21.5 (21.3-21.7)
2012-2013	189,546	15.1 (15.0-15.3)	45.7 (45.5-45.9)	10.3 (10.1-10.4)	29.9 (29.7-30.1)	20.4 (20.3-20.6)
2014-2015	143,630	14.2 (14.1-14.4)	45.5 (45.3-45.8)	10.3 (10.1-10.4)	28.4 (28.2-28.6)	20.2 (20.0-20.4)

5.4.4 Patterns of primary care contacts

There is a small peak in contacts in the first week after childbirth relating to ‘ongoing mental or physical symptoms or conditions’ (65.1/100 contacts) (Figure 5.1); this peak is largely due to contacts relating to: pain, anaemia or blood disorders, constipation, and haemorrhoid or anal abscess (data not shown). Contacts for ‘acute illness or event’ which includes infections is also raised across the first two weeks after childbirth (peak of 37.8/100 contacts). However, the largest peak in contacts coincides with the postnatal check, on day 42 after childbirth this peaked to 282.9/100 contacts with a record of a postnatal check or visit. Contacts for ‘ongoing mental and physical symptoms or conditions’ and ‘preventative, future care’ also peak on day 42 with 221.2/100 contacts and 197.3/100 contacts respectively.

Figure 5.1: The most common health topic documented in women's primary care contacts across the first 100 days after childbirth

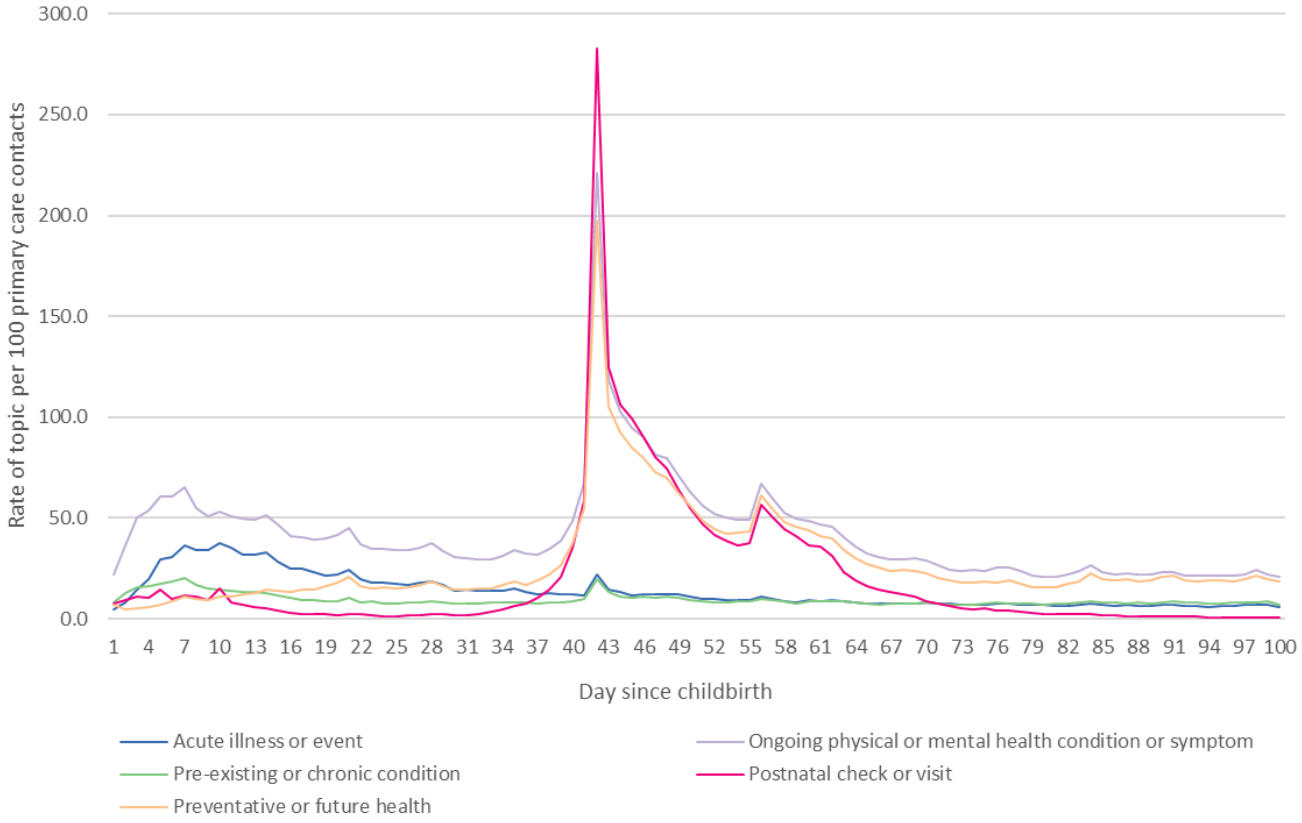
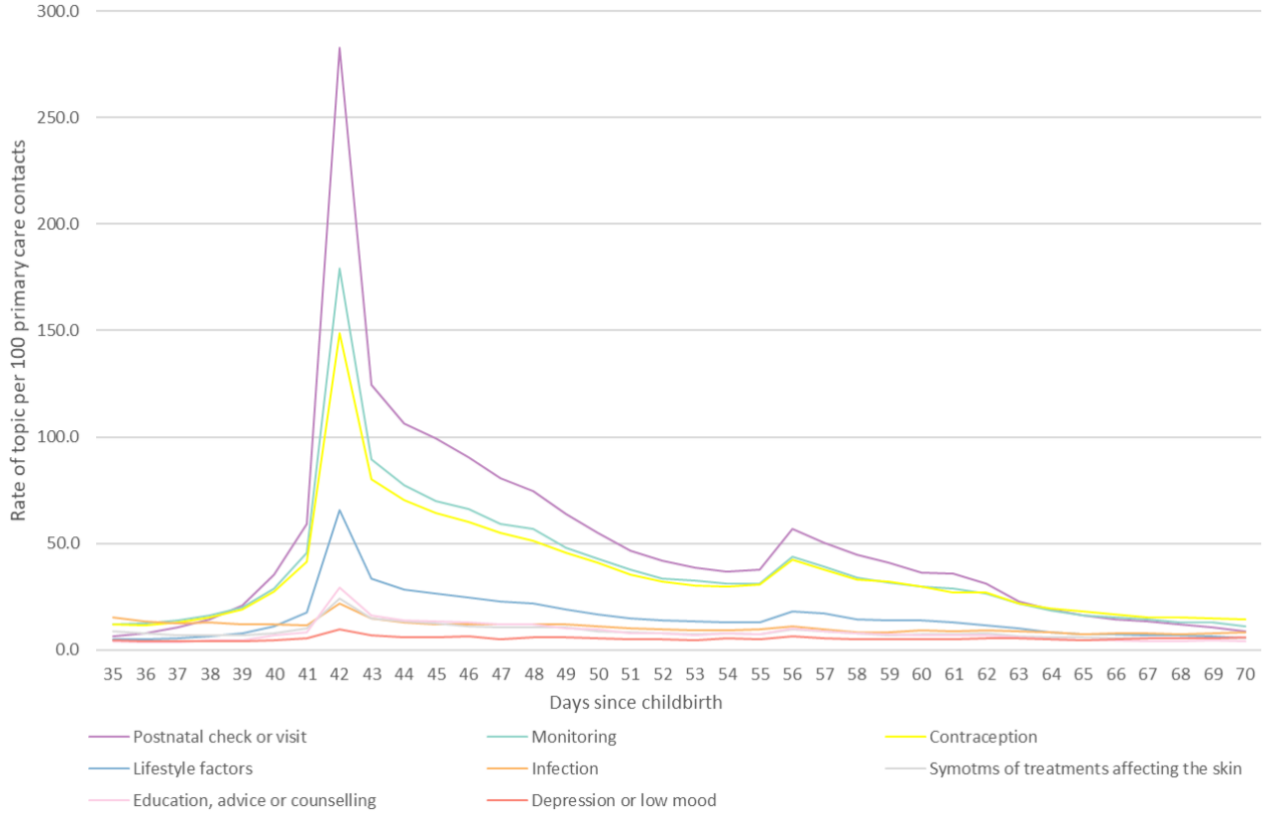


Figure 5.2: The ten most common clinical events or health needs documented in women's primary care contacts between five and ten weeks after childbirth



5.4.5 Common clinical events or health needs at the time of the postnatal check

Between weeks 5 and 10 (days 35-70) after childbirth which corresponds to the time of the postnatal check, the most common clinical events or health needs documented are: a record of a ‘postnatal check or visit’; ‘monitoring’ (e.g. blood pressure or temperature reading); ‘contraception’; ‘lifestyle factors’ (e.g. smoking status); ‘infection’; ‘symptoms or treatments affecting the skin’; ‘education, advice or counselling’; and ‘depression or low mood’ (Figure 5.2).

5.5 Discussion

5.5.1 Main findings

I found that in the first 100 days after childbirth, women were most likely to use primary care to have a postnatal visit or check, for monitoring (such as a blood pressure reading, height or weight measurement) or to access contraception. Investigating the peak in consultations at the time of the postnatal check showed that many different health needs are identified and documented at this appointment; most commonly this was for a postnatal check or visit, monitoring, contraception, lifestyle factors, infection, symptoms or treatments affecting the skin, education, advice or counselling and depression or low mood.

5.5.2 Study strengths and limitations

To my knowledge this is the first study to use electronic health records from primary care to examine the reasons why women use primary care after childbirth in a large cohort of women. I drew on information from 924,387 care contacts relating to 309,573 childbirths. The use of electronic health records provides a reflection of real-world clinical practice, allowing me to describe a broad range of health topics and clinical events in a large cohort of women. As with all studies of electronic health records however, I am limited by what is recorded in the primary care electronic health records. Women may experience other needs which are not discussed or documented because they are sensitive, they did not have time to raise them, they sought support from outside primary care, or they didn't feel they needed medical help. Thus, this study describes women's common documented reasons for using primary care services but may lack some elements of women's broader postnatal health needs and experiences. I also acknowledge the limitations in grouping specific Read or prescription codes into clinical events or health needs. While I took a systematic approach with GP input, this is a subjective process, which may lead to some overlap or miss-classification and other researchers may group these codes differently. However, it is unlikely that changes in these groupings would alter the key findings of my study.

5.5.3 Findings in relation to previous studies

While I found no previous studies examining women's postnatal primary care use, past studies exploring women's postnatal health needs provide some useful comparisons. A 2008 integrative review by Cheng summarises these studies and

found that the most common physical postnatal health needs or symptoms women experience were: pain – including back pain, headaches, wound pain from a caesarean incision and perineal pain (20-79% of women), fatigue or tiredness (15-76% of women), sore nipples (15-50% of women), haemorrhoids (36% of women), incontinence (around a third of women), constipation (7-27% of women) and sex-related concerns (10% of women) (18). This review did not explicitly look at mental health needs or mastitis. There is some overlap with my findings as I also identified pain (21.9% of women), sleep/fatigue/tiredness (1.7% of women), breastfeeding related needs (9.9% of women), haemorrhoids (9.2% of women) and constipation (9.5% of women) among the list of common reasons why women use primary care services after childbirth. My study typically found lower occurrence of these conditions. For example, I found just 0.5% of women had a record of experiencing tiredness of fatigue after childbirth and I found that only 7.1% of women in my study had a record of haemorrhoids. These differences may be due to differences in data sources used, studies in this review used questionnaires where women self-report conditions or symptoms they experience from a predefined list. It is likely that some of these needs would be more common in a self-reported study – such as tiredness, haemorrhoids or some types of pain – as women experience them but they would not necessarily seek medical intervention for them and hence not be recorded in primary care data. It is interesting that more sensitive health needs, such as incontinence and sex-related concerns, were not identified in my study using clinical records information but were common in self-report studies. Women may be more reluctant to report these to a health care professional or not view these to be medical concerns.

In terms of mental health needs, I found that depression or low mood was among the most common ongoing postnatal mental or physical symptoms or conditions, with 7.3% (n=22,568) of women having at least one record in the first 100 days after childbirth. It should be noted that my finding is lower than previous studies which estimates postnatal depression can affect up to 20% of women in the year after childbirth (35–38). This difference is likely due to restricting my analysis to the first 100 days after childbirth only and using EHRs to identify depression, rather than surveys which typically lead to higher rates of depression often reported in other studies.

My study is the first study I identified on “real-world” health care use after childbirth, thus I cannot benchmark clinical events that are not specific conditions and symptoms – such as being monitored or receiving advice, education or counselling which were identified to be common in my study.

5.5.4 Implications of findings and future research recommendations

I identified numerous health needs documented at the time of women’s postnatal check, including contraceptives, infections, symptoms affecting the skin, and depression and low mood; alongside the documenting of valuable clinical events (such as monitoring or lifestyle factors) which demonstrates the varied support provided during these appointments. This also suggests that many of the health needs I identified overall in this study were identified at the time of the postnatal check and shows the importance of women having this planned, dedicated time with their GP.

It is also clear however that women seek support at other times in the first few months after childbirth and have needs beyond the postnatal check. Particularly for infections, symptoms or treatments affecting the skin, pain, anaemia or blood disorders, constipation, and haemorrhoid or anal abscess, which I found to be common in the early days and weeks following childbirth. This has not been identified by previous studies. While primary care services may be well prepared to offer the planned check 6-8 weeks, this study provides new information on the type of health needs GPs may expect women to experience in the early weeks after childbirth and these findings can be used to plan services to meet these needs. In addition, it appears that primary care services may need to engage more proactively in identifying more sensitive needs, including incontinence and sex-related concerns. These were commonly identified in self-reported studies but not in my study using electronic health data. Previous research shows that women prefer to be asked about such needs rather than have to offer up this information themselves and that many women are not routinely asked about these following childbirth despite treatments being beneficial (19,97).

Overall, women may benefit from being better prepared for their postnatal care encounters, particularly for their planned postnatal check at 6-8 weeks after childbirth. This is an opportunity for women to raise a broad range of health concerns

and women may get the most out of the appointment by considering what to discuss in advance and also being aware of what the check will cover. This may help women understand which symptoms may benefit from medical support – such as incontinence – or provide reassurance that their experiences are similar to other women. Expanding on this, future research should seek to identify what content and delivery of postnatal care is most effective for women and if using such postnatal care leads to better outcomes.

5.5.5 Conclusion

The first 100 days after childbirth are a crucial time for women as they recover mentally and physically from pregnancy and birth. I found that in this time women most commonly use primary care for: monitoring – such as a blood pressure reading, contraception and a postnatal check or visit. I also found that many different health needs are identified at the postnatal check showing the value in having this planned time with women. This included providing contraceptives, treating infections and symptoms affecting the skin, and supporting with depression and low mood, alongside the documenting of valuable clinical events.

5.6 Chapter summary

In this chapter I expanded on my work in chapter 4 by exploring the most common postnatal clinical issues and medical complaints using the symptoms, diagnoses and medications documented in women's primary care consultations in the first 100 days after childbirth.

5.7 Section I Summary

In Part I of this thesis, I have provided an overview of women's primary care use after childbirth. I found that women consult on average 4.8 times per year and that most women (95%) had at least one consultation in the year after childbirth. The most common reasons for consulting were for a postnatal visit or check, for monitoring (e.g blood pressure reading), and to access contraception. Only half of women (56%) had a record of a postnatal check, and younger and more deprived women were less likely to have this check. In Part II I will focus on one of these areas in detail – postnatal depression. Next, I will outline my rationale for this, provide further background information on postnatal depression and then investigate the duration of antidepressant treatment in women with postnatal depression.

Part II: duration of antidepressant treatment in women with postnatal depression.

6. Background on postnatal depression and antidepressants

6.1 Chapter overview

In this chapter, I will explain my rationale for focusing on postnatal depression and in particular the use of antidepressant treatment for postnatal depression in the remainder of this thesis. I will also provide an overview of postnatal depression, including a summary of prevalence, risk factors, diagnosis, and detailed information on antidepressant treatment.

6.2 Rationale for focusing on postnatal depression treatment

In my first two PhD studies I have provided a broad overview of women's primary care use after childbirth and within this identified the most common postnatal clinical events or health needs documented in women's primary care records. In Chapter 5, I found that there were many health issues/conditions women have in the first 100 days after childbirth. However, it would not be possible for me to examine each of these in depth within this PhD. Therefore, I decided to focus on one specific area.

In May 2019 I presented preliminary findings from Chapter 4 and Chapter 5 to two PPIE panels and asked them "When considering what women's primary care use can tell us about their health after childbirth, what are the most important topics to address or questions to answer?" After a group discussion, the panels highlighted that women's mental health after childbirth would be a clear priority for this research. In particular, they wanted to understand who is most at risk of postnatal depression, how women can be encouraged to get support with their postnatal mental health and the longer-term consequences/trajectories of having postnatal depression (detailed information on the PPIE work conducted in this thesis is included in Chapter 10). This, coupled with my own experiences of becoming a mother while carrying out this PhD, led me to want to focus on postnatal depression. Having friends delay seeking support for their depression and being reluctant to start antidepressant treatment after becoming parents was particularly impactful to me. I was also interested in the differences among friends and myself who had a history of depression and how this affected my/their postnatal mental health experience.

While previous studies have sought to determine prevalence and risk factors of postnatal depression and/or antidepressant treatment within the postnatal period, research exploring how the history of depression can impact on postnatal depression

and in-turn on the longer-term trajectory (beyond the first year after childbirth) has been less extensive (98). I plan to add to this literature by investigating how previous history of depression affects postnatal antidepressant treatment and how that in turn impacts on long term duration of depression treatment. I will do this by investigating how long antidepressant treatment initiated in the postnatal period typically lasts and determine possible factors associated with long-term use, key factors will include a history of antidepressant treatment. My focus will be on antidepressant treatment and duration of treatment rather than recording of depression per se as it is not possible to investigate the duration of postnatal depression using symptom and diagnosis codes using EHRs. This is because a symptom or diagnosis code of depression may be recorded at the first consultation where this is raised/diagnosed, however it is rare to see records that indicate depression is resolved. Having an antidepressant prescription in the year after childbirth indicates that a woman had depression in the postnatal period. Previous studies have shown that of women with an SSRI prescription (the study did not include all antidepressants) in the year after childbirth, over 70% also had a symptom and/or diagnostic code indicating depression or postnatal depression (40). I recognise that a small number of women may be prescribed antidepressants for something other than depression (such as anxiety), but I expect these to be in the minority and investigating duration of postnatal antidepressant treatment will still be valuable for these women.

I anticipate that women who start antidepressant treatment in the first year after childbirth will fall into one of three trajectories. First, those with a mental health need which existed prior to pregnancy/childbirth and are so returning to or continuing a pre-existing treatment schedule. Second, those where postnatal depression treatment is a discrete episode and treatment duration is short-term (less than one year). Third, those where postnatal depression treatment is the beginning of a long-term mental health condition and treatment continues beyond the postnatal period.

Thus, in summary, I have decided to focus the remainder of my PhD on antidepressant treatment initiated in the postnatal period because postnatal depression remains an important health need and priority for women after childbirth and little is currently known about the longer-term trajectory of treatment.

Next, I will provide an overview of postnatal depression and treatment before reporting on my final two studies which include a systematic review of the literature and a cohort study using primary care electronic health records from IMRD to address my second thesis aim:

Part II: To determine the duration of antidepressant treatment in women with a postnatal prescription.

6.3 What is postnatal depression?

Postnatal depression is a common mental health disorder characterized by a persistent sadness that lasts for several weeks or months and occurs at any time in the year after childbirth (99–103). Postnatal depression affects up to 1 in 5 mothers (35,104–106). However, it can be difficult to accurately measure as mood fluctuates and can be affected by other factors such as stress or lack of sleep. A UK study examining postnatal depression using primary care EHRs found that roughly 11% of women have a record suggestive of depression in the year after birth (40). Studies may also be subject to an under-reporting and/or under-recognition of depressive symptoms as symptoms can be sensitive or stigmatising to report (107,108). This means research may underestimate the true number of women experiencing depression after childbirth. Just like depression at any time, the causes of postnatal depression are not thoroughly understood. It is thought that a combination of social, psychological and biological factors is at play but an adverse or significant life event, such as a bereavement or giving birth, can trigger the onset of a depressive episode (109,110). The hormonal, physiological and psychological changes which occur as a result of pregnancy and birth, alongside the lack of sleep, pressures of new motherhood and changes in relationship and societal role are all likely to play a part in the increased risk of depression following childbirth (33).

6.3.1 Clinical features and presentation

Postnatal depression presents in many different ways, symptoms can include: loss of interest and enjoyment in everyday life and usual activities; low mood; feeling tearful and more emotional; feelings of failure, hopelessness or not coping; difficulty managing simple tasks; feelings of distress, negative thoughts or guilt; feeling irritable, angry or rageful; being very exhausted or having sleep problems (not being able to sleep when baby is sleeping well); changes in appetite or thoughts towards food and/or body image; and in more severe cases thoughts of self-harm or suicide (102,103). It is common that women experience “baby blues” in the first few days after childbirth. The symptoms of baby blues are similar to depression but don’t last very long – typically a couple of days starting soon after birth – and no treatment or support beyond usual care is required (102). Postnatal depression, however, likely starts later and lasts for several weeks or months and often requires some level of support and/or an intervention to resolve.

6.3.2 Diagnosis

NICE guidelines advise that “At each postnatal contact, women should be asked about their emotional wellbeing, what family and social support they have and their usual coping strategies for dealing with day-to-day matters… and tell their healthcare professional about any changes in mood, emotional state and behaviour that are outside of the woman's normal pattern” (23). This can include contacts with midwives or health visitors but typically this contact would come from GPs within Primary Care (100). Health care professionals being proactive in asking women about their mental health in this way may help to identify cases of depression as women may be reluctant or unsure of raising symptoms without being prompted. When concerns are raised, or postnatal depression is suspected, a formal validated tool to help identify depression may be used (99). These include the Edinburgh Postnatal Depression Scale (EPDS) or the Patient Health Questionnaire (PHQ-9) (99,100). Alongside validated tools, women may be asked about previous mental health problems, their relationships and support networks, their feelings towards their pregnancy and birth, and their physical health (99). The severity of symptoms and the risk of harm for the women and infant will be considered alongside this information to determine the presence of postnatal depression (99). A referral to specialist or support from specialist services may also be used to support in possible cases.

6.3.3 Risk factors

A number of key factors have been identified which increase a woman’s risk of experiencing postnatal depression. A prior history of depression or anxiety either during or before pregnancy has been associated with a significantly increased risk of postnatal depression and is consistently identified as the most prominent risk factor for depression after childbirth (104,105,111–114). In terms of sociodemographic factors, younger women and in particular teenage mothers are at an increased risk of postnatal depression (115,116) and there is some evidence that postnatal depression is associated with deprivation, with those living in more deprived areas being slightly more likely to experience postnatal depression (40,104,105,117). Several social and relationship factors have been identified. These include a perceived lack of social support during pregnancy or after childbirth and experiencing marital problems or dissatisfaction with their partner relationship (104,105,108,116,118). Pregnancy and delivery related complications (such as

premature labour, preeclampsia or instrumental delivery) present a small but significant risk in developing postnatal depression (113). Studies have also explored and identified a link between depression and experiencing domestic abuse or violence (119), alcohol and drug use (120) and migration status (121).

6.3.4 Complications/consequences

For women with postnatal depression, there is some evidence that they are more likely to experience suicidal ideation and thoughts of self-harm compared to women without postnatal depression who have recently given birth (122–124). There is also some evidence that postnatal depression is negatively associated with infant outcomes (125–128), and can impact on the mother-infant bond (129,130). Negative infant outcomes include emotional, behavioural and psychological problems as well as cognitive and language development delays (131–134); higher incidence of diarrheal episodes (135,136); and being less likely to be breastfed or have shorter breastfeeding duration (137). Moreover, there is evidence that depression in mothers could affect the quality of care and support they give their infant, and there is increasing evidence that it can alter the level of health care infants receive (138,139) although the causal mechanism is not well understood. It is thought that infants of women with postnatal depression are higher users of urgent/unplanned care (138). But it is not clear if these infants have more complex health needs that could have an impact on the mental health of the mother or if maternal depression leads to more negative thoughts/ catastrophising which leads them to seeking more unplanned care for their infant. Adding to this, studies (139–144) have shown that the infants of mothers with depression may be less likely to attend preventative or planned health care measures (139–141). A small number of studies (139–145) have explicitly examined adherence to infant immunization schedules in mothers with postnatal depression but the results from these studies are mixed, and the link between postnatal depression and infant vaccine uptake is inconclusive.

While there is evidence of these consequences, the interplay between postnatal depression and infant outcomes is complex and there are several gaps in this body of literature. For example, numerous studies are limited to specific sub-populations (such as very low-income women) which makes the generalisability of findings difficult. Data may be lacking, or studies have not fully explored key contributing factors such as treatment of depression, socio-economic status or marital/partner

relationships. Some infant outcomes are self-reported (such as infant sleeping, feeding, crying or pain levels) which due to their subjective nature may be more negatively reported by women experiencing depression and more objective measures may be required. It is not clear if the presence of any postnatal depression leads to negative outcomes or if the severity and/or duration of depression is critical to understanding this relationship. Lastly, the causal mechanism between poor infant health and postnatal depression is not well understood and it is not clear if poor health in infants increases the risk of maternal postnatal depression or vice versa.

6.4 Treatment of postnatal depression

6.4.1 Pharmacological treatment – antidepressants

For the treatment of depression in adults, antidepressants have been shown to be more efficacious than placebos (146) and around 17% (7.3 million) of adults in England are prescribed antidepressants each year (147). Antidepressants are also commonly prescribed for postnatal depression. It is estimated that 1 in 8 women are prescribed antidepressant treatment in the year after childbirth (40). A small number of studies have shown antidepressants to be significantly efficacious for the treatment of postnatal depression (148). However, there remains a lack of high-quality studies comprehensively investigating the safety and efficacy of antidepressant use for postnatal depression, including if they are more effective for certain women and if certain antidepressants are more effective than others (149).

There are several different types of antidepressant drugs prescribed for depression. The most common is SSRIs. These are widely prescribed as they have fewer side effects than other antidepressants, an overdose is not likely to be serious and they have been shown to be compatible with breastfeeding (109,150). It is not fully known how SSRIs work but it is thought that they increase serotonin levels in the brain which helps to improve symptoms of depression and makes other non-pharmacological treatments, such as therapy, more effective. Serotonin is a neurotransmitter that carries chemical signals between nerve cells and the brain and, after carrying a signal, the nerve cells reabsorb the serotonin. SSRIs aim to block this reabsorption which means more serotonin is available to help pass more messages to nearby nerve cells (151). SSRIs need to be taken for at least 4 weeks to feel a benefit and should be taken for at least six months after symptoms improve to avoid a relapse (151). Other older types of antidepressants include Tricyclic

antidepressants (TCAs) and Monoamine oxidase inhibitors (MOAIs), but neither are commonly prescribed anymore as they can cause more serious side effects or be more harmful if overdosed (152). Some people taking SSRIs may experience feelings of agitation or anxiousness, have diarrhoea or nausea, have dizziness or blurred vision or experience a reduced sex drive. These side effects are typically mild and improve over time (151). There are also concerns around stopping antidepressant treatment without clinical support as women may experience withdrawal symptoms, including restlessness, sleep problems, unsteadiness, sweating, stomach problems, and feelings of irritability, anxiousness and confusion if treatment is not gradually tapered (153).

6.4.2 Other treatment or management options

Alongside pharmacological treatment some women are offered access to psychological treatment for postnatal depression either on its own or in conjunction with antidepressants (99). This may commonly include Cognitive Behavioural Therapy (CBT) which may be effective in reducing postnatal depression but further high-quality studies are needed to fully determine this (154–156). Traditional therapies – such as aromatherapy and acupuncture (157,158), telephone support (159,160) and physical activity (161–163) have also been investigated as interventions to reduce symptoms of postnatal depression but much like the research on CBT, further high-quality studies are needed to determine their effectiveness.

6.5 Chapter summary

In this chapter I outlined my rationale for focusing on postnatal depression and in particular the use of antidepressant treatment for postnatal depression in the remainder of this thesis. I also provided an overview of postnatal depression and detailed information on antidepressant treatment. In the next chapter I will conduct a systematic review of the literature to identify studies which have explored the duration of antidepressant treatment in women with postnatal depression.

7. Study III: Duration of antidepressant treatment in women with postnatal depression: a systematic review

7.1 Chapter overview

In this chapter, I present the results of a systematic review of the literature to investigate duration of antidepressant treatment in women with postnatal depression. This review will help detail our current knowledge in this area, how this relates to treatment duration guidelines and identify any research gaps.

7.2 Background

Supporting women to have good mental health after childbirth has become an increasingly prominent part of postnatal care. It is estimated that 10 to 20% of women will develop a mental illness during pregnancy or in the year after childbirth – the postnatal period (4,33,34). Depression is one of the most common conditions and it is thought that up to 20% of women will experience postnatal depression (35–38); however, estimates vary by study design, follow-up period, diagnostic definition and country. The risk of postnatal depression is thought to be greater in younger women, those who are more socially deprived and those with previous depression (40–42). Some women may self-treat or seek peer support, but others will need a non-pharmacological (e.g. CBT) and/or pharmacological intervention (e.g. antidepressant treatment). Around 1 in 8 women with postnatal depression will use antidepressant treatment in the postnatal period (40). It is recommended that antidepressant treatment is continued for at least six weeks to experience the full effect and that treatment is continued for around 6 months after women start to feel better, as stopping too early may lead to depression returning (164). Despite these recommendations the typical postnatal antidepressant treatment duration has not been determined. Understanding the expected treatment duration could help women and clinicians understand how long treatment may be required in order to make more informed decisions when deciding if antidepressant treatment is right for them. The aim of this study was to determine the typical duration of antidepressant treatment for women with postnatal depression by reviewing previously published literature.

7.3 Methods

This systematic review was conducted and reported in accordance with PRISMA guidelines (92) and was registered with PROSPERO in August 2020 (registration number CRD42020205522) (Appendix C).

7.3.1 Search strategy

I conducted a systematic literature search using the following bibliographic databases: PubMed/MEDLINE, EMBASE, CINAHL, PsycINFO and Web of Science. Searches were devised with the support of an information specialist and the search terms used combined keywords and medical subject headings for postnatal depression, antidepressant treatment and duration (Appendix C). All relevant English language literature published between 1st January 2001 and 31st July 2020 were retrieved for inclusion (in order to review the most recent decade of literature at the time of searching).

7.3.2 Study selection, inclusion and exclusion criteria

The identified titles were entered into Ryyan, a systematic review software, and duplicates were removed. As the lead reviewer, I screened all titles and abstracts, and a second reviewer (KS) screened a random 10%. Full text papers that were considered relevant by either reviewer after this screening were obtained where possible. These were then considered against study inclusion criteria (Table 7.1) independently by both reviewers, and those that did not meet these criteria were excluded. Any discrepancies were discussed and resolved by consensus. Reference checking and citation searching of relevant articles was conducted to identify further literature.

Table 7.1: Inclusion criteria

Setting	Is the study published within the date range: 1st January 2001 and 31st July 2020?
Population	Women aged 15-49 years who have given birth and were treated with antidepressants in the year after childbirth?
Intervention/exposure	Any antidepressant treatment in the year after childbirth?
Outcome	Duration (such as days spent on treatment) of antidepressant treatment included in the study?

7.3.3 Quality assessment

I appraised the quality of included studies using the Critical Appraisal Skills Program (CASP) checklists relevant to each study design (165). No studies were excluded based on quality.

7.3.4 Data extraction and data synthesis

For included studies the following data were extracted: authors, year of publication, title, study size, study design, country of origin, aims, cohort information and relevant findings. Number of women and duration of antidepressant treatment will be calculated, depending on study reporting this will be either median time on antidepressants (in months) and inter-quartile range or as a proportion of women still on treatment at key time intervals e.g. proportion of women still taking antidepressants five years after childbirth. If these figures are not given in text, they will be estimated from a time-to-event chart where possible. A narrative synthesis of included studies was conducted.

7.4 Results

7.4.1 Search results

Electronic searches identified 2,339 citations; 533 duplicates were removed leaving 1,806 unique citations to be screened for inclusion (Figure 7.1). Following title and abstract screening, 21 citations remained for consideration. The full texts of 18 papers were retrieved, 2 citations were conference abstracts, and 1 full text could not be found. After applying inclusion and exclusion criteria to the remaining 18 full-text papers, 4 citations were excluded as it was not clear whether antidepressant treatment was initiated in the postnatal period, 13 citations had no information on antidepressant treatment duration and 1 citation did not include antidepressants prescribed for postnatal depression. There were no disagreements between the two reviewers. Finally, one citation met the full criteria and was included in the review.

7.4.2 Characteristics of included study

The study included in the review is summarised in

Table 7.2. This cohort study by Rasmussen et al (166) was conducted in Denmark and utilised population-based registry data to describe the risk of postpartum affective disorder, the recurrent risk and the duration of antidepressant treatment in women who had given birth between 1996 and 2013. Conducting a quality assessment of this study raised no concerns about the inclusion of this paper and found it to be generally of high quality (Appendix C).

7.4.3 Duration of antidepressant treatment

The included study involved 457,317 women who had given birth between 1996 and 2013. Of these, 0.5% (n=2,389) had an antidepressant prescribed in the six months following their first childbirth (Table 7.3). The time taken for half of women to stop their first antidepressant treatment was 5.1 months (inter-quartile range: 2.5 – 14.0 months). Authors note that a relatively large proportion of women (23%) filled only one antidepressant prescription after childbirth and so have a very short treatment duration. As a result, only n=669 (28%) of women were still on treatment at 1 year postpartum and after 4 years this had reduced to just n=129 (5.4%) of women.

Figure 7.1: Identification of included study

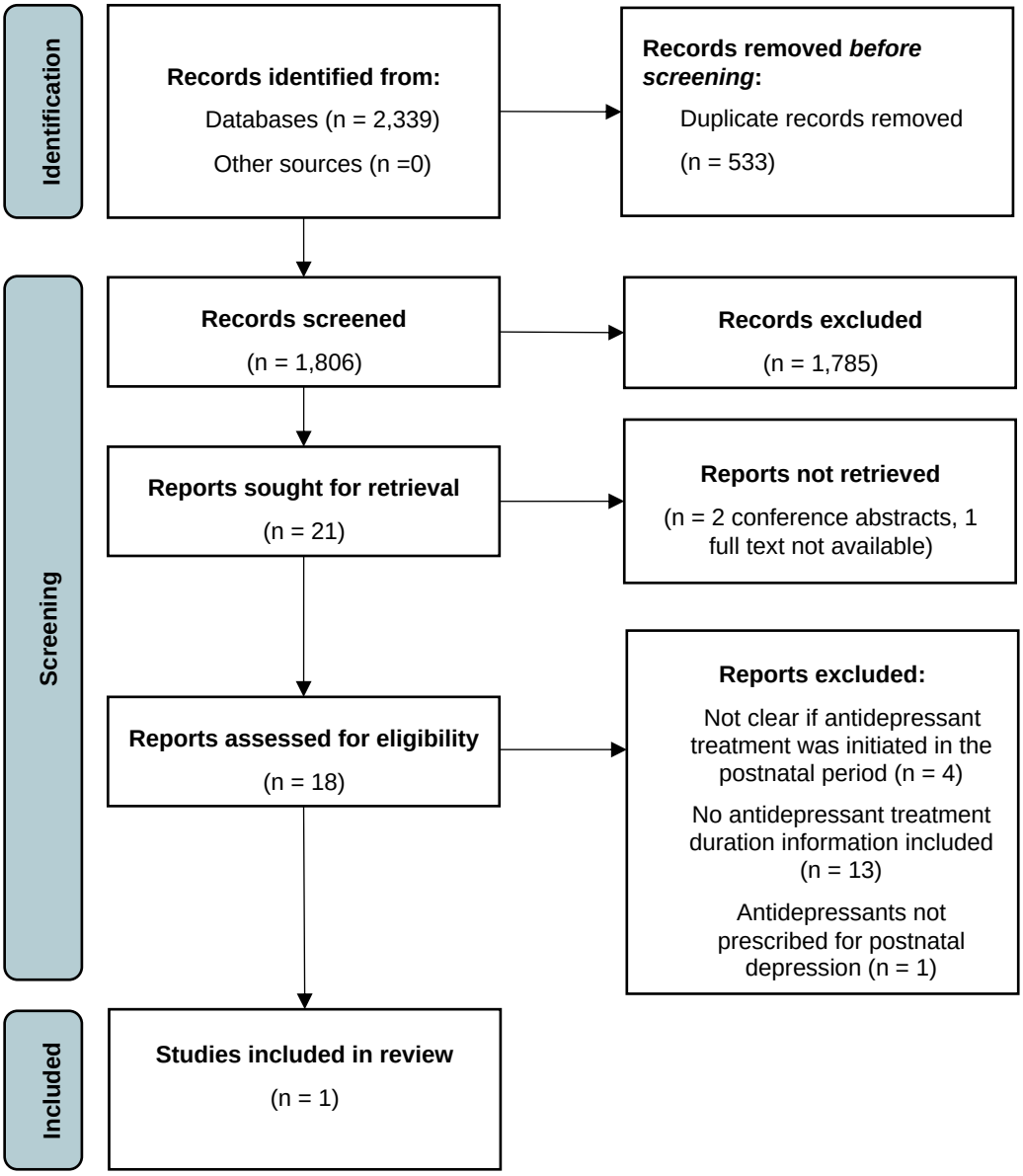


Table 7.2: Characteristics of included study

First Author	Country, year	Study design	Data source	Postnatal mental health identification
Rasmussen	Denmark, 2017	Cohort study	Population-based register	Prescribed antidepressant or hospital contact for depression in first 6 months after childbirth

Table 7.3: Study findings from systematic review

Study	Cohort	Cohort size	Postnatal antidepressant treatment	Time between prescription refills	Average duration (IQR)	Other findings
Rasmussen (2017)	Women who delivered their first live-born singleton child between 1st January 1996 and 31st December 2013 and no prior psychiatric hospital contacts and/or use of antidepressants	N=457,317	0.5% (n=2,389)	3 months	5.1 (2.5-14.0) months	23% of women filled only one antidepressant prescription 28% of women were still on treatment at 1 year 5% remained on treatment after 4 years

Abbreviations: IQR – inter-quartile range

7.5 Discussion

7.5.1 Main findings

In this systematic review I identified only one study which examined the duration of antidepressant treatment in postnatal women. This study found an average antidepressant treatment duration of 5.1 months, which is shorter than recommendations made by NICE (167). The lack of studies in this area makes it challenging to draw any conclusions regarding treatment duration of antidepressants for women after childbirth.

7.5.2 Study strengths and limitations

The included study in this review by Rasmussen et al, (166) was considered to be of high quality which adds strength to findings. Of concern, however, is the setting in which women with postnatal mental health needs were identified which may limit the generalisability of findings. Authors identified this through a prescribed antidepressant or hospital contact for depression in the first 6 months after childbirth only which resulted in identifying a small proportion of women (0.5%) with a postnatal antidepressant prescription. In addition, women with a prior history of psychiatric hospital contacts and/or use of antidepressants were excluded from this study and this study covered postnatal antidepressant use from 1996-2014, where prescribing has increased greatly over time. For example, in Denmark in 1999 (the earliest year data are available) 43.40 antidepressant drugs were prescribed per 1,000 women aged 25-44 years compared to 100.05 in 2013 (latest year data are available) (168). Other studies which have examined this in a broader cohort in a primary care setting found that 12% of women were prescribed an antidepressant in the year after childbirth (40). It is important that future studies seek to answer this question of treatment duration in a broader cohort of women with postnatal depression and in community settings. Furthermore, duration is only given after a woman's first birth and not stratified by characteristics – it would be essential to look beyond this, as duration may vary by age, prior use, parity or social deprivation, co-morbidities and again this should be considered in future research.

My preliminary scoping search revealed only a small number of studies which were relevant to my research question. As such, I decided to keep the inclusion and exclusion criteria as broad as possible in my full search to capture as many studies as possible. Particularly as studies may not have examined treatment duration as

their primary outcome but had included it in supporting analysis. This broad approach is a strength of this study. I did not however search for grey literature or non-English language studies which may have yielded further relevant information.

7.5.3 Conclusions and implications

The duration of antidepressant treatment in women with postnatal depression is understudied, despite antidepressants being regularly prescribed to women after childbirth. Further studies are needed to examine the typical duration of postnatal antidepressant treatment in a broad cohort of women and how this varies by women's characteristics.

7.6 Chapter summary

This systematic review of the literature has identified a clear gap in our understanding of how long women with treated postnatal depression remain on antidepressants for. In the next Chapter I will investigate this outcome in a broad cohort of women using EHRs from Primary Care.

8. Study IV: Duration of antidepressant treatment in women with postnatal depression: a cohort study using UK primary care data

8.1 Chapter overview

In this chapter, I will draw on primary care electronic health records from IMRD and the pregnancy cohort described in Chapter 3 to investigate in women who are prescribed antidepressant treatment in the postnatal period the duration of that treatment, and factors associated with duration. This will help address the research gap I identified in Chapter 7.

8.2 Background

As I outlined in Chapter 7 it is recommended by NICE that antidepressant treatment, once started, is continued for at least six weeks to experience the full effect and then, once women start to feel better, that treatment be continued for around six months (164). If treatment is stopped too soon, this may risk depressive symptoms returning. Despite these recommendations, as I found in Chapter 7, there has been very limited research into how long women with postnatal depression remain on antidepressant treatment. How long women may expect to be on antidepressant treatment is likely to be a crucial factor in women's decision making around treatment for postnatal depression and indeed may be a factor in seeking help for those symptoms in the first place. For example, if women knew that most women who initiate antidepressant treatment in the year after having a child had a relatively short treatment duration (less than a year) they may be encouraged to consider this treatment. In contrast however, if most women stay on treatment for longer (a year or more) they may be more reluctant to start treatment as this may feel like a more significant commitment and may wish to explore alternatives. This could be a particularly important factor of consideration for mothers as there can be practical limitations to other treatment options. For example, those with a young baby may find it difficult to attend regular scheduled therapy sessions or there may be waiting lists for other treatments which may feel overwhelming as they feel they need help more urgently. Understanding the expected treatment duration could help women and clinicians understand how long treatment may be required in order to make more informed decisions when choosing if antidepressant treatment is right for them.

In this study, I will expand on the work by Rasmussen et al (166) (Chapter 7) by investigating antidepressant treatment duration in a large cohort of women drawn from primary care data, and explore how that duration varies by key factors, including history of antidepressant treatment, parity, maternal age and social deprivation.

8.2.1 Objectives

In this chapter I will conduct a cohort study of women who have given birth to:

- Examine the initiation and duration of antidepressant treatment prescribed to women in the postnatal period.
- Explore how antidepressant prescription duration and discontinuation varies by patient characteristics – including age, deprivation, parity and prior history of antidepressant treatment.

As many women initiate antidepressant treatment at the time of their postnatal check (40), I will also investigate if having a history of antidepressant treatment impacted on the likelihood of having a postnatal check and so I will explore:

- The relationship between history of antidepressant treatment (prior to childbirth) and having a postnatal check in the year after childbirth.

8.3 Methods

8.3.1 Study population

Drawing on the cohort described in Chapter 4, in this study, I included women aged 15 to 49 years who gave birth between 1st January 2006 and 31st December 2015. Women who had been registered at a practice for less than six months were excluded. Women who did not have complete follow information up to their child turning one year of age (i.e. they died or transferred practice) and/or were missing social deprivation information were also excluded. Where women had multiple eligible children within the study period, one was selected at random for inclusion.

8.3.2 Definition of variables

8.3.2.1 Antidepressant treatment initiation

Women who had at least one antidepressant prescription within 12 months after the date of childbirth were considered exposed. Antidepressants were identified within a woman's therapy record and included: TCAs and related antidepressant drugs,

MAOIs, SSRIs, and other antidepressant drugs (See section 6.4.1). These were identified as any prescription categorised under the BNF chapter 4, subchapter 3 (4.3: Antidepressant drugs) (167). Upon consultation with my clinical supervisors, any prescriptions for amitriptyline or duloxetine were excluded as they likely related to treatment for pain or anxiety rather than depression.

8.3.2.2 Antidepressant treatment duration

The duration of first postnatal antidepressant prescription episode is the total number of days participants were on antidepressants from the day they were first prescribed. However, prescription duration is not recorded in IMRD and as there is no standard dose/duration of antidepressants in UK, I had to estimate this information. In this study, I utilized a waiting time distribution (WTD) approach based on the methodology developed by Stovring et al (169,170) to determine the usual time period in which we would expect a patient to receive a new antidepressant prescription and therefore remain on treatment. The WTD is a mathematical approach (log-normal interarrival distribution) which can be used to examine how long people wait for their prescription within a given time frame. This can be visualised to help us understand how long it would take before a certain proportion of the population would receive a prescription (Figure 8.1). A decision rule can be applied to determine in what time duration you anticipate that the prevalent proportion of your cohort will receive a prescription. This duration can then be used as an estimate of the time window in which you expect people who remain on treatment to receive a repeat prescription. For example, you may decide to identify the time period in which 80% of your cohort receive a prescription (such example is provided in Figure 8.1). This value can be varied, and sensitivity analyses performed.

Using the study start date (1 January 2006) as an entry point for all women, I identified the time taken (in days) for 80% of the cohort (women prescribed at least one antidepressant in the study period) to receive their first antidepressant prescription – the 80% inter-arrival density (IAD). This then provided me with an estimate of the time I would expect women to receive a repeat prescription and therefore remain on treatment. Thus, a prescription episode was defined as the time between the first antidepressant prescribed in the postnatal period and any subsequent prescriptions that were recorded in less time than the 80% IAD. If no

further prescriptions occur within the 80% IAD, the first episode ended at the 80% IAD. Women could have multiple prescription episodes during the study period and a new episode would begin when a prescription was issued after more than 80% IAD to the previous prescription. Women were followed-up for up to a maximum of five years following child's date of birth to identify duration of first antidepressant episode, censoring for practice transfer or death. If follow-up ended before reaching 80% IAD in an episode, it was assumed treatment continued up to and ended at the 80% IAD. A sensitivity analysis was conducted using the 90% IAD to compare key findings.

Figure 8.1: Density for a Log-Normal inter-arrival distribution with a mean of 90 days and standard deviation of 30 days

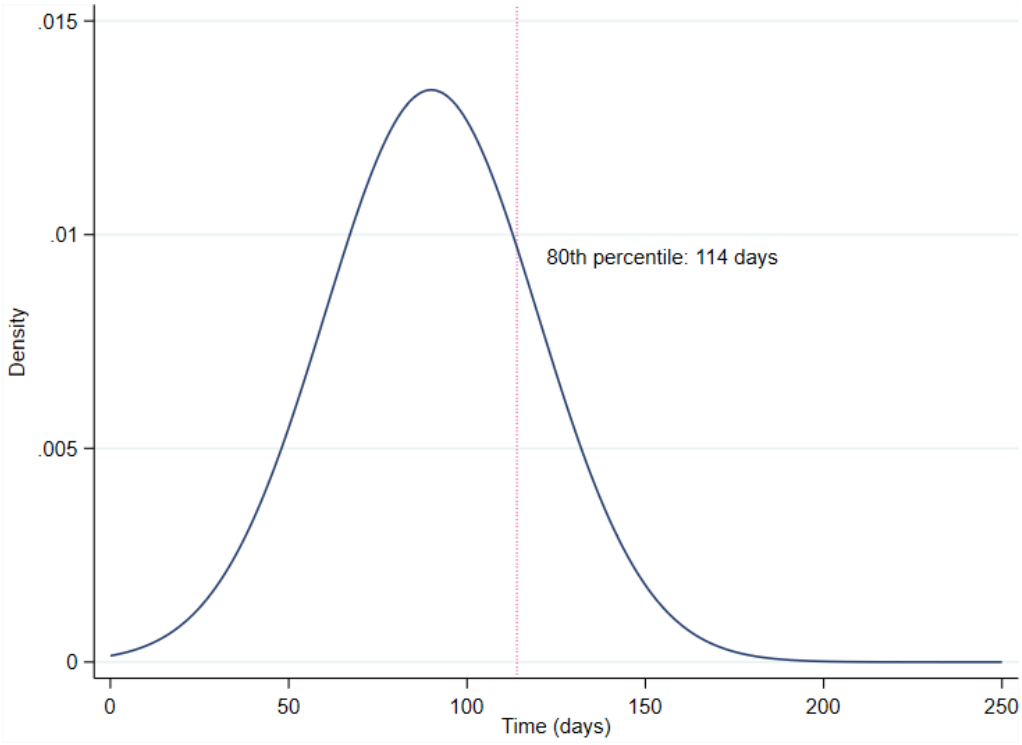


Figure adapted from Figure 1, Stovring et al 2016 (164).

8.3.2.3 Patient and childbirth characteristics

I stratified the antidepressant duration analysis by maternal age, social deprivation (Townsend score), history of antidepressant treatment, parity, mode of delivery and calendar year. Women were assigned to a five-year band according to their age at childbirth. I used Townsend score quintiles whereby each woman is assigned to one of five groups of deprivation, from least to most deprived. History of antidepressant treatment was categorised as: 'recent' – those who had a record of any antidepressant treatment in the 1 year before childbirth to cover the period of

conception and pregnancy; ‘previous’ – those who had a record of any antidepressant treatment in the period of 2 years before childbirth up to 1 year before childbirth, recognising that some women may stop treatment when planning to get pregnant and be pregnant; and ‘none’ – those with no record of any antidepressant treatment in the 2 years prior to childbirth. If a woman had both a recent and previous prescription, she was included in the recent group only. An exploration of using different time periods, including only going back 2 years before childbirth, to categorise history of antidepressant treatment was conducted and is included as a sensitivity analysis. Calendar year was grouped into two-year bands. Mode of delivery was determined using the identifying pregnancy/childbirth Read codes and was broadly grouped into ‘caesarean’, ‘vaginal’ and ‘unknown’ based on classifications developed previously (82).

8.3.2.4 Postnatal check

To determine if women who received antidepressant treatment before childbirth were more or less likely to have a postnatal check in the year after childbirth, I explored what proportion of those with a history of antidepressant received a postnatal check (as defined in Chapter 4).

8.3.3 Statistical analysis

I derived a table to show the characteristics of women with a postnatal antidepressant prescription at the time of their child’s birth. Poisson regression was used to explore how having a postnatal antidepressant prescription varied by age, deprivation, mode of delivery, party, history of antidepressant treatment and calendar year. Three models are presented unadjusted; adjusted for age, deprivation, mode of delivery, parity and year group; and a fully adjusted model. Practice was included as random effects term. The time to first prescription after childbirth was estimated in days given as the median in months and IQR. The median duration of first postnatal antidepressant prescription episode is given as number of months and the IQR and illustrated using a Kaplan–Meier graph stratified by history of antidepressant treatment, censoring for practice transfer, death or end of study. To examine which factors were associated with duration, Cox regression was used to explore how discontinuation of first antidepressant episode varied by age, social deprivation, history of antidepressant treatment and calendar year. Women who had less follow

up than the 80% IAD were excluded from this analysis to ensure they had enough follow-up time to meet the minimum episode duration. Upon exploration of the data, women aged 40-44 years and 45-49 years were combined into one category as there were few events in these groups. To minimize the impact of violating the proportional hazards assumption, discontinuation was estimated for four distinct time periods: the first covered from the 80% IAD up to six months after initiation, the second from six months to one year after initiation, the third from one year after initiation up to two years, and the fourth covered from two years up to three years after initiation. Unadjusted and fully-adjusted (for age, social deprivation, history of antidepressant treatment and year) estimates are presented for my key variables of interest: age and history of antidepressant treatment. The proportional hazards assumption was investigated using visual inspection of Kaplan-Meier plots and Schoenfeld residuals.

Practice was included as a cluster term. An exploration of using a 90% IAD was conducted to explore how this impacted on my outcome - duration of antidepressant treatment. Lastly, Poisson regression was used to explore how having a postnatal check varied by history of antidepressant treatment. Two models are presented unadjusted and a fully adjusted model.

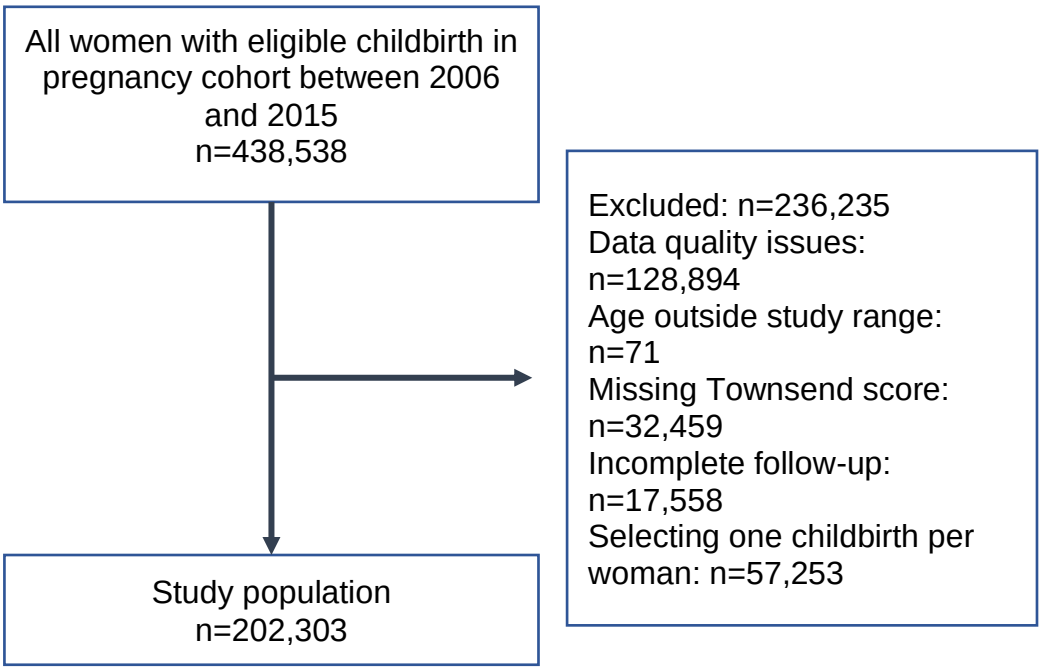
All analyses were conducted using Stata V.16 (StataCorp, College Station, Texas, USA).

8.4 Results

8.4.1 Participants

Between 1 January 2006 and 31 December 2015, 438,538 pregnancies/childbirths were identified in the pregnancy cohort within IMRD data. Study inclusion and exclusion criteria were applied to these records that resulted in a final sample of 202,303 women (Figure 8.2).

Figure 8.2: Flow diagram showing application of study inclusion and exclusion criteria



8.4.2 Antidepressant prescribing

In this study, 13.3% (n=26,835) of women had at least one antidepressant prescribed in the year after their infant's birth (Table 8.1). Younger women were more likely to have a postnatal antidepressant prescription compared to older women (unadjusted IRR (reference women aged 30-34 years): 1.62, 95%CI: 1.54-1.72 for women aged 15-19 years: 1.51, 95%CI: 1.46-1.57 for women aged 20-14 years; 1.05, 95%CI: 0.83-1.32 for women aged 45-49 years). Women living in the most deprived areas were 1.75 times more likely to have a postnatal antidepressant prescription compared to those living in the least deprived areas (unadjusted IRR: 1.75, 95%CI: 1.67-1.82 for most deprived compared to the least deprived – IRR: 1 - reference category). Of those with a postnatal antidepressant prescription (n=26,835), around half (53.7%) had no history of antidepressant treatment, 34.4% had a recent prescription and 11.9% had a previous prescription. Those with a

recent prescription were 7.5 times (unadjusted IRR: 7.56, 95%CI: 7.36-7.76) as likely to have a postnatal prescription and those with a previous prescription were 3.9 times (unadjusted IRR: 3.92, 95%CI: 3.77-4.08) compared to those with no history (1-reference category). Prescribing was similar across other characteristics and associations were comparable when adjusting for other variables (Table 8.1).

Table 8.1: Characteristics of women with an antidepressant prescription in the first year after childbirth and mixed-effects Poisson estimates of factors associated with a postnatal antidepressant prescription

Characteristic	n (% down)	Postnatal antidepressant prescription n (% across)	Postnatal antidepressant prescription		
			Unadjusted: IRR (95% CI)	Partially adjusted*: IRR (95% CI)	Fully adjusted**: IRR (95% CI)
Overall	202,303	26,835 (13.3)			
Maternal age (years)					
15-19	6,327 (3.1)	1,304 (20.6)	1.62 (1.54-1.72)	1.65 (1.55-1.75)	1.90 (1.79-2.02)
20-24	27,012 (13.4)	5,066 (18.8)	1.51 (1.46-1.57)	1.47 (1.42-1.53)	1.32 (1.27-1.37)
25-29	49,039 (24.2)	6,913 (14.1)	1.18 (1.14-1.22)	1.16 (1.12-1.20)	1.12 (1.08-1.16)
30-34	63,397 (31.3)	7,137 (11.3)	1	1	1
35-39	44,223 (21.9)	4,934 (11.2)	1.02 (0.98-1.06)	1.02 (0.98-1.05)	0.99 (0.96-1.03)
40-44	11,650 (5.8)	1,409 (12.1)	1.12 (1.05-1.18)	1.11 (1.05-1.17)	1.01 (0.96-1.07)
45-49	655 (0.3)	72 (11.0)	1.05 (0.83-1.32)	1.04 (0.83-1.31)	0.93 (0.73-1.17)
Townsend Score quintile					
1-least deprived	43,405 (21.5)	4,414 (10.2)	1	1	1
2	39,615 (19.6)	4,576 (11.6)	1.15 (1.10-1.20)	1.13 (1.08-1.18)	1.08 (1.04-1.13)
3	45,207 (22.4)	5,841 (12.9)	1.30 (1.25-1.35)	1.25 (1.20-1.30)	1.12 (1.08-1.17)
4	42,330 (21.0)	6,427 (15.2)	1.53 (1.47-1.59)	1.43 (1.37-1.49)	1.20 (1.15-1.25)
5-most deprived	31,746 (15.7)	5,577 (17.6)	1.75 (1.67-1.82)	1.58 (1.51-1.65)	1.23 (1.18-1.28)
History of antidepressant treatment					
Recent	14,363 (7.1)	9,232 (64.3)	7.56 (7.36-7.76)		7.48 (7.28-7.69)
Previous	9,627 (4.8)	3,206 (33.3)	3.92 (3.77-4.08)		3.84 (3.69-3.99)
None	178,313 (88.1)	14,397 (8.1)	1		1
Mode of delivery					
Vaginal delivery	49,595 (24.5)	6,490 (13.1)	1	1	1
Caesarean	15,759 (7.8)	2,164 (13.7)	1.06	1.12	1.07

			(1.01-1.12)	(1.06-1.18)	(1.02-1.12)
Unknown	136,949 (67.7)	18,181 (13.3)	1.00 (0.95-1.04)	1.03 (0.98-1.07)	1.02 (0.98-1.06)
Parity					
First	104,088 (51.5)	12,945 (12.4)	1	1	1
Second	38,167 (18.9)	5,182 (13.6)	1.07 (1.04-1.11)	1.16 (1.12-1.19)	1.06 (1.02-1.09)
Third or higher	10,445 (5.2)	1,581 (15.1)	1.15 (1.09-1.22)	1.26 (1.19-1.33)	1.03 (0.98-1.09)
Unknown	49,603 (24.5)	7,127 (14.4)	1.19 (1.16-1.23)	1.27 (1.23-1.31)	1.10 (1.06-1.13)
Year group					
2006-2007	44,713 (22.1)	5,950 (13.3)	1	1	1
2008-2009	43,512 (21.5)	5,772 (13.3)	0.99 (0.95-1.03)	0.98 (0.95-1.02)	0.98 (0.94-1.02)
2010-2011	41,466 (20.5)	5,691 (13.7)	1.02 (0.98-1.06)	1.01 (0.97-1.05)	0.97 (0.93-1.00)
2012-2013	40,211 (19.9)	5,466 (13.6)	1.01 (0.97-1.05)	1.00 (0.97-1.04)	0.92 (0.89-0.96)
2014-2015	32,401 (16.0)	3,956 (12.2)	0.89 (0.86-0.93)	0.89 (0.86-0.93)	0.81 (0.78-0.84)

**Adjusted for maternal age, Townsend score, mode of delivery, parity and year group.*
***Adjusted for maternal age, Townsend score, mode of delivery, history of antidepressant treatment, parity and year group.*
GP Practice is included as a random-effects term
Abbreviations: CI – confidence interval, IRR – Incident rate ratio.

8.4.3 Time to first antidepressant prescription

For all women, the time to first postnatal antidepressant prescription was 3.4 months (IQR: 1.4-6.8). Older women had their first prescription sooner than younger women (2.2 months (IQR: 1.1-5.1) for women aged 45-49 years compared to 3.7 months (IQR: 1.7-6.9) for women aged 15-19 years). Most notably, the time to first prescription after childbirth was 4.8 months (IQR: 2.4-7.9) for those with no prior history of antidepressant use, 1.4 months (IQR: 0.6-3.5) for those with a recent history of antidepressant treatment and 3.9 months (IQR:1.7-7.2) for those with previous treatment (Table 8.2). Time to first prescription was broadly similar across other characteristics.

Table 8.2: The time to and duration of first postnatal antidepressant episode in months, by characteristic

Characteristic	Time to first antidepressant prescription in months, median (IQR)	Duration of first postnatal antidepressant in months, median (IQR)
Overall	3.4 (1.4-6.8)	6.5 (3.3-13.5)
Maternal age (years)		
15-19	3.7 (1.7-6.9)	4.1 (2.9-6.8)
20-24	3.6 (1.5-6.8)	4.8 (2.9-9.2)
25-29	3.4 (1.4-6.8)	6.2 (2.9-12.6)
30-34	3.4 (1.3-7.0)	7.6 (3.7-15.5)
35-39	3.2 (1.2-6.7)	8.7 (3.9-17.8)
40-44	2.8 (1.1-6.2)	8.8 (4.1-19.5)
45-49	2.2 (1.1-5.1)	7.0 (3.5-15.9)
Townsend Score quintile		
1-least deprived	3.5 (1.4-7.1)	7.5 (3.7-14.9)
2	3.5 (1.4-6.9)	7.2 (3.6-14.6)
3	3.5 (1.4-6.8)	7.0 (3.4-13.9)
4	3.2 (1.3-6.7)	6.1 (2.9-13.2)
5-most deprived	3.2 (1.3-6.7)	5.6 (2.9-11.2)
History of antidepressant treatment		
Recent	1.4 (0.6-3.5)	9.6 (4.4-20.4)
Previous	3.9 (1.7-7.2)	6.1 (2.9-12.1)
None	4.8 (2.4-7.9)	5.5 (2.9-10.3)
Mode of delivery		
Vaginal delivery	3.4 (1.4-6.8)	6.4 (3.0-13.3)
Caesarean	3.4 (1.3-6.9)	7.1 (3.6-15.0)
Unknown	3.4 (1.4-6.8)	6.5 (3.3-13.5)
Parity		
First	3.5 (1.4-7.0)	6.3 (2.9-12.6)
Second	3.3 (1.4-6.6)	7.1 (3.6-15.4)
Third or higher	2.9 (1.1-6.9)	6.7 (3.4-15.6)
Unknown	3.2 (1.3-6.6)	6.5 (3.3-13.7)
Year group		
2006-2007	3.9 (1.5-7.2)	6.5 (3.3-13.8)
2008-2009	3.7 (1.5-7.1)	6.8 (3.4-14.0)
2010-2011	3.4 (1.4-7.0)	6.8 (3.3-15.1)
2012-2013	3.1 (1.2-6.6)	6.8 (3.4-15.1)
2014-2015	2.4 (1.1-5.5)	5.6 (2.9-10.1)

Abbreviations: IQR – inter-quartile range.

8.4.4 Duration and discontinuation of antidepressant treatment

In this study the 80% IAD between prescriptions was estimated to be 89 days (95%CI: 81-96). The median duration of first antidepressant episode for all women was 6.5 months (IQR: 3.3-13.5) (Table 8.2). Most notably, duration was longer for women with a history of antidepressant treatment compared to those with no history (9.6 months, IQR 4.4-20.4 vs 5.5 months, IQR: 2.9-10.3 respectively). Duration also typically increased with age (4.1 months, IQR: 2.9-6.8 for women aged 15-19 years vs 8.8 months, IQR: 4.1-19.5 for women aged 40-44 years) and decreased with deprivation (7.5 months, IQR: 3.7-14.9 for least deprived vs 5.6 months, IQR: 2.9-11.2 for most deprived).

After excluding those with less than 89 days of follow-up (n=6,792), 20,043 women remained in this analysis. Women who were excluded were broadly similar in terms of age, deprivation and history of antidepressant treatment compared to the group as a whole (data not shown). At all time periods, the Hazard of discontinuing antidepressant treatment was highest in younger women. After adjusting for other factors, the Hazard of discontinuing at six months after initiation was more than twice as high in women aged 15-19 years compared to women aged 30-34 years (aHR: 2.19, 95% CI: 1.96-2.44 and aHR:1 – reference group, respectively) (Table 8.3). Conversely the Hazard of discontinuing was lowest for those with a recent history of antidepressant treatment across all time periods (at six months after initiation aHR: 0.59, 95% CI: 0.55-0.63 for women with a recent history compared to aHR: 1-refernce category, for women with no history). Up to one year after initiation, those living in the most deprived areas had a higher Hazard of discontinuing antidepressant treatment (aHR: 1.17, 95% CI: 1.07-1.28 for the most deprived between 6 months and one year after initiation, compared to aHR:1 – reference group for the least deprived) but there was minimal difference between these groups after one year (Table 8.3). The Hazards were proportional for measures reported.

*Table 8.3: Mixed-effects Cox estimates of factors associated with discontinuation of postnatal antidepressant prescription in distinct time periods after initiation; unadjusted and fully adjusted**

Characteristic	90-180 days (first 6 months)		6 months to 1 year		1-2 years		2-3 years	
	Unadjusted: HR (95% CI)	Fully adjusted*: HR (95% CI)	Unadjusted: HR (95% CI)	Fully adjusted*: HR (95% CI)	Unadjusted: HR (95% CI)	Fully adjusted*: HR (95% CI)	Unadjusted: HR (95% CI)	Fully adjusted*: HR (95% CI)
Maternal age (years)								
15-19	2.56 (2.30-2.84)	2.19 (1.96-2.44)	2.00 (1.77-2.27)	1.71 (1.50-1.94)	1.68 (1.39-2.02)	1.54 (1.27-1.89)	1.90 (1.24-1.51)	1.70 (1.05-2.73)
20-24	1.88 (1.74-2.02)	1.74 (1.61-1.88)	1.41 (1.32-1.52)	1.31 (1.22-1.41)	1.34 (1.22-1.47)	1.30 (1.18-1.43)	1.28 (1.08-1.52)	1.19 (0.99-1.43)
25-29	1.33 (1.24-1.42)	1.28 (1.19-1.37)	1.14 (1.07-1.22)	1.10 (1.03-1.17)	1.17 (1.08-1.27)	1.16 (1.07-1.26)	1.18 (1.03-1.36)	1.17 (1.02-1.35)
30-34	1	1	1	1	1	1	1	1
35-39	0.85 (0.78-0.92)	0.88 (0.81-0.95)	0.85 (0.80-0.92)	0.87 (0.81-0.93)	0.95 (0.87-1.03)	0.95 (0.88-1.04)	0.81 (0.71-0.94)	0.83 (0.72-0.95)
40-49	0.92 (0.81-1.06)	0.99 (0.86-1.13)	0.85 (0.76-0.95)	0.91 (0.81-1.01)	0.81 (0.72-0.92)	0.84 (0.74-0.95)	0.89 (0.73-1.07)	0.90 (0.75-1.08)
History of antidepressant treatment								
Recent	0.56 (0.53-0.60)	0.59 (0.55-0.63)	0.53 (0.50-0.55)	0.53 (0.50-0.56)	0.64 (0.60-0.68)	0.64 (0.60-0.68)	0.80 (0.72-0.89)	0.76 (0.68-0.85)
Previous	0.90 (0.83-0.97)	0.93 (0.86-1.01)	0.85 (0.79-0.92)	0.87 (0.80-0.94)	0.94 (0.86-1.04)	0.95 (0.86-1.05)	0.94 (0.79-1.13)	0.94 (0.78-1.14)
None	1		1	1	1	1	1	1

**Adjusted for age, Townsend score, history of antidepressant treatment and year group. Abbreviations: HR – Hazard ratio, CI – confidence interval. Practice is included as a cluster term.*

8.4.5 Postnatal check and history of antidepressant treatment

Of those women included in this analysis, 57.4% (n=116,087) had a record of a postnatal check. In fully adjusted analysis, those with a recent antidepressant prescription were 6% (95% CI: 9%-4%) less likely to have a postnatal check and those with a previous antidepressant prescription were 3% (95% CI: 6%-0%) less likely to have a postnatal check compared to those with no previous history (Table 8.4).

*Table 8.4: Mixed-effects Poisson estimates of how history of antidepressant treatment is associated with having a postnatal check; unadjusted and fully adjusted**

Characteristic	n (% down)	Postnatal check n (% across)	Postnatal check	
			Unadjusted: IRR (95% CI)	Fully adjusted*: IRR (95% CI)
Overall	202,303	116,087 (57.4)		
History of antidepressant treatment				
Recent	14,363 (7.1)	7,549 (52.6)	0.93 (0.91-0.95)	0.94 (0.91-0.96)
Previous	9,627 (4.8)	5,252 (54.6)	0.96 (0.94-0.99)	0.97 (0.94-1.00)
None	178,313 (88.1)	103,286 (57.9)	1	1

**Adjusted for age, deprivation and year group*
Abbreviations: IRR – incidence rate ratio, CI – confidence interval.
Practice is included as random effects terms.

8.4.6 Sensitivity analysis – varying the inter-arrival density between prescriptions

The 90% IAD between prescriptions was estimated to be 163.2 days (95%CI: 150.4-175.9). Using this IAD, the duration of first antidepressant episode for all women was 11.3 months (IQR: 6.3-22.5) (in contrast to 6.5 months with 80% IAD) (Table 8.4). The relationship between antidepressant treatment duration and other characteristics (age, social deprivation, history of antidepressant treatment and year group) was similar to the relationships when using the 80% IAD.

Table 8.5: Duration of first postnatal antidepressant prescription using 90% inter-arrival density

Characteristic	Duration of first postnatal antidepressant in months, median (IQR)
Overall	11.3 (6.3-22.5)
Maternal age (years)	
15-19	7.4 (5.4-12.0)
20-24	8.7 (5.4-15.6)
25-29	10.6 (6.2-20.4)
30-34	12.9 (6.9-26.1)
35-39	14.7 (7.4-32.1)
40-44	15.5 (7.8-34.6)
45-49	14.8 (7.7-34.9)
Townsend Score quintile	
1-least deprived	12.6 (6.7-25.0)
2	12.3 (6.5-24.7)
3	11.7 (6.3-22.7)
4	10.5 (6.1-21.5)
5-most deprived	9.8 (6.0-19.2)
History of antidepressant treatment	
Recent	17.7 (8.9-36.2)
Previous	10.8 (6.2-19.9)
None	9.0 (5.4-16.0)
Year group	
2007-2008	11.5 (6.3-24.2)
2009-2010	11.4 (6.3-24.8)
2011-2012	12.1 (6.3-27.5)
2013-2014	12.5 (6.4-25.6)
2015-2016	9.2 (6.0-14.4)

Abbreviations: IQR – inter-quartile range.

8.4.7 Sensitivity analysis - history of antidepressant treatment

In my primary analysis I found that 64% of women with a recent antidepressant prescription (row C, column E in table 8.6) and 53% of women with a previous prescription (row B, column E in table 8.6) had a postnatal antidepressant prescription (Table 8.6). If I examine women with a prescription more than two years before childbirth (row A, column E in table 8.6), only 34% of women have a postnatal antidepressant prescription. There are also quite a large proportion of recent users who appear to be long-term users and vice versa. Thus, there was a clear overlap between those in our recent and previous categories; 52% of those with a previous prescription had a recent prescription and 72% of those with a recent prescription had a previous prescription (Table 8.6).

Table 8.6: Exploration of different time periods relating to history of antidepressant prescriptions. These tables present conditional frequency of records: given that one meets the criteria on a given row on the left-hand side, what is the frequency of meeting the criteria across the columns along the top. For example, the table illustrates that 47% of those in row E, also met the criteria for column A. On the other hand, 34% of those in row A, also met the criteria for column E. These correspond to: A – women who were prescribed at least 1 antidepressant more than 2 years before childbirth. B – women who were prescribed at least 1 antidepressant 2 years before childbirth up to 1 year before childbirth. C – women who were prescribed at least 1 antidepressant in year prior to childbirth. D – women who were prescribed at least 1 antidepressant in the 18 to 6 months before start of pregnancy (27 months-15 months before childbirth). E – women with the outcome, those who were prescribed at least 1 antidepressant in the year after childbirth.

N=202,303	A	B ‘previous’	C ‘recent’	D	E Postnatal
A	A	36%	24%	38%	34%
B ‘previous’	66%	B	52%	87%	53%
C ‘recent’	62%	72%	C	62%	64%
D	74%	90%	47%	D	52%
E Postnatal	47%	39%	34%	37%	E

8.5 Discussion

8.5.1 Main findings

In this chapter, I found that 13% of women received an antidepressant prescription in the year after childbirth and 50% remain on this treatment for 6.5 months or longer. Most notably, women with a recent history of antidepressant treatment were more than seven times as likely to have a postnatal prescription compared to those with no history and women who had a previous prescription were nearly four times as likely. Also, the median duration of treatment in those with a recent history of antidepressant treatment was longer than those with no history (9.6 vs 5.5 months respectively).. Younger women (aged 15-24 years) were around twice as likely to have a postnatal antidepressant prescription compared to older women (aged 35-44 years) but have a shorter treatment duration. Similarly, women living in the most deprived areas were more likely to have an antidepressant prescription and have a shorter treatment duration compared to women living in the least deprived areas. Likelihood of antidepressant prescription and treatment duration was similar for other characteristics. Lastly, women with a history of antidepressant treatment were 6% (95% CI 9%-4%) less likely to have a postnatal check compared to those with no previous history.

8.5.2 Study strengths and weaknesses

This is among one of the largest (N=202,303) population-based studies to examine antidepressant initiation and treatment duration in recent mothers to-date. The use of EHRs from primary care allowed me to utilise longitudinal prescribing data which captures information before and after childbirth which provided detailed context on the use of postnatal antidepressants and allowed me to explore how treatment duration varies by women's characteristics (including social deprivation and history of treatment). These are strengths of this study. Additionally, using a WTD approach to determine prescribing episodes and treatment duration adds new information relating to the expected time between antidepressant prescriptions based on real world prescribing data. The parameters of this were also explored through a sensitivity analysis which showed that increased the IAD (expected time between prescriptions) to 90% did not alter the relationships between antidepressant treatment duration and patient characteristics, but it did change the duration of the first prescribing episode from 6.5 months to 11.3 months.

One limitation of this study is that I focused my analysis on the first postnatal treatment episode of the childbirth of interest, this means I may miss more nuanced information about those who restart treatment within the study period and the possible impact of future pregnancies and childbirths on treatment trajectories. Another potential limitation relates to how I categorised history of antidepressant treatment. The time period cut-offs for the categories in this variable may impact my findings with regards to postnatal treatment initiation and duration. However, to investigate the impact of using different time periods, I conducted a sensitivity analysis examining how all prior history of antidepressant treatment related to postnatal treatment initiation. This analysis showed that those with an antidepressant prescription more than two years before childbirth were much less likely to have a postnatal antidepressant prescription and thus, it seems reasonable not to consider these women in the primary analysis. Additionally, I chose to split those with a history of antidepressant treatment into 'recent' a prescription in the year before childbirth and 'previous' a prescription between the two years before and up to one year before childbirth. This allowed me to separate out those who stopped taking antidepressants during conception and pregnancy in my analysis. These decisions may impact on the interpretation of this variable and future studies could investigate this further.

8.5.3 Findings in relation to previous studies

My finding that 13.3% of mothers have a postnatal antidepressant prescription is broadly in line with previous research which found that 12% of women had an antidepressant prescribed in the year after childbirth (40). Similarly, my findings that younger women and those living in more deprived areas are more likely to have an antidepressant prescription echoes findings from studies exploring how postnatal depression (not just an antidepressant prescription) varies by these characteristics (9,10,22,23,24). I identified just one prior study by Rasmussen et al in 2017 which examined duration of postnatal antidepressant treatment. Authors found an average treatment duration of 5.1 months in women with no history of depression or treatment (166). In my study we identified a longer average treatment duration of 6.5 months, but I included all women regardless of their mental health history. When my results were restricted to just those with no prior history of antidepressants (median duration 5.5 months, IQR: 2.9-10.3 months) the findings are more comparable.

Lastly, in my study I identified history of antidepressant use as a key risk factor for a postnatal antidepressant prescription which has been identified by others (42,115).

8.5.4 Implications of findings and future research recommendations

NICE guidelines recommend that antidepressant treatment be taken for at least six weeks; and be continued at the same dose for at least six months or longer to avoid a relapse in symptoms (167). In my study I did find that half of women remained on treatment for at least six months which is broadly in line with these recommendations; however, younger women aged 15-24 years fall below this threshold and had a treatment duration of around 4.5 months and so did women from more deprived areas. It is important to understand why younger and/or more deprived women have a shorter treatment duration, particularly as women in this group were more likely to have an antidepressant prescription, and if the treatment prescribed is meeting their needs. Additionally, in this study I was interested in duration of treatment only and was not able to explore reasons for different durations. For example, if someone has a short treatment duration, I cannot confirm if this is because their depressive symptoms resolved or if they stopped for another reason – such as treatment side effects or that they found the treatment to be ineffective. Future research could investigate the reasons behind the antidepressant treatment durations identified in this study and importantly if this treatment leads to a resolution in depressive symptoms in the medium and long term for all patient groups.

My sensitivity analysis which explored varying the parameters of the IAD to investigate the expected time between prescriptions found that using 90% IAD gave an expected time between prescriptions of 163.2 days (roughly 5.5 months) compared to 89 days (3 months) for the 80% IAD. This means that using the 90% IAD approach it is possible for two prescriptions which are nearly 6 months apart (with none in-between) to be considered as part of the same treatment episode and thus determining that somebody remained on continuous treatment for that time. This approach is likely to overestimate the time between prescriptions as it is reasonable that somebody could stop and restart treatment within 5-6 months which could incorrectly classify intermittent users as continuous users and result in an inflated treatment duration of 11.3 months (compared 6.5 months for 80% IAD). In addition, it is unlikely that someone would be prescribed nearly six months of

antidepressants at one time. The 80% IAD value of 89 days between prescriptions is a much more reasonable estimate which is more in-line with clinical expectations and prescribing duration and thus why I chose this estimate to be used in this study.

In this study I also sought to explore my hypothesis that women who have an antidepressant prescription in the year after having a child fall into one of three trajectories. The first, are those with a mental health need which existed prior to pregnancy/childbirth and return to or continue a pre-existing treatment schedule in the year after having a child. I found that around a third of women (34%) with a postnatal prescription had one in the year before childbirth/during pregnancy and these women had a much shorter time to first prescription (1.4 months, IQR: 0.6-3.5) suggesting that these women remained on treatment through pregnancy and into the postnatal period. These women also have a longer treatment duration. The second, are those where postnatal depression is a discrete episode and treatment duration is short-term (less than one year). I found that of those with a postnatal antidepressant prescription, around half (53.7%) had no history of antidepressant treatment and that these women had a longer treatment duration (9.6 months, IQR: 4.4-20.4)than those with a recent prescription, with a median treatment duration of 5.5 months (IQR:2.9-10.3). Third, those where postnatal depression is the beginning of a long-term mental health condition and treatment continues beyond the postnatal period. I found that few women continued on the same treatment episode for many years..

My analysis demonstrates that there does seem to be merit in considering women with a postnatal antidepressant prescription in these different trajectories as these women likely have different risk factors for postnatal depression and may benefit from different treatment courses. My finding that women who had a history of antidepressant treatment were much more likely to be prescribed antidepressants after childbirth demonstrates that history of antidepressant use remains a very relevant factor for health care professionals and patients to consider when identifying those at risk of postnatal depression and longer-term treatment use. Future studies could expand on this history of antidepressant treatment variable by including symptoms and diagnoses of depression (and other mental health conditions). It would also be particularly beneficial for future studies to seek to identify possible risk factors for postnatal antidepressant treatment in those with no history of treatment. It is likely that factors beyond what is captured in EHRs will be relevant. For example,

these could include how the mother is sleeping, her access to social support networks, the health of the infant and possible work or financial stress etc. The shorter treatment duration identified in this group and the particularly short treatment duration in younger women and those living in more deprived areas should also be further investigated to identify if these women are having their needs met, if treatment is less effective in these groups or if particular barriers to treatment exist.

8.5.5 Conclusion

I found that more than one in ten women initiated antidepressant treatment in the year after childbirth, and that half of women remained on treatment for at least 6.5 months. Younger women and those living in more deprived areas had shorter treatment durations, while women who had a recent history of antidepressant treatment remained on treatment much longer. Further studies are needed to investigate if the treatment duration identified is sufficient to resolve depressive symptoms in all women. History of antidepressant treatment remains a crucial factor in identifying those at risk after having a child and GPs should be mindful of this. My findings add valuable new information about how long women may expect to remain on antidepressant treatment after childbirth which is a crucial consideration for treatment options for both patients and GPs.

8.6 Chapter summary

In this final results chapter, I have detailed a study in which I investigated the duration of antidepressant treatment in women prescribed in the year after childbirth using IMRD and explored how that duration varied by key factors, including history of antidepressant treatment. In the next chapter I will draw on the results from the four studies in my thesis to discuss these findings, outline the broader implications of my research for policy and practice and suggest areas of further research.

9. Discussion

9.1 Chapter overview

In this chapter, I will summarise the key findings from the four studies in this thesis. I will also discuss some common themes I identified across my studies and the broader implications my findings have for both health policy and clinical practice, and suggest potential areas for further research. This chapter builds on the detailed discussions in each individual study chapter.

9.2 Key findings

This thesis had two aims:

Part I: To understand the primary care use of women in the UK in the postnatal period.

Part II: To determine the duration of antidepressant treatment in women with a postnatal prescription.

Below, I will summarise the key findings of each study:

Part I:

1. **Postnatal checks and primary care consultations in the year following childbirth: an observational cohort study using IMRD**

In Chapter 4, I identified 309,573 childbirths of women who had given birth between 2006-2016 in IMRD. I found that just over half of women (56%) had a record of a postnatal check in the year after childbirth. Teenage women (aged 15-19 years) were 12% less likely to have a postnatal check compared with older women aged 30-35 years, and those living in the most deprived areas were 10% less likely to have a check compared to women from the least deprived areas. Women consulted on average 4.8 times per year and 94.7% of women had at least one consultation in the year after childbirth. Those who had a caesarean delivery and smokers had higher than average consultation rates (7.7 times per women per year and 5.9 times per women per year respectively). Across the first year, the consultation rate is highest in week six with a peak of 11.8 consultations/ 100 women, which coincides with the postnatal check, after week ten the consultation rate is flat with 1 consultation/ 100 women on each day.

2. **Common postnatal clinical events or health needs: a descriptive study using IMRD**

In Chapter 5, I found that in the first 100 days after childbirth, women were most likely to use primary care services to have a postnatal visit or check, for monitoring (such as a blood pressure reading, height or weight measurement), and to access contraception. Younger women were more likely to have contacts relating to infections and future, preventative care compared to older women, but were less likely to have contacts for ongoing mental and physical symptoms or conditions, and pre-existing conditions. Women living in the most deprived areas were more likely to have contacts relating to pre-existing conditions compared to least deprived women but rates were similar across other categories. In the first few weeks after childbirth, contacts mostly related to acute conditions (infections), pain, anaemia and blood disorders, constipation, and haemorrhoid or anal abscess. The highest peak in contacts occurred at the time of the postnatal check. At this time, contacts related to clinical events, including documenting a postnatal check or visit, monitoring a patient (taking a blood pressure or temperature reading) and recording lifestyle factors (such as alcohol use or smoking status). In addition, women received support for several health needs at the time of this check including contraception, infections, symptoms affecting the skin, and depression and low mood; providing education, advice or counselling was also common at the time of the postnatal check.

Part II:

3. **Duration of antidepressant treatment in women with postnatal depression: a systematic review**

In this third study (Chapter 7), my systematic review of the literature identified just one prior study which had investigated the duration of antidepressant treatment in women with a postnatal prescription. This study found an average antidepressant treatment duration of 5.1 months, which is shorter than what is recommended in the UK (at least 6 months). The study also had limited generalisability. In particular, authors used data from a hospital setting only which resulted in a small proportion of women (0.5%) having a postnatal antidepressant prescription. Furthermore, women with any prior history of psychiatric hospital contact and/or prior antidepressant treatment were excluded from the duration analysis. Meaning this study only

captured incident antidepressant users in a hospital setting. The lack of generalisable studies in this area made it challenging to draw any conclusions regarding treatment duration of antidepressants for all women after childbirth.

4. Duration of postnatal antidepressant treatment: a cohort study using IMRD

In this fourth study (Chapter 8), I sought to address the research gap identified in the previous chapter by again drawing on the cohort of women who had given birth identified in IMRD and used throughout this thesis. I found that 13% of women initiated antidepressant treatment in the year after childbirth and that 50% of women remained on this treatment for at least 6.5 months. Most notably, women with a history of antidepressant treatment were much more likely to have a postnatal prescription compared to those with no history, (7.5 times as likely for women who had a recent prescription and 3.9 times as likely for women who had a previous prescription). The median duration of treatment in those with a recent history of antidepressant treatment was much longer than those with no history (9.6 vs 5.5 months respectively). Additionally, those with a history of antidepressant treatment were less likely to have a postnatal check documented in their record. Younger women (aged 15-19 years) were nearly twice as likely to have a postnatal antidepressant prescription compared to older women (aged 45-49 years), but their treatment was on average 3 months shorter. Similarly, women living in the most deprived areas were more likely to have an antidepressant prescription and have a shorter treatment duration compared to women living in the least deprived areas.

Detailed strengths and limitations, comparison of findings to previous studies, implications of findings for policy and practice, and future research recommendations for each study are included in individual chapters.

In the next section I will outline some additional findings I identified across the studies.

9.3 Additional findings

9.3.1 Varying needs of different subgroups of women

Throughout this thesis I repeatedly found that certain subgroups of women, in particular younger women and women living in the most deprived areas, had worse outcomes or different needs compared to average. For example, younger women were 12% less likely to have a postnatal check compared to older women (15-19 years vs 30-34 years), and this was despite having higher overall consultation rates (women aged 15-19 years had 5.0 consultations per person-year compared to 4.6/ person-year for women aged 30-34 years). Women aged 15-19 years were also 90% more likely to have a postnatal antidepressant prescription compared to women aged 30-34 years when other factors were adjusted for but have a shorter treatment duration (women aged 15-19 years had a treatment duration of 4.1 months compared to 7.6 months for women aged 30-34 years).

Similarly, women living in the most deprived areas were 10% less likely to have a postnatal check compared to women in the least deprived areas, this was again despite having higher overall consultations rates (women in the most deprived areas had 5.0 consultations per person-year compared to 4.7/ person-year for women in the least deprived areas). While less likely to have a postnatal check, women in the most deprived areas were more likely to have contacts for pre-existing conditions. They were also 23% more likely to have a postnatal antidepressant prescription compared to women in the least deprived areas once other factors were adjusted for but have a shorter treatment duration (women in the most deprived areas had a duration of 5.6 months compared to a duration of 7.5 months for women in the least deprived areas). It is also likely that the needs of this group are underestimated in this thesis as IMRD has an under-representation of women living in the most deprived areas compared to the general population (75).

9.3.2 Does clinical practice reflect guidelines?

Through the analysis conducted in Chapter 4 and 5, I can make some observations about how real world clinical practice captured through primary care EHRs and in particular the documentation of the postnatal check reflects the 2006 NICE Guidelines ‘Postnatal care up to 8 weeks after birth’ (23), the relevant UK guideline for my study period of interest. As I outlined in Chapter 1, NICE (and WHO) recommend that all women have a postnatal check 6-8 weeks after childbirth as part

of their routine postnatal care (23,66). In my study (Chapter 4) I found that just over half of women (56%) had a record of a formal postnatal check, meaning that 4 in 10 women may have missed out. The NICE guideline outlines that at the postnatal check a women's physical, emotional and social wellbeing should be reviewed. While it is not specific on which health concerns should be covered in the check, the guideline does offer a long list of potential areas of postnatal care including: perineal care, dyspareunia, headache, fatigue, backache, constipation, haemorrhoids, faecal incontinence, urinary retention, urinary incontinence, contraception, immunisation and breastfeeding concerns (23). In Chapter 5, I found that contraception, infection, pain (which includes headaches and backache), fatigue, constipation, haemorrhoids and breastfeeding related concerns were among the most documented health needs or clinical events in IMRD. This means there is reasonable overlap between the health needs outlined in the NICE guidelines and what I identified in real-world clinical practice. Faecal and urinary incontinence, urinary retention and perineal care (which may have been partially captured by our category 'symptoms or treatments affecting the skin') were the only health needs on this list not identified in my study and these were also found to be commonly experienced by women in studies using questionnaire and self-reporting methods. This may mean these needs are not being identified and met during postnatal care or they are not well documented in this type of data.

9.4 Implications of findings for policy and practice

9.4.1 Updated guidelines and GP contract

Since I began work on this thesis, a substantial update to the NICE Guidelines which covers the routine postnatal care women should receive in the first 8 weeks after childbirth has been issued and the England GP contract was updated with key changes regarding postnatal care.

In 2020, the GP contract was updated to: require all practices to deliver a maternal check 6-8 weeks after birth as an additional appointment to the 6-8 week baby check (previously the maternal postnatal check was recommended for practices to offer, but not required); consider maternity medical services to be an essential service; and, revise the GP contract's definition of the 'postnatal period' to cover up to 8 weeks after childbirth (it previously just covered the first 2 weeks after childbirth) (171). An additional £12 million was provided to support the provision of these

checks. The contract outlines that the content of the postnatal check should be in line with NICE guidance and focus on: the mother's mental health and general wellbeing, the return to physical health following childbirth, contraceptive options and a review of conditions that existed before or arose during pregnancy (171).

The new NICE guideline "Postnatal Care" was published in 2021 (172) and alongside this, the NICE Quality Standard was updated in 2022 (173). These updated guidelines still recommend that GPs provide a postnatal check 6-8 weeks after childbirth, but the potential areas of care have been updated since 2006, and include: signs and symptoms or postnatal mental health and physical health problems, importance of pelvic floor exercises, fatigue, nutrition and diet, physical activity, smoking, alcohol, recreational drug use, contraception, sexual intercourse, safeguarding concerns, symptoms and signs of infection, pain, vaginal discharge and bleeding, bladder function, bowel function, nipple and breast discomfort, thromboembolism, pre-eclampsia, perineal healing and wound healing. In addition, the guidelines recommend women are provided opportunities to discuss their birth experience.

These changes are in line with the findings and recommendations I have made in Chapters 4 and 5 and are welcomed. In particular, the mandate to require GP practices to provide postnatal checks should help to ensure that more women receive one and improve on my finding that just 56% of women received a postnatal check between 2006 and 2016. Furthermore, highlighting the need to review pre-existing conditions after childbirth is useful, as I found in Chapter 5 that roughly 10 in every 100 primary care contacts related to a pre-existing condition. The changes of postnatal health needs in the NICE guidelines are also appreciated, and in particular I support the continued focus on more sensitive needs (bladder and bowel function and sexual intercourse) in the hopes that this will lead to improvements in recognising, treating and documenting these needs going forward. It is essential however, that GPs have the capacity and resources to provide this vital postnatal care for women. I am concerned about the volume and diversity of care that GPs are required to provide in one formal check and future policies made need to expand beyond this to provide a longer-term structured pathway for maternal postnatal care which extends beyond 8 weeks.

9.4.2 Postnatal care beyond the postnatal check

As stated, the postnatal check may not provide enough time for GPs and patients to adequately raise and discuss all the need's women have after childbirth and my findings from chapters 4 and 5 show that while the postnatal check is an important touch point for women during the first year after childbirth, they are still receiving a lot of care beyond this one planned appointment. It is important that primary care services are prepared for these additional demands and the varying needs women may present with in the first year after childbirth. Additionally, as there is a vast amount to cover in this one appointment and not all needs apply to all women, it may be prudent to send women information about the potential list of common health needs or areas of discussion in advance of the appointment. This would allow women to be better prepared for their check, guide the discussion to their needs and make the best use of the time available as they can focus on what is most critical to them. This may also reduce some of the stigma of raising more sensitive concerns, such as incontinence, as they can see in advance that this a 'normal' experience after childbirth and this appointment is an opportunity to seek treatment and support for these (19,174).

It is also likely that one formal planned appointment at 6-8 weeks after childbirth is not enough support for women after childbirth. While of course women can book additional appointments as they need, this can be challenging with a small child, both practically and emotionally, and being invited to a dedicated appointment may make women feel more likely to attend and raise health concerns rather than having to take the initiative to book an appointment themselves. I recommend that an additional formal check is offered to women at 9 to 12 months after childbirth, which would be in line with baby's 1 year health review (175) and when maternity pay ends and lots of women return to work. By this time, it is likely that a woman is more able to focus on her own health and recovery rather than primarily on the care of their infant. It will also be clearer if issues, such as depression or low mood, pain or discomfort after sex, or incontinence, are persisting and becoming more medium to long term concerns. Being able to provide treatment and support for issues not already addressed could potentially have huge benefits for women. For example, incontinence if not identified could persist for over ten years despite available treatment (7,176). It may also be appropriate at this time to provide advice or care if

women are planning additional pregnancies. Lastly, women may also be in a better position to have somebody else care for their infant and attend the appointment alone should they wish. This may allow them to better focus on their own care which could be much more challenging to do in the early weeks after childbirth.

9.4.3 Focus on younger and more deprived women

My finding that younger and more deprived women are less likely to have a postnatal check despite having higher health needs (being more likely to have a postnatal antidepressant prescription and more postnatal consultations) is particularly important as these groups may have the most to gain from attending a planned check. There is a clear link between deprivation and maternal age at childbirth, with teenage pregnancies being six times as likely in the most deprived areas compared to the least (59) and there are potentially negative consequences of teenage pregnancies for both mother and baby. For example, teenage mothers may experience mental health difficulties and lower educational attainment, and it can also lead to further deprivation (59). It is essential that these vulnerable women can access the care they need and be signposted on or referred for additional support as needed. Furthermore, any postnatal care contact is a chance to build confidence and parenting skills (177) which may be more challenging in groups with less peer support. I also found in Chapter 5 that contraceptives are commonly documented at the time of the postnatal check and access to timely and effective contraceptives may help younger women avoid repeat unwanted pregnancies (59). Younger or more deprived women may face particular challenges in attending their postnatal check, for example they may not have the money or means to travel to the appointment, they may not be aware of the benefits of the check or see it as important. In order to help women attend these checks it may be necessary for GPs to send additional reminders, possibly through text messages, clearly outlining the benefits of attending, or GPS could encourage peer support closer to home or even hold some appointments remotely.

9.4.4 Informed decision making about postnatal antidepressant treatment

My findings in Chapter 8 that women with a history of antidepressant treatment are by far the most likely to receive treatment again after childbirth continues to highlight the need to provide additional support to these women and identify them far in advance of childbirth. Some women may still be on treatment while pregnant but

other may have had depression prior to this or chose to stop treatment during pregnancy. It is important clinicians remain aware of this link and support women accordingly. It may be necessary to schedule additional appointments with women with a prior history of depression during pregnancy and the year after birth to ensure depression is swiftly identified and treated. It is also important that my findings regarding the typically duration of antidepressant treatment are highlighted to GPs and patients. How long someone might expect to remain on treatment is an important consideration when deciding what treatment pathway to take for both clinicians and patients.

9.5 Future research recommendations

9.5.1 Inclusion of ethnicity in postnatal research

There remains continued evidence that Black, Brown and mixed ethnicity women have poorer pregnancy outcomes and poorer experiences of antenatal and postnatal care compared to White women in the UK (21,178). While I found that certain subgroups of women (those younger and more deprived) experienced relatively poorer outcomes it is likely that ethnicity is also an essential factor in understanding such differences in care. It was not possible to include ethnicity in this thesis as it was not included in the pre-existing cohort of women I utilised. Additionally, ethnicity is not considered to be well recorded in primary care data as completeness of the ethnicity field is often lacking in historical data (179); though it is likely that this has improved in more recent years (179,180). As ethnicity is essential to understanding postnatal care and the postnatal experience for all women, it is imperative that future studies exploring postnatal care include ethnicity as a key variable. Statistical methods, such as multiple imputation, are currently the gold standard in addressing such missing data (181,182) and this approach could be used to examine how primary care postnatal consultations and postnatal antidepressant treatment varies in women of different ethnicities over time following childbirth. Only by understanding how postnatal care and antidepressant treatment varies for all women can we seek to address inequalities.

9.5.2 Content and timing of planned postnatal care

While the planned postnatal check scheduled 6-8 weeks after childbirth is recommended by NICE and WHO, there is limited evidence which underlies the exact timing or content of this check, and it has not been well explored if this current

model of care is the most beneficial for women. This should be thoroughly explored through further research to better understand what content, delivery, timing and frequency of postnatal checks are most effective for women and if attending a postnatal check at 6-8 weeks after childbirth leads to better outcomes. Randomised control trials offering different models of care, for example evaluating an additional check at 9-12 months after birth as I have recommended, could then explore important medium- and long-term outcomes for women, such as their satisfaction with care, levels of morbidity and experiences of parenting. It is also essential to evaluate if the updates to the NICE guidelines and particularly the expansion of the GP contract led to improvement in attendance at planned postnatal care and if this in turn leads to improved outcomes for women. My study could be used as a baseline for such research.

9.5.3 Postnatal mental health needs beyond depression

In part 2 of my thesis, I focused on postnatal depression and in particular antidepressant treatment. While depression is common after childbirth, other mental health needs are also common, and it would be prudent to consider perinatal mental health as a broader umbrella. I am particularly interested in the longer-term trajectories of women with a perinatal mental health need and future studies could explore how the history of any mental health need impacts firstly on a woman's mental health during pregnancy and the postnatal period and then beyond this. For example, future studies could investigate, depression, anxiety, post-traumatic stress disorder and serious mental illness. Understanding these longer-term trajectories could help identify women most at risk and those most in need of treatment.

9.6 Conclusions

In part one of this thesis, I have provided important new information about women's postnatal primary care use. I have shown that women consult on average 4.8 times per year and that the vast majority of women (95%) had at least one consultation in the year after childbirth. I found that the most common reasons for consulting were to have a postnatal visit or check, for monitoring (such as a blood pressure reading, height or weight measurement), and to access contraception. I also found that only around half of women (56%) had a record of a postnatal check in the year after childbirth, a planned appointment all women should have 6-8 weeks after childbirth, and that younger and more deprived women were less likely to have this check. In

part two of this thesis, I have added valuable new information on an identified research gap on the duration of antidepressant treatment for women who initiate treatment in the year after childbirth and most importantly how the prior use of antidepressant treatment before pregnancy and childbirth impacts on antidepressant treatment after childbirth. I found that 13% of women initiated antidepressant treatment in the year after childbirth and that 50% of women remained on this treatment for 6.5 months or longer. Younger and more deprived women were more likely to have a postnatal antidepressant prescription but have shorter treatment durations compared to older and less deprived women respectively. Most notably however, is that women with a history of antidepressant treatment were much more likely to have a postnatal prescription compared to those with no history and have a longer treatment duration. Work from this thesis provides a valuable baseline from which to evaluate more recent postnatal care policy changes and steps to expand the current provision of primary care support for women after childbirth should be consider.

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10. Patient and Public Involvement and Engagement

10.1 Chapter overview

In this chapter I will outline the PPIE work that I undertook throughout this thesis. This includes consulting a generalist panel at the start of my PhD to seek guidance on the focus for this thesis and securing an additional small public engagement grant.

10.2 Expert by experience panel input

While I was developing a plan for my PhD research, I consulted with two 'Expert by Experience' panels in May 2019 to seek advice on which areas of maternal postnatal health were most important to investigate and to seek feedback on some preliminary findings. These Expert by Experience panels are an initiative established by University College London's Primary Care and Population Health department and they comprise at least 40 primary members from different backgrounds, ages, genders and ethnicities with an interest in primary care research. This panel can be drawn upon to advise on different stages of the research process and provide input to ensure research addresses questions that are meaningful to patients.

When I met with these two public panels, I presented preliminary findings from Chapters 4 and 5 "Postnatal checks and primary care consultations in the year following childbirth: an observational cohort study of 309 573 women in the UK, 2006–2016" and asked the panels: "When considering what women's primary care use can tell us about their health after childbirth what are the most important topics to address or questions to answer?" In response, the panels were supportive of the idea to identify attendance of postnatal checks; they suggested I clearly identify groups who do not attend and to examine differences in a woman's first versus subsequent childbirths. As a result, I included additional analysis exploring attendance by patient characteristics (such as age and social deprivation) and developed a measure of parity to determine the number of childbirths women had in IMRD and how this influenced primary care use and postnatal check attendance.

Our discussions additionally highlighted broader themes that were very important to the panel members and to parents. These included:

- Mental health being a very key concern. They highlighted that understanding more about postnatal depression and treatment for postnatal depression

would be very impactful for parents. In particular, having ways to identify women most at risk of postnatal depression, ensuring women are provided with information on how to recognise postnatal mental health needs and to understand more about the longer-term experiences and consequences of having postnatal depression.

- An interest in understanding more about the impact of childbirth on fathers. Including changes in their own mental health and also how their partner's mental health may influence them.

These broader points led to a number of key actions in my PhD work and also led me to apply for funding to carry out additional research work. Firstly, the clear importance placed on women's postnatal mental health led me to focus on postnatal depression and more specifically the treatment trajectory of postnatal antidepressant treatment in the second half of my thesis as this was the clear priority to this group. Secondly, I received a small NIHR SPCR patient engagement award (£2,000) in August 2019 to fund a project to develop a video animation to help women access information and support for their wellbeing after childbirth. Lastly, I received an NIHR SPCR grant (£17,657) in February 2020 to investigate the use of antidepressant treatment among new fathers which I have since published a manuscript titled: 'Association of Recent Fatherhood With Antidepressant Treatment Initiation Among Men in the United Kingdom'.

10.3 Video animation project: helping women access information and support for their mental wellbeing after childbirth

10.3.1 Project background

We know that many women may experience depression or low mood after childbirth. However, for some it might be difficult to get the appropriate support and treatment. In the first few days after childbirth, women can turn to their midwife for help. Subsequently, women can visit their GP. In our research, we found that some women have a health check-up with their GP six to eight weeks after childbirth and that this helps identifying those women needing support with mental wellbeing. However, some women delay seeking help or may not seek help at all. This could be because they don't know where to get support or they may be worried to seek help or may not be aware they are experiencing depression.

The primary aim of this project was to support women who have recently given birth to help them recognise if they need support with their mental wellbeing and to signpost them to appropriate services. My secondary aims include:

- Raising the profile of our research to a wider audience
- Inspiring conversation and engagement on the broader topic of postnatal care/mental wellbeing
- Identifying areas of future research

10.3.2 Project plan

In this project, I set out to create a short video animation to be shared online and through social media to give information to new mothers and their partners/families about mental wellbeing after childbirth. The aim of this video is to encourage mums how to recognise that they may need support with their mental wellbeing and where to seek support.

A script outline and storyboard for the video was developed in partnership with a professional animation studio 'Buff Motion' (https://www.buffmotion.com/). This initial stage provided an overview for the script content, tone and style of the video. Buff Motion developed several draft design options for the look and feel of the animation and the script was reviewed by a script editor. Once a draft video animation had been created, I recruited several recent or expecting mums and dads to review and provide feedback on the video to ensure it met our project aims. Based on their feedback and clinician input, we: revised the script in several places to ensure our messaging was clearer; included more on-screen text so that the video is accessible to wider audience and to allow viewers without sound to see the message of the video; changed the background colour of the animation to a softer pallet so the video has a lighter feel; and created a list of places to share the video.

10.3.3 Project outcome

The video animation was launched in February 2022 and can be viewed here: https://vimeo.com/675641887. As of June 2023, this video has roughly 3,300 views on Vimeo, roughly 9,000 views on Instagram, over 5,500 views on Twitter and more than 200 interactions on LinkedIn.

Through this project I was able to develop my communication skills by working with an external design team and having to work together towards a final product which

contained accurate research information balanced with visually interesting and engaging designs. I was also able to successfully transform our PPIE input to take place remotely. This worked well for parents as they could participate at a time and place to suit them, rather than trying to hold a mutually convenient meeting. The animation is a novel way to start the conversation about mental health and to share research related findings. I hope this video will have an impact and encourage women to seek support where they need it. I also hope this project inspires other researchers to be creative with their research and engagement work.

10.4 Chapter summary

In this chapter I provided an overview of the PPIE work I undertook as part of this thesis and highlighted where this impacted on my research.

Appendices

Appendix A- Supplementary material for chapter 4

A-1: How characteristics and likelihood of having a postnatal check varies for those with missing and non-missing (unknown) variables

	Townsend score		Mode of delivery		Parity		Smoking status	
Characteristic	Missing n (%)	Not missing n (%)	Missing n (%)	Not missing n (%)	Missing n (%)	Not missing n (%)	Missing n (%)	Not missing n (%)
Overall	32,459	277,114	210,641	98,932	70,466	239,107	45,998	263,575
Maternal age (years)								
15-19	813 (2.5)	8,755 (3.2)	6,624 (3.1)	2,944 (3.0)	380 (0.5)	9,188 (3.8)	559 (1.2)	9,009 (3.4)
20-24	4,280 (13.2)	38,836 (14.0)	29,722 (14.1)	13,394 (13.5)	6,875 (9.8)	36,241 (15.2)	2,417 (5.3)	40,699 (15.4)
25-29	8,487 (26.2)	69,211 (25.0)	53,102 (25.2)	24,596 (24.9)	17,101 (24.3)	60,597 (25.3)	7,245 (15.8)	70,453 (26.7)
30-34	10,961 (33.8)	87,308 (31.5)	66,630 (31.6)	31,639 (32.0)	23,378 (33.2)	74,891 (31.3)	18,024 (39.2)	80,245 (30.4)
35-39	6,409 (19.7)	57,762 (20.8)	43,418 (20.6)	20,753 (21.0)	17,701 (25.1)	46,470 (19.4)	14,009 (30.5)	50,162 (19.0)
40-44	1,438 (4.4)	14,470 (5.2)	10,567 (5.0)	5,341 (5.4)	4,770 (6.8)	11,138 (4.7)	3,549 (7.7)	12,359 (4.7)
45-49	71 (0.2)	772 (0.3)	578 (0.3)	265 (0.3)	261 (0.4)	582 (0.2)	195 (0.4)	648 (0.3)
Townsend Score quintile								
1-least deprived	-	-	38,684 (18.4)	19,899 (20.1)	12,831 (18.2)	45,752 (19.1)	11,306 (24.6)	47,277 (17.9)
2	-	-	36,168 (17.2)	17,488 (17.7)	11,686 (16.6)	41,970 (17.6)	8,862 (19.3)	44,794 (17.0)
3	-	-	42,354 (20.1)	19,669 (19.9)	13,965 (19.8)	48,058 (20.1)	8,927 (19.4)	53,096 (20.1)
4	-	-	40,356 (19.2)	18,150 (18.4)	13,431 (19.1)	45,075 (18.9)	7,385 (16.1)	51,121 (19.4)
5-most deprived	-	-	30,061 (14.3)	14,285 (14.4)	10,813 (15.3)	33,533 (14.0)	4,535 (9.9)	39,811 (15.1)
Missing	-	-	23,018 (10.9)	9,441 (9.5)	7,740 (11.0)	24,719 (10.3)	4,983 (10.8)	27,476 (10.4)
Year group								
2006-2007	4,864 (15.0)	58,929 (21.3)	43,678 (20.7)	20,115 (20.3)	14,161 (20.1)	49,632 (20.8)	10,866 (23.6)	52,927 (20.1)
2008-2009	5,799 (17.9)	60,520 (21.8)	44,962 (21.4)	21,357 (21.6)	14,625 (20.8)	51,694 (21.6)	8,324 (18.1)	57,995 (22.0)
2010-2011	7,008 (21.6)	59,470 (21.5)	44,895 (21.3)	21,583 (21.8)	15,017 (21.3)	51,461 (21.5)	8,469 (18.4)	58,009 (22.0)

2012-2013	7,737 (23.8)	55,443 (20.0)	43,050 (20.4)	20,130 (20.4)	14,768 (21.0)	48,412 (20.3)	9,142 (19.9)	54,038 (20.5)
2014-2015	7,051 (21.7)	45,752 (15.4)	34,056 (16.2)	15,747 (15.9)	11,895 (16.9)	37,908 (15.9)	9,197 (20.0)	40,606 (15.4)
Outcome- Postnatal check								
Yes	16,831 (51.9)	157,230 (56.7)	113,043 (53.7)	61,018 (61.7)	40,001 (56.8)	134,060 (56.1)	25,978 (56.5)	148,083 (56.2)
No	15,628 (48.2)	119,884 (43.3)	97,598 (46.3)	37,914 (38.3)	30,465 (43.2)	105,047 (43.9)	20,978 (43.5)	115,492 (43.8)

In my model analysis, I exclude 32,459 women who have a missing Townsend score. Those who are excluded for having a missing Townsend score have a broadly similar age distribution to those who have complete Townsend information. A higher proportion of women with a missing Townsend score gave birth towards the end of the study period. For women with missing Townsend score, 23.8% of women gave birth in 2012-13 and 21.7% gave birth in 2014-15, this compares to 20.0% and 15.4% respectively of those with complete Townsend information. With respect to my outcome – having a postnatal check, those with a missing Townsend score had a lower proportion of women with a postnatal check compared to those with complete information (51.9% vs 56.7%).

In my model analysis I only adjust for age and deprivation but I have included information on other variables with missing categories (mode of delivery, parity and smoking status) for context. The only notable difference in women with missing or complete mode of delivery information is that those with complete information are more likely to have a postnatal check compared to those with missing information (61.7% vs 53.7%). Those with complete parity information were more likely to be in younger age groups compared to those with missing information, 3.8% vs 0.5% for women aged 15-19 years and 15.2% vs 9.8% for women aged 20-24 years. Likewise, those with complete smoking status information were more likely to be in younger age groups compared to those with missing information, 3.4% vs 1.2% for women aged 15-19 years and 15.4% vs 5.3% for women aged 20-24 years. The likelihood of having missing smoking status information decreased with deprivation. For those with missing smoking status, 24.6% were in the least deprived group and 9.9% were in the most deprived group, this compares to 17.9% and 15.1% respectively for those with complete information. Differences were similar across other variables.

A-2: Likelihood of having a postnatal check using a more sensitive outcome definition (any consultation between weeks 5-10)

Characteristic	All women n	Consultation in weeks 5-10 n (%)	Consultation in weeks 5-10	
			Unadjusted: IRR (95% CI)	Age & deprivation adjusted: IRR (95% CI)
Overall	309,573	243,516 (78.7)		
Maternal age (years)				
15-19	9,568	6,977 (72.9)	0.94 (0.91-0.96)	0.94 (0.92-0.97)
20-24	43,116	32,429 (75.2)	0.96 (0.95-0.98)	0.97 (0.95-0.98)
25-29	77,698	60,597 (78.0)	0.99 (0.98-1.00)	0.99 (0.98-1.00)
30-34	98,269	78,671 (80.1)	1	1
35-39	64,171	51,504 (80.3)	1.00 (0.98-1.01)	1.00 (0.98-1.01)
40-44	15,908	12,674 (79.7)	0.99 (0.97-1.01)	0.99 (0.97-1.01)
45-49	843	664 (78.8)	0.98 (0.90-1.06)	0.97 (0.90-1.06)
Townsend Score quintile				
1-least deprived	58,583	48,142 (82.2)	1	1
2	53,656	43,336 (80.8)	1.00 (0.98-1.01)	1.00 (0.98-1.01)
3	62,023	49,169 (79.3)	0.99 (0.97-1.00)	0.99 (0.98-1.00)
4	58,506	45,574 (77.9)	0.98 (0.96-0.99)	0.98 (0.97-1.00)
5-most deprived	44,346	32,729 (73.8)	0.95 (0.93-0.96)	0.95 (0.94-0.97)
Missing	32,459	24,566 (75.7)	Excluded	Excluded
Mode of delivery				
Vaginal delivery	75,506	63,533 (86.8)	1	1
Caesarean	23,426	20,074 (85.7)	1.03 (1.01-1.04)	1.02 (1.01-1.04)
Unknown	210,641	159,533 (75.7)	0.96 (0.94-0.98)	0.96 (0.94-0.97)
Parity				
First	149,639	118,998 (79.5)	1	1
Second	69,355	53,969 (77.8)	0.97 (0.96-0.98)	0.97 (0.96-0.98)
Third or higher	20,113	15,258 (75.9)	0.95 (0.93-0.96)	0.94 (0.92-0.95)
Unknown	70,466	55,291 (78.5)	0.96 (0.95-0.97)	0.95 (0.94-0.96)
Smoking status				
Current smoker	34,634	27,236 (78.6)	0.99 (0.98-1.01)	1.01 (0.99-1.02)
Past smoker**	85,592	66,542 (77.7)	0.97 (0.96-0.98)	0.97 (0.96-0.98)
Non-smoker	143,349	115,019 (80.2)	1	1
Unknown	45,998	34,719 (75.5)	0.93 (0.92-0.94)	0.93 (0.92-0.94)
Year group				
2006-2007	63,793	50,496 (79.2)	1	1
2008-2009	66,319	52,571 (79.3)	1.00 (0.98-1.01)	1.00 (0.98-1.01)
2010-2011	66,478	52,819 (79.5)	1.00 (0.99-1.02)	1.01 (0.99-1.02)
2012-2013	63,180	49,788 (78.8)	1.00 (0.99-1.02)	1.00 (0.99-1.02)
2014-2015	49,803	37,842 (76.0)	0.97 (0.96-0.99)	0.97 (0.96-0.99)

Abbreviations: IRR – incidence rate ratio, CI – confidence interval. Practice and woman are included as random effects terms in all models. Models exclude women with missing Townsend score

Appendix B- Supplementary material for chapter 5

B-1: Code lists and groupings for common postnatal clinical events or health needs

These are not exhaustive code lists and should not be used to identify a condition or health topic without review, these are reduced codelists based on women's presentation to primary care following childbirth. Read Codes and their descriptions in these lists are presented sorted by the most commonly occurring at the top to least common at the bottom.

Infections

Read Code	Description
H05z.11	Upper respiratory tract infection NOS
SP25500	Postoperative wound infection, unspecified
H01..00	Acute sinusitis
H05z.00	Upper respiratory infection NOS
F4C0.00	Acute conjunctivitis
K15..00	Cystitis
F501.00	Infective otitis externa
K190.00	Urinary tract infection, site not specified
H06z000	Chest infection NOS
H06z011	Chest infection
AB01.13	Fungal nail infection
K190z00	Urinary tract infection, site not specified NOS
A79z.00	Viral infection NOS
L394500	Infection of obstetric surgical wound
H01..11	Sinusitis
J43..11	Gastroenteritis
M03z100	Abscess NOS
J025000	Dental abscess
M0z..11	Infected sebaceous cyst
M03z000	Cellulitis NOS
H051.00	Acute upper respiratory tract infection
M07z.11	Infected insect bite
H05z.12	Viral upper respiratory tract infection NOS
H06z100	Lower resp tract infection
H06z111	Respiratory tract infection
SK03.00	Post-traumatic wound infection NEC
A07y000	Viral gastroenteritis
F4C0.12	Conjunctivitis
H02..13	Throat infection - pharyngitis
1AG..00	Recurrent urinary tract infections
SP25.00	Postoperative infection
H13..00	Chronic sinusitis
H062.00	Acute lower respiratory tract infection

F4D1111	Meibomian cyst infected
H0...00	Acute respiratory infections
M03z.00	Cellulitis and abscess NOS
L443.12	Infection - perineal wound
F52z.11	Infection ear
K423.00	Abscess of Bartholin's gland
M07z100	Infection toe
Lyu6A00	[X]Infection of caesarean section wound following delivery
J650.00	Acute cholecystitis
J540.00	Perianal abscess
14D4.00	H/O: recurrent cystitis
K150.00	Acute cystitis
22L4.00	O/E - Wound infected
A081200	Gastroenteritis - presumed infectious origin
A3B0.00	Streptococcal infection
J024.11	Dental infection
H03..11	Throat infection - tonsillitis
2G64.00	O/E - infected toe
A78A.00	Chlamydial infection
K40z.12	Female pelvic infection
M07z200	Infection finger
M08..00	Cutaneous cellulitis
F4C0.11	Eye infection
F501100	Acute infective otitis externa
H1y1z14	Nasal infection
M02z.11	Nail infection NOS
1592.00	H/O: pelvic infection
F400500	Eye infection
65P..11	Contact - infectious disease
F4C0011	Conjunctivitis
M230400	Ingrowing nail with infection
F4C0611	Acute allergic conjunctivitis
H010.00	Acute maxillary sinusitis
K190500	Urinary tract infection
M03..00	Other cellulitis and abscess
A080300	Infectious gastroenteritis
K424011	Abscess of labia
7G25111	Drainage of abscess NEC
M060.00	Pilonidal cyst with abscess
H01z.00	Acute sinusitis NOS
M020.00	Cellulitis and abscess of finger
A3B0000	Group B streptococcus infection
M036z00	Cellulitis and abscess of leg NOS
M033100	Cellulitis and abscess of axilla
F4G0100	Orbital cellulitis
A074300	Campylobacter gastrointestinal tract infection

F4C0300	Acute mucopurulent conjunctivitis
K190.11	Recurrent urinary tract infection
M02z.13	Infected nailfold
A77y.00	Other viral conjunctivitis
A77z.11	Viral conjunctivitis
F4D1100	Hordeolum internum (infected meibomian cyst)
F501F00	Chronic infective otitis externa NOS
M09..00	Cutaneous abscess
14B9.00	History of acute lower respiratory tract infection
A083.11	Diarrhoea & vomiting -? infect
F4C3300	Bacterial conjunctivitis
M020000	Cellulitis and abscess of finger unspecified
F501000	Unspecified infective otitis externa
H06z200	Recurrent chest infection
A3B1.00	Staphylococcal infection
A54..11	Herpes simplex viral infection
M07yz11	Infection toe
SP25z00	Postoperative infection NOS
H011.00	Acute frontal sinusitis
K155.00	Recurrent cystitis
M032600	Cellulitis and abscess of groin
F501200	Acute infection of pinna
J651z00	Cholecystitis NOS
H13z.00	Chronic sinusitis NOS
K424000	Abscess of vulva
M021.00	Cellulitis and abscess of toe
M02z.14	Nailfold infected
M035.00	Cellulitis and abscess of buttock
M092200	[X]Perineal abscess
SP25700	Postoperative wound infection-superficial
1415000	H/O: chlamydia infection
H130.12	Maxillary sinusitis
H5yy.11	Respiratory infection NOS
M07yz13	Infection finger
M080.11	[X]Nail bed infection
SD95.00	Insect bite, nonvenomous, infected, NOS
F4C2.00	Blepharoconjunctivitis
H054.00	Recurrent upper respiratory tract infection
H0z..00	Acute respiratory infection NOS
F502700	Other chronic non infective otitis externa
J065.11	Infection of tooth socket
J083z11	Infection mouth
M07z000	Infection foot
SD11D00	Abrasion of vagina, infected
J541.00	Ischiorectal abscess
K424.00	Other abscess of vulva

L40..00	Major puerperal infection
SD73.00	Blister of foot and toe, infected
F4D1400	Cellulitis of eyelid
H15..00	Peritonsillar abscess - quinsy
H30..11	Chest infection - unspecified bronchitis
J651000	Chronic cholecystitis
K190300	Recurrent urinary tract infection
L166600	Urinary tract infection following delivery
M030.00	Cellulitis and abscess of face
M032400	Cellulitis and abscess of umbilicus
M073.00	Scalp infection
M07yz12	Infection foot
SD04.00	Insect bite, nonvenomous, of head, without infection
SD11900	Abrasion of perineum, infected
7G25700	Incision and drainage of abscess
A074500	Helicobacter pylori gastrointestinal tract infection
A07y.00	Gastrointestinal tract infection specified organism NEC
A78A000	Chlamydial infection of lower genitourinary tract
F4C0z00	Acute conjunctivitis NOS
K190200	Post operative urinary tract infection
M033.00	Cellulitis and abscess of arm
M062.00	Pilonidal sinus with abscess
M085.00	Cellulitis of leg
Q404.11	Umbilical stump infection of the newborn
141G.00	H/O: Clostridium difficile infection
A081100	Enteritis - presumed infectious origin
A541500	Anogenital herpesviral infection
A78AX00	Chlamydial infection of genitourinary tract, unspecified
F4A..11	Keratoconjunctivitis
F4F3.11	Dacryocystitis - acute
H014.00	Acute rhinosinusitis
H135.00	Recurrent sinusitis
L166800	Urinary tract infection complicating pregnancy
M036.00	Cellulitis and abscess of leg excluding foot
Q40..00	Infections specific to perinatal period
SD93.00	Blister, infected, NOS
SP25100	Postoperative wound abscess
65PE.00	Infectious disease contact, arthropod - nits or lice
65S..00	Infection surveillance
9OqB.00	Sexually transmitted infection screening offered
A020.00	Salmonella gastroenteritis
A080.00	Infectious colitis, enteritis and gastroenteritis
A083.00	Diarrhoea of presumed infectious origin
AyuDG00	[X]Viral infection, unspecified
F501112	Cellulitis, external ear
H13..11	Chronic rhinosinusitis

J574G00	Perianal infection
M030111	Cellulitis and abscess of nose
M036.11	Cellulitis and abscess of leg
M037000	Cellulitis and abscess of foot unspecified
M03y.00	Other specified cellulitis and abscess
SD65.00	Insect bite, nonvenomous, of lower limb, infected
SP25800	MRSA infection of postoperative wound
6832.12	Sexually transmitted infection screening
773A000	Drainage of ischiorectal abscess
773A100	Drainage of perianal abscess
A....00	Infectious and parasitic diseases
A080200	Infectious enteritis
A3Ay200	Clostridium difficile infection
A772.00	Viral pharyngoconjunctivitis
F4C0000	Unspecified acute conjunctivitis
F4C1.00	Chronic conjunctivitis
F4C1300	Vernal conjunctivitis
H1y2200	Parapharyngeal abscess
J54..00	Abscess of anal and rectal regions
K151.00	Chronic interstitial cystitis
M021000	Cellulitis and abscess of toe unspecified
M036100	Cellulitis and abscess of thigh
M08B.00	Cellulitis of foot
M093.00	[X]Abscess of buttock
M09y.00	[X]Abscess of other site
Q404000	Infectious granuloma
Q407.00	Neonatal candida infection
SD13900	Blister of perineum, infected
SD44.00	Insect bite, nonvenomous, of hand, without infection
SD51.00	Abrasion or friction burn of finger, infected
SD72.00	Blister of foot and toe, without mention of infection
SD75.00	Insect bite, nonvenomous, of foot and toe, infected
SD99.00	Tick bite, infected
ZV02A00	[V]MRSA-Multiple resistant staph aureus infection carrier
123..00	FH: Infectious disease
141..00	H/O: infectious disease
65Q..00	Infectious disease carrier
65Z..00	Infect.dis.prevent/control NOS
6838.00	Bact. conjunctivitis screening
684..00	Other infection screening
7H21200	Open drainage of abdominal abscess NEC
A02z.00	Salmonella infection NOS
A081.00	Colitis, enteritis and gastroenteritis presumed infectious
A081.11	Colitis,enteritis ? infectious
A081000	Colitis - presumed infectious origin
A082.00	Infectious diarrhoea

A3A0.11	Clostridium infection
A3B0100	Group A streptococcus infection
A3B4.00	Escherichia coli infection
A3B7.00	Pseudomonas infection
A3By600	Coccal infection NEC
A788.11	Human immunodeficiency virus infection
A78AW00	Chlamydial infection, unspecified
A796.00	Parvovirus infection
A79B.00	Human papilloma virus infection
AD6..00	Other and unspecified infectious and parasitic diseases
F4A3100	Vernal conjunctivitis of limbus and cornea
F4D0.11	Cellulitis of eyelids
F4D1200	Abscess of eyelid
F4F3000	Unspecified dacryocystitis
F4F3200	Acute dacryocystitis
F501900	Other acute external ear infections
F501z00	Infective otitis externa NOS
F506.00	Abscess of external ear
F530.11	Abscess of mastoid
H131.11	Frontal sinusitis
H20..11	Chest infection - viral pneumonia
J033300	Periodontal abscess
J064000	Abscess of jaw
J083.00	Oral cellulitis and abscess
J083200	Abscess of oral soft tissue unspecified
J085000	Abscess of lip
J201.12	Appendix abscess
J650z00	Acute cholecystitis NOS
K10..00	Infections of kidney
K10z.00	Infection of kidney NOS
K152y00	Chronic cystitis unspecified
K152z00	Other chronic cystitis NOS
K402100	Ovarian abscess
K402200	Tubo-ovarian abscess
K405.00	Parametritis and pelvic cellulitis unspecified
L166700	Infections of the genital tract in pregnancy
L40z.00	Major puerperal infection NOS
M020100	Finger pulp abscess
M020z00	Cellulitis and abscess of finger NOS
M030000	Cellulitis and abscess of cheek (external)
M032200	Cellulitis and abscess of back
M081.00	[X]Cellulitis of other parts of limb
M086.00	Cellulitis of ankle
M088.00	Cellulitis of arm
M08A.00	Cellulitis of axilla
M091.00	[X]Abscess of neck

M092100	[X]Abdominal wall abscess
M094000	[X]Abscess of axilla
N230.00	Infective myositis
Q401.00	Congenital cytomegalovirus infection
SD11C00	Abrasion of vulva, infected
SD35.00	Insect bite, nonvenomous, of lower arm, infected
SD43.00	Blister of hand, infected
SD46.00	Splinter of hand, without major open wound or infection
SD53.00	Blister of finger, infected
SD61.00	Abrasion or friction burn of lower limb, infected
SD61300	Abrasion of lower leg, infected
SD61400	Abrasion of ankle, infected
SD62400	Blister of ankle, without mention of infection
SD63.11	Blister of leg, infected
SD65300	Insect bite, nonvenomous, of lower leg, infected
SD71.12	Abrasion or friction burn of toenail, infected
SD72.11	Blister of heel, without mention of infection
SD73000	Blister of foot, infected

British National Formula sub-chapter	Description
05.01.00	Antibacterial drugs
05.01.01	Penicillins
05.01.02	Cephalosporins and other beta-lactams
05.01.03	Tetracyclines
05.01.04	Aminoglycosides
05.01.05	Macrolides
05.01.06	Clindamycin
05.01.07	Some other antibacterials
05.01.08	Sulphonamides & trimethoprim
05.01.09	Antituberculosis drugs
05.01.10	Antileprotic drugs
05.01.11	Metronidazole and tinidazole
05.01.12	Quinolones
05.01.13	Urinary-tract infections
05.02.00	Antifungal drugs
05.02.01	Triazole antifungals
05.02.02	Imidazole antifungals
05.02.03	Polyene antifungals
05.02.05	Other antifungals
05.03.01	HIV infection
05.03.02	Herpesvirus infections
05.03.03	Viral hepatitis
05.03.04	Influenza

05.04.00	Antiprotozoal drugs
05.04.01	Antimalarials
05.04.04	Antigiardial drugs
05.05.01	Drugs for threadworms
05.05.03	Drugs for tapeworm infections
11.03.01	Antibacterials (in eye preparations)
11.03.03	Antivirals (in eye preparations)

Monitoring

Read Code	Description
246..00	O/E - blood pressure reading
242..00	O/E - pulse rate
2E3..11	O/E - temperature level
3395.00	Peak exp. flow rate: PEFR/PFR
4131.00	Blood test requested
246..12	O/E - blood pressure
3395.11	PEFR - peak exp. flow rate
41B1.00	Blood test due
3395.13	Peak flow rate
3395.12	PFR - peak flow rate
339g.00	Serial peak expiratory flow rate
R1y2.00	[D]Raised blood pressure reading
2424.00	O/E - pulse rate normal
2E31.00	O/E - temperature normal
339A.00	Peak flow rate before bronchodilation
339o.00	Peak expiratory flow rate measured using EN 13826 device
315B.00	Ambulatory blood pressure recording
246L.00	Target diastolic blood pressure
469..00	Urine blood test
235..00	O/E - rate of respiration
339B.00	Peak flow rate after bronchodilation
46...11	Urine tests
41B2.00	Urine test due
4692.00	Urine blood test = negative
4697.00	Urine blood test = +++
ZV70B00	[V]Examination of blood pressure
G20..11	High blood pressure
9N4o.00	Did not attend blood test
339C.00	Peak expiratory flow rate pre steroids
246E.00	Sitting blood pressure reading
62W..00	Antenatal blood tests
4696.00	Urine blood test = ++
4695.00	Urine blood test = +
242Z.00	O/E - pulse rate NOS
3393.11	Peak flow rate normal
339n.00	Serial peak expiratory flow rate abnormal

339c.00	Peak expiratory flow rate pre steroids
339d.00	Peak expiratory flow rate post steroids
339D.00	Peak expiratory flow rate post steroids
469..11	Blood in urine test
246D.00	Standing blood pressure reading
2E34.00	O/E - temperature elevated
339A.11	Peak expiratory flow rate before bronchodilation
339p.00	Predicted peak expiratory flow rate using EN 13826 standard
479..00	Faecal occult blood test
662Q.00	Trial reduction of antihypertensive therapy
339E.00	More than 80% of predicted peak flow rate
662j.00	Cardiac drug monitoring
3395000	Diurnal variation of peak expiratory flow rate
339B.11	Peak expiratory flow rate after bronchodilation
339C.11	Expected peak expiratory flow rate
246d.00	Standing blood pressure reading
339F.00	FEV1 post steroids
6211.00	Pregnant - urine test confirms
7P1A.00	Diagnostic blood tests
3394.11	Peak flow rate abnormal
2426.00	O/E - pulse rate tachycardia
339..00	Respiratory flow rates
9NuA.00	Interpreter needed - Polish
9OD..12	Blood pressure screen admin
R1y3.00	[D]Low blood pressure reading
246e.00	Sitting blood pressure reading
339V.00	Recorded/predicted peak expiratory flow rate ratio
4JN..00	Helicobacter blood test
246Q.00	Sitting systolic blood pressure
339u.00	Peak inspiratory flow rate
8HR8.00	Referral for 24 hour blood pressure recording
246c.00	Lying blood pressure reading
3391.00	Resp. flow rate measured
339q.00	Forced expiratory flow rate between 25+75% of vital capacity
246C.00	Lying blood pressure reading
246R.00	Sitting diastolic blood pressure
339D.11	Best ever peak expiratory flow rate
339X.00	Percentage of best ever peak expiratory flow rate
246V.00	Average 24 hour diastolic blood pressure
246W.00	Average 24 hour systolic blood pressure
246g.00	Self measured blood pressure reading
339G.00	Serial peak expiratory flow rate
235Z.00	O/E - rate of respiration NOS
2429.00	O/E pulse rate stable
246Y.00	Average day interval systolic blood pressure
317C.00	Urinary flow rate

3394.00	Resp. flow rate abnormal
339Z.00	Respiratory flow rates NOS
2422.00	O/E - pulse rate - bradycardia
246K.00	Unequal blood pressure in arms
246Z.00	O/E-blood pressure reading NOS
339E.11	More than 80% of predicted peak expiratory flow rate
339W.00	Worst peak flow rate
745C000	Measurement of peak expiratory flow rate

Symptoms or treatments affecting the skin

Read Code	Description
B76..14	Mole of skin
M111.00	Atopic dermatitis/eczema
M0...00	Skin and subcutaneous tissue infections
M2yz.11	Skin lesion
2F13.00	O/E - dry skin
M12z100	Eczema NOS
M21z100	Skin tag
M12..11	Contact dermatitis
7G22.12	Removal of suture of skin
M12z000	Dermatitis NOS
R021z00	[D]Rash and other nonspecific skin eruption NOS
AB0..11	Fungal infection of skin
R021.00	[D]Rash and other nonspecific skin eruption
7G09100	Cryotherapy to lesion of skin NEC
M2z0.00	Skin lesion
1D15.00	C/O: itching
7G2E.11	Dressing of skin
2FD..00	O/E - skin cyst
M12z300	Hand eczema
M07z.00	Local infection skin/subcut tissue NOS
M18z.12	Itch
M12z200	Infected eczema
M101.00	Seborrhoeic dermatitis
2227.12	O/E - itchy rash
14F1.00	H/O: eczema
2F...00	Examination of skin
1N03.00	C/O: dry skin
7G22300	Removal of suture from skin NEC
B76..15	Papilloma of skin
M1...11	Dermatitis/dermatoses
B76..11	Benign naevus of skin
1D15.11	Scalp itchy
7G2E300	Dressing of skin NEC
M101.11	Seborrhoeic dermatitis capitis

M101.12	Seborrhoeic eczema
M2y4500	Epidermal cyst
1N0..00	Skin symptoms
7G2E.00	Dressing of skin or wound
M18z.11	Skin irritation
M153500	Perioral dermatitis
1N...00	Symptoms of skin and integumentary tissue
M113.00	Flexural eczema
66I..00	Skin disorder monitoring
2FG..00	O/E - skin scar
2FT..00	O/E - pigmented skin lesion
4JG..11	Swab - skin
Z1B..00	Dressing of skin or wound
7G03300	Excision of lesion of skin NEC
12H1.00	FH: Eczema
2F1..00	O/E - general skin exam.
M07z.14	Infected dermatitis
2FJ..00	O/E - skin tags
7N71000	[SO]Skin of scalp
M12..00	Contact dermatitis and other eczemas
7G03.00	Other excision of skin
G849000	Anal skin tag
B768.00	Melanocytic naevi of skin
7G22.00	Removal of repair material from skin
8P0..00	Removal of skin sutures/clips
M12..12	Contact eczema
1425.00	H/O: * skin
Z1K1300	Removal of suture from skin
7G05300	Shave excision of lesion of skin NEC
SP25000	Postoperative stitch abscess
M102.00	Infectious eczematoid dermatitis
M129.00	Irritant contact dermatitis
7G2G500	Diagnostic dermatoscopy of skin
R020300	[D]Tingling of skin
SE...00	Contusion (bruise) with intact skin
ZQ36.00	Skin lesion assessment
Mz...00	Skin and subcutaneous tissue disease NOS
M119.00	Discoid eczema
26C4.00	Nipple eczema
M128.00	Allergic contact dermatitis
M2y4z00	Other specified skin disorder NOS
M2yC.00	Pigmented skin lesion
7G05B00	Excision biopsy of skin lesion
7G25.11	Incision of skin
2FE2000	O/E - cracked skin of feet
66IZ.00	Skin disorder monitoring NOS

2F14.00	O/E - foreign body in skin
4JG2.00	Skin scrapings taken
7G05z00	Excision of lesion of skin NOS
7G09000	Cauterisation of lesion of skin NEC
7G21.00	Suture of skin of other site
7N72400	[SO]Skin of axilla
M....00	Skin and subcutaneous tissue diseases
258..11	O/E - skin of abdomen
7G21000	Primary suture of skin NEC
G831.11	Varicose eczema
M0z..00	Skin and subcut tissue infection NOS
R020.00	[D]Skin sensation disturbance
M114.00	Allergic (intrinsic) eczema
M2z..00	Other skin and subcutaneous tissue disease NOS
M11..00	Atopic dermatitis and related conditions
2F4..00	O/E - nodules in skin
2FE2100	O/E - cracked skin of hands
7G05C00	Excision of skin tag NOS
7G09011	Cauterisation of wart of skin NEC
B76..00	Benign neoplasm of skin
M2y4600	Dermoid cyst of skin
14F..00	H/O: skin disorder
66I2.00	Skin: follow-up assessment
7G03311	Removal of mole of skin by excision
M1z..00	Skin and subcutaneous tissue inflammatory disorders NOS
PH3y000	Congenital accessory skin tags
4JG4.00	Skin wound swab taken
81H3.00	Attention to dressing of skin
M07y.00	Local infection of skin or subcutaneous tissue OS
M2yz.00	Other skin and subcutaneous tissue disease NOS
81H4.00	Checking dressing of skin
2FF..00	O/E - skin ulcer
7G...00	Skin operations
7G08100	Cryotherapy to lesion of skin of head or neck
F502411	Eczema of external ear
2FY..00	O/E - skin lesion
G849.00	Residual haemorrhoidal skin tags
M095.00	Skin abscess
2FE..12	O/E - skin fissure
7G2D500	Cleaning of skin wound NEC
Z1B2.00	Dressing of skin
2F12.00	O/E - skin examined - NAD
7G06111	Curettage and cauterisation of skin wart NEC
M102.11	Pustular eczema
258..00	O/E - abdominal wall skin
7G06.00	Curettage of lesion of skin

Z174L00	Skin care
4JG6.00	Skin swab culture positive
7G22100	Removal of clip from skin NEC
7N72A00	[SO]Skin of nipple
Mz...11	Sore skin
Z1B2100	Dressing of burnt skin
Z1K1200	Removal of alternate clips from skin
2F14.12	O/E - splinter in skin
335..11	Allergy skin test
7G06100	Curettage and cauterisation of lesion of skin NEC
7G0A.00	Punch biopsy of skin
7G0B.00	Shave biopsy of skin
7G2..00	Other skin,subcutaneous tissue and wound procedures
7G21400	Suture of skin NOS
7G21z00	Suture of skin of other site NOS
7N23700	[SO]Skin of lip
M0y..00	Other specified infections of skin or subcutaneous tissue
M112.00	Infantile eczema
M12z111	Discoid eczema
M12zz00	Contact dermatitis NOS
R020100	[D]Burning of skin
Z1B1400	Attention to dressing of burnt skin
1N00.00	Change in skin lesion
2F6..00	O/E - skin bullae
2FZ..11	O/E - skin lesion
4JG1.00	Skin swab taken
7G0..12	Removal of mole of skin operations
7N73500	[SO]Skin of toe
M2y1.00	Scar conditions and fibrosis of skin
Z1K1100	Removal of clip from skin
1N04.00	Itching of skin lesion
2F14.11	O/E - glass fragment in skin
2FC..00	Skin elasticity
2FM0.00	O/E - skin red
7G05200	Shave excision of lesion of skin of head or neck
7G06.11	Curettage of lesion of skin or subcutaneous tissue
7G0z.00	Removal of skin or subcutaneous tissue NOS
7G20.00	Suture of skin of head or neck
B32..00	Malignant melanoma of skin
F4D3100	Contact or allergic eyelid dermatitis
F4D3112	Contact eczema - eyelids
M11z.00	Atopic dermatitis NOS
M127300	Photodermatitis
M2W..00	Follicular cyst of skin & subcutaneous tissue, unspecif
Myu2200	[X]Exacerbation of eczema
Z793.00	Skincare management

ZQ35.00	Skin assessment
12H..00	FH: Skin disease
2F1Z.00	O/E - general skin exam. NOS
2FM..00	O/E - skin colour
2HD..00	O/E - skin colour over lesion
7G0..00	Removal of skin or subcutaneous tissue
7G03z00	Other excision of skin NOS
7G05800	Deroofing of skin blister
7G09500	Electrodessication of lesion of skin NEC
7G2..11	Skin suture and wound procedures
7G24500	Removal of foreign body from skin NEC
7G25012	Drainage of boil of skin of head or neck
7G25100	Drainage of lesion of skin NEC
7G2Ez00	Dressing of skin NOS
7N7..00	[SO]Skin
7N70.00	[SO]Skin of face
7N72B00	[SO]Skin of areola
G831.00	Varicose veins of the leg with eczema
M153600	Periocular dermatitis
M1y0.00	Nummular dermatitis
M21z300	Redundant skin
R02z.00	[D]Skin symptoms NOS
2F9..00	O/E - skin scales
2FI..00	O/E - sinus in skin
335..12	Patch skin test
4JG..00	Skin sample for organism
7G03y00	Other specified other excision of skin
7G05.00	Other excision of lesion of skin
7G05700	Excision of skin cyst
7G22.11	Removal of repair material from skin including head or neck
7G25600	Incision of skin NEC
7G2E100	Dressing of burnt skin NEC
7G2G200	Tattooing of skin
7Gz..00	Skin operations NOS
7N73200	[SO]Skin of finger
7N73t00	[SO]Skin of knee region
8BC8.00	Application of adhesive skin closure
B7J0100	Haemangioma of skin and subcutaneous tissue
F4D3000	Eczematous eyelid dermatitis
F502400	Acute eczematoid otitis extern
M07..00	Other local infections of skin and subcutaneous tissue
M1...00	Other skin and subcutaneous tissue inflammatory conditions
M110.00	Napkin dermatitis
M128300	Allergic contact dermatitis due to dyes
M27..00	Chronic skin ulcer
M2y5.00	Foreign body in skin or subcutaneous tissue

M2yA.00	Skin sinus
R028.00	[D]Skin texture changes
Z1B1.00	Attention to dressing of skin
Z1O2.00	Swabbing skin area
1J0G.00	Suspected skin cancer
2F5..11	O/E - vesicles in skin
2FGZ.00	O/E - skin scar NOS
2FH..00	O/E - skin crust
2FH2.00	O/E - skin crust present
2FK..00	O/E - Peeling skin
2FL..00	O/E lichenified skin
2FM1.00	Lower leg skin pigmentation
2FM5.00	Skin normal colour
7G03500	Ligation of lesion of skin NEC
7G03511	Ligation of skin tag
7G03C00	Excision of lesion of skin of head or neck NEC
7G05500	Wide excision of skin lesion
7G08000	Cauterisation of lesion of skin of head or neck
7G0C100	Biopsy of lesion of skin NEC
7G22200	Removal of suture from skin of head or neck
7G22z00	Removal of repair material from skin NOS
7G2E000	Dressing of burnt skin of head or neck
7G2E500	Dressing of skin ulcer NEC
7N12511	[SO]Skin of nipple
7N70200	[SO]Skin of cheek
7N73000	[SO]Skin of arm, unspecified
7N73100	[SO]Skin of hand
7N73300	[SO]Skin of leg
A512.00	Contagious pustular dermatitis
BA02200	Neoplasm of unspecified nature of skin
F4D3111	Allergic dermatitis - eyelid
L18B.00	Dis of the skin and subcut tis comp preg childbrth puerp
M123800	Contact dermatitis due to scabicides
M124100	Contact dermatitis due to adhesive plaster
M272.00	Ulcer of skin
R028100	[D]Thickening of skin
Z1B2300	Dressing of skin ulcer
Z1O1300	Drying skin creases
ZX1D.00	Picking own skin
14F3.00	H/O: chronic skin ulcer
2581	O/E - skin of abdomen
2F1E.00	Warm skin
2F1F.00	Skin normal temperature
2F4Z.00	O/E - skin nodules NOS
2FD2.00	O/E - skin cyst present
2FDZ.00	O/E - skin cyst NOS

2FT7.00	Non-healing pigmented skin lesion
2FZ..00	O/E - skin examination NOS
3852.12	Skin lines
64L3.00	Child exam.: skin
679g.00	Skin care education
7731000	Excision of skin tag of anus
7G0..11	Excision of skin or subcutaneous tissue
7G03.11	Other excision of skin including head or neck
7G03C11	Removal of mole of skin of head or neck by excision
7G05.11	Other excision of lesion of skin including head and neck
7G06z00	Curettage of lesion of skin NOS
7G0C300	Incision biopsy of skin
7G0Cz00	Other biopsy of skin NOS
7G19.00	Local subcutaneous pedicle skin flap
7G23y00	Removal other specified inorganic substance from skin
7G25311	Incision of boil of skin NEC
7G25z00	Opening of skin NOS
7G2D011	Debridement of wound of skin NEC
7G2E700	Attention to dressing of burnt skin NEC
7G2EB00	Four layer compression bandaging for skin ulcer
7G2EC00	Three layer compression bandage for skin ulcer
7G2Fz00	Other operation on skin wound NOS
7G2Gy00	Other specified operation on skin
7N71100	[SO]Skin of neck
7N72200	[SO]Skin of back
7N73i00	[SO]Skin of calf
8HTu.00	Referral to eczema clinic
A540.00	Eczema herpeticum - Kaposi's varicelliform eruption
AB23.00	Candidiasis of skin and nails
AB23100	Other skin candidiasis
B764100	Benign neoplasm of skin of neck
B765000	Benign neoplasm of skin of axilla
B765600	Benign neoplasm of skin of perineum
B765900	Benign neoplasm of skin of back
B76z.00	Benign neoplasm of skin NOS
M07z.12	Infected skin ulcer
M11A.00	Asteatotic eczema
M124111	Elastoplast contact dermatitis
M127800	Photocontact dermatitis [berloque dermatitis]
M12y100	Contact dermatitis due to cold weather
M12y200	Contact dermatitis due to dyes
M12z.00	Contact dermatitis NOS
M15y012	Staphylococcal scalded skin syndrome
M1B..11	Juvenile plantar dermatitis
M2...00	Other skin and subcutaneous tissue disorders
M21..00	Other atrophic and hypertrophic conditions of skin

M213200	Atrophic spots of skin
M21z.00	Skin atrophy/hypertrophy NOS
M2B..00	Follicular cysts of skin and subcutaneous tissue
M2y4D00	Macerated perianal skin
M2y4z11	Chapping of skin
M2y8.00	Mucinosis of skin
M2yB.00	Fistula of skin
R020200	[D]Pricking of skin
R020z00	[D]Skin sensation disturbance NOS
R028000	[D]Induration of skin
SEz..00	Contusion with skin intact, NOS
Z174L11	SKIN TREATMENT

British National Formula sub-chapter	Description
13.00.00	Skin
13.01.00	Management of skin conditions
13.01.03	Excipients and sensitisation
13.02.01	Emollients
13.02.02	Barrier preparations
13.03.00	Topical local anaesthetic and antipruritics
13.04.00	Topical corticosteroids
13.05.00	Preparations for eczema and psoriasis
13.05.01	Preparations for eczema
13.05.02	Preparations for psoriasis
13.06.01	Topical preparations for acne
13.06.02	Oral preparations for acne
13.06.03	Topical preparations for rosacea
13.07.00	Preparations for warts and calluses
13.08.01	Sunscreen preparations
13.08.02	Camouflagers
13.09.00	Shampoos and other preparations for scalp and hair
13.09.01	Shampoos and other scalp preparations
13.10.01	Antibacterial preparations (for skin conditions)
13.10.02	Antifungal preparations (topical, for skin conditions
13.10.03	Antiviral preparations (topical, for skin conditio
13.10.04	Parasiticidal preparations (topical)
13.10.05	Preparations for minor cuts and abrasions
13.11.00	Skin cleansers, antiseptics, and preparations for promotion of wound healing
13.11.01	Alcohols and saline
13.11.02	Chlorhexidine salts
13.11.04	Iodine
13.11.05	Phenolics

13.11.06	Oxidisers and dyes
13.11.07	Preparations for promotion of wound healing
13.12.00	Antiperspirants
13.13.00	Topical circulatory preparations
13.14.00	Miscellaneous skin preparations

Pain (gastrointestinal, backache or headache, etc.)

Read Code	Description
1969.00	Abdominal pain
16C6.00	Back pain without radiation NOS
16C5.00	C/O - low back pain
1A55.00	Dysuria
182..00	Chest pain
1A59.00	C/O pelvic pain
1C3..00	Earache symptoms
196..11	Abdominal pain type
1972.00	Epigastric pain
16C2.00	Backache
1BA5.11	Pain in sinuses
1968.00	Abdominal discomfort
1A53.11	C/O - loin pain
16C..00	Backache symptom
1A58000	Vaginal pain
1977.00	Right iliac fossa pain
182B.00	Rib pain
2D7..00	O/E - painful ear
16CA.00	Mechanical low back pain
1978.00	Left iliac fossa pain
1979.00	Suprapubic pain
196B.00	Painful rectal bleeding
16C9.00	Chronic low back pain
197C.00	Lower abdominal pain
1A58100	Vulval pain
1825.00	Pleuritic pain
25C..15	O/E - abdomen tender
1971.00	Central abdominal pain
16C7.00	C/O - upper back ache
197..13	Site of abdominal pain
16C3.00	Backache with radiation
197..11	Flank pain
25C..00	O/E - abdo. pain on palpation
1828.00	Atypical chest pain
197D.00	Right upper quadrant pain
1C32.00	Unilateral earache
182C.00	Chest wall pain

1BA5.00	Frontal headache
1A53.12	C/O - lumbar pain
1829.00	Retrosternal pain
1A5E.00	Pain in vulva
1A53.13	C/O - renal pain
1824.00	Anterior chest wall pain
1A53.00	Lumbar ache - renal
1A58.00	Pain in female genitalia
16C8.00	Exacerbation of backache
1822.00	Central chest pain
1BA9.00	Sinus headache
16CZ.00	Backache symptom NOS
197B.00	Upper abdominal pain
29E3.00	O/E - analgesia present
1A5A.00	C/O perineal pain
1BA6.00	Occipital headache
1A5D.00	Urethral pain
25C1.00	O/E - no abd.pain on palpation
25C..14	O/E - umbilical pain on palp.
25C8.00	O/E - abd. pain - R.iliac
197A.00	Generalised abdominal pain
1C33.00	Bilateral earache
197..12	Iliac fossa pain
1976.00	Right flank pain
25C2.00	O/E - abd.pain-R.hypochondrium
1C3Z.00	Earache symptom NOS
25CZ.00	O/E -abd.pain on palpation NOS
1974.00	Right subcostal pain
25C9.00	O/E - abd. pain - hypogastrium
25CA.00	O/E - abd. pain - L.iliac
2D73.11	O/E - mastoid tender
182Z.00	Chest pain NOS
196..00	Type of GIT pain
197..14	Subcostal pain
1975.00	Left flank pain
1BA8.00	Temporal headache
1BB..00	Specific fear
F2W0.00	Medication overuse headache
S120.00	Closed fracture rib
182A.00	Chest pain on exertion
182B000	Costal margin chest pain
196A.00	Hunger pain
197Z.00	Site of GIT pain NOS
1A5..00	Genitourinary pain
25C3.00	O/E - abd. pain - epigastrium
F2W..00	Drug-induced headache, not elsewhere classified

1823.00	Precordial pain
196Z.00	Type of GIT pain NOS
1973.00	Left subcostal pain
197A.11	General abdominal pain-symptom
1A58200	Ovarian pain
1A5Z.00	Genitourinary pain NOS
1BA3.00	Unilateral headache
1M52.00	Chronic pain
25C..13	O/E - lumbar pain on palpation
2IA..11	O/E - painful sign
66n..00	Chronic pain review

British National Formula sub-chapter	Description
04.07.01	Non-opioid analgesics
04.07.02	Opioid analgesics
04.07.04	Antimigraine drugs

Depression or low mood

Read Code	Description
1BT..11	low mood
1BT..00	depressed mood
1JJ..00	suspected depression
1BT..12	sad mood

British National Formula sub-chapter	Description
04.03.01	Tricyclic and related antidepressant drugs
04.03.02	Monoamine-oxidase inhibitors (MAOIs)
04.03.03	Selective serotonin re-uptake inhibitors
04.03.04	Other antidepressant drugs

Anaemia or blood disorder

Read Code	Description
D00..00	Iron deficiency anaemias
D00y100	Microcytic hypochromic anaemia
D21z.00	Anaemia unspecified
145..11	H/O: anaemia
D00zz00	Iron deficiency anaemia NOS
D0...00	Deficiency anaemias
2C2..11	O/E - anaemic
D010.00	Pernicious anaemia
D00..12	Microcytic - hypochromic anaemia
D012.00	Folate-deficiency anaemia

D21..00	Other and unspecified anaemias
D21z.11	Secondary anaemia NOS
D403.00	Eosinophilia
D011.11	Vitamin B12 deficiency anaemia
D011X00	Vitamin B12 deficiency anaemia, unspecified
D012500	Macrocytic anaemia unspecified cause
D214.00	Chronic anaemia
D000.00	Iron deficiency anaemia due to chronic blood loss
D2z..00	Other anaemias NOS
D400A00	Leucopenia
D40y300	Lymphopenia
145..00	H/O: blood disorder
1453.00	H/O: haemolytic anaemia
1455.11	H/O: bleeding disorder
D000.11	Normocytic anaemia due to chronic blood loss
D00z.00	Unspecified iron deficiency anaemia
D012.11	Folic acid deficiency anaemia
D0z..00	Deficiency anaemias NOS
D107A00	Haemoglobin E trait
D211.11	Normocytic anaemia following acute bleed
D21z.12	Normocytic anaemia due to unspecified cause
D411.00	Chronic lymphadenitis

British National Formula chapter	Description
09.01.01	Iron deficiency anaemias
09.01.02	Drugs used in megaloblastic anaemias
09.01.03	Drugs used in hypoplastic, haemolytic & renal anaemias
09.01.06	Drugs used in neutropenia

Constipation

Read Code	Description
19C..00	Constipation
J520z00	Constipation NOS
19C..11	Constipation symptom
19C1.00	Not constipated
19C2.00	Constipated
J520000	Acute constipation
19CZ.00	Constipation NOS
J520200	Chronic constipation without overflow
J520400	Chronic constipation

British National Formula chapter	Description
01.06.00	Laxatives

01.06.01	Bulk-forming laxatives
01.06.02	Stimulant laxatives
01.06.03	Faecal softeners
01.06.04	Osmotic laxatives
01.06.05	Bowel cleansing preparations
01.06.07	Other drugs used in constipation

Haemorrhoid or anal abscess

Read Code	Description
25Q..00	O/E - rectal examination done
J540.00	Perianal abscess
25Q1.00	O/E - rectal examination - NAD
25QZ.00	O/E - rectal examination NOS
25Q7.00	Rectal discharge
J54..00	Abscess of anal and rectal regions
25Q5.00	O/E - PR - rectum empty

British National Formula chapter	Description
01.07.00	Local preparations for anal and rectal disorders
01.07.01	Soothing haemorrhoidal preparations
01.07.02	Compound haemorrhoidal preparations with corticost
01.07.03	Rectal sclerosants
01.07.04	Management of anal fissures

Breast or breastfeeding related

Read Code	Description
26B..00	O/E - general breast exam.
K310.13	Mastitis
6795.00	Health ed. - breast exam.
62PA.00	Mother currently breast feeding
K317000	Mastodynia - pain in breast
1A8..00	Breast lump symptom
26C3.11	Sore nipple
9OHE.00	Patient breast aware
26...11	Breast examination
K317100	Lump in breast
1243.11	FH: Breast cancer
26B1.00	O/E - general breast exam. NAD
62PC.00	Breast feeding problem
62P1.00	Breast fed
K310z00	Inflammatory breast diseases NOS
62P1.11	Infant breast fed
L452.00	Obstetric nonpurulent mastitis
Z2C3.00	Does perform breast-feeding

K318.00	Breast abscess
122B.00	No FH: breast carcinoma
62P3.00	Breast feeding with supplement
8C1H.00	Breast feeding education
26BH.00	Breast tenderness
26C3.12	Painful nipple
62P4.00	Breast changed to bottle feed
1596.00	H/O: breast problem
6422.00	Breast fed at 6 weeks
26C3.00	O/E - cracked nipple
1243.00	FH: * - breast
Z2C3.11	Performs breast-feeding
26B6.00	O/E - lactating breast
L451.11	Purulent mastitis - obstetric
Z1P2400	Instruction relating to breast-feeding
K3...00	Disorders of breast
62P6.00	Breast feeding stopped
K312.11	Cracked nipple
K317011	Breast soreness
1A9..00	Nipple discharge symptom
Z44..00	Breast-feeding counselling
1551.00	H/O: infant breast fed
K317300	Inversion of nipple
26B..11	O/E - breast - general
Z2C4.00	Does not perform breast-feeding
26C..11	O/E - nipple - general
L462.00	Breast engorgement in pregnancy, the puerperium or lactation
Z1P1400	Breast self-examination instruction
ZL5G100	Referral to breast surgeon
K310111	Pubertal mastitis
62E3.11	Intends to breast feed
6423.00	Breast fed + supp. at 6 weeks
K310800	Breast infection
6412.00	Breast fed at 10 days
K317400	Nipple discharge
L45..00	Obstetric breast infections
38J..00	Breastfeeding assessment
K310.12	Mastitis - non puerperal
62E3.00	Feeding intention - breast
K317z00	Breast signs and symptoms NOS
26C4.00	Nipple eczema
Z2C1.00	Able to perform breast-feeding
7N12.00	[SO]Breast
26B7.12	Lumpy breasts
Z2C5.00	Difficulty performing breast-feeding
1A82.00	Breast lump present

L463500	Pain on breast feeding
585C.00	US scan of breast
K310400	Acute nonpuerperal breast abscess
K31z.00	Other breast disorders NOS
Z163200	Applying topical preparations to nipples
L461.00	Cracked nipple in pregnancy, the puerperium or lactation
K300.00	Solitary cyst of breast
7N12500	[SO]Nipple
K310.11	Abscess, breast, non puerperal
L451.00	Obstetric breast abscess
ZV50112	[V]Breast reduction
1424.00	H/O: * breast
8H5M.00	Referral to breast surgeon
1A86.00	Breast lump detected by self-examination
L462z11	Breast engorgement
M032100	Cellulitis and abscess of breast
L450.12	Nipple infection - obstetric
26E..11	O/E - breast lump position
615H.00	Breast feeding problem
K301.11	Chronic cystic mastitis
26BZ.00	O/E - general breast exam. NOS
B34..00	Malignant neoplasm of female breast
ZVu6n00	[X]Presence of silicon implant in breast
B77..11	Fibroadenoma of breast
K310.00	Inflammatory breast disease
ZV50111	[V]Breast augmentation
1A83.00	Breast lump detected by clinician examination
26BD.00	Intractable breast pain
B34z.00	Malignant neoplasm of female breast NOS
K300.11	Benign breast cyst
Q483700	Difficulty in feeding at breast
62P5.00	Breast feeding started
L452400	Obstetric nonpurulent mastitis with postnatal complication
PH62.00	Accessory breast
Q477.00	Newborn breast engorgement
Z166.00	Supporting breasts during breast-feeding
Z1P2411	Breast feeding education
7N12400	[SO]Axillary tail of breast
7N72A00	[SO]Skin of nipple
K317500	Retraction of nipple
Z2C2.00	Unable to perform breast-feeding
12F4.00	FH: Breast disease
Q483z12	Breast feeding problem in the newborn
Z2C..00	Ability to perform breast-feeding
26BC.00	Recurrent cyst of breast
4I2A.11	Breast milk sample

K312.00	Fissure of nipple
K31y200	Occlusion of breast duct
L452100	Obstetric nonpurulent mastitis - delivered
Q405.00	Neonatal infective mastitis
1J0I.00	Suspected breast cancer
26B7.11	Breast irregular nodularity
L452z00	Obstetric nonpurulent mastitis NOS
L46..00	Obstetric breast and lactation disorders NOS
M012100	Boil of breast
Z2C1.11	Performs breast-feeding
1A81.00	No breast lump
26C2.11	O/E - retracted nipple
26F..00	O/E - breast lump size
7136500	Eversion of nipple
7N72000	[SO]Skin of breast
B34..11	Ca female breast
K301.00	Fibrocystic disease of breast
K30y000	Sebaceous cyst of breast
K310300	Chronic nonpuerperal mastitis
K3z..00	Breast disorders NOS
6413.00	Breast + supp. fed at 10 days
K302.00	Fibroadenosis of breast
K310000	Acute nonpuerperal mastitis
L45z.00	Obstetric breast infection NOS
PH63.00	Accessory nipple
PH68.00	Ectopic breast tissue
Z2D5.00	Difficulty latching on to breast for feeding
1A8Z.00	Breast lump symptom NOS
1A9Z.00	Nipple discharge NOS
26B8.11	O/E - ulcer on breast
26B9.00	O/E - breast swollen
26C2.00	O/E - retraction of nipple
26D..00	O/E - nipple discharge
26E..00	O/E - breast lump palpated
62P3000	Breastfeeding and supplementary bottle feed at dis from hosp
6442.00	Breast fed at 6 months
64f2.00	Breast and supplementary bottle fed at 4 months
713..00	Breast operations
7131211	Lumpectomy of breast
7132.00	Reconstruction of breast
7138000	Drainage of lesion of breast
7N12511	[SO]Skin of nipple
K317111	Breast mass
L451400	Obstetric breast abscess with postnatal complication
L451z00	Obstetric breast abscess NOS
SD11200	Abrasion of breast, infected

SD13200	Blister of breast, infected
SE20.00	Contusion, breast
Z163100	Applying expressed breast milk to nipples
1A84.00	Breast lump detected by mammogram
1A85.00	Breast lump detected by partner
26C..00	O/E - general nipple exam.
26C1.00	O/E - nipple normal
26D1.00	O/E - no nipple discharge
26E3.00	O/E-breast lump-upper in-quad
26E6.00	O/E-breast lump-lower out-quad
26G..00	O/E - breast lump consistency
64f0.00	Breast fed at 4 months
6795000	Breast self-examination instruction
6862000	Breast neoplasm screen normal
7131900	Excision of accessory breast tissue
7135.00	Biopsy of breast
7138.00	Other operations on breast
7138500	Extraction of milk from breast
9N1y900	Seen in breast clinic
B3...00	Malig neop of bone, connective tissue, skin and breast
B77..00	Benign neoplasm of breast
Byu6.00	[X]Malignant neoplasm of breast
K301.12	Cystic breast
K317.00	Breast signs and symptoms
K317200	Induration of breast
K31y.00	Other breast disorders OS
K31yz00	Other breast disorders NOS
L450.00	Obstetric nipple infection
L452000	Obstetric nonpurulent mastitis unspecified
L45y000	Other obstetric breast infection unspecified
L461z00	Cracked nipple in pregnancy, the puerperium or lactation NOS
L462z00	Breast engorgement in pregnancy/puerperium/lactation NOS
PH6..00	Specified anomalies of breast
PH65.00	Supernumerary nipple
PH66.00	Hypoplasia of breast
R138.00	[D]Breast imaging abnormal
S890.00	Open wound of breast
SP07P00	Rupture of breast implant
Z163.00	Nipple care procedure
Z1P2500	Instruction on breast hygiene
ZV6G100	[V]Acquired absence of breast(s)
ZV76100	[V]Screening for malignant neoplasm of breast

Sleep-related, tiredness or fatigue

Read Code	Description
168..00	Tiredness symptom
1683.00	Tired all the time
R007500	[D]Tiredness
1683.11	C/O - "tired all the time"
168..11	Fatigue - symptom
E205.12	Tired all the time
R005.00	[D]Sleep disturbances
1682.00	Fatigue
1B1Q.00	Poor sleep pattern
Fy00.00	Disorders of initiating and maintaining sleep
1B1R.00	Good sleep pattern
R005000	[D]Sleep disturbance, unspecified
Fy0..00	Sleep disorders
8Q0..00	Sleep management
1688.00	Exhaustion
E274.00	Non-organic sleep disorders
R007100	[D]Fatigue
F286.11	CFS - Chronic fatigue syndrome
E274700	Somnambulism - sleep walking
8G9B.00	Sleep hygiene behaviour education
1681.00	Not tired
F286.00	Chronic fatigue syndrome
168Z.00	Tiredness symptom NOS
R005311	[D]Sleep apnoea syndrome
1BX..00	Sleep observations
1BX1.00	Excessive sleep
Eu51300	[X]Sleepwalking
Fy03.00	Sleep apnoea
A86..11	Sleeping sickness
F286.12	Postviral fatigue syndrome
F286.14	Post-viral fatigue syndrome
L39y500	Maternal exhaustion
3148.00	Sleep studies
8HTn.00	Referral to sleep clinic
E274D11	Restless sleep
Eu46011	[X]Fatigue syndrome
F481511	Tired eyes
Fy03.11	Obstructive sleep apnoea
L168.00	Fatigue during pregnancy
R005.12	[D]Sleep rhythm problems
Z1M..00	Sleep and rest interventions

Allergy treatment or symptom

Read Code	Description
14L..00	H/O: drug allergy
14M..00	H/O: non-drug allergy
14L1.00	H/O: penicillin allergy
14M1.00	H/O: food allergy
14M4.00	H/O: cat allergy
14M5.00	H/O: anaphylactic shock
14LZ.00	H/O: drug allergy NOS
14LA.00	H/O: raloxifene allergy
14L2.00	H/O: antibiotic allergy NOS
14LE.00	H/O: trimethoprim allergy
14LG.00	H/O: metronidazole allergy
14L4.00	H/O: analgesic allergy
14L5.00	H/O: vaccine allergy
14LC.00	H/O: chloramphenicol allergy
14LJ.00	H/O: influenza vaccine allergy
14LK.00	H/O: aspirin allergy
14LI.00	H/O: nitrofurantoin allergy
14LP.00	H/O: warfarin allergy
14M2.00	H/O: plant allergy

British National Formula sub chapter	Description
03.04.01	Antihistamines
03.04.02	Allergen Immunotherapy
03.04.03	Allergic emergencies

Asthma

Read Code	Description
663Q.00	Asthma not limiting activities
663O.00	Declined to perform inhaler technique
66YJ.00	Home oxygen supply - cylinder
663q.00	Asthma not limiting activities
663s.00	Peak flow meter at home
663U.00	Asthma management plan given
66YK.00	Home oxygen supply - concentrator
H33..00	Asthma
663n.00	Asthma treatment compliance satisfactory
663f.00	Oral steroids started
663O000	Asthma never disturbs sleep
H333.00	Acute exacerbation of asthma
663N.00	Asthma treatment compliance satisfactory
663..11	Asthma monitoring
663P.00	Asthma treatment compliance unsatisfactory

663V.00	Asthma severity
663v.00	Asthma severity
663e000	Asthma sometimes restricts exercise
663t.00	No peak flow meter at home
663u.00	Asthma management plan given
663y.00	Steroid dose inhaled daily
8795.00	Asthma control step 2
12D2.00	FH: Asthma
9OJA.00	Asthma monitoring check done
663p.00	Asthma treatment compliance unsatisfactory
8796.00	Asthma control step 3
663N000	Asthma causing night waking
663M.00	Bronchodilators used a maximum of once daily
663r.00	Service of nebuliser
8794.00	Asthma control step 1
663L.00	Spacer device in use
38DL.00	Disabilities of arm shoulder and hand outcome measure score
66YQ.00	Asthma monitoring by nurse
2126200	Asthma resolved
9OJ5.00	Asthma monitor 2nd letter
663w.00	Asthma prophylactic medication used
178..00	Asthma trigger
1789.00	Asthma trigger - respiratory infection
663e.00	Home oxygen supply stopped
388t.00	Royal College of Physicians asthma assessment
1J70.00	Suspected asthma
66Y9.00	Step up change in asthma management plan
66Yp.00	Asthma review using Roy Colleg of Physicians three questions
663N200	Asthma disturbs sleep frequently
66Yq.00	Asthma monitoring by nurse
663N100	Asthma disturbs sleep weekly
9OJ6.00	Asthma monitor 3rd letter
212G.00	Asthma resolved
66YR.00	Asthma monitoring by doctor
66YP.00	Asthma review using Roy Colleg of Physicians three questions
679J200	Health education - structured patient focused asthma discuss
1781.00	Asthma trigger - pollen
66Yr.00	Asthma monitoring by doctor
1788.00	Asthma trigger - cold air
663V000	Occasional asthma
8H2P.00	Emergency admission, asthma
178B.00	Asthma trigger - exercise
9OJ7.00	Asthma monitor verbal invite
1786.00	Asthma trigger - animals
66YA.00	Step down change in asthma management plan
1787.00	Asthma trigger - seasonal

663V100	Mild asthma
388t000	Royal College Physician asthma assessment 3 question score
663V200	Moderate asthma
9OJ2.00	Refuses asthma monitoring
H33z.00	Asthma unspecified
H33z100	Asthma attack
178A.00	Asthma trigger - airborne dust
663P200	Asthma limits activities most days
8CMA000	Patient has a written asthma personal action plan
66YC.00	Number of cons days less than 80% peak expiratory flow rate
9OJ8.00	Asthma monitor phone invite
1785.00	Asthma trigger - damp
663m.00	Bronchodilators used a maximum of once daily
663P000	Asthma limits activities 1 to 2 times per month
6.63E+102	Preventive procedures
H33zz00	Asthma NOS
1782.00	Asthma trigger - tobacco smoke
1783.00	Asthma trigger - warm air
663W.00	Asthma prophylactic medication used
8793.00	Asthma control step 0
9OJA.11	Asthma monitored
173A.00	Exercise induced asthma
1784.00	Asthma trigger - emotion
663P100	Asthma limits activities 1 to 2 times per week
663h.00	Inhaler technique - good
1O2..00	Asthma confirmed
663x.00	Irritable airways
66YE.00	Emergency COPD admission since last appointment
8797.00	Asthma control step 4
H330.00	Extrinsic (atopic) asthma
663j.00	Asthma - currently active
66Y5.00	Change in asthma management plan
68C3.00	Asthma screening
679J100	Health education - structured asthma discussion
H33..11	Bronchial asthma
H330.11	Allergic asthma
679J000	Health education - asthma self management
H330.12	Childhood asthma
H330011	Hay fever with asthma
H330111	Extrinsic asthma with asthma attack
122C000	No family history of asthma
173d.00	Work aggravated asthma
661M100	Asthma self-management plan agreed
663V300	Severe asthma
H330.14	Pollen asthma
H33z000	Status asthmaticus NOS

H33z111	Asthma attack NOS
H33zz11	Exercise induced asthma
66Yz000	Asthma management plan declined
9OJZ.00	Asthma monitoring admin.NOS
9Q21.00	Patient in asthma study
H330.13	Hay fever with asthma

British National Formula chapter	Description
03.01.01	Adrenoceptor agonists
03.01.02	Antimuscarinic bronchodilators
03.01.03	Theophylline
03.01.04	Compound bronchodilator preparations
03.01.05	Peak flow meters, inhaler devices and nebulisers

Cardiovascular disease

Read Code	Description
38DP.00	QRISK2 cardiovascular disease 10 year risk score
24...00	Exam. of cardiovascular system
38DR.00	Framingham 1991 cardiovascular disease 10 year risk score
1224.00	No FH: Cardiovascular disease
662k.00	JBS cardiovascular disease risk <10% over next 10 years
8CAT.00	Patient advised about cardiovascular disorder
12C..00	FH: Cardiovascular disease
38D6.00	Assessing cardiovascular risk using SIGN score
38DF.00	QRISK cardiovascular disease 10 year risk score
66f..00	Cardiovascular disease monitoring
18Z1.00	No cardiovascular symptom
33BC.00	Cardiovascular event risk
662l.00	JBS cardiovascular disease risk 10-20% over next 10 years
679W.00	Health education - cardiovascular disease
9Oh9.00	Cardiovascular disease risk assessment declined
ZV7B200	[V]Screening for other/unspecified cardiovascular disease
38B1000	CVD (cardiovascular disease) risk assessment by third party
66f1.00	Cardiovascular disease interim monitoring
6C2..00	Primary prevention of cardiovascular disease
38G6.00	Joint British Societies cardiovascular disease risk score
662n.00	JBS cardiovascular disease risk >30% over next 10 years
66f0.00	Cardiovascular disease annual review
68X..00	Screening for cardiovascular system disease
9m21.00	Cardiovascular disease risk assessment verbal invitation

British National Formula sub-chapter	Description
02.05.01	Vasodilator antihypertensive drugs
02.05.02	Centrally-acting antihypertensive drugs

02.05.04	Alpha-adrenoceptor blocking drugs
02.05.05	Drugs affecting the renin-angiotensin system

Rheumatic disease

British National Formula sub-chapter	Description
10.01.01	Non-steroidal anti-inflammatory drugs
10.01.02	Corticosteroids (in musculoskeletal and joint conditions)
10.01.03	Drugs which suppress the rheumatic disease process
10.01.04	Gout and cytotoxic-induced hyperuricaemia
10.01.05	Other drugs for rheumatic diseases

Thyroid disease or hyperthyroidism

Read Code	Description
C04..13	Hypothyroidism
66B..00	Thyroid disease monitoring
442J.00	Thyroid function test
442A.00	TSH - thyroid stim. hormone
C02..11	Hyperthyroidism
C04..00	Acquired hypothyroidism
442..00	Thyroid hormone tests
442..13	Thyroid function tests
1251.00	FH: Thyroid disorder
8HP5.00	Refer for thyroid test
442I.00	Thyroid function tests abnormal
22H..00	O/E - thyroid gland
C04..12	Thyroid deficiency
1432.00	H/O: hypothyroidism
66BZ.00	Thyroid disease monitoring NOS
143..11	H/O: thyroid disorder
L181500	Postpartum thyroiditis
4421.00	Thyroid hormone tests normal
C04z.00	Hypothyroidism NOS
1431.00	H/O: hyperthyroidism
C0...00	Disorders of thyroid gland
9Oj..00	Hypothyroidism monitoring administration
442H.00	Thyrotropin releasing hormone (TRH) stimulation test
43G5.00	Thyroid autoantibodies
C047.00	Subclinical hypothyroidism
C062.00	Thyroid cyst
C05..00	Thyroiditis
585G.00	Ultrasound scan of thyroid
6871.00	Thyroid disorder screen
R145.00	[D]Thyroid function test abnormal

1JM..00	Suspected hypothyroidism
4423.00	Thyroid hormone tests low
66BB.00	Hypothyroidism annual review
C000.13	Thyroid nodule
C120.00	Hyperparathyroidism
4421.11	Euthyroid
442Z.00	Thyroid hormone tests NOS
7110200	Hemithyroidectomy
7110.00	Thyroidectomy operations
7N10000	[SO]Thyroid gland
8CR5.00	Hypothyroidism clinical management plan
22H3.00	O/E - thyroid swelling -bilat.
22H4.00	O/E - thyroid lump
4422.00	Thyroid hormone tests high
442C.00	Thyroid horm tests borderline
66B8.00	Thyroid dis.treatment changed
9Oj0.00	Hypothyroidism monitoring first letter
9h72.00	Excepted from thyroid quality indicators: Informed dissent
C00z.11	Thyroid enlargement
C121.00	Hypoparathyroidism
22H1.00	O/E - thyroid gland - NOS
43Gd000	Serum thyroid peroxidase antibody concentration
7110000	Total thyroidectomy
7110300	Lobectomy of thyroid gland NEC
C025.00	Subclinical hyperthyroidism
C040.00	Postsurgical hypothyroidism
C04z.13	Hypothyroid goitre, acquired
C06z.00	Thyroid disorder NOS
212P.00	Hyperthyroidism resolved
22H2.00	O/E - thyroid swelling -unilat
43aB.00	Thyroid mitochondrial antibody level
43mQ.00	Thyroid stimulating antibody level
442G.00	Thyroid hormone tests abnormal
44AM.00	Plasma parathyroid hormone related peptide level
7110z00	Thyroidectomy NOS
9Oj1.00	Hypothyroidism monitoring second letter
9Oj4.00	Hypothyroidism monitoring telephone invitation
9h71.00	Excepted from thyroid quality indicators: Patient unsuitable
B8yy000	Carcinoma in situ of thyroid gland
ByuB.00	[X]Malignant neoplasm of thyroid and other endocrine glands
C000.11	Retrosternal thyroid goitre
C03..00	Congenital hypothyroidism
C050.00	Acute thyroiditis
C052.11	Autoimmune thyroiditis

British National Formula sub-chapter	Description
06.02.01	Thyroid hormones
06.02.02	Antithyroid drugs

Diabetes

Read Code	Description
466..00	Urine test for glucose
4662.00	Urine glucose test negative
4669.00	Urine dipstick for glucose
4661.00	Urine glucose test not done
44T9.00	Glucometer blood sugar
44g..00	Plasma glucose level
44U..11	Blood sugar result
44T1.00	Random blood sugar
44g0.00	Plasma random glucose level
44f..00	Serum glucose level
44T2.00	Fasting blood sugar
44f1.00	Serum fasting glucose level
42W..00	Hb. A1C - diabetic control
C11y200	Impaired glucose tolerance
42W5.00	HbA1c levl - IFCC standardised
4663.00	Urine glucose test = trace
44f0.00	Serum random glucose level
44TK.00	Fasting blood glucose level
44g1.00	Plasma fasting glucose level
R10E.00	[D]Impaired glucose tolerance
8A17.00	Self monitoring of blood glucose
42W4.00	HbA1c level (DCCT aligned)
44T1000	Random blood sugar normal
42c..00	RBC - red blood cell size
4664.00	Urine glucose test = +
44T..11	Blood sugar method
44T..00	Inborn error of metabolism screening test
44TA.00	Plasma glucose
4666.00	Urine glucose test = +++
4665.00	Urine glucose test = ++
4667.00	Urine glucose test = ++++
42W2.00	Hb. A1C 7-10% - borderline
466..11	Sugar - urine test
7P17200	Glucose tolerance test
9m9..00	Impaired glucose tolerance monitoring administration
R10D.00	[D]Elevated blood glucose level
C11y400	Impaired glucose regulation
C313500	Glucose intolerance

1JL..00	Suspected diabetes mellitus
42G6.00	Red cell glucose 6-phosphate dehydrogenase screening test
R102.12	[D]Impaired glucose tolerance test
13BB.00	High sugar diet
2126900	Impaired glucose tolerance resolved
42c0.00	HbA1 < 7% - good control
44T6.00	Lunch time blood sugar
44TZ.00	Blood glucose method NOS
44j..00	Glucose load test
46S..12	Sugars in urine
66AC.00	Diabetic peripheral neuropathy screening
68K1.00	Urine screen for glucose
8A17000	Frequency of blood glucose self-monitoring
8A18.00	Self monitoring of urine glucose
9m90.00	Impaired glucose tolerance monitoring invitation
9m90000	Impaired glucose tolerance monitoring invitation 1st letter
9m90200	Impaired glucose tolerance monitoring invitation 3rd letter
R102.00	[D]Glucose tolerance test abnormal
R10D011	[D]Impaired fasting glucose
66AY.00	Gestational diabetes mellitus annual review

British National Formula sub-chapter	Description
06.01.01	Insulin
06.01.02	Antidiabetic drugs
06.01.04	Treatment of hypoglycaemia
06.01.06	Diagnostic & monitoring agents for diabetes mellitis

Epilepsy

British National Formula sub-chapter	Description
04.08.01	Control of epilepsy
04.08.02	Drugs used in status epilepticus

Contraception

Read Code	Description
61B1.11	Depo-provera injection given
611..00	General contraceptive advice
6151.00	IUD fitted
614E.11	Pill check
61KA.00	Insertion of subcutaneous contraceptive
6148.00	Progestagen only oral contrac.
6154.00	IUD checked - no problems
6147.00	Combined oral contraceptive

614..12	Pill - oral contraception
61B1.00	Depot contraceptive given
61M..00	Emergency contraception
6144.00	Oral contraceptive repeat
614..11	Oral contraception
614D.00	Oral contraceptive prescribed
6148.12	Progestagen only pill
614..00	Oral contraceptive
6143.00	Oral contraceptive re-started
615F.00	IUD check
6141.00	Oral contraceptive started
61B..11	Depot contraception
6155.00	IUD checked - problems
6145.00	Oral contraception -no problem
6152.00	IUD removed
614E.00	Oral contraceptive advice
6157.00	IUD fitting awaited
61B..00	Uses vaginal hormone releasing ring
61A..11	Morning-after pill
615L.00	Intrauterine contraceptive device 6 week check
61A1.00	Morning after" pills given
615..00	Intra-uterine contr. device
61B2.00	Depot contraceptive repeated
614F.00	Emergency contraception advice
6148.11	Mini-pill: oral contraceptive
61KB.00	Check of subcutaneous contraceptive
61A..00	Post-coital contraception
615S.00	Mirena coil check
615..12	IUD contraception
61K..00	Subcutaneous contraceptive
615..11	Coil contraception
6146.00	Oral contraception - problem
6110.00	Contraceptive advice for patients with epilepsy
614Z.00	Oral contraception NOS
6159.00	IUD change due
61KC.00	Insert subcutaneous contraceptive implnt othr healthcre prov
6149.00	Oral contraceptive changed
61KE.00	Subcut contrcptive implnt palp
61N..00	Transdermal contraceptive
61KZ.00	Subcutaneous contraceptive NOS
61B3.00	Depot contraceptive-no problem
6148.14	Progestogen only pill
615A.00	IUD check due
61R..00	Intrauterine system contraception
61KD.00	Subcutaneous contraceptive in situ
6148.13	Progestogen only oral contraceptive

9kA0.00	IUCD fitting - enhanced service completed
61W0.00	UK medical eligib criteria for contraceptive use 2009 cat 1
615G.00	IUD in situ
615J.00	Unsuccessful intrauterine contraceptive device insertion
61BZ.00	Depot contraceptive NOS
615K.00	Intrauterine contraceptive device annual review
6153.00	IUD re-fitted
615B.00	IUD expelled
61KF.00	Remov subcutaneous contraceptive implant othr healthcre prov
61P..00	No current contraception
61B4.00	Depot contraceptive - problem
6142.00	Oral contraceptive stopped
9OB..12	Pill contraceptive admin
615Z.00	IUD - NOS
6158.00	IUD removal awaited
6151100	Insertion of T shaped 375 mm squared copper coated IUCD
615T.00	Intrauterine contraceptive device threads seen
615E.00	IUD threads lost
61A1.11	Post coital pills given
61X..00	Planned contraception method
619..00	Withdrawal contraception
61AZ.00	Post-coital contraception NOS
61W1.00	UK medical eligib criteria for contraceptive use 2009 cat 2
61W..00	UK medical eligib criteria for contraceptive use 2009 risk
615B.11	IUD fallen out
6156.00	IUD - defaulted from check
6181.00	Uses rhythm method
6146100	Headache caused by oral contraceptive pill
615P.00	IUCD fitted by other healthcare provider
615P000	Hormone releasing IUCD fitted by other healthcare provider
61B5.00	Depot contraception stopped
61A2.00	Morning after" IUD fitted
615D.00	IUD partially expelled
61W2.00	UK medical eligib criteria for contraceptive use 2009 cat 3
8D75.00	Penile sheath provision
2JG..00	Understands importance of BP monitoring and control
615N.00	Intrauterine contraceptive device fit by another GP practice
61W3.00	UK medical eligib criteria for contraceptive use 2009 cat 4
614C.00	Progestogen-only Pill failure
618..00	Rhythm method contraception
9OB..11	Oral contraceptive admin
615C.00	IUD failure - pregnant
61Q..00	Partner contraception
8BV..00	Emergency contraception indicated
965..00	Removal of subcutaneous contraceptive claim
6146200	Hypertension induced by oral contraceptive pill

615Q.00	Intrauterine contracep device removed by other hlth provider
618Z.00	Rhythm method NOS
61V..00	Problem with contraception
61Y..00	Uses contraception
614A.00	OCP for non-contraceptive use
614B.00	Combined O.C. pill failure
615R.00	Intrauterine contracep device checked by other hlth provider
61A2.11	Post-coital IUD fitted
61E..00	Sympto-thermal contraception
61E1.00	Uses sympto-thermal contracepn
61EZ.00	Sympto-thermal contraceptn NOS
61KG.00	Unsuccessful subcutaneous contraceptive insertion
61KH.00	Subcutaneous contraceptive implant not palpable
964..00	Insertion of subcutaneous contraceptive claim
9OB..00	Oral contracept. check admin.

British National Formula chapter	Description
07.03.01	Combined hormonal contraceptives
07.03.02	Progestogen-only contraceptives
07.03.03	Spermicidal contraceptives
07.03.04	Contraceptive devices
07.03.05	Emergency contraception

Education, advice, or counselling

Read Code	Description
679..11	Advice to patient - subject
8CB..00	Had a chat to patient
8CA..00	Patient given advice
677B.00	Advice about treatment given
67I..00	Advice
8CAZ.00	Patient given advice NOS
67E..00	Foreign travel advice
6781.00	Health education offered
8CAN.00	Pt given written advice on benefits of physical activity
67H..00	Lifestyle counselling
8CAa.00	Patient given advice about management of depression
67...12	Health education
8CE..00	Self-help advice leaflet given
679C.00	Insulin administration education
6797.00	Health ed. - immunisation
67...11	Counselling
8CAK.00	Patient given telephone advice out of hours
679..00	Health education - subject
67C..00	Postnatal support group
679S.00	Health education. - safe sex

679K.00	Health education - sexual health
8CA1.00	Patient advised to rest
671..00	Counselling - general
6775.00	Sterilisation counselling
8CAe.00	Patient advised about the risks of HIV
67H8.00	Lifestyle advice regarding hypertension
671C.00	Discussed with doctor
8CAj.00	Patient advised to telephone for test result
676..00	Pre-pregnancy counselling
8CA3.00	Patient advised re OTC medicat
6776.12	TOP counselling
67IJ000	Pre-conception advice for patients with epilepsy
67AF.00	Pregnancy advice for patients with epilepsy
67A..00	Pregnancy advice
677L.00	Chlamydia screening counselling
67DJ.00	Informing patient of named accountable general practitioner
8CAh.00	Patient advised of carers legal rights
8CAp.00	Head injury advice given
8CAk.00	Patient given telephone advice out of hours
67IJ.00	Pre-conception advice
8CAJ.00	Patient advised to telephone for test result
8CAC.00	Patient advised about safe drinking - water
8CAB.00	Patient advised to contact NHS Direct
679H.00	Social skills training
6714.00	Counselling carried out
67E2.00	Travel vaccination given
67I6.00	Advice about symptomatic treatment
8CAD.00	Pt ad notify sexual partners of sexual transmitted infection
679Y.00	Health education - ear care
671F.00	Discussed with patient
8CAn.00	Pt given written advice on benefits of physical activity
8CAd.00	Pt ad notify sexual partners of sexual transmitted infection
67A1.00	Infant feeding advice
6779.00	Psychological counselling
679N.00	Health education - parenting
67IT.00	Advice to carer regarding child's sleep
6760.00	Folic acid advice - pre-pregnancy
679I.00	Health education - infant massage
6776.13	Termination counselling
679e.00	Education about human papillomavirus
67IG.00	Oral health advice given
8CAw000	Advice about IUCD, checking for threads
6794.00	Health ed. - rubella status
6736.00	Counselled by a counsellor
8CAP.00	Head injury advice given
ZC7..00	Food hygiene advice

8CAY.00	Advised risk of deep vein thrombosis in air travel
6773.00	Investig. result counselling
67I3.00	Advice about weaning
6751.00	Bereavement counselling
8CAt.00	Patient advised about cardiovascular disorder
679K900	Education about prevention of sexually transmitted disease
679L.00	Health education - diabetes
8CAc.00	Patient advised about safe drinking - water
67Iq.00	Advice to carer regarding child's toilet training
8CA6.00	Patient advised re bed rest
679E.00	Education about human papillomavirus
8CAI.00	Patient advised to bring sample to surgery
6718.00	Discussed with health visitor
679D.00	Resuscitation training
679F.00	Health education - osteoporosis
67...00	Counselling/health education
67E1.00	Recommend travel vaccinations
6771.00	Genetic counselling
67AE.00	Folic acid advice in first trimester of pregnancy
67IK.00	Patient advised about nutrition
8CAW.00	Patient advised to have pregnancy test
8CAu.00	Patient advised of anticoagulant dose
679Z.00	Health education - subject NOS
67IM.00	Advice to stop taking medication
67IY.00	Advice to carer regarding prevention of SIDS
8CAm.00	Patient advised about alcohol
67P3.00	Anticoagulation therapy discussed
8CAS.00	Advised to self care
6774.00	Medication counselling
6775.11	Vasectomy counselling
8CAs.00	Advised to self care
6713.00	Counselling not wanted
8CA8.00	Patient Advised not to Drive
8CAG.00	Smoking cessation advice provided by community pharmacist
677A.00	Psychosexual counselling
67I4.00	Advice about fluid intake
67IW.00	Advice to return if problem persists or deteriorates
67DE.00	Provision of information about vitamin D supplementation
8CA9.00	Patient Advised to inform DVLA
679G.00	Skin care education
67I5.00	Advice about posture
67P..00	Discussion about procedure
8CAV.00	Patient advised about renal disorder
8CAX.00	Recommended thickened fluids
8CAl.00	Smoking cessation advice
6778.11	Fertility counselling

6783.00	Health education given
8CAi.00	Patient advised to bring sample to surgery
6712.00	Counselling offered
6715.00	Counselling by other agency
6755.00	Post miscarriage counselling
677..00	Medical counselling
679T.00	Demonstration of condom use
8CAy.00	Advised risk of deep vein thrombosis in air travel
8Hj4.00	Referral to DESMOND diabetes structured education programme
6721.00	Patient counselled
674Z.00	Social counselling NOS
67I8.00	Advice about taking aspirin
67IL.00	Child feeding advice
67J..00	Stress counselling
8CEC.00	Safer sex leaflet given
6748.00	Anger management counselling
679f.00	Health education - osteoporosis
67IR.00	Advice to carer regarding child's immunisations
8CI..00	Had a chat to parent
8CdA.00	Advice given about risks of unprotected sexual intercourse
6761.00	Diabetic pre-pregnancy counselling
6772.00	Disease counselling
67DC.00	Informing patient of test result process
67I7.00	Advice about foot care
8CE0200	Insulin passport given
8Cd4.00	Physical activity opportunity signposted
8Hj0.00	Referral to diabetes structured education programme
6719.00	Discussed with consultant
679Q.00	Health education - nutrition
679R.00	Patient offered diabetes structured education programme
67DF.00	NHS Hlth Chck rais awareness abt dementia and memory clinics
67DP.00	Discussion about clinical red flag warning signs
67Ia.00	Advice about impotence
67Ie.00	Falls advice - hip protectors supplied
67K4.00	Maintenance stage
67N0.00	Employment counselling
8CAx.00	Recommended thickened fluids
671F100	Hypoglycaemic management discussed
6776.11	Abortion counselling
6778.00	Procreat/fertility counselling
679M.00	NHS Diabetes Preventn Programe
67H3.00	Lifestyle advice regarding drug misuse
67IP.00	Advice to carer regarding child's safety
67Im.00	Advice to stop taking medication
67L..00	Goal identification
8CA7.00	Patient advised to mobilise part

8CAf.00	Patient advised to purchase medical kit
8CE8.00	Preferred place of care - discussed with patient
ZC22.00	Advice about fluid intake
671A.00	Discussed with district nurse
6743.00	Benefits counselling
675..00	Grieving counselling
6776.00	Preg. termination counselling
677C.00	Genetic disorder carrier
677Z.00	Medical counselling NOS
67Ia.11	Advice about domestic abuse
67Ic.00	Falls advice
67If.00	Nebulizer care advice
67K0.00	Precontemplation stage
67K3.00	Action stage
8CAB000	Patient advised to use sunblock
8CAr.00	Advised to attend minor injuries unit
8CB..11	Had a chinwag with patient
8CE0000	Gestational diabetes information leaflet given
8CE0100	Insulin alert patient information booklet given
8CdG.00	Advice about Healthy Start voucher scheme
677B100	Advice about temperature control
677J.00	Pre-screening counselling
6796.00	Health ed. - donor status
679K400	Education for female condom
679V.00	Health education - chronic obstructive pulmonary disease
67D3.00	Clinical examination explained
67DL.00	Discussion about previous experience in baby care
67DQ.00	Discussion about female genital mutilation
67E5.00	Outbreak of rabies - advice
67E8.00	Advice on foreign travel - health insurance
67H5.00	Lifestyle advice regarding relapse prevention
67I0.00	Advice about child safety
67IB.00	Home safety advice
8CAF.00	Patient advised to purchase medical kit
8CAR.11	Advice given about swine flu
8CE0.00	Preferred place of care - home
8CEP.00	Health care services information leaflet given
8CER.00	Foreign travel advice leaflet given
8Cd0.00	Advised to attend general practitioner out of hours service
8Cd9.00	Advice given about wound care
8Hj5.00	Referral to XPERT diabetes structured education programme
ZC21200	Advice to change dairy food intake
671D.00	Discussed with next of kin
671F000	Insulin alert pat information booklet information discussed
6731.00	Counselled by a doctor
6747.00	Relationship counselling

677G.00	Family counselling
678..00	Health education - general
678Z.00	Health education - general NOS
6797100	Education about vaccination
679A.00	Health ed.- drugs of addiction
679B.00	Health education - child immunisation
679L000	Education in self management of diabetes
679L200	Education about diabetes and driving
679b000	Testicular self-examination instruction
679g.00	Skin care education
679j.00	Medication education
67A6.00	Drugs in pregnancy advice
67A7.00	Pregnancy dental advice
67A9.00	Maternity benefit advice
67AZ.00	Pregnancy advice NOS
67D1.00	Informing patient of prognosis
67DN.00	Provision of information about chicken pox
67EB.00	Advice on foreign travel - diarrhoea
67F1.00	Informing relative of prognosis
67Ib.00	Home safety advice
67Ik.00	Patient advised about nutrition
67Il.00	Child feeding advice
67Ip.00	Advice to carer regarding child's safety
67Ir.00	Advice to carer regarding child's immunisations
67K2.00	Preparation stage
67K7.00	Cycle of change stage, physical activity
67K8.00	Cycle of change stage, healthy eating
67P0.00	Resuscitation discussed with patient
67Z..00	Counselling/health ed. NOS
8CA0.00	Patient advised to inform insurance company
8CA4Q00	Healthy eating education
8CAE.00	Patient advised about the risks of HIV
8CAZ000	Patient given advice about management of anxiety
8CAZ100	Advice given about access to emergency appointment
8CAb.00	Patient advised to contact NHS Direct
8CB..12	Had a discussion with patient
8CdE.00	Advice about appropriate use of emergency appointment system
8CdJ.00	Advice about use of elastic compression hosiery
8Hj3.00	Referral to DAFNE diabetes structured education programme
ZC2D.00	Advice about weaning

Lifestyle factors (alcohol, drug use, smoking, diet or exercise)

Read Code	Description
1371.00	Never smoked tobacco
137S.00	Ex smoker

137P.00	Cigarette smoker
8CAL.00	Smoking cessation advice
13A..00	Morbidity index
136..00	Alcohol consumption
138..00	Exercise grading
6791.00	Health ed. - smoking
137R.00	Current smoker
1383.00	Enjoys light exercise
1371.11	Non-smoker
1373.00	Light smoker - 1-9 cigs/day
1367.00	Stopped drinking alcohol
1374.00	Moderate smoker - 10-19 cigs/d
1384.00	Enjoys moderate exercise
8CA4.00	Patient advised re diet
6799.00	Health ed. - diet
1378.00	Ex-light smoker (1-9/day)
1FA..00	Diet good
1379.00	Ex-moderate smoker (10-19/day)
663f.00	Oral steroids started
1372.11	Occasional smoker
388u.00	Fast alcohol screening test
66C..11	Weight monitoring
6798.00	Health ed. - exercise
162..00	Weight symptom
136L.00	Alcohol intake within recommended sensible limits
137P.11	Smoker
137F.00	Reason for restarting smoking
8H7i.00	Referral to smoking cessation advisor
1361.11	Non drinker alcohol
13WF400	Passive smoking risk
663e000	Asthma sometimes restricts exercise
38D4.00	Alcohol use disorder identificatn test consumptn questionnre
9N2k.00	Seen by smoking cessation advisor
137L.00	Ex roll-up cigarette smoker
137G.00	Trying to give up smoking
1375.00	Heavy smoker - 20-39 cigs/day
1372.00	Trivial smoker - < 1 cig/day
67H7.00	Lifestyle advice regarding diet
137..00	Tobacco consumption
1377.00	Ex-trivial smoker (<1/day)
9k16.00	Alcohol screen - fast alcohol screening test completed
1FC..00	Diet average
8E77.00	Pelvic floor exercises
13p0.00	Negotiated date for cessation of smoking
1625.11	Abnormal weight loss - symptom
679P.00	Health education - weight management

6792.00	Health ed. - alcohol
66CG.00	Weight management programme offered
8CA5.00	Patient advised re exercise
8CA4600	Pt advised re low fat diet
8CA4011	Patient advised to lose weight
13p..00	Smoking cessation milestones
9k17.00	Alcohol screen - AUDIT C completed
137A.00	Pipe tobacco consumption
745H.00	Smoking cessation therapy
1361.12	Non-drinker alcohol
22A4.11	O/E - overweight
1622.00	Weight increasing
137K.00	Stopped smoking
67H2.00	Lifestyle advice regarding exercise
R031.00	[D]Abnormal weight gain
137..11	Smoker - amount smoked
137U.00	Not a passive smoker
66CC.00	Wants to lose weight
13AZ.00	Patient initiated diet NOS
137T.00	Date ceased smoking
8IEM.00	Smoking cessation drug therapy declined
67H1.00	Lifestyle advice regarding smoking
R032.00	[D]Abnormal loss of weight
22K4.00	Body mass index index 25-29 - overweight
8HTK.00	Referral to stop-smoking clinic
8IAj.00	Smoking cessation advice declined
137d.00	Not interested in stopping smoking
38D3.00	Alcohol use disorders identification test
1D1A.00	Complaining of weight loss
68S..00	Alcohol consumption screen
67H0.00	Lifestyle advice regarding alcohol
ZG53.00	Advice about weight
663e.00	Home oxygen supply stopped
13p5.00	Smoking cessation programme start date
6635.00	Increasing exercise wheeze
1FB..00	Diet poor
136V.00	Alcohol units per week
66CH.00	Weight management plan started
13p1.00	Smoking status at 4 weeks
13A3.00	Weight reducing diet
22A8.00	Weight loss from baseline weight
137c.00	Thinking about stopping smoking
8BAH.00	Lymphoedema care
1382.00	Avoids even trivial exercise
9N0H.00	Seen in osteoporosis clinic
66At.00	Diabetic dietary review

8CA4700	Patient advised re low cholesterol diet
136Z.00	Alcohol consumption NOS
13A4.00	Low fat diet
137Q.11	Smoking restarted
137C.00	Thinking about stopping smoking
1623.00	Weight decreasing
8IEK.00	Smoking cessation programme declined
9OO..11	Stop smoking clinic admin.
14f..11	History of attempted weight loss
8CAM.00	Patient advised about alcohol
ZC2..00	Dietary advice
13A1.11	Vegetarian diet
67H6.00	Brief intervention for smoking cessation
8E79.00	Home exercise programme
8H76.00	Refer to dietician
178B.00	Asthma trigger - exercise
8CA4000	Pt advised re wt reducing diet
9OO..12	Stop smoking monitoring admin.
9OOA.00	Stop smoking monitor.chck done
1FH..00	Healthy diet
67I9.00	Advice about weight
E23..00	Alcohol dependence syndrome
8HHH.00	Refer to weight management programme
8H7q.00	Referral for exercise therapy
ZC2C711	Dietary advice for weight reduction
8HkQ.00	Referral to NHS stop smoking service
22A5.00	O/E - weight > 20% over ideal
66C9.00	Target weight discussed
745H400	Smoking cessation drug therapy
9NS0200	Referral for smoking cessation service offered
9k13.00	Alcohol questionnaire completed
22A6.00	O/E - Underweight
1385.00	Enjoys heavy exercise
1621.00	Weight steady
1F...00	Dietary history
137b.00	Ready to stop smoking
66At100	Type II diabetic dietary review
9OO1.00	Pneumococcal vaccination verbal invite
9k15.00	Alcohol screen - AUDIT completed
ZG16100	Advice to exercise
ZL82.11	Refer to dietician
137j.00	Ex-cigarette smoker
8CA4400	Pt advised re high fibre diet
8HHc.00	Referred for wheelchair assessment
9k11.00	Alcohol consumption counselling
66CF.00	Target weight

8Cd7.00	Advice given about weight management
9kn..00	Non-smoker annual review - enhanced services administration
E23..12	Alcohol problem drinking
J61y100	Non-alcoholic fatty liver
136X.00	Alcohol units consumed on heaviest drinking day
22A3.00	O/E - weight within 10% ideal
ZG53100	Patient advised to lose weight
ZC2C700	Patient advised about weight-reducing diet
1625.00	Abnormal weight loss
66At000	Type I diabetic dietary review
ZC35.00	Dietary intake assessment using food diary
138S.00	Declined referral to physical exercise programme
138Z.00	Exercise grading NOS
1782.00	Asthma trigger - tobacco smoke
8HkX.00	Referral to general practitioner assessment unit
136T.00	Harmful alcohol use
137K000	Recently stopped smoking
137V.00	Smoking reduced
13A1.00	Vegetarian diet - no meat
67A3.00	Pregnancy smoking advice
8B57.00	Weight reducing diet
9OO..00	Pneumococcal vaccination administration
136K.00	Alcohol intake above recommended sensible limits
173A.00	Exercise induced asthma
745Hz00	Smoking cessation therapy NOS
Z652.00	Strengthening exercises
22A4.00	O/E - weight 10-20% over ideal
22A7.00	Baseline weight
ZG23300	Advice on smoking
137I.00	Passive smoker
137h.00	Pipe smoker
13A5.00	Low salt diet
13BZ.00	Medical diet NOS
13WF.11	Smoker in the family
13p4.00	Smoking free weeks
66CB.00	Intensive weight management programme commenced
67A2.00	Diet in pregnancy advice
9k1A.00	Brief intervention for excessive alcohol consumptn completed
13B..00	World languages
1624.00	Abnormal weight gain
68L..00	Exercise status screening
8E7A.00	Group exercise programme
9NJ6.00	In-house dietetics
Z656.00	Stretching exercises
137B.00	Ready to stop smoking
1381.00	Exercise physically impossible

1FZ..00	Dietary history NOS
3213.00	Exercise ECG
8CA4100	Pt advised re diabetic diet
13B1.00	Diabetic diet
13p2.00	Smoking status between 4 and 52 weeks
8CAg.00	Smoking cessation advice provided by community pharmacist
8IAM.00	Referral to weight management service declined
L161.11	Excessive weight gain in pregnancy
ZC2C800	Dietary advice for diabetes mellitus
ZC31.00	Review of current diet
13p5000	Practice based smoking cessation programme start date
1F32.00	Dietary sodium - average
8BA8.00	Alcohol detoxification
8CA4200	Pt advised re gluten free diet
8CdB.00	Stop smoking service opportunity signposted
8T08.00	Referral to smoking cessation service
9OO2.00	Refuses stop smoking monitor
9OOZ.00	Stop smoking monitor admin.NOS
E01y000	Alcohol withdrawal syndrome
Z653.00	Mobilising exercises
136S.00	Hazardous alcohol use
1376.00	Very heavy smoker - 40+cigs/d
137J.00	Ex-cigarette smoker
137m.00	Rolls own cigarettes
8CA4A00	Pt advis-low carbohydrate diet
8IEo.00	Referral to smoking cessation service declined
9hG1.00	Excepted from smoking quality indicators: Informed dissent
R034800	[D]Underweight
Z684.00	Back exercises
1368.00	Alcohol consumption unknown
137E.00	Tobacco consumption unknown
137Z.00	Tobacco consumption NOS
138A.00	GPPAQ physical activity index: moderately active
13A2.11	Vegan diet
13B3.00	Low cholesterol diet
13WI.00	Parents do not smoke
13WK.00	No smokers in the household
1F11.00	Diet - low in fat
22AA.00	Overweight
3213000	Exercise ECG normal
67A4.00	Pregnancy exercise advice
67A5.00	Pregnancy alcohol advice
8CP5.00	Discussion about weight management programme
8E78.00	Quadriceps exercises
8HBM.00	Stop smoking face to face follow-up
9N27.00	Seen by dietician

9NNF.00	Under care of physician
9OO7.00	Stop smoking monitor verb.inv.
ZC1..00	Actions to lose weight
ZG16.00	Advice about exercise
03K1.00	Dietician
137Q.00	Smoking started
138B.00	GPPAQ physical activity index: active
138O.00	Takes inadequate exercise
13A8.00	High fibre diet
13V2.00	Not on a special diet
1626.00	Intentional weight loss
162Z.00	Weight symptom NOS
1F14.00	Diet high in saturated fats
2577.11	O/E - alcoholic breath
33B9.00	Exercise tolerance test
6878.11	Weight screen
8B5..00	Dietary regime
8CA4900	Pt advised - lactose free diet
8CA4z00	Pt advised re diet NOS
8H7p.00	Referral to community alcohol team
8IA7.00	Alcohol consumption screening test declined
8IAH.00	Pre-conception advice for patients with epilepsy declined
9N1yK00	Seen in weight management clinic
9kc..00	Smoking cessation - enhanced services administration
E23..11	Alcoholism
R034100	[D]Failure to gain weight
ZC2C.00	Dietary advice for disorder
ZC61b00	Nitrogen supplementation
1282.00	FH: Alcoholism
137H.00	Pipe smoker
137I000	Exposed to tobacco smoke at home
137W.00	Chews tobacco
137k.00	Stopped smoking
1388.00	Aerobic exercise 0 times/week
13A6.11	Milk free diet
13AB.00	Diabetic lipid lowering diet
13BA.00	Exclusion diet
177..00	Smoke inhalation
1F2..00	Dietary fibre intake
1F31.00	Dietary sodium - low
1F4..00	Dietary calorie intake
62O..12	Static weight gain pregnancy
661L.00	Exercise assessment completed
66CD.00	Intensive weight management programme declined
66CK.00	Target weight reached
66e..00	B12 deficiency monitoring

6892.00	Alcohol consumption screen
6B4..00	Counterweight weight management programme
8B93.00	Low salt diet - prophylaxis
8CA4Z00	Pt advised re diet NOS
8E96.00	Ante-natal exercises
8HHe.00	Referral to community drug and alcohol team
8IAZ.00	Referral for medication compliance assessment declined
9NS0300	Referral to weight management service offered
9OO8.00	Stop smoking monitor phone inv
9hG0.00	Excepted from smoking quality indicators: Patient unsuitable
9ko..11	Current smoker annual review
Z657.00	Functional exercises
Z683.00	Neck exercises
ZC23.00	Advice to change dietary fibre intake
ZC2CM00	Dietary advice for obesity
ZC4..00	Dietary health promotion advice
ZG23100	Advice on alcohol consumption
ZL45.00	Under care of dietitian
ZV65300	[V]Dietary surveillance and counselling
ZV6D600	[V]Alcohol abuse counselling and surveillance
136W.00	Alcohol misuse
137a.00	Pipe tobacco consumption
137e.00	Tobacco consumption unknown
137f.00	Reason for restarting smoking
137l.00	Ex roll-up cigarette smoker
138Q.00	Aerobic exercise four times a week
13A2.00	Vegan diet - no dairy produce
13BB.00	High sugar diet
13WF.00	Main spoken language Swati
13WF300	Both parents smoke
1462.00	H/O: alcoholism
1627.00	Unintentional weight loss
185..00	Impaired exercise tolerance
1F3..00	Dietary salt intake
1F7..00	Restricted diet pattern
63C7.00	Maternal alcohol abuse
66C3.00	Understands reducing diet
66C4.00	Opioid substitution therapy monitoring
66CJ.00	Weight management plan completed
66CR.00	Int risk health ass overwt ob advice about diet physical act
66a6.00	Osteoporosis - dietary advice
66e0.00	Alcohol abuse monitoring
745Hy00	Other specified smoking cessation therapy
8B53.00	Light diet
8B6a.00	Statin prophylaxis
8CA4800	Pt advised re low salt diet

8CA4D00	Pt advised re milk free diet
8CAM000	Advised to abstain from alcohol consumption
8CdC.00	Weight management service opportunity signposted
8E74.12	Quadriceps exercises
8E93.00	Breathing exercises
8E9Z.00	Post-natal exercises
8H4n.00	Referral to weight management special interest GP
8HHE.00	Referral to community drug and alcohol team
8I3A.00	Referral to dietician declined
9NiX.00	DNA weight management special interest GP clinic
9k1B.00	Extended intervention for excessive alcohol consumptn complt
9kn..11	Non-smoker annual review
C293000	Dietary calcium deficiency
E230.00	Acute alcoholic intoxication in alcoholism
E250.00	Nondependent alcohol abuse
E250000	Nondependent alcohol abuse, unspecified
Eu10011	[X]Acute alcoholic drunkenness
J153.00	Alcoholic gastritis
J433000	Dietetic gastritis
L161.00	Oedema or excessive weight gain in pregnancy no hypertension
L16D.00	Excessive weight gain in pregnancy
Q12..00	Disorders relating to long gestation and high birthweight
Z4M1200	Reassuring about exercise
Z68..00	Exercises
Z681200	Shoulder exercises
Z7D1500	Overestimates own body weight
ZC2C200	Dietary advice for coeliac disease
ZC2CA00	Dietary advice for type II diabetes
ZC2CI00	Dietary advice for lipid disorder
ZC2CJ00	Dietary advice for hyperlipidaemia
ZL82.00	Referral to dietitian
ZL82.12	Refer to dietitian
ZL82100	Referral to community-based dietitian
ZQ3L.00	Dietary intake assessment
ZR1F.11	AUDIT - Alcohol use disorders identification test
ZV4K300	[V]Inappropriate diet and eating habits
ZV4KC00	[V] Alcohol use
ZV65312	[V]Dietary counselling in diabetes mellitus
ZV65319	[V]Dietary counselling in obesity

British National Formula sub-chapter	Description
04.10.00	Drugs used in substance dependence
04.10.01	Alcohol dependence

04.10.02	Cigarette smoking
04.10.03	Opioid dependence

Cervical examination

Read Code	Description
4K22.00	Cervical smear: negative
6859.00	Ca cervix - screen done
685B.00	Ca cervix screen normal
6793.00	Health ed. - cervical cytology
6852.00	Ca cervix screen - offered
685R.00	Liquid based cervical cytology screening
685F.00	Cervical smear due
4JK9.00	Endocervical chlamydia swab
4K29.00	Cerv.smear: borderline changes
2695.00	Uterine cervix visualised
685A.00	Ca cervix screen-no result yet
4K21.00	Cervical smear:inadequate spec
685..12	Cervical smear screen
2696.00	360 degree sweep of cervix performed
ZV76212	[V]Routine cervical smear
4JK5.00	Cervical swab taken
4K23.00	Cerv.smear: mild dyskaryosis
6856.00	Ca cervix screen - up to date
9O8f.00	Smear inflamed - 2nd recall
41F0.00	Endocervical swab
4K24.00	Cerv.smear: severe dyskaryosis
685M.00	Cervical smear overdue
4149.00	Cervical cytology sample sent to laboratory
9O8..00	Cervical smear screen admin.
9O85.00	Cervical smear - 1st recall
6854.00	Ca cervix screen - wanted
4K22.11	Smear NAD: no endocervic cells
4K28.00	Cerv.smear: mod.dyskaryosis
685..00	Cervical neoplasia screening
9O8S.00	Cervical smear defaulter
685Z.00	Ca cervix screen NOS
4JRL.00	Cervical cytology screening test
4K2..00	Cervical smear result
4K55.00	Cervical cytology test
9O81.00	Cervical smear - 1st call
2C32.00	O/E -cervical lymphadenopathy
4K4..00	Cervical smear - action needed
ZG52100	Advice on cervical cytology
9O87.00	Cervical smear - 3rd recall
4K2J.00	Cervical smear - low grade dyskaryosis
685C.00	Ca cervix screen abnormal

4K29000	Cervical smear - borderline change in squamous cells
6858.00	Ca cervix screen - not reached
9O86.00	Cervical smear - 2nd recall
9O8h.00	Smear inflamed - recall delete
4K2D.00	Cervical smear transformation zone cells present
6859.11	Cervical cytology examination
9O8c.00	Cervical smear screening first letter
9O83.00	Cervical smear - 3rd call
9O82.00	Cervical smear - 2nd call
4JKB.00	Gonococcal cervical swab
7E2A211	Cervical smear NEC
9Ndx.00	Patient consent given for medical photography
4K2Q.00	Cervical smear - human papillomavirus negative
ZV76200	[V]Screening for malignant neoplasm of cervix
4K2C.00	Smear NAD - no endocervical cells
2699.00	Uterine cervix transformation zone visualised
4K2..11	Dyskaryosis on cervical smear
9O8R.00	Smear normal - pt. notified
4K2L.00	Cervical smear - high grade dyskaryosis (severe)
268A.00	O/E-VE-cervical excit.absent
4K2A.00	Cervical smear endocervical cells present
4K31.00	Cervical smear-no inflammation
685..11	Cervical cytology screen
8I6K.00	Nebivolol not indicated
9O8A.00	Cervical smear every 12 months for life
9O8e.00	Smear inflamed - 1st recall
4K26.00	Cervical smear: ? gland neopl.
9O8b.00	Cervical smear disclaimer sent
K550000	Erosion of cervix
4K4Z.00	Cervical smear action NOS
7E08000	Dilation cervix & vacuum aspirat products conception uterus
9O8d.00	Cervical smear screening second letter
4K2K.00	Cervical smear - high grade dyskaryosis (moderate)
9O8B.00	Cervical smear disclaimer sent
K550.00	Erosion and ectropion of the cervix
4K47.00	Cx. smear: repeat 12 months
4K2Z.00	Cervical smear result NOS
4K2Z.11	Nuclear abnormality on smear
7E00600	Loop diathermy excision of cervix
7E03400	Colposcopy of cervix
4K2E.00	Cervical smear transformation zone cells absent
685E.00	Cervical smear status unknown
B790.11	Adenomatous polyp - cervix uteri
K557.11	Polyp of cervix NOS
4K2R.00	Cervical smear - human papillomavirus positive
4K34.00	Cervical smear - candida

7E01400	Avulsion of cervical polyp
7N89000	[SO]Cervical lymph node
N110.00	Cervical spondylosis without myelopathy
2698.00	Lesion of cervix
7E02.00	Biopsy of cervix uteri
9O8..11	Cervical cytology admin.
4K25.00	Cerv.smear:severe dysk.?inv.ca
4KA2.00	Vaginal vault smear-inadequate
7E03500	Colposcopic biopsy cervix
9O8g.00	Smear inflamed - 3rd recall
K557.00	Mucous polyp of cervix
N134.00	Brachial (cervical) neuritis
124D.00	FH: neoplasm of cervix
4K27.00	Cervical smear:atrophic change
4K27.11	Atrophic change on cerv.smear
4K29100	Cervical smear - borderline change in endocervical cells
4K38.00	Cervical smear - actinomyces
4KA1.00	Vaginal vault smear negative
685K.00	No smear - no cervix
9O89.00	SMEAR ABNORMAL - PATIENT TOLD
9O8C.00	Cervical smear screening first letter
K550211	Ectopy of cervix
N110.11	Cervical spondylosis
4K2..12	Dysplasia (dysk.)on cerv.smear
685H.00	No smear - benign hysterectomy
8CEA.00	Preferred place care - patient unable to express preference
9O8X.00	Cervical smear - suspend recall
9O8Z.00	Cervical smear admin. NOS
K550200	Ectropion (eversion) of cervix
4K2B.00	Cervical smear endocervical cells absent
4K43.00	Cx. smear: repeat 3 months
4K45.00	Cx. smear: repeat 6 months
685H.11	No smear - hysterectomy
685J.00	Vaginal vault smear due
7E07000	Dilation cervix uteri & curettage products conception uterus
7E08100	Dilation cervix & evacuation products conception uterus NEC
7E2A.11	Other examination of cervix uteri
7E2A200	Papanicolau smear NEC
9O89.11	SMEAR ABNORMAL - PT. NOTIFIED
9O8M.00	Smear inadequate - 1st recall
9O8Q.00	Cerv.smear disclaimer received
B831.11	CIN III - carcinoma in situ of cervix
K551411	Cervical intraepithelial neoplasia grade II
K587.00	Contact bleeding of cervix
2692.00	O/E - speculum = cervical abn.
4K3..00	Cervical smear - inflam.change

4K36.12	HPV changes: cervical smear
4K48.00	Cx. smear: colposcopy needed
7E01200	Cauterisation of lesion of cervix uteri
7E01600	Cold coagulation of lesion of cervix
7E02500	Diathermy loop cone biopsy of cervix
7E07200	Dilation of cervix uteri and curettage of uterus NEC
B831.13	Cervical intraepithelial neoplasia grade III
K551X00	Severe cervical dysplasia, not elsewhere classified
K55y100	Cyst of cervix
N13..00	Other cervical disorders
14l..00	H/O: drug allergy
1J06.00	Suspected cervical cancer
2689.00	O/E-VE-cervical excit.present
2697.00	360 degree sweep of cervix not performed
4JK5000	Cervical swab culture positive
4K32.00	Cervical smear-severe inflamm.
4K33.00	Cervical smear - trichomonas
4K36.00	Cervical smear - wart virus
4K3A.00	Cervical smear: koilocytosis
5333.00	X-ray cervical lymph nodes
67DA.00	Provision of information about cervical screening programme
685G.00	No smear - not sexually active
7E00500	Cervical polypectomy
7E0A100	Intracervical artificial insemination
7N61000	[SO]Cervix uteri
AB21z11	Candidiasis cervix
B41..00	Malignant neoplasm of cervix uteri
B41..11	Cervical carcinoma (uterus)
B410z00	Malignant neoplasm of endocervix NOS
K42yz00	Other cervical, vaginal and vulval disease NOS
K551311	Cervical intraepithelial neoplasia grade I
K55z.00	Noninflammatory cervical disorder NOS
L245.00	Cervical incompetence
PC4yv00	Other congenital anomaly of cervix
PC4yz00	Other cervical/vaginal/external female genital anomaly NOS

Vaccinations

Read Code	Description
65E..00	influenza vaccination
65ED.00	Seasonal influenza vaccination
65B..00	Rubella vaccination
65A1.00	Measles vaccination
65F5.00	Mumps vaccination
6544.00	Booster diphtheria vaccination
6584.00	Booster polio vaccination
65FA.00	Human papillomavirus vaccinatn givn by othr hlthcare providr

652..00	Typhoid vaccination
6564.00	Booster tetanus vaccination
6565.00	Final tetanus immunisation
65E9.00	PANDEMRIX - first influenza A (H1N1v) 2009 vaccination given
6554.00	Pertussis booster vaccination
65FD.00	Booster hepatitis A vaccin.
6572.00	Pneumococcal vaccination
65F1.00	1st hepatitis B vaccination
65F2.00	2nd hepatitis B vaccination
65E0.00	First pandemic influenza vaccination
65FS.00	First human papillomavirus vaccination
65FT.00	Second human papillomavirus vaccination
65F3.00	3rd hepatitis B vaccination
65FB.00	2nd hepatitis A vaccination
65FV.00	Third human papillomavirus vaccination
657J.00	Meningitis ACW & Y vaccination
6524.00	Single dose typhoid vaccination
6541.00	First diphtheria vaccination
6561.00	First tetanus vaccination
6581.00	First polio vaccination
6523.00	Booster typhoid vaccination
65F4.00	Boost hepatitis B vaccination
65FC.00	3rd hepatitis A vaccination
6521.00	First typhoid vaccination
65C..00	Yellow fever vaccination
65ML.00	First hepatitis A and typhoid vaccination
65F6.00	4th hepatitis B vaccination
65FL.00	Chickenpox vaccination
6556.00	Pertussis vaccination in pregnancy
6542.00	Second diphtheria vaccination
6562.00	Second tetanus vaccination
6582.00	Second polio vaccination
65E5.00	CELVAPAN - first influenza A (H1N1v) 2009 vaccination given
65EA.00	PANDEMRIX - second influenza A (H1N1v) 2009 vaccination give
6563.00	Third tetanus vaccination
657I.00	Single meningitis C vaccination
6543.00	Third diphtheria vaccination
6583.00	Third polio vaccination
657D.00	Booster (single) haemophilus B vaccination
65EB.00	PANDEMRIX - 1st flu A (H1N1v) 2009 vac by othr hlth provider
6551.00	First pertussis vaccination
657G.00	Third meningitis C vaccination
6522.00	Second typhoid vaccination
657A.00	1st haemophilus B vaccination
653..00	Tuberculosis (BCG) vaccination
657L.00	First pneumococcal conjugated vaccination

65M1.00	Measles/mumps/rubella vaccn.
6556000	Pertussis vacc in pregnancy given by other healthcre providr
65E2000	Seasonal influenza vaccin given by other healthcare provider
65MC.00	MMR vaccination - 2nd dose
65D3.00	3rd rabies vaccination
65MA.00	Measles mumps and rubella booster vaccination
9OF..00	Epilepsy screen administration
6511.00	First cholera vaccination
657S.00	Booster meningitis C vaccination
65D1.00	Second rotavirus vaccination
65D2.00	Rotavirus vaccination given by other health care provider
65F7.00	5th hepatitis B vaccination
65D4.00	Rabies booster vaccination
65ED000	Seasonal influenza vaccination given by pharmacist
65E1.00	Second pandemic influenza vaccination
65E6.00	CELVAPAN - second influenza A (H1N1v) 2009 vaccination given
65G..00	Other single vaccinations
14b5.00	History of measles, mumps and rubella vaccination
6552.00	Second pertussis vaccination
656..00	Tetanus vaccination
6571000	First meningitis B vaccination
657B.00	2nd haemophilus B vaccination
657E.00	First meningitis C vaccination
65E2400	1st intramuscular seasonal influenza vacc given by other HCP
65ED100	Administration of first intranasal seasonal influenza vacc
65FH.00	1st Japanese encephalitis vaccination
65FI.00	2nd Japanese encephalitis vaccination
9kv..00	Pertussis vaccinatn progrme pregnant women enhan srvce admin
9mK..00	Pertussis vaccination in pregnancy invitation
14b..00	History of vaccination
14b8.00	History of tonsillitis
6512.00	Second cholera vaccination
6553.00	Third pertussis vaccination
65F2000	Second hepatitis B junior vaccination
65FF.00	1st hepatitis A junior vaccination
65FG.00	2nd hepatitis A junior vaccination
65d0.00	First rotavirus vaccination
TJKz.00	Adverse reaction to vaccine or biological substance NOS
14b3.00	History of influenza vaccination
14b6.00	History of yellow fever vaccination
6525.00	Oral typhoid vaccination
653..11	BCG vaccination
655..00	Pertussis vaccination
6571100	Second meningitis B vaccination
6572000	Pneumococcal vaccination given
6575.00	First anthrax vaccination

657C.00	3rd haemophilus B vaccination
657F.00	Second meningitis C vaccination
657K.00	Booster pneumococcal vaccination
65E3.00	1st pan flu vac othr hlth prov
65E8.00	CELVAPAN - 2nd flu A (H1N1v) 2009 vacc by othr hlth provider
65EC.00	PANDEMRIX - 2nd flu A (H1N1v) 2009 vac by othr hlth provider
65F..00	Other viral vaccinations
65F3000	Third hepatitis B junior vaccination
65F8.11	Tick-borne encephalitis vaccin
65FJ.00	3rd Japanese encephalitis vaccination
65FP.00	3rd hepatitis A junior vaccination
65FQ.00	Booster hepatitis A junior vaccination
65I..00	DTP (triple)+polio vaccination
65M..00	Other combined vaccinations
65MZ.00	Other combined vaccination NOS
9O5..00	Child immunisation admin.
9O51.00	Child imm.- 1st call
9m3..00	Provision of patient satisfaction questionnaire
TJJyz00	Adverse reaction to other bacterial vaccine NOS

British National Formula chapter	Description
14.04.00	Vaccines and antisera
14.04.25	Vaccination against varicella zoster (chickenpox)
14.05.03	Anti-D (RHO) immunoglobulin
14.06.00	International travel

Postnatal check or visit

Read Code	Description
62S..11	Postnatal exam. - maternal
62S..00	Maternal P/N 6 week exam.
62R..00	Postnatal visits
62SZ.00	Maternal P/N 6 week exam. NOS
62S5.00	Maternal P/N exam. done
62S7.00	Postnatal examination normal
62RZ.00	Postnatal visit NOS
62S2.00	Maternal P/N exam. offered
62R1.00	P/N - first day visit
62R2.00	P/N - second day visit
62R3.00	P/N - third day visit
62R4.00	P/N - fourth day visit
62R5.00	P/N - fifth day visit
62S6.00	Postnatal examination minor problem found
62R..11	Postnatal visit
62RA.00	P/N - tenth day visit
62R7.00	P/N - seventh day visit

62R6.00	P/N - sixth day visit
62RD.00	P/N care >48hrs after birth
62S4.00	Maternal P/N exam. defaulted
62R9.00	P/N - ninth day visit
62R8.00	P/N - eighth day visit
62S1.00	Maternal P/N exam. not offered
62RC.00	P/N care <48hrs after birth
62RB.00	P/N care started at birth
62R..12	New birth visit
6B23.00	Sure Start postnatal visit

Appendix C- Supplementary material for chapter 7

C-1: Approved PROSPERO protocol

NIHR National Institute for Health and Care Research

PROSPERO
International prospective register of systematic reviews

Systematic review of the duration of antidepressant treatment for women with postnatal depression

Holly Smith, Sonia Saxena, Irene Petersen

Citation

Holly Smith, Sonia Saxena, Irene Petersen. Systematic review of the duration of antidepressant treatment for women with postnatal depression. PROSPERO 2020 CRD42020205522 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020205522

Review question

What is the typical duration of antidepressant treatment for women with postnatal depression?

Searches

The following electronic databases will be searched using relevant search terms: PubMed/MEDLINE, EMBASE, CINAHL, PsycINFO and Web of Science databases. All relevant English language literature published between 1st January 2001 and 31st July 2020 will be retrieved for inclusion. Reference checking and citation searching of identified articles will be carried out. Unpublished studies will be sought. Searches will be re-run just before the final analyses and any further studies identified will be retrieved for inclusion. The process of searching and reporting of studies in this review will be carried out in line with Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines.

Types of study to be included

Any study design will be included.

Condition or domain being studied

Maternal postnatal depression.

Participants/population

Inclusion criteria: Studies will be eligible for inclusion if women aged 15-49 years have given birth to a live infant and were treated with antidepressants in the year after childbirth.

Intervention(s), exposure(s)

The intervention of interest is antidepressant treatment for depression in the year after childbirth (postnatal period). Any antidepressant treatment will be considered, including selective serotonin reuptake inhibitors (SSRI) and tricyclic antidepressants (TCA) used for treatment of depression.

Comparator(s)/control

No comparison.

Context

Any healthcare or community setting will be considered. Research in high income countries only will be included. Time period of review is restricted to coincide with antidepressant availability and regular usage.

Main outcome(s)

Duration of antidepressant treatment.

Measures of effect

The mean and median time spent on treatment.

Additional outcome(s)

None.

Measures of effect

Not applicable.

Data extraction (selection and coding)

The search will encompass all the indexed articles, computerized literature databases supplemented by manual searching of reference and citation lists from each relevant paper identified. Duplicates will be removed after the searches. Screening of study title and abstracts will be conducted by the primary researcher and a second independent researchers will screen a random 10% of studies using established inclusion and exclusion criteria. The full text will be retrieved and assessed for eligibility if both reviewers are unable to reject a study title or abstract with complete certainty. Any disagreements between the review authors regarding eligibility criteria and study selection will be resolved through further discussion and potential involvement of the project team. Eligible studies will be retrieved for full-text review. Authors will be contacted if any information is missing. Study screening and selection will be conducted using Rayyan and full text articles will be stored in Mendeley. A form will be created to extract the relevant information from included studies. Fields will include: authors, year of publication, title, study size, study design, country of origin, aims, findings of relevance, type of antidepressant. This extracted information will be stored in an Excel Spreadsheet.

Risk of bias (quality) assessment

The Critical Appraisal Skills Program (CASP) checklists relevant to each study design will be used to assess the risk of bias for included studies. A second reviewer will independently assess a minimum of 10% of included studies.

Strategy for data synthesis [1 change]

Data from included studies will be extracted at the aggregate level and a summary of study characteristics and outcome will be provided in table format. Number of women and duration of antidepressant treatment will be calculated, depending on study reporting this will be either median time on antidepressants (in days) and inter-quartile range or as proportion of women still on treatment at key time intervals e.g. proportion of women still taking antidepressants five years after childbirth. A forest plot of the primary outcome from included studies will be generated. If more than one study is identified, a formal narrative synthesis to discuss how included studies, their risk of bias and outcome addresses our research question will be carried out. If the included studies are sufficiently homogenous (assessed using the I^2 statistic, considering more than 50% as substantial heterogeneity and allowing a meta-analysis to be performed), a random-effects meta-analysis will be conducted for our primary outcome (duration of antidepressant episode), however given the findings of our scoping search we do not anticipate this.

Analysis of subgroups or subsets

We will stratify our analysis by type of antidepressant issued.

Contact details for further information

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Organisational affiliation of the review

Department of Primary Care and Population Health, University College London (UCL)

Review team members and their organisational affiliations

Ms Holly Smith. UCL
Professor Sonia Saxena. School of Public Health, Faculty of Medicine, Imperial College London
Professor Irene Petersen. Department of Primary Care and Population Health, UCL, UK

Type and method of review

Narrative synthesis, Systematic review

Anticipated or actual start date

01 August 2020

Anticipated completion date

31 January 2021

Funding sources/sponsors

This work is funded by the National Institute for Health Research (NIHR) School for Primary Care Research (SPCR)

Grant number(s)
State the funder, grant or award number and the date of award
Project reference: 549832

Conflicts of interest

Language

English

Country

England

Stage of review

Review Ongoing

Subject index terms status

Subject indexing assigned by CRD

Subject index terms

Antidepressive Agents; Depression, Postpartum; Female; Humans

Date of registration in PROSPERO

28 August 2020

Date of first submission

21 August 2020

Stage of review at time of this submission

Stage	Started	Completed
Preliminary searches	Yes	No

Stage	Started	Completed
Piloting of the study selection process	No	No
Formal screening of search results against eligibility criteria	No	No
Data extraction	No	No
Risk of bias (quality) assessment	No	No
Data analysis	No	No

The record owner confirms that the information they have supplied for this submission is accurate and complete and they understand that deliberate provision of inaccurate information or omission of data may be construed as scientific misconduct.

The record owner confirms that they will update the status of the review when it is completed and will add publication details in due course.

Versions

28 August 2020

C-2: Example search strategy for PsycInfo

Database: APA PsycInfo <1806 to November Week 5 2021>

Search Strategy:

---

1 exp postnatal period/ or exp postpartum depression/ or exp perinatal period/ (12922)

2 (perinatal or post-natal* or peripartum or postpartum or post-partum or postnatal*).tw. (43205)

3 ((after or following or post) adj3 (childbirth or birth or delivery)).tw. (12053)

4 1 or 2 or 3 (51285)

5 (animals not (humans and animals)).sh. (7348)

6 4 not 5 (51159)

7 exp antidepressant drugs/ (40121)

8 antidepress*.tw. (42563)

9 (SSRI or selective serotonin reuptake inhibitor* or (Serotonin-noradrenaline reuptake inhibitor* or SNRI) or (NASSA or (Noradrenaline and specific serotonergic antidepress*)) or (Tricyclic antidepress* or TCA) or (Monoamine oxidase inhibitor* or MAOI) or Amitriptyline hydrochloride or Aripiprazole or Clomipramine hydrochloride or Dosulepin hydrochloride or Doxepin or Duloxetine or Escitalopram or Flupentixol or Imipramine hydrochloride or Isocarboxazid or Lofepramine or Mianserin hydrochloride or Mirtazapine or Moclobemide or Nortriptyline or Paroxetine or Phenelzine or Reboxetine or Sertraline or Tranylcypromine or Trazodone hydrochloride or Trimipramine or Venlafaxine or Vortioxetine).mp. (28518)

10 7 or 8 or 9 (69156)

11 ((antidepress* or treatment or prescri* or drug*) adj4 (duration or length or time or period or continu* or spell* or episode*)).mp. (40006)

12 6 and 10 and 11 (108)

C-3: Quality assessment tool of Rassmusen et al

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CASP Checklist: 12 questions to help you make sense of a **Cohort Study**

How to use this appraisal tool: Three broad issues need to be considered when appraising a cohort study:

- Are the results of the study valid? (Section A)
- What are the results? (Section B)
- Will the results help locally? (Section C)

The 12 questions on the following pages are designed to help you think about these issues systematically. The first two questions are screening questions and can be answered quickly. If the answer to both is "yes", it is worth proceeding with the remaining questions. There is some degree of overlap between the questions, you are asked to record a "yes", "no" or "can't tell" to most of the questions. A number of italicised prompts are given after each question. These are designed to remind you why the question is important. Record your reasons for your answers in the spaces provided.

About: These checklists were designed to be used as educational pedagogic tools, as part of a workshop setting, therefore we do not suggest a scoring system. The core CASP checklists (randomised controlled trial & systematic review) were based on JAMA 'Users' guides to the medical literature 1994 (adapted from Guyatt GH, Sackett DL, and Cook DJ), and piloted with health care practitioners.

For each new checklist, a group of experts were assembled to develop and pilot the checklist and the workshop format with which it would be used. Over the years overall adjustments have been made to the format, but a recent survey of checklist users reiterated that the basic format continues to be useful and appropriate.

Referencing: we recommend using the Harvard style citation, i.e.: *Critical Appraisal Skills Programme (2018). CASP (insert name of checklist i.e. Cohort Study) Checklist. [online] Available at: URL. Accessed: Date Accessed.*

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Paper for appraisal and reference:.....

Section A: Are the results of the study valid?

1. Did the study address a clearly focused issue?

Yes ☑
Can't Tell ☐
No ☐

HINT: A question can be 'focused' in terms of
- the population studied
- the risk factors studied
- is it clear whether the study tried to detect a beneficial or harmful effect
- the outcomes considered

Comments:

2. Was the cohort recruited in an acceptable way?

Yes ☑
Can't Tell ☐
No ☐

HINT: Look for selection bias which might compromise the generalisability of the findings:
- was the cohort representative of a defined population
- was there something special about the cohort
- was everybody included who should have been

Comments: Authors used Danish population based registry data which includes all women born in Denmark in the given time period. Need to consider how this population compares to other countries.

Is it worth continuing?

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3. Was the exposure accurately measured to minimise bias?

Yes	✓
Can't Tell	
No	

HINT: Look for measurement or classification bias:
- did they use subjective or objective measurements
- do the measurements truly reflect what you want them to (have they been validated)
- were all the subjects classified into exposure groups using the same procedure

Comments:	Very clear objective measures used - method of identifying postnatal depression is stringent (requires hospital contact or prescription) so may affect comparability with other studies.

4. Was the outcome accurately measured to minimise bias?

Yes	✓
Can't Tell	
No	

HINT: Look for measurement or classification bias:
- did they use subjective or objective measurements
- do the measurements truly reflect what you want them to (have they been validated)
- has a reliable system been established for detecting all the cases (for measuring disease occurrence)
- were the measurement methods similar in the different groups
- were the subjects and/or the outcome assessor blinded to exposure (does this matter)

Comments:	A clear objective method for measuring duration is outlined and the 3 month grace window between prescriptions explored in a sensitivity analysis

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5. (a) Have the authors identified all important confounding factors?

Yes ✓
Can't Tell
No

HINT:
- list the ones you think might be important, and ones the author missed

Comments: Parity, year of birth, and age are all considered by the authors and key confounding factors. They could also have considered deprivation, mode of delivery and type of antidepressant.

5. (b) Have they taken account of the confounding factors in the design and/or analysis?

Yes ✓
Can't Tell
No

HINT:
- look for restriction in design, and techniques e.g. modelling, stratified-, regression-, or sensitivity analysis to correct, control or adjust for confounding factors

Comments:

6. (a) Was the follow up of subjects complete enough?

Yes ✓
Can't Tell
No

HINT: Consider
- the good or bad effects should have had long enough to reveal themselves
- the persons that are lost to follow-up may have different outcomes than those available for assessment
- in an open or dynamic cohort, was there anything special about the outcome of the people leaving, or the exposure of the people entering the cohort

6. (b) Was the follow up of subjects long enough?

Yes ✓
Can't Tell
No

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Comments:	

Section B: What are the results?

7. What are the results of this study?

HINT: Consider
- what are the bottom line results
- have they reported the rate or the proportion between the exposed/unexposed, the ratio/rate difference
- how strong is the association between exposure and outcome (RR)
- what is the absolute risk reduction (ARR)

Comments:	0.6% (n=4,550) of women in the study had postnatal depression. 50% of women staid on antidepressants for 5.1 months and 27.9% of women were still on treatment at 1 year.

8. How precise are the results?

HINT:
- look for the range of the confidence intervals, if given

Comments:	Confidence intervals not provided for several results, my primary finding was read off a graph.

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9. Do you believe the results?

Yes	✓
Can't Tell	
No	

HINT: Consider
- big effect is hard to ignore
- can it be due to bias, chance or confounding
- are the design and methods of this study sufficiently flawed to make the results unreliable
- Bradford Hills criteria (e.g. time sequence, dose-response gradient, biological plausibility, consistency)

Comments: Treatment duration follows a logical pattern and a large number of women filled only one script which makes intuitive sense. Other results make sense wrt age and calendar time.

Section C: Will the results help locally?

10. Can the results be applied to the local population?

Yes	✓
Can't Tell	✓
No	

HINT: Consider whether
- a cohort study was the appropriate method to answer this question
- the subjects covered in this study could be sufficiently different from your population to cause concern
- your local setting is likely to differ much from that of the study
- you can quantify the local benefits and harms

Comments: The comparability of the Danish population to the UK would have to be explored.

11. Do the results of this study fit with other available evidence?

Yes	✓
Can't Tell	✓
No	

Comments: The proportion of women with depression is much lower than expected but authors use a stringent criteria. There are no previous studies to compare duration of antidepressant treatment against.

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12. What are the implications of this study for practice?

Yes
Can't Tell
No

HINT: Consider

- one observational study rarely provides sufficiently robust evidence to recommend changes to clinical practice or within health policy decision making
- for certain questions, observational studies provide the only evidence
- recommendations from observational studies are always stronger when supported by other evidence

Comments:	

Appendix D- General Supplementary material

D-1: Table showing variance and standard error of random-effect terms of a selection of models reported in this thesis

Model	Random effect term	Variance σ^2	Standard error
Fully-adjusted mixed-effects Poisson estimates of the likelihood of having a postnatal check *(Table 4.2)*	GP Practice	0.702	0.045
Fully-adjusted mixed-effects Poisson estimates of the likelihood of women having a primary care contact documenting an acute event or illness in the first 100 days after childbirth *(Table 5.2)*	GP Practice	0.021	0.001
Fully-adjusted mixed-effects Poisson estimates of the likelihood of women having a primary care contact documenting an ongoing mental or physical symptom or condition in the first 100 days after childbirth *(Table 5.2)*	GP Practice	0.024	0.002
Fully-adjusted mixed-effects Poisson estimates of the likelihood of women having a primary care contact documenting a pre-existing condition in the first 100 days after childbirth *(Table 5.2)*	GP Practice	0.046	0.003
Fully-adjusted mixed-effects Poisson estimates of the likelihood of women having a primary care contact documenting preventative, future health in the first 100 days after childbirth *(Table 5.2)*	GP Practice	0.017	0.001
Fully-adjusted mixed-effects Poisson estimates of the likelihood of women having a primary care contact documenting 'other' (postnatal check or visit) in the first 100 days after childbirth *(Table 5.2)*	GP Practice	0.699	0.043
Fully-adjusted mixed-effects Poisson estimates of factors associated with a postnatal antidepressant prescription *(Table 8.1)*	GP Practice	0.036	0.004

The practice-level variance is typically small (<0.05) for the outcomes investigated in my thesis, apart from analysis exploring the likelihood of having a postnatal check and/or visit (variance =0.699 and =0.702). This suggests that the likelihood of having a postnatal check varies greatly between GP Practices. This may be due to differences in documenting of the postnatal check but may also mean that some practices are more/less likely to provide a check than others. It is likely that the inclusion of providing a postnatal check in the GP contract from 2020 will reduce this variation and improve overall attendance of a postnatal check. Future studies exploring the impact of this change could investigate variation by GP Practice in more detail.

D-2: Other funding and projects which have emerged so far as a result of the work in this thesis

- *Helping women access information and support for their mental wellbeing after childbirth.* **£2,000** Patient and Public Involvement and Engagement grant awarded in August 2019 by NIHR School for Primary Care Research.
- Use of antidepressant treatment among new fathers: a cohort study using UK primary care data. **£17,657** awarded in February 2020 by NIHR School for Primary Care Research.
- NIHR SPCR Seedcorn salary support fellowship & Bridging funding. **£4,000** awarded in May 2023.

Antibiotic prescribing in the first eight weeks after childbirth

Holly Christina Smith, Sonia Saxena, Irene Petersen

Background: Many women will receive antibiotics around the time of childbirth and delivery. However, in the United Kingdom, maternal care is transferred from secondary care to primary care shortly after birth and little is known about antibiotic treatments in women in the first few weeks after childbirth.

Objectives: To determine the rate of antibiotic prescribing in women in the first eight weeks after childbirth.

Methods: We conducted a cohort study using UK primary care electronic health records from The Health Improvement Network (THIN) database. Women aged 15-49 who gave birth between 1 January 2006 and 31 December 2016 were included. The primary outcome was antibiotic treatment in the first eight weeks after childbirth. We estimated the prevalence rate ratio (PRR) of antibiotic use. The PRR was estimated by age, socio-economic deprivation, mode of delivery, parity and calendar time for antibiotic prescribing.

Results: Of 309,573 women included in the study, 68,485 (22.1%) had at least one antibiotic prescription in the first eight weeks after childbirth. Most antibiotics were prescribed between 5 and 15 days after childbirth and the number declined steadily thereafter. A total of 90,524 antibiotics were issued. Prevalence Rate Ratios of antibiotic prescribing were: 76% higher in those who had a caesarean compared to vaginal delivery (PRR: 1.76 95% CI: 1.72-1.80); 11% higher in women aged 40-45 years compared to those aged 15-19 (PRR: 1.11, 95% CI: 1.06-1.17); 9% higher in the least deprived women compared to most (PRR: 1.09, 95% CI: 1.06-1.11); and 7% higher in first time mothers compared to those who had their second child (PRR: 1.07, 95% CI: 1.05-1.09). Rates of antibiotic prescribing also increased over time.

Conclusions: The first eight weeks after childbirth are a time of high antibiotic use in women. Antibiotic use is particularly high in the first two weeks after childbirth and for those who had a caesarean delivery, with rates being nearly double that of women who had a vaginal birth.

Postnatal depression and infant “5-in-1” vaccine adherence in United Kingdom

Holly Christina Smith, Sonia Saxena, Fahima Choudry, Irene Petersen

Background: All infants in the United Kingdom are offered three doses of the 5-in-1 vaccination at 2, 3 and 4 months of age. This combined vaccination protects against diphtheria, tetanus, pertussis (whooping cough), polio and Hib disease (*Haemophilus influenzae* type b). There is a suggestion that there may be a lower uptake of infant vaccinations in children of mothers with postnatal depression; however, the evidence thus far has been mixed and the link between postnatal depression and infant vaccine uptake remains inconclusive.

Objectives: To examine if adherence of the infant 5-in-1 vaccination is lower in mothers who have postnatal depression.

Methods: We conducted a retrospective cohort study using UK primary care electronic health records from The Health Improvement Network (THIN) database. Linked mother-infant pairs were identified with infant date of birth between 1 January 2006 and 31 December 2015. Mother’s records were examined to identify postnatal depression in the first year after childbirth. The primary outcome measure was completion of all three doses of the infant 5-in-1 vaccination before one year of age. Poisson regression models were used to compare the likelihood of infant 5-in-1 vaccination uptake in children of women with postnatal depression to women with no recorded postnatal depression.

Results: Of the 219,810 women included in the study, 23,151 (10.5%) had a record of postnatal depression in the first year after birth. There was no difference in infant’s 5-in-1 vaccination completion between mothers with postnatal depression and those without (adjusted IRR: 1.01, 95% CI: 0.99-1.02). Those from more socially deprived areas were less likely to complete their infant vaccinations compared to those from the least deprived areas (IRR: 0.92, 95% CI: 0.90-0.92). The likelihood of completing infant 5-in-1 vaccination reduced over time, comparing 2006-07 to 2014-2015 (IRR: 0.91, 95% CI: 0.90-0.92).

Conclusion: Infants of mothers with postnatal depression were just as likely to have completed their 5-in-1 vaccine as infants of mothers without postnatal depression.

What medications are prescribed to women during their postnatal check?

Holly Christina Smith, Sonia Saxena, Irene Petersen

Background: In the United Kingdom (UK) every woman has access to midwives and health visitors for the first few days after childbirth. They are then discharged to the care of their General Practitioner (GP) who invites them for a planned postnatal check 6-8 weeks after birth, as recommended by National Institute for Health and Care Excellence (NICE) and the World Health Organisation (WHO). This is an opportunity to review a woman's physical and mental health mental, and assess how they are recovering after pregnancy and birth. It is also a key point to discuss breastfeeding, contraception, smoking cessation, physical activity and dietary advice. While guidelines outline what health needs could be covered during these consultations, few studies have investigated what is addressed in reality and how this relates to national guideline recommendations.

Objectives: To determine what medications are prescribed to women during their postnatal check and how these relate to NICE guidelines.

Methods: We conducted a descriptive cohort study using UK primary care electronic health records from The Health Improvement Network (THIN) database. Women aged 15-49 who gave birth between 1st January 2006 and 31st December 2016 were included. A woman's record was examined to identify evidence of having a postnatal check. The postnatal check typically takes place 6-8 weeks after childbirth, however some women may receive this check slightly earlier or later so the time window for our study was expanded to weeks 5-10. The primary outcome measure was all prescriptions issued at the time of the postnatal check (week 5-10). Prescriptions were grouped by British National Formulary (BNF) subchapter to capture distinct health needs, such as antibiotics or antidepressant drugs. To identify the most common medications issued, the frequency and proportion of each prescription grouping is given as a fraction of all prescriptions in weeks 5-10.

Results: Of the 309,573 women included in this study, 180,059 (58.2%) had at least one prescription issued in the time period of the postnatal check; with 346,975 prescriptions being issued in total. The most common prescriptions related to: contraceptives 116,458 (33.6%); antibiotics 33,594 (9.7%); antidepressants 18,987

(5.5%); pain relief 12,844 (3.7%); local preparations for anal and rectal disorders 12,386 (3.6%); topical corticosteroids 10,309 (3.0%); and laxatives 10,255 (3.0%).

Conclusions: The postnatal check is a unique opportunity for many women to receive key medications and preventative care after childbirth. The medications prescribed to women during their postnatal check are reflective of national guidelines.