An exploration of influences and changes in the diagnosis and management of symptoms of gastro-oesophageal reflux in infants aged 0-1 year of age.

Jean Cowie

MSc Health Promotion, PGCE -Tertiary Level Teaching,
BA Community Health Nursing, Dip Nurse (London), Dip Health Visiting.

This thesis is submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy. The candidate has already achieved 180 credits for assessment of taught modules within the blended learning PhD programme

May 2019

Faculty of Health and Medicine

Lancaster University

I declare that this thesis is my own work and has not been submitted for the award of a higher degree elsewhere

ACKNOWLEDGEMENTS

In completing this thesis, I wish to acknowledge the people who have contributed and supported me in this work. Firstly, I'd like to thank the data analysts at the Information Services Division of NHS National Services Scotland, who provided me with valuable prescribing data. I would also like to thank the parents, who participated in the interviews and shared their experiences of caring for an infant with symptoms of gastro-oesophageal reflux (GOR). Thanks also go to the health visitors and general practitioners who also participated in the interviews and openly shared their experience and professional practice when supporting families caring for infants with symptoms of GOR.

I am very grateful to my supervisors Professor Christine Milligan and Dr Paula Holland for their time, support, and research expertise as well as their encouragement. I would also like to thank Dr Iain Pirie for his statistical support and Dr Laura Machin for her advice and support regarding ethics.

I would also like to thank my colleagues at NHS Education for Scotland for their support and encouragement, especially Susan Key and Alison Connolly.

Many thanks also go to my mother and brother for their love, support and understanding as it helped me progress with my doctoral studies.

Finally, I want to thank my many friends and colleagues for their continual support and encouragement.

ABSTRACT

An exploration of influences and changes in the diagnosis and management of symptoms of GOR (gastro-oesophageal reflux) in infants aged 0-1 year of age.

Gastro-oesophageal reflux (GOR) is common in infants. According to NICE (2015), it affects 40% or more of infants and generally resolves naturally without the need for medical treatment. However, preliminary indications suggest that there has been a rise in the use of medicines to manage GOR in young infants under the age of twelve months. This is particularly evident for acid suppressant medicines such as ranitidine and omeprazole – drugs that are currently not licensed for use in the 0-1 age group in the UK (BNFC, 2019).

To gain a greater understanding of the extent to which this rise in prescribing rates is manifest in Scotland, and what underpins this shift in prescribing patterns, this thesis adopted a two-stage research approach to the study. Stage one of this study analysed national prescribing data from the Information Services Division of NHS Scotland (ISD), to explore how patterns of prescribing for alginate, domperidone, omeprazole and ranitidine have changed over time, and how they differ between NHS Board areas in Scotland. Findings from stage one confirmed that the prescribing of alginate, omeprazole and ranitidine increased significantly in Scotland over a 7-year period between 2010 and 2016. Prescribing of alginate increased from 15.7 per 100 infants in 2010 to 24.7 per 100 infants in 2016, whilst the prescribing rate for ranitidine increased over four-fold from 2.3 per 100 infants in 2010 to 9.7 per 100 infants in 2016,

and for omeprazole the prescribing rate increased over three-fold from 0.9 per 100 infants in 2010 to 3.2 per 100 infants in 2016. Furthermore, the data revealed regional variation in the drugs prescribed.

Stage two sought to investigate what underpinned this change in prescribing patterns in greater depth. Focusing on one NHS Board in Scotland that had a high prescribing rate for ranitidine, stage two adopted a qualitative approach and used in-depth interviews to explore issues contributing to this shift in prescribing patterns from the perspectives of health visitors, general practitioners and parents. Semi-structured interview schedules were used to guide in-depth interviews with 22 participants. Issues of adherence to national guidelines, the shift away from conservative to more pharmaceutical treatments for GOR and shifts in knowledge and power between clinicians and parents were explored. While general practitioners and health visitors remain the key players in diagnosing and treating GOR in infants in Scotland, general practitioners often rely on the expertise of health visitors whom they see as the experts in this field, whilst health visitors are often influenced by parental pressures. Parents were thus found to play an important role in influencing the diagnosis and the treatment approach offered, with the prescribing of medicines often seen by parents as the first-line of approach to the treatment of GOR. Parental pressures placed on clinicians was seen to arise from changing attitudes and expectations of parenthood, shifts in family support structures, and the growing accessibility of a wealth of health information from (both reliable and unreliable) sources on the worldwide web, as well as the subtle (and not so subtle) advertising of medicines to manage GOR on social media. These factors

all play a key role in the pharmaceuticalisation of treatment for GOR and is likely to go some way toward accounting for changes in prescribing patterns over time. Theoretically, therefore, this study points to the medicalisation of everyday care practices for infants, especially the management of symptoms of GOR. Importantly, it is possible that some infants are being prescribed unlicensed acid suppressant medicines unnecessarily and this has financial implications for the NHS as well as health implications for young infants.

CONTENTS **PAGE**

Acknowledgments 1

Abstract 2

Table of Contents 5

List of Figures 10

List of Tables 11

List of Appendices 12

Chapter 1: Introduction

1.0: Background and Rationale for the Study 14

1.1: Context and Geographical Location of the Study 17

1.2: Overview of Thesis 20

Chapter 2: Literature Review

2.0: Introduction 23

2.1: Search Strategy 23

2.1.1: Inclusion Criteria 25

2.1.2: Exclusion Criteria 26

2.2: Definition, Diagnosis and Prevalence of Gastro-oesophageal Reflux (GOR) 28

2.3: Management of GOR 32

2.3.1: Conservative Management 32

2.3.2: Medical Management 34

2.3.3: Use of Alginate (Gaviscon) 35

2.3.4: Use of Motility Stimulants (Domperidone) 36

2.3.5: Use of H2-Receptor Antagonists (Ranitidine) 37

2.3.6: Use of Proton Pump Inhibitors (Omeprazole) 40

2.4: Medicalisation of Normality: A Conceptual Framework 43

2.4.1: Changing Focus of Health Care with Examples of 'Medicalisation' 48

2.4.2: Pharmaceuticalisation 54

2.4.3: Knowledge Acquisition 57

2.4.4: Professional Decision Making 61

2.5: Strengths and Limitations of Literature Search Strategy 63

2.6: Conclusion 64

Chapter 3: Research Methods

3.0: Introduction 67

3.1: Two Stage Research Design 68

3.2: Stage One: Quantitative Research Method 70

3.2.1: Ethical Approval 73

3.2.2: Quantitative Data Analysis 73

3.2.3: Reliability and Validity 76

3.3: Stage Two: Qualitative Research Method 76

3.3.1: Participant Selection 79

3.3.1.1: Recruitment of Health Visitors 80

3.3.1.2: Recruitment of General Practitioners 80

3.3.1.3: Recruitment of Parents 81

3.3.2: Setting of Data Collection 82

3.3.2.1: Data Collection 82

3.3.2.2: Semi-Structured Interview Schedules 83

3.3.2.3: Pilot Study 84

3.3.2.4: Audio Recording and Field Notes 85

3.3.2.5: Duration of Interviews 85

3.3.3.6: Data Saturation 85

3.3.3: Qualitative Data Analysis 86

3.3.3.1: Trustworthiness 89

3.3.3.2: Positionality and Reflexivity 90

3.4: Ethical Considerations 91

3.4.1: Informed Consent 92

3.4.2: Anonymity and Confidentiality 92

3.4.3: Research Governance 92

3.5: Reflections on the Research 94

Chapter 4: Stage One: Findings from Quantitative Analysis of National Prescribing Data

4.0: Introduction 96

4.1: National Prescribing Data from ISD Scotland 96

4.2: Infant Population in Scotland 97

4.3: Prescribing in Scotland. The National Picture 101

4.4: Prescribing at the NHS Territorial Board Level 107

4.4.1: Prescribing of Alginate (Gaviscon) 108

4.4.2: Prescribing of Domperidone 111

4.4.3: Prescribing of Omeprazole 113

4.4.4: Prescribing of Ranitidine 116

4.5: Prescribing in NHS Grampian 118

4.6: Conclusion 121

Chapter 5: Stage Two: Findings from Qualitative Analysis of Data from Semi-structured Interviews

5.0: Introduction 122

5.1: Characteristics of the Participants. 123

5.1.1: Parents 124

5.1.2: Health Visitors 126

5.1.3: General Practitioners 126

5.2: Findings from Analysis of Data from Interviews with Parents 127

5.2.1: The Parent's 'Reflux' Journey 127

5.2.2: Emotional and Mental Health Wellbeing 136

5.2.3: Changes Over Time 142

5.2.4: Conclusion 143

5.3: Findings from the Analysis of Data from Interviews with Health Visitors 144

5.3.1: The Process of Diagnosing GOR 144

5.3.2: Influences on Decision Making in the Diagnosis of GOR in Infants 149

5.3.3: Changes Over Time 153

5.3.4: Conclusion 155

5.4: Findings from Analysis of Data from Interviews with General Practitioners 155

5.4.1: The Process of Diagnosing GOR 155

5.4.2: Influences on Decision Making in the Diagnosis of GOR in Infants 160

5.4.3: Influences on Prescribing Decisions Regarding GOR in Infants 164

5.4.4: Changes Over Time 169

5.4.5: Conclusion 171

5.5: Conclusion 171

Chapter 6: Discussion of Findings from Stage One and Stage Two

6.0: Introduction 174

6.1: Patterns of Prescribing of Medicines in the Management of GOR in Infants 175

6.2: Influences on Decisions to Diagnose GOR in Infants 177

6.2.1: Parental Stress and Anxiety 177

6.2.2: Shifting Social Support Structures 183

6.2.3: Sources of 'Medical' Knowledge 185

6.3: Professional Approach to Diagnosis 188

6.4: Influences on Prescribing Decisions 190

6.5: Changes Over Time 195

6.6: Medicalisation of GOR 199

6.7: Strengths and Limitations of the Study 203

6.8: Conclusion 208

Chapter 7: Conclusion 209

7.1: Recommendations 211

Reference List 213

Appendices 243

FIGURES

Figure 1.01: Map of NHS Territorial Boards in Scotland

Figure 4.01: Prescribing rate (per 100 infants) for alginate, domperidone, omeprazole and ranitidine in infants aged 0-1 year in Scotland 2010 – 2016

Figure 4.02: Prescribing rate (per 100 infants) and regression line for alginate in Scotland.

Figure 4.03: Prescribing rate (per 100 infants) and regression line for domperidone in Scotland.

Figure 4.04: Prescribing rate (per 100 infants) and regression line for omeprazole in Scotland.

Figure 4.05: Prescribing rate (per 100 infants) and regression line for ranitidine in Scotland.

Figure 4.06: Prescribing rate for alginate per NHS Board 2010 – 2016

Figure 4.07: Prescribing rate for domperidone in NHS Boards 2010 – 2016

Figure 4.08: Prescribing rate of omeprazole in NHS Boards 2010-2016

Figure 4.09: Prescribing rate for ranitidine per NHS Board 2010 – 2016

Figure 4.10: Prescribing rate and regression line for ranitidine in Grampian 2010-2016

Figure 4.11: Prescribing rate and regression line for alginate in Grampian 2010 -2016

Figure 4.12: Prescribing rate and regression line for domperidone in Grampian 2010 – 2016

Figure 4.13: Prescribing rate and regression for omeprazole in Grampian 2010 -2016

TABLES

Table 1.01: Population and demography across the territorial boards mid 2015

Table 2.01: Key words, search term and alternatives.

Table 2.02: Search Strategy: CINAHL and Medline

Table 3.01: Data Analysis Plan

Table 4.01: Mid-year population estimates from National Records if Scotland for infants aged 0-1 year across health boards in Scotland

Table 4.02: Patient count/ number of infants aged 0-1-year prescribed alginate per NHS Board and Scotland per year

Table 4.03: Patient count/ number of infants aged 0-1-year prescribed domperidone per NHS Board and Scotland per year

Table 4.04: Patient count/ number of infants aged 0-1-year prescribed omeprazole per NHS Board and Scotland per year

Table 4.05: Patient count/ number of infants aged 0-1-year prescribed ranitidine per NHS Board and Scotland per year

Table 4.06: Prescribing rate and upper and lower confidence interval levels for alginate, domperidone, omeprazole and ranitidine in Scotland (2010 -2016)

Table 4.07: Top 3 Ranking NHS Boards for prescribing alginate in infants aged 0-1 year (2010 - 2016)

Table 4.08: Top 3 Ranking NHS Boards for prescribing domperidone in infants aged 0-1 year (2010 - 2016)

Table 4.09: Top 3 Ranking NHS Boards for prescribing omeprazole in infants aged 0-1 year (2010 - 2016)

Table 4.10: Top 3 Ranking NHS Boards for prescribing ranitidine in infants aged 0-1 year (2010 - 2016)

Table 5.01: Participant Table: Parents

Table 5.02: Participant Table: Health Visitors

Table 5.03: Participant Table: General Practitioners

Table 6.01: International comparison of change in use of PPI Medicine in 0-1-year infants

APPENDICES

Appendix 1: Quality Appraisal Tools

Appendix 2: Studies Included in Literature Review

Appendix 3: Letters of Invitation and Participant Information Sheet

- 3a: Health Professionals
  - Letter of Invitation
  - Participant Information Sheet
- 3b: Parents
  - Letter of Invitation
  - Participant Information Sheet

Appendix 4: Semi-structured Interview Schedules

- 4a: Health Professionals (Health Visitor & General Practitioner)
- 4b: Parents

Appendix 5: Example of list of initial themes & sub-themes from interviews with General Practitioners

Appendix 6: Example of some early themes, sub-themes mapped to research aim and underpinning theoretical framework (medicalisation**)**

Appendix 7: Example of indexing in NVivo

Appendix 8: Example of Part of Data Summary and Display: Influence on Diagnosis

Appendix 9: Ethical Approval

- 9a: Consent Form
- 9b: Letters of Approval Lancaster University
- 9c: Letter of Approval NHS Grampian Research & Development
- 9d: Letter of Approval NHS Lothian Research & Development
- 9e: Confidentiality Agreement for the Transcription of Qualitative Data

Appendix 10: Ranking Tables

Appendix 11: Public Output

11a: Journal of Health Visiting

CHAPTER 1: INTRODUCTION

1.0 Background and Rationale for the Study

I am a Registered Health Visitor, and at the onset of the study I was employed as a lecturer and programme leader for a Specialist Community Public Health Nursing – Health Visiting course at a university in the north east of Scotland. To maintain credibility in this academic role I worked half a day each week as health visitor in clinical practice. This involved me working in several clinical settings and with a variety of health visiting colleagues. An observation during these sessions related to a perceived increase in the number of infants diagnosed with, and prescribed medicine for gastro-oesophageal reflux (GOR) compared to when I work full-time as a health visitor. Anecdotal evidence from discussions with health visitors also suggested an increase in the number of infants presenting with symptoms of GOR. When in full-time employment as a health visitor 15 - 20 years previously, it seemed to me that less infants were being presented with symptoms of GOR and very few were prescribed medicine to manage the symptoms. At that time conservative management strategies were advised as the first line of treatment, and few infants were prescribed medicine. Gaviscon (alginate) was the medicine of choice and it was only prescribed to infants with severe symptoms of GOR such as weight loss or very poor weight gain. Now, it seems that many infants are diagnosed with GOR and prescribed ranitidine (H2-receptor antagonist) or omeprazole (proton pump inhibitor).

Gastro-oesophageal reflux (GOR) is defined as the backflow of stomach contents into the oesophagus (Rosen et al, 2018; NICE, 2016). Gastro-

oesophageal reflux in infants, however, differs from that in adults. In young infants the condition is physiological, innocuous and resolves over time and as the infant grows, whereas, in adults the condition is pathological as the regurgitated stomach contents in adults is normally acidic causing heartburn and oesophagitis (NICE, 2019; NICE, 2016; Bhasvar et al., 2011; Toila and Vandenplas, 2009). Pathological symptoms of GOR in both adults and infants that cause complications such as oesophagitis and haematemesis are diagnosed as gastro-oesophageal reflux disease (GORD) (Rosen et al., 2018; NICE, 2015). Whilst the prevalence of GORD in the general population is estimated between 10% and 20%, epidemiological data pertinent to GOR and GORD in young infants is lacking (El-Serag et al., 2014; Dent et al.,2005). Most epidemiological studies such as that by Ruigomez et al. (2010), and Gold (2004) focus on children older than 1 year of age. According to Rosen et al. (2018) and NICE (2015), the lack of epidemiological data is due the difficulty differentiating symptoms of GOR from symptoms of GORD in young infants. Nevertheless, NICE (2015) consider the prevalence of GORD in children to be low, but symptoms of GOR in infants to be common and go on to report regurgitation of feeds to occur in 40% or more infants and to resolve naturally in 90% of cases by the time the infant is 1 year old.

The observations from practice referred to above prompted my interest in learning more about the condition and management strategies in order to determine if there really was an increase in the number of infants diagnosed with, and treated for symptoms of GOR as assumed, and if this was the case, why this was happening and what had changed. Further investigation of the

condition revealed the evidence base supporting the use of medicines to manage symptoms GOR to be weak. This spurred my inquiry as to why infants were now prescribed medicines of unproven efficacy to manage a condition that in previous years was considered benign and managed conservatively and generally resolved of its own accord. Moreover, further investigation revealed that two of the main drugs prescribed, ranitidine and omeprazole, are not yet licensed for oral use in infants under one year of age in the UK (BNFC, 2019). This seemed quite a notable change in practice, and the need to find out what had instigated this shift in practice provided the impetus for this study. It also raised the notion of the 'medicalisation of normality' and suggests that gastro-oesophageal reflux, a normal physiological condition in infants has become medicalised and is now considered, and accepted, as a condition requiring medical treatment. The concept of 'medicalisation', therefore, frames the theoretical underpinning of this study.

The study used a two-stage research design to address the following research aim and objectives:

Stage One:

Aim: To explore patterns of prescribing of alginate, domperidone, omeprazole and ranitidine in Scotland over time and place.

Objective:

1. Examine patterns of prescribing and changes over time and place.

Stage Two:

Aim: To explore factors influencing and underpinning how health professionals and parents perceive and manage symptoms of GOR in infants aged 0-1 year.

Objectives:

1. Understand how health professionals approach their diagnosis of GOR in infants.
2. Explore factors influencing health professional's decision-making in the diagnosis of GOR in infants.
3. Explore factors influencing health professional's prescribing decisions about GOR
4. Assess changes over time in the management strategies for dealing with GOR in infants and what underpins these changes
5. Understand parent/ carer experiences and expectations with regard to the management of GOR in infants.

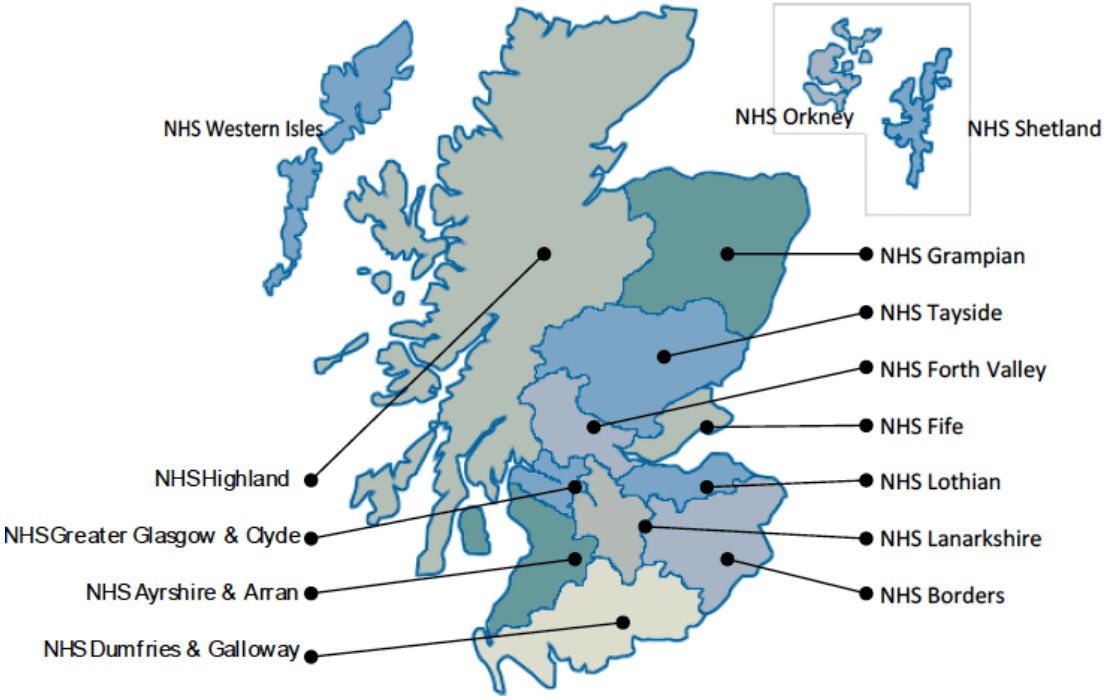
The study took a two-staged approach using quantitative techniques in stage one to analyse changes in patterns of prescribing over time and place, and qualitative research methods in stage two to explore and understand what influenced diagnostic and prescribing decisions by health professionals.

1.1 Context and Geographical Location of the Study

The study takes place in Scotland where responsibility for healthcare is devolved from Westminster and is the responsibility of the Scottish Government. Although responsibility for healthcare is devolved to the Scottish Parliament, the regulatory bodies of health professionals, such as the Nursing

and Midwifery Council and the General Medical Council are UK wide. Also, clinical guidelines such as that from the National Institute for Health Care Excellence (NICE) are sometimes referred to if no equivalent guideline is available from the Scottish Intercollegiate Guidelines Network (SIGN), as in the instance of gastro-oesophageal reflux in infants. In Scotland there are 8 Special National Health Service (NHS) Boards and 14 Territorial NHS Boards as indicated in Figure 1.01. Territorial boards have an important role in the provision of healthcare services, and for health protection and health promotion of the population within their NHS board area.

Figure 1.01: Map of NHS Territorial Boards in Scotland



Special NHS Boards

NHS Education for Scotland	NHS Health Scotland
NHS National Services Scotland	NHS National Waiting Times Centre
Healthcare Improvement Scotland	NHS 24
Scottish Ambulance Service	The State Hospitals Board for Scotland

Scottish Government (2017a)

The landscape and geography of Scotland has resulted in wide variation in the demography and population distribution of the 14 territorial boards as detailed in Table 1.01. For example, Greater Glasgow and Clyde, an area of large conurbation, has the highest population whilst remote and rural areas such as the island boards of Orkney, Shetland and the Western Isles have the lowest populations. Furthermore, the mountainous landscape and wild terrain has led to variation in the density of the populations across territorial board areas. The Western Isles, a chain of interconnected islands off the west coast of Scotland, and the Highlands which has the largest land mass, both have very low population densities. This study examined prescribing data at a national level for the whole of Scotland, and territorial NHS Board level and with a particular focus on NHS Grampian. NHS Grampian is the fourth largest territorial board in Scotland with approximately 587 820 inhabitants (Table 1.01). It also has a high prescribing rate for ranitidine (H2RA). Geographically, the region includes both urban, and remote and rural areas. It also has areas of affluence and deprivation.

Prescribing data routinely gathered by the Information Services Division (ISD Scotland) are used to inform this study. ISD Scotland is part of NHS National Services Scotland (NSS) one of the Special NHS Boards in Scotland that provides a variety of specialist and national services that inform decision making and planning in the NHS in Scotland (ISD Scotland, 2010). The decision to focus on infants aged 0-1-year is two-fold. Firstly, symptoms of GOR normally resolve by the age of 1 year (NICE, 2015), and ISD Scotland record data by

whole years therefore the available prescribing data was for the 0-1-year age group.

Table 1.01: Population and demography across the territorial boards mid 2015 (National Records of Scotland, 2016)

NHS Board	Total Population	Density (Person per square km)	Infants aged 0-1 year	Working age (%)	Pensionable age (%)
Ayr & Arran	370,590	110	3,656 (0.97%)	222,354 (60%)	85,236 (23%)
Borders	114,030	24	1,024 (0.90%)	66,137 (58%)	28,667 (25%)
Dumfries & Galloway	149,670	23	1,291 (0.86%)	86,809 (58%)	38,914 (26%)
Fife	368,080	278	3,879 (1.05%)	224,529 (61%)	77,297 (21%)
Forth Valley	302,650	114	3,043 (1.00%)	190,669 (63%)	60,530 (20%)
Grampian	587,820	67	6,265 (1.06%)	382,083 (65%)	105,808 (18%)
Gt Glasgow & Clyde	1,149,890	1,041	12,424 (1.08%)	758,927 (66%)	206,980 (18%)
Highland	321,000	10	3,020 (0.01%)	192,600 (60%)	77,040 (24%)
Lanarkshire	654,490	292	7,136 (0,01%)	412,329 (63%)	124,353 (19%)
Lothian	867,800	503	9,470 (1.09%)	572,748 (66%)	147,526 (17%)
Orkney	21,670	22	198 (0.91%)	13,002 (60%)	5,201 (24%)
Shetland	23,200	16	238 (1.02%)	14,384 (62%)	4,640 (20%)
Tayside	415,040	55	4,141 (1.00%)	257,325 (62%)	91,309 (22%)
Western Isles	27,070	9	216 (0.80%)	15,7001 (58%)	7,038 (26%)
Scotland	5,373,000	68	56,001 (1.04%	3,384,990 (63%)	1,074,600 (20%)

1.2 Overview of Thesis

Chapter 2 examines the literature regarding GOR in infants and the theoretical framework underpinning the study. It begins by considering the definition and diagnosis of GOR and the prevalence of the condition in infants. Thereafter

management strategies are discussed starting with an overview of conservative management strategies. Regarding medical strategies, evidence and research related to a range of medicines, such as alginate, motility stimulants, H2-receptor antagonists (H2RA) and proton pump inhibitors (PPI) is also presented and discussed. Theoretically, the thesis engages with Szasz's notion of medicalisation and pharmaceuticalisation of everyday life as well as discussing the influence of the internet and social media on shifting prescribing patterns.

The research methods and research design are described and discussed in chapter 3 and a rationale given for the two-stage research design. A quantitative research approach was used in stage one of the study as there was a need to analyse national prescribing data to determine patterns of prescribing and to assess if there had been an increase in prescribing over time. In stage two, qualitative research methods were used to explore factors influencing the diagnosis and prescribing of medicine for GOR. The decision to hold semi-structured interviews with health visitors, general practitioners and parents of infants with symptoms of GOR is discussed as well as the approach to recruitment. The approach to the analysis of both the quantitative and the qualitative data is deliberated as well as some of the ethical issues that arose. Consideration is also given to positionality and reflexivity.

Chapter 4 presents the findings from the quantitative analysis of national prescribing data from ISD Scotland. Analysis of data regarding the population of 0-1-year old infants prescribed Gaviscon (alginate), domperidone (motility stimulant), omeprazole (PPI) or ranitidine (H2RA) in each NHS board is

presented first. National data for the whole of Scotland is then examined and presented, thereafter prescribing data for each drug and for each of the 14 NHS territorial boards is analysed and presented. The results then centre on prescribing in NHS Grampian, the NHS board area of focus in stage two of the study. The results from the analysis of the qualitative interviews from stage two of the study are presented in chapter 5. Firstly, findings from the interviews with parents are reported followed by the analysis of the data from health visitors then general practitioners.

Chapter 6 presents an interpretation of the results of the study and discusses the findings in relation to the study objectives and the underpinning theoretical framework. Influences on the diagnosis of GOR and prescribing of medicines to manage symptoms of GOR are discussed, and consideration is given to the influence of parents, changing social support networks and changes over time. The theoretical framework is also discussed in relation to the literature, and findings of the study. Finally, consideration is given to the strengths and limitations of the research study. In the concluding chapter (chapter 7) the key findings and recommendations arising from the study are presented.

CHAPTER 2: REVIEW OF THE LITERATURE.

2.0 Introduction

This chapter examines the existing literature regarding gastro-oesophageal reflux (GOR) to determine what is already know about the condition, its diagnosis, prevalence and management in infants aged 0-1 year of age, as well as any gaps in knowledge. It begins with an overview of the search strategy, followed by an investigation of the definition, diagnosis and prevalence of the condition in infants. Thereafter strategies to manage GOR are appraised. This focuses on conservative and medical interventions. Finally, the chapter engages with the theoretical framework that underpins this thesis by discussing concepts of medicalisation and pharmaceuticalisation in a bid to understand why there has been a change in the management and prescribing behaviours for gastro-oesophageal reflux in infants and what underpins this change.

2.1 Search Strategy

The literature search was undertaken using the following databases and search engines: Onesearch (Lancaster University), CINAHL, EMBASE, Medline, Pubmed, Web of Science, Cochrane Library, Medicines Complete, Knowledge Network (NHS Scotland), NICE, and Google Scholar. The literature search focused on GOR in infants aged 0-1 year of age and conservative and medical management, and initially involved literature dating from 1990 (when I worked as a health visitor) to the present day. Relevant grey literature, such as local and national protocols and clinical guidelines, was also searched or obtained from health visiting colleagues in the practice setting. This study uses the

definition of ‘infant’ defined by NICE (2015) and includes all babies, children and infants under 1 year of age. Key words and synonyms used to search the literature are presented in Table 2.01.

Table 2.01: Key words, search term and alternatives.

Key words/ terms	**Synonyms /alternatives**
Gastro-oesophageal reflux	Gastro-esopheal reflux, Gastroesopheal reflux, reflux, GOR, GER, vomiting, spitting, regurgitation, posseting
Infants (0-1-year-old)	Babies, children, newborn
Diagnosis	Symptoms, back arching, crying, unsettled, guidelines, protocols.
Conservative management	Non-medical interventions, non-pharmaceutical management, feeding, feeding technique, volume of feed, winding, positioning, upright position, ‘kangaroo care’, slings, soothing, comforting.
Medical management	Drugs, pharmaceutical interventions, medical management, ranitidine, omeprazole, Gaviscon, domperidone, alginate, motility stimulants, H2receptor antagonists, H2-RA, proton pump inhibitors, PPI
Efficacy	Effectiveness, best practice, evidence
Medicalisation	Medicalisation of normality, pharmaceuticalisation, sociology of diagnosis, social diagnosis

The titles and abstracts of the papers identified in the search were read for relevance to the study and pertinent full-text articles obtained. In addition, reference lists in key papers were searched manually and reviewed for references thought useful to the study. An example of the search strategy using CINAHL and Medline is illustrated in table 2.02.

Table 2.02: Search Strategy: CINAHL and Medline

Main search area	**Search terms**		**Database**	
Search Term	**AND**	**AND**	**CINAHL**	**Medline**
Gastro-oesophageal reflux OR gastro-oesophageal reflux disease			774	2833
Gastro-oesophageal reflux OR gastro-oesophageal reflux disease	Infants OR babies		149	562
Gastro-oesophageal reflux OR gastro-oesophageal reflux disease	Infants OR babies	Prevalence OR incidence OR epidemiology OR occurrence	38	153
Gastro-oesophageal reflux OR gastro-oesophageal reflux disease	Infants OR babies	diagnosis	59	234
Gastro-oesophageal reflux OR gastro-oesophageal reflux disease	Infants OR babies	Guidelines OR protocols OR practice guidelines OR clinical practice guidelines	16	32
Gastro-oesophageal reflux OR gastro-oesophageal reflux disease	Infants OR babies	treatment OR intervention OR therapy	96	317
Gastro-oesophageal reflux OR gastro-oesophageal reflux disease	Infants OR babies	alginate OR Gaviscon	11	31
Gastro-oesophageal reflux OR gastro-oesophageal reflux disease	Infants OR babies	prokinetic OR domperidone	9	42
Gastro-oesophageal reflux OR gastro-oesophageal reflux disease	Infants OR babies	H2-receptor antagonist OR ranitidine	2	5
Gastro-oesophageal reflux OR gastro-oesophageal reflux disease	Infants OR babies	Proton pump inhibitor OR PPI OR omeprazole	18	46

2.1.1 Inclusion Criteria

Regarding inclusion criteria the population of interest is infants aged 0-1-year-old. This is because physiological GOR is normal in infants in the first year of life and normally resolves spontaneously by the time an infant is one year old (Nelson et al., 1997; Martin et al., 2002). Interventions focused on conservative management, and the medical management of GOR and particularly the use of Gaviscon (alginate), domperidone (motility stimulant), omeprazole (proton pump inhibitor: PPI), and ranitidine (H2-receptor antagonist: H2RA). These are

the drugs identified in local guidelines to manage severe symptoms of GOR in infants and children in Scotland (NHS Lothian, 2014., NHS Grampian, 2012). Furthermore, Gaviscon, ranitidine and omeprazole are highlighted by the British National Formulae for Children (BNFC, 2019) as the preferred drugs in their respective drug classes to manage symptoms of gastro-oesophageal reflux disease in infants and children. At the outset of the study domperidone was the prokinetic/ motility stimulant drug of choice, however following advice from the European Medicines Agency (2014), domperidone is no longer recommended in the management of symptoms of gastro-oesophageal reflux disease in children. The focus of the outcome measure concerns the effectiveness of these drugs in alleviating symptoms of GOR in young infants. GOR is described by NICE (2015) as the backflow, or regurgitation, of stomach contents into the oesophagus or mouth. When the symptoms of GOR become severe and lead to complications such as oesophagitis and require medical treatment, it becomes a pathological condition and known as gastro-oesophageal reflux disease (NICE, 2015).

2.1.2 Exclusion Criteria

Exclusion criteria regarding the population of interest included preterm infants because according to Rossen et al, (2018), and NICE (2015) preterm infants have an increased risk of developing pathological gastro-oesophageal reflux disease (GORD). Infants over 1 year of age are excluded as physiological GOR resolves naturally by the time the infant is 1 year of age in 90%- 95% of cases (NICE, 2015., Nelson et al., 1997). Infants with additional health issues or

complex needs such, as cystic fibrosis or neurological impairment, also have a higher risk of developing GORD and therefore are excluded.

Regarding the intervention, drugs other than Gaviscon (alginate), domperidone (motility stimulant), omeprazole (PPI) and ranitidine (R2RA) were excluded as these are the medicines most commonly used in the UK (NHS Lothian, 2014., NHS Grampian, 2012., BNFC, 2019). Surgical management was also excluded as this involves infants with very severe or complex symptoms of GOR or GORD and this study is concerned with prescribing of medicines in the management of symptoms of GOR. Other studies that were not relevant to this research, for example, studies that focused on pharmacokinetic outcomes for these four medicines were also excluded. Studies not available in English were also excluded.

The search strategy included international studies, primarily from the United States, Australia or Europe and included quantitative studies, and systematic literature reviews. No pure qualitative studies were identified in the literature search, however one mixed methods study (Dahlen et al, 2018) included a qualitative stage. The quality of the research studies was assessed using the Critical Appraisal Skills Programme (CASP) checklists that included 10 questions for appraisal of systematic reviews, and 11 questions for randomised controlled studies. Examples of these can be found in Appendix 1.

Thirty-nine quantitative studies were included in this literature review plus six items of grey literature. These are presented in a table in Appendix 2 with details of the year, publication, age of infant, intervention, research method and quality.

2.2 Definition, Diagnosis and Prevalence of Gastro-oesophageal reflux (GOR)

In recent years there has been general agreement that gastro-oesophageal reflux (GOR) in infants is a physiological condition whereby the contents of the stomach flow back into the oesophagus or mouth (National Institute for Clinical Excellence [NICE], 2015; Tighe et al, 2014; DTB, 2010; Vandenplas et al., 2009). This involuntary back flow of gastric contents is sometimes described as regurgitation, posseting, spilling or spitting up (Schellack, 2012; Vandenplas et al, 2009). The condition is benign and normally resolves over time and as the infant grows and develops (Cohen et al., 2015; Hassell, 2012; Bhavsar et al., 2011).

Determining the prevalence of GOR and GORD in infants is difficult. In part due to the lack of epidemiological data (Dent et al., 2005; El-Serag et al., 2014) and in part due to difficulty in determining the prevalence of GOR and GORD because of the lack of specificity of the presenting symptoms (Kolimarala et al., 2018). Nevertheless, in their seminal study Nelson et al. (1997) reported 50% of infants to posset after feeding at least once per day whilst a later study by Martin et al. (2002) found the regurgitation of most feeds on a daily basis to be commonplace amongst young infants. More recently, a population-based study in Australia, found 23% of parents reported their infant had GOR (Sun et al., 2015).While the evidence indicates a large proportion of infants under 12 months experience symptoms of GOR, a number of studies (Miyazawa et al., 2002; Hegar et al., 2009; Campanozzi et al., 2009) found regurgitation to be

most common in the first five months of life and to resolve spontaneously by the age of 1 year.

The cause of GOR in infants has been attributed to factors such as the shorter oesophagus in infants, relaxation of the immature lower oesophageal sphincter, over feeding and an over distended stomach, delayed gastric emptying, and cow's milk allergy or sensitivity (Tighe et al., 2014; Drugs and Therapeutic Bulletin [DTB], 2010; Lawson, 2003). Whilst physiological GOR is essentially innocuous, in a small number of infants complications may develop leading to the diagnosis of gastro-oesophageal reflux disease (Lightdale, 2013; DTB, 2010; McLennan et al., 2010).

In contrast, gastro-oesophageal reflux disease (GORD) is a pathological condition of greater concern. It has been defined by Sherman et al. (2009), and also recognised internationally, as the gastro-oesophageal reflux of stomach contents that causes troublesome symptoms or complications that impairs quality of life. In writing this definition Sherman et al. (2009) considered severe symptoms or complications that may impair quality of life to include weight loss, oesophagitis, and haematemesis (Shellack, 2012). Nevertheless, the definition proposed by Sherman et al. (2009) can be argued to be vague and to result in some ambiguity in the diagnosis and differentiation between physiological GOR and its pathological counterpart GORD. For example, Vandenplas et al. (2005) indicate that the progression of GOR to GORD is evident when the severity and occurrence of the reflux increases, whilst according to NICE (2015), GORD occurs when symptoms of GOR are severe enough to merit medical

intervention. Diagnosis, therefore, is subjective and open to interpretation as there is no clarity of what is meant by the terms ‘severe’, ‘severity’ and ‘occurrence’, nor of what constitutes an increase of significance that would warrant the diagnosis of GORD. Orenstein (2010) highlights that the definition of GORD offered by Sherman et al. (2009) does little to clarify the situation and argues that the word ‘troublesome’ could be construed in a multitude of ways. Orenstein (2010) draws attention to the challenge of determining the extent to which a symptom is troublesome in infants who are unable to communicate verbally. Whilst crying, back arching, irritability, refusing to feed and sleep disturbance are all symptoms associated with GORD, and could be used to determine ‘troublesomeness’, they are also common baby behaviours indicative of other childhood conditions such as infant colic or a distended stomach (Hassell, 2012; Patience, 2012). Furthermore, relying on the parent or carer to denote the nature and extent of the ‘troublesomeness’ may present another dilemma. Orenstein (2010) questions who the symptoms are more troublesome to, and suggests that rather than the infant being troubled, it is the parent who has to deal with the upset infant and clean up the mess created by the reflux and regurgitation. Consequently, this lack of clarity in defining and diagnosing GOR and GORD from presenting symptoms can pose a challenge to health professionals confronted with concerned parents of infants who show signs of regurgitation and potential GOR and GORD. In turn this may lead to misdiagnosis, or confusion, in the diagnosis of physiological GOR and pathological GORD in practice. Interestingly, although a range of investigations to determine GORD in infants are available in secondary care these tend to be limited in their specificity and sensitivity and therefore are not wholly reliable in

formulating an accurate diagnosis (Rosen et al., 2018). This suggests that further information or research is needed to determine the factors that influence the diagnosis of GOR and GORD in daily practice, particularly amongst health professionals in primary care settings. As there is no clear delineation between GOR and GORD, in this study the term GOR will be used to describe the full continuum of symptoms ranging from physiological GOR to the more severe and pathological symptoms associated with GORD.

Gastro-oesophageal reflux (GOR) is a common concern among parents of young infants (Bell et al., 2018; Bhavsar et al., 2011; Campanozzi et al., 2009). Although it is recognised as a normal physiological condition that generally resolves of its own accord, with or without conservative management (Pettinger, 2017; Chellani et al., 2015), evidence suggests that over the last 15 years, or more, there has been an increase in the prescribing of medication for the condition in infants in the United States (Hassell, 2012; Chen et al, 2012; Barron et al, 2007), Australia (Bell et al., 2018), Belgium (De Bruyne et al., 2014) and New Zealand (Blank and Parkin, 2017). This evidence largely relates to the prescribing of proton pump inhibitors (i.e. Omeprazole), and H2-receptor antagonists (i.e. Ranitidine). Anecdotally health visitors in the UK have observed a rise in the prescribing of Gaviscon (alginate) and H2-receptor antagonists (ranitidine) in young infants. Therefore, in trying to explain this shift in the management and prescribing behaviours for gastro-oesophageal reflux in infants by health professionals, background literature regarding the diagnosis of GOR and its management, both medical and conservative, is explored and presented.

2.3 Management of GOR

In the UK the lack of reliable criteria or guidelines to determine a definitive diagnosis of GOR in infants leads to challenges for health professionals and a reliance on their intuition and professional judgement. Furthermore, evidence suggests that GOR is being over diagnosed in practice in Australia (Bell et al., 2018), India (Chellani et al., 2015), Belgium (De Bruyne. et al, 2014). and the United States (Hassell, 2012; Khoshoo et al., 2007), therefore unclear guidelines may be a key predisposing factor for this. This lack of clarity and blurring of the parameters surrounding the diagnosis of physiological GOR and pathological GORD may also be a predisposing factor in the over prescribing of medication in the United States, Australia and Belgium (Bell et al., 2018; De Bruyne et al., 2014; Hassell, 2012, 2008; DTB, 2010; Chellani et al., 2015; Barron et al, 2007).

The management of GOR in infants essentially fall into two categories, that is conservative and medical that follow.

2.3.1 Conservative Management

Conservative management of GOR is recognised as the first line of treatment in the management of GOR in the UK, the United States and Europe (Rosen et al., 2018; NICE, 2015; Vandenplas et al., 2009; Orenstein and McGowan, 2008). This involves reassuring parents that the symptoms will improve over time and providing advice on the volume of feeds, feeding techniques, positioning of the infant, massage therapy, and use of feed thickeners (Rosen et al., 2018; NICE, 2015; Neu et al. 2014; Orenstein and McGowan, 2008). The

rationale for reducing the volume of feeds is based on the work of Sutphen and Dillard (1988) and Khoshoo et al. (2000) who found that a reduction in the volume of feeds led to a reduction in GOR in infants. NICE (2015) and Rosen et al. (2018) also recommend a reduction in the volume of feeds in infants that are clearly being overfed. Overfeeding may lead to an overstretched and distended stomach that has reached its capacity and the oesophageal sphincter acting as a pressure valve at risk of a blowout resulting in reflux and regurgitation. A small study by Neu et al. (2014) found massage therapy to be beneficial in relieving stress in infants but did not affect symptoms of GORD.

The efficacy of thickening agents, for formula fed infants, has been debated for many years. For example, a systematic review by Horvath et al. (2008) found thickening agents to be moderately effective in the treatment of GOR, but the systematic review by Huang et al. (2009) that focused on infants up to one month old, did not find sufficient evidence to support or discredit the use of thickeners. Thickened feeds were found to reduce the frequency of regurgitation in a multi-National (Greece, Morocco, France and Belgium), prospective randomized intervention study by Xinias et al. (2005), in a prospective randomized controlled study in Taiwan and Belgium by Chao and Vandenplas (2007), and in a prospective, blinded, randomized Indonesian study by Hegar et al. (2009). All three studies included infants up to 3 months old. More recently a Cochrane Review by Kwok et al. (2017), reported thickened feeds to be moderately effective in reducing episodes of regurgitation in formula fed infants. However, it should be noted that alginate is included as a feed thickener in the study by Kwok et al. (2017), and the age of the infants extended

from 3 to 6 months. Rosen et al. (2018), NICE (2015) and local guidelines (NHS Grampian (2012) all recommend the use of thickening agents in the management of GOR.

Early studies (Meyers and Herbst, 1982) have shown positioning of the baby, particularly lying prone, to be beneficial in the management of GOR. However due to the increased risk of sudden infant death syndrome to babies when sleeping in the prone position, this practice is not recommended (Rosen et al., 2018; NICE, 2015; Vandenplas et al., 2009). According to Kinny and Thach (2009) lying infants in the prone position can treble the risk of sudden infant death syndrome in infants.

2.3.2 Medical Management

Whilst medical management is generally concerned with pharmaceutical interventions, it may involve surgery in very severe cases of GORD. As surgery is at the severe end of the continuum of treatments for GOR in infants, and this study is concerned with increases in medical prescribing, literature regarding surgery is excluded from the literature review.

A range of pharmaceutical preparations are currently available and used in the treatment of GOR in infants. These can be categorised as antacids, alginates, H2-receptor antagonists, prokinetics or motility stimulants, and proton pump inhibitors (Rosen et al., 2018; DTB, 2010; Tighe et al., 2014, 2009). Antacids are no longer recommended or used to manage gastro-oesophageal reflux due to the potential risks associated with raised plasma aluminum levels in young

infants, and therefore these will not be discussed further (Lightdale et al., 2013; Vandenplas et al., 2009; Tighe et al., 2009). The 2009 Clinical Knowledge Summary (CKS, 2009) did not recommend initiation and use of motility stimulants, H2-receptor antagonists (H2RA), and proton pump inhibitors (PPI) in primary care in the UK. Nevertheless, evidence suggests that they are used regularly by colleagues in the United States (Barron et al., 2007; Hassall, 2012) and therefore worthy of further discussion. More recently, guidance from the National Institute of Clinical Excellence (NICE, 2015) in the UK recommends a 4-week trial of ranitidine (H2RA), or omeprazole (PPI) in infants with overt regurgitation that is accompanied by distressed behaviour, faltering growth or unexplained feeding difficulties.

2.3.3 Use of Alginates (Gaviscon)

Regarding the use of alginates, such as Gaviscon, in the management of GOR in infants, the available evidence is both limited and conflicting (Tighe et al., 2014; Clinical Knowledge Summary, 2009). For example, the largest study by Millar (1999) found Gaviscon to be effective in alleviating and reducing bouts of regurgitation and vomiting in infants, however it is noted that the age range of the subjects was 0 - 12 months. As it is well recognised that GOR generally resolves independent of treatment in most infants by the age of 12 - 14 months (NICE, 2015; Nelson et al., 1997; Martin et al., 2002), it is questionable if the improvement in this instance can in fact be attributed to the use of the alginate, Gaviscon. Findings of a, later but smaller, study by Del Buono et al. (2005) were weak and suggested that there was no perceived benefit of using Gaviscon to manage of symptoms of GOR in infants. A more recent study by Salvatore et

al, 2018 suggested that alginate may help reduce symptoms of GOR in infants. However, the study (Salvatore et al, 2018) was also small and the researchers acknowledge that the findings may be biased and resulted in a false positive effect due to parents under-reporting symptoms of GOR in infants following commencement of treatment with alginate. For more definitive results, the researchers advise that a placebo-controlled double-blind randomized controlled study be conducted. Nevertheless, Gaviscon is the most commonly used alginate and is said to work by reacting with gastric acid to thicken the gastric contents making reflux more difficult due to the increased viscosity, and also to form a protective layer over the distal oesophagus (DTB, 2010; Corvaglia et al., 2011). Due to the inconclusive evidence of its efficacy, the use of alginate in the treatment of symptoms of GOR is not supported in the Pediatric Gastroesophageal Reflux Clinical Practice Guideline developed by (Rosen et al., 2018) on behalf of the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition (NASPGHAN) and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN). However, it is advocated as a treatment option for breast fed infants, and in the stepped care approach for formula fed infants with symptoms of GOR in the UK by NICE (2015), and also locally by NHS Grampian (2012).

2.3.4 Use of Motility Stimulants (Domperidone)

Motility stimulants, also known as prokinetics, claim to relieve reflux by stimulating stomach emptying (DTB, 2010; Vandenplas et al., 2009; Tighe et al., 2009) and include drugs such as domperidone, metoclopramide and cisapride. Several systematic reviews found insufficient evidence in infants to

support the use of metoclopramide (Hibbs and Lorch, 2006), domperidone (Pritchard et al., 2005) and cisapride (McLennan et al., 2010) in practice (Tighe et al., 2014). Furthermore, a study in Italy by Cresi et al (2008) that focused on infants aged between 24 and 30 days old found evidence of the use of domperidone to manage symptoms of GOR in this age group to be unconvincing and therefore did not recommend it's use. In addition, the findings of a systematic review by Scott (2012) did not find domperidone effective in the management of symptoms of GOR in infants. Motility stimulants, however, are not without their adverse effects and despite being the drug of choice and used widely some years ago, cisapride was withdrawn from the market due to its association with cardiac arrythmias and sudden death (DTB, 2010). Since commencing this study, the European Medicines Agency (2014) issued advice warning of an increased risk of cardiac problems with the use of domperidone, therefore domperidone is not recommended for the management of symptoms of GOR in infants. Furthermore, Vandenplas et al. (2009) did not recommend the use of motility stimulants in the management of gastro-oesophageal reflux in infants, a view that is also shared in the UK by NICE (2015) and in Europe and the US (Rosen et al., 2018).

2.3.5 Use of H2-Receptor Antagonists (Ranitidine)

H2-receptor antagonists (H2RA) aim to reduce gastric acid secretion (DTB, 2010; Vandenplas et al., 2009; Tighe et al., 2009). Ranitidine and Cimetidine are examples of H2RA drugs. However, despite evidence (Cucchiara et al, 1989) of cimetidine being effective in the treatment of reflux oesophagitis (a complication of GOR indicative of GORD), there was insufficient evidence to

support its safe use in children (DTB, 2010), therefore it is not recommended in the British National Formulary for Children (BNFC, 2019). An Italian study by Cucchiara et al. (1993) found ranitidine to be effective in the treatment of reflux oesophagitis or GORD in infants. However, it should be noted that the sample population is small and the method of randomization is not clear. Azizollahi et al (2016) in a small randomized double-blind trial and parallel-group study, involving 60 infants also found ranitidine to be effective in the treatment of GORD. Nevertheless, a study of oesophageal acid exposure and gastric acid secretion in infants older than 1 year concluded that the infants that did not respond to treatment with ranitidine either required better acid suppression management, or their lack of response to the medication was because their symptoms of GOR were not acid related (Salvatore et al., 2006). A systematic review by Tighe et al (2014) did not find any randomised controlled trials evaluating the effectiveness of ranitidine to manage symptoms of GOR or GORD in infants. This situation appears largely unchanged as no further studies were revealed when searching the literature. Furthermore, a Clinical Knowledge Summary (CKS, 2009) did not advocate the use of H2RA medicine in primary care, considering these drugs to be more appropriate for infants with severe symptoms and complications of GOR such as oesophagitis and mucosal erosion that can impair quality of life (Lightdale et al., 2013; DTB, 2010). Such infants were recommended to be referred to secondary care for further investigation and diagnosis of GORD (CKS, 2009). Nevertheless, an analysis of data gathered by the UK National Poisons Information Service by Crawford et al. (2018) identified that among the recorded overdoses of ranitidine in the 0-

5-year age group (100%=517), 79% (410) were in infants under 6 months of age.

In the UK, oral ranitidine is not licensed for use in children under 3-years of age (BNFC, 2019). According to the General Medical Council (GMC, 2013), and the Medicines and Healthcare Products Regulatory Agency (2014), unlicensed medicines refer to drugs that are prescribed outside of the terms of use defined by the marketing authority or manufacturer. For example, regarding prescribing of ranitidine (H2RA) in the UK, the license does not include infants under 1 year of age. The reason being that the efficacy, safety, and quality of these unlicensed drugs has not been assessed to the appropriate quality standard for use in the 0-3-years age group in the UK, therefore their efficacy and safety is in doubt (Medicines and Healthcare Products Regulatory Agency, 2014). Nevertheless, the GMC (2013), and the Medicines and Healthcare Products Regulatory Agency (2014) both recognise there will be situations where unlicensed medicines may be prescribed. For example, The British Pain Society (2005) give the example of antidepressant medicine not being licensed to manage pain, but in some instances used for this purpose. Unlicensed medicines are sometimes used in palliative care, psychiatry and paediatrics where conducting randomised controlled trials to provide evidence of efficacy may be challenging (Medicines and Healthcare Products Regulatory Agency, 2014).

Interestingly, NICE (2015) advise that a 4-week trial of an H2RA, such as ranitidine, may be given to infants with overt regurgitation accompanied by distressed behaviour, faltering growth or feeding difficulties. However, the

interpretation of the perceived distress of the infant and their feeding difficulties remains subjective. In contrast, Rosen et al. (2018) referring to the NASPGHAN and ESPGHAN guideline do not recommend the use of H2RA in distressed infants with overt regurgitation who are generally healthy, and a systematic review by Tighe et al. (2014) did not find sufficient evidence to support the use of H2RA medication in infants under one year of age. Furthermore, studies concerning preterm infants and neonates highlight an association of ranitidine (H2RA) use with increased risk of infection (Santana et al., 2017; Terrin et al., 2012) and advise caution in the use of ranitidine in young infants.

2.3.6 Use of Proton Pump Inhibitor (Omeprazole)

Proton pump inhibitors (PPI) are also acid suppressant drugs and like H2RA medicines they are not licensed for use in infants under 1-year of age in the UK (DTB, 2010; BNFC, 2019). Nevertheless, PPI medicines have gained in popularity in recent years, particularly in the United States where Chen et al. (2012) and Barron et. (2007 indicate that their use in infants under 12 months of age has increased over the last 20 years. Barron et al (2007) reported that, in the United States, prescribing of PPI medicines to manage symptoms of GOR in infants increased four-fold between the years 1999 and 2004. An analysis of prescribing data in Belgium by De Bruyne et al (2014) found that prescribing of PPI and H2RA medicines to children aged 0-2-years increased seven-fold between the years 1997 and 2009 . A national study in New Zealand, by Blank and Parkin (2017) also revealed an increase in prescribing of PPI medicines to manage symptoms of GOR in infants from 2.5% in 2005 to 5.2% of infant in 2012. This suggests that the increase in prescribing of PPI medicines is not just

a Scottish phenomenon but is occurring more widely across a number of western countries.

Only one study was identified that assessed the efficacy of omeprazole in managing symptoms of GOR and GORD in infants. This was a small randomized, double blind placebo-controlled crossover study undertaken in Australia by Moore et al. (2003) that reported omeprazole to be ineffective in alleviating symptoms of GOR such as irritability and unsettledness. Moore et al. (2003) suggested that omeprazole should only be administered to infants with proven acid reflux, oesophagitis or GORD. Other studies regarding omeprazole tended to focus on older children or compared omeprazole with other acid suppressant drugs in the treatment of severe symptoms of GORD or oesophagitis as in the study by Cucchiaria et al. (1993).

Focusing on PPI drugs, Chen et al., (2012) conducting a review on behalf of the US Food and Drug Administration did not find sufficient evidence of the efficacy of PPI drugs to support their use in the treatment of symptoms of GOR. Other systematic reviews by van der Pol et al. (2011), Kierkus et al. (2014) and Gieruszczak-Bialek et al. (2015) also found evidence to support the use of PPI in infants under 1 year of age to be weak. However, Kierkus et al. (2014) Gieruszczak-Bialek et al. (2015) and De Bruyne and Ito (2018) also warned of the risk of adverse effects of long-term PPI use, such as an increased risk of infection. This is also supported by Rosen at al. (2018) in the updated NASPGHAN and ESPGHAN guideline. Furthermore, the systematic review by Tighe et al. (2014) found the research evidence concerning PPI medicines to

be weak but were of the view that omeprazole (PPI) may help infants with acid induced oesophagitis as typical of GORD. Nevertheless, despite the lack of evidence supporting the use of PPIs, in the UK, NICE (2015) do not appear to have dismissed their use entirely, rather they suggest a 4-week trial of a PPI medicine in infants with overt regurgitation that is accompanied by distressed behaviour, faltering growth or feeding difficulties. Again, the interpretation of distressed behaviour and feeding difficulties in infants is subjective.

It is also interesting to note that Hassell (2012) highlights an increase, in the Unites States, of PPI medicines being used in the management of GOR in infants under 6 months of age. Furthermore, a study by Khoshoo et al (2007) in the United States concluded that most infants prescribed prokinetic, H2RA or PPI medicines did not have acid related pathology such as GORD or oesophagitis. More recently, a study by Bell et al. (2018) suggests that in Australia, general practitioners may be overprescribing acid suppressants such as PPI to infants aged 0-1 year. According to Hassell (2012) the increase in prescribing of PPI is partly due to the increasing workloads of doctors, the reduced time to consult with, and to take a more in-depth history from patients, as well as parental pressure to alleviate the symptoms of GOR. However, it may also reflect the difficulty in differentiating symptoms of physiological GOR from pathological GORD in infants. Another reason posed by Hassell (2012) relates to the relaxation in the regulations regarding marketing in the US that has led to pharmaceutical companies advertising directly to the consumer. Furthermore, in their advertising the pharmaceutical companies use terms such as ‘acid reflux’ to justify the need for medicines to counteract or neutralise the

acid. Whilst such advertising is essentially aimed at symptoms of GOR in the adult population, Hassell (2012) believes that the notion of 'acid reflux' has filtered down and now influences perceptions of GOR in the younger age group of children and infants with some parents believing that gastric reflux in young infants is acidic. This suggest that the physiological symptoms of GOR in infants are becoming medicalized. Given that marketing of remedies aimed at 'acid reflux' are evident in the advertisements shown on UK television there is the potential that this trend will develop in the UK and increase over time. Subsequently this may lead to the medicalization of GOR and a greater demand and expectation for medicines to be prescribed for GOR in infants.

2.4 Medicalisation of Normality: A Conceptual Framework

The reason for the increase in prescribing of medicines to manage symptoms of GOR in young infants is not clear, however to try and understand the underpinning reasons for this change in practice, the concepts of medicalisation and diagnosis will be explored. Although other theoretical frameworks are relevant, it was felt that they do not resonate with the aim, objectives and subject matter of this study as well as that of 'medicalisation of normality'. For example, the focus of social constructionism concerns the influence of culture, social interactions and the experience of illness (Conrad and Barker, 2010). In this study, those experiencing the 'illness' (infants with symptoms of GOR) are unable to express or share that experience, instead it is the parent's interpretation and experience of caring for the infant that is explored. Whilst the influence of social interactions, culture and other socio-cultural factors on the experience of the illness are recognized, this study is concerned with what is

driving the shift from conservative to medicalised strategies in the management of GOR in infants. This, therefore, lends itself to concepts around 'the medicalisation of normality'. Furthermore, using 'medicalisation of normality' as a theoretical framework allows other concepts such as pharmaceuticalisation to be explored.

The concept of 'medicalisation of normality' is not new with early writing on the subject by Szasz dating back to the 1960's (Szasz, 1960, 2007). However, according to Conrad et al. (2010) and Clarke (2013), interest in the 'medicalisation of normality' has gained in momentum over the last thirty to forty years. The concept has been described in many different ways. For example, Kanieski (2010), describes medicalisation as the increasing use of medical terminology to explain a range of conditions and behaviours that individuals may exhibit, whilst Conrad (1992) considers it as the identification, and subsequent management, of common everyday ailments and concerns as medical illnesses or disorders. Medicalisation, therefore, could be argued to be the interpretation, diagnosis and treatment of natural human functions and ordinary bodily activities as medical problems requiring medicinal treatment. Reflecting on the possible medicalisation of GOR in infants, the lack of specificity and differentiation between the symptoms of GOR and GORD in clinical guidelines (Rosen et al.,2018; NICE, 2015) may have led to some infants with symptoms of physiological GOR being diagnosed with pathological GORD.

In exploring the concept further, Zola (1972) considered diagnosis, and assigning the labels of ‘health’ or ‘illness’ to symptoms, to be a critical feature of medicalisation in practice. The ability to diagnose or assign a label to a condition conveys a degree of power and control, however whilst recognising this elitism, Zola (1972) did not deem medical authority or supremacy to be a key determinant underpinning the notion of ‘medicalisation’. Instead, he considered the concept of illness to be defined and shaped by social and environmental factors that continually evolve and influence the daily life of individual people as well as the population at large. In other words, he believed ‘health’ and ‘illness’ to be influenced by wider social and environmental factors, such as air pollution or poverty, impacting on a person and their health and that diagnosis should not be limited to the presenting symptoms alone.

Focusing on diagnosis, Jutel (2011a), highlights the work of Friedson (1970), inferring that in practice, diagnosis is the ability to decipher various signs and symptoms presented by a patient to form clinical meaning that allows an illness, or label, to be assigned. From this clinical picture and diagnosis, medical interventions and treatments can then be planned and prescribed. Diagnosis, therefore, is viewed as a supreme skill as well as a very powerful classification tool within medicine (Jutel, 2009). Diagnosis confirms and legitimises ‘ill health’ and as a result can bestow certain privileges such as sick leave or access to services, and additional support (Jutel, 2011a, 2011b). Alternatively, confirmation of a diagnosis can have a negative impact. For example, some diagnoses, or labels, such as AIDS, chronic fatigue syndrome or Huntington’s Disease may be stigmatizing or affect insurance cover or job prospects for the

person. However, there are also instances whereby presenting symptoms cannot be classified or labeled within the available diagnostic frameworks. Such conditions, because there is no identified organic pathology, are considered to be medically unexplained and according to Jutel (2009) are often branded as psychogenic in origin. Some symptoms of GOR in infants, such as crying and irritability, are often unexplained. Furthermore, diagnostic criteria differentiating between symptoms of GOR and GORD in clinical guidelines (Rosen et al., 2018; NICE, 2015) are vague. Medically unexplained symptoms may result in misery and suffering for many people who, feeling unbelieved and being without a legitimate diagnosis, are deprived of appropriate treatment and access to resources and support (Nettleton, 2006). Diagnosis, therefore, not only legitimises illness and reinforces the individual's belief that they are ill, but it confirms greater knowledge, status and power on those diagnosing. This is generally undertaken by a physician or doctor.

The notion of a power imbalance between patient and doctor is supported by Cornwell (1984) who highlighted medicalisation to be concerned with an interaction or relationship between two groups with differing health beliefs. According to Cornwell (1984) lay people or patients generally have more traditional or intuitive health beliefs, whereas doctors are from the world of medicine and therefore embrace empiricism and scientific beliefs. Over time the traditional and intuitive health beliefs of lay people have become overshadowed by science and technology, leading to some conditions becoming medicalised (Cornwell, 1984).

Whilst agreeing that the concepts of diagnosis and medicalisation are inherently linked, Jutel (2009) emphasizes that they are also very different. Jutel (2009) argues that medicalisation incorporates much more than mere diagnosis. For example, entwined within medicalisation is the notion of pharmaceuticalisation (Williams et al., 2008). Pharmaceuticalisation refers to social, behavioural and bodily conditions, such as addiction, obesity and baldness in men, deemed as ailments or problems that require medical treatment (Abraham, 2010). Nevertheless, Jutel (2009) suggests that there is an iterative relationship between the concepts of medicalisation and diagnosis, in that diagnosis has a key role in medicalisation, whilst medicalisation has an influence on the sociology of diagnosis.

On reviewing the sociology of diagnosis in more depth, Brown et al. (2011) proposed the concept of 'social diagnosis' whereby the diagnosis of an illness encompasses more than the physical presentation and considers wider influences on health such as social, economic, and environmental factors. For example, damp housing may affect the health of a child with asthma. According to Brown et al. (2011) there is a link between the process of diagnosis and/or the illness itself, to political, economic, cultural and social factors. Furthermore, Brown et al. (2011) perceive a variety of social players to be involved in social diagnosis with the activities of one group of players affecting the actions of other players. Social actors could include medical professionals, researchers, government bodies, private organisations and so forth. In simple terms, social diagnosis involves consideration of social factors, or determinants of health when formulating a diagnosis, as well as consideration of the influence of social

players, other disciplines and professional groups, such as policy makers, employers, and health and social care professionals (Brown et al., 2011).

Reflecting on the situation in Scotland, it is plausible that the process of diagnosing and managing GOR in infants has become medicalised. Traditional beliefs regarding childrearing are argued by Apple (1995) to have been eroded over time. Apple (1995) refers to this phenomenon as the move towards 'scientific motherhood' and describes the emergence of scientific motherhood in the United States and the dichotomy faced by women who, as mothers, were responsible for the health and wellbeing of their family but encouraged to rely on medical advice rather than their own maternal intuition. According to Apple (1995) the ideology of scientific motherhood denied mothers control over the upbringing of their children by favouring scientific and medical advice from doctors over maternal instinct. Over time, therefore, the medical profession clearly had power and authority to exert social control and to determine boundaries of what is, and what is not, accepted as being normal.

2.4.1 Changing Focus of Health Care with Examples of 'Medicalisation'

The focus of health care has changed over time, for example, Clarke (2010) highlights how attitudes to death and dying have changed over the years. According to Clarke (2010), traditionally death and dying was seen as a rite of passage that had great social significance for the individual and their family. For example, up until the twentieth century most people died at home cared for and surrounded by family and friends. Death, therefore, was a natural event presided over by priests or other religious leaders of the time. In contrast the

twentieth century was a time of change. According to Howarth (2007), the increasing interest and advances in medical science led to religious leaders gradually being replaced at the bedside by physicians who had more control over pain and could offer greater physical comfort to the patient. Death, a natural phenomenon, became medicalised. Nevertheless, it is interesting to note that by the mid twentieth century the notion of respect and dignity in the lead up to death, and indeed in the process of dying, gained momentum with the development of the hospice movement (Clarke, 2010). This was in contrast to the cold and stark approach to caring for dying patients in hospitals that epitomized the medical approach to death. According to Clarke (2010), attitudes to death and dying were evolving and changing from the influence and dominance of theology, then medicine, to being more individual and person-centred and taking account of the psychological needs of the dying person. More recently, however, it could be argued that the medicalisation of death is again coming to the fore with growing interest in assisted suicide and euthanasia (Hains & Hulbert-Williams, 2013; Shekhar and Goel, 2012).

Another natural life event that has become increasingly dominated by the medical profession is childbirth (Christiaens et al., 2013; Clarke, 2010; Johanson et al., 2002). Whilst Christiaens et al. (2013) laud the contribution of medical interventions to safeguard women and their infants when complications and pathological problems during pregnancy and labour arise, they also highlight that unnecessary obstetrical intervention in otherwise healthy pregnant women can lead to increased risks that may jeopardize the health of both the mother and baby. Nevertheless, medical intervention in pregnancy and

childbirth has increased over the years. According to Clarke (2010) childbirth has become firmly rooted in the medical domain and become an intensely technical matter. Johanson et al. (2002), highlight that the increase in medical involvement in childbirth has led to an increase in caesarean sections with Walsh (2006) indicating that globally 20% of infants are delivered by caesarean section. More recent data from ISD Scotland (2018) indicates that caesarean section rates in Scotland have risen from 9% in 1976, to 32% in 2018. Whilst most caesarian sections are performed for clinical reasons, ISD Scotland (2018) acknowledge that in some instances there is no clinical indication for the procedure and the reason for the caesarean section is due to the preference and choice of the woman. This suggests changing attitudes and expectations of childbirth.

Traditionally the Netherlands was a country where natural child birth dominated and medical intervention was resisted, however Johanson et al. (2002), and Christiaens et al. (2013), both highlight the increasing trend and movement towards medical interventions such as induction and augmentation of labour. In some instances, this may be desired by women who find the pain, inconvenience, and unpredictability of labour and childbirth to be incongruent with their plans, schedules and lifestyle (Christiaens et al., 2013). This is in contrast to the earlier work of Oakley (1979; 1980) that found that women did not feel in control of their labour due to medical dominance and wanted a more natural birth and greater autonomy and empowerment over the decisions regarding their pregnancy and birth. From this it could be conferred that attitudes to childbirth and medical intervention are changing, and that in some

quarters medicalisation of childbirth has been welcomed with parents knowing the sex of their unborn baby as well as being involved in decisions regarding the proposed date of induction of labour, or indeed caesarean section. This suggests that the medicalisation of childbirth, rather than being abhorred, has been embraced by some women and permitted them to have some influence over the date of induction of labour or mode of delivery. Some women, therefore, may perceive that they have some control over their delivery and childbirth.

As discussed by Szasz (2007) in the context of psychiatry, assessment and decisions regarding childbirth, could be argued to have become more subjective and linked to what society now accepts as being normal. For example, compared to previous generations, few women in the UK opt for a home birth (McLaren, 2015) and it has become normal for births to take place in a hospital setting. However, this trend may be at a turning point as according to NICE (2014), for women with low risk of complications, giving birth at home is safe and associated with less medical intervention compared to giving birth in hospital. Regarding symptoms of GOR in infants, it is possible that societal norms are also changing with parents viewing what was previously seen as common baby behaviours such as regurgitation, crying and unsettledness as requiring medical treatment.

Power to determine the boundaries of what is, and is not, accepted as being normal may influence the process of diagnosis. For example, Szasz (2007) (focusing on psychiatry) proposes that the process of diagnosing mental ill-health is very different from that of physical illness. Szasz (2007) argues that

the medical diagnosis of physical illness is objective and often based on measurable changes in bodily functions and physical state (eg Blood Pressure, temperature, urinary output, blood tests etc.), whereas the diagnosis of mental illness is more subjective. In making a diagnosis in the field of mental health, psychiatrists assess and judge a person's behaviour in light of their own perception of reality and on what society currently accepts as normal behaviour (Szasz, 2007). Psychiatrists, therefore, have tremendous power and ability to exert social control, particularly when making a diagnosis. According to Szasz (2007), diagnoses in psychiatry that are not diseases include kleptomania (shoplifting and stealing), pyromania (setting fires) and compulsive gambling (Szasz, 2007). For example, Lenz and MagShamhráin (2012) highlight that kleptomania came to the fore at the start of the twentieth century when department stores were first introduced. Department stores provided a socially acceptable venue for middle and upper class women to wander safely and to meet other like-minded women. The employment of women to work in such stores also gave women a new sense of independence and freedom. Consequently, this new freedom for women was not welcomed by all in society and therefore, according to Lenz and MagShamhráin (2012), had to be repressed. To this end, Lenz and MagShamhráin (2012) highlight that the medical profession, that is physicians and psychiatrists, pulled rank to create the new illness of kleptomania, or shoplifting, and according to Lenz and MagShamhráin (2012) this aimed to thwart the freedom of middle and upper class women. This supports the view of Szasz (2007), that the medical profession, including psychiatrists were developing a higher authority and rise

in status that gave them great power to exert social control by means of creating a medical diagnosis.

The concept of social control is interesting. For example, myalgic encephalomyelitis and chronic fatigue syndrome are conditions that could be argued to be influenced by social control. Although recognised as illnesses by the US Centers for Disease Control and Prevention (2017), the cause of illness remains unclear and, to date, no specific diagnostic tests are available (CDC 2017; NHS Inform, 2019). Diagnosis, therefore, is subjective and under the control of the physician. Furthermore, in previous years, the media influenced public perception of the condition by branding it as ‘yuppie flu’ and implying the symptoms are psychosomatic and the sufferers weak-willed or work-shy (Siegel et al., 2018; Tuller, 2007). The lack of a legitimate diagnosis denied sufferers of myalgic encephalomyelitis treatment and support (Jutel, 2011; Nettleton, 2006). Diagnosis of GOR and GORD in infants may also be influenced by changing social attitudes. According to Rosen et al. (2018), there is no single diagnostic test for GOR or GORD in infants. Diagnosis appears to be intuitive and as highlighted by Szasz (2007) may be based on what society considers as normal baby behaviours, or on health professionals’ perception of reality.

Alternatively, some behaviours considered deviant and labelled as mental illnesses in years gone by are now accepted as normal. McColl (1994) and Conrad et al. (2010) highlight the case of homosexuality that was considered a disease and homosexual people mentally ill or disturbed. However, over the years, attitudes and perceptions have changed and society has become more

open-minded, sympathetic and accepting of homosexuality. Furthermore, Szasz (2007) highlights how, after much protest by gay groups, homosexuality was demedicalised in 1967 with gay people no longer being branded as mentally ill. This supports the concept of 'social diagnosis', presented by Brown et al. (2011), in that social and cultural factors as well as action from social players, such as gay and homosexual support groups, have instigated this change of view and diagnosis of homosexuality as an illness. Szasz (2007), therefore, suggests that in contrast to the notion of 'medicalisation', in some cases such behaviours have become demedicalised and accepted as normal.

2.4.2 Pharmaceuticalisation

Interestingly Bell and Figert (2012) and Williams et al. (2011) highlight a growing interest in the role and dominance of the pharmaceutical industry on 'medicalisation' and how the use of medicines has increased dramatically over the last 20 - 30 years. The concept of 'pharmaceuticalisation' as an element of medicalisation has gained much attention (Williams et al., 2008). In contrast to 'medicalisation', 'pharmaceuticalisation' is the perception that some normal physical conditions and human characteristics and capabilities are opportunities for pharmaceutical intervention and capitalisation (Williams et al., 2008).

Unlike the definition of medicalisation given by Conrad (1992), that focused on identifying, and treating everyday ailments as medical conditions, pharmaceuticalisation has its focus on finding potential conditions that are normal and disease free, such as baldness in men (Harvey, 2013), and marketing them as problems requiring pharmaceutical treatment. In other

words, pharmaceutical companies being commercial enterprises utilise innovative and ingenuous marketing strategies to bolster their sales and subsequent profits (Busfield, 2010).

In exploring the concepts of medicalisation and pharmaceuticalisation further, Harvey (2013), Bell and Figert (2012), and Williams et al. (2008, 2011) highlight concerns that medicalisation and pharmaceuticalisation have become akin to disease mongering. The notion of disease mongering being that it is ‘diseases’ and ‘illnesses’ that are being marketed and sold to the public rather than drugs. The underpinning psychology appears to be that once the seed has been planted and an individual believes that he or she has a recognised ‘illness’ or condition for which a treatment happens to be available, he or she will either buy the product from a pharmacy or seek a prescription from their general practitioner. Selling the ‘illness’ or condition, therefore, sells the pharmaceutical product. Moreover, Fox and Ward (2008) discuss ‘lifestyle drugs’ and describe a group of pharmaceutical products that are linked to lifestyle choices giving the examples of nicotine replacement therapy for smokers, and weight reducing drugs for the obese. Medicalisation, pharmaceuticalisation, disease mongering and life style drugs could be argued to be firmly rooted and established within modern life. For example, the rising demand, or market, for cosmetic surgery and aesthetic procedures suggests that increasingly people are dissatisfied with their appearance, and desire to look beautiful. Indeed, beauty parlors, cosmetic products and aesthetic procedures such as the use of botulinum toxin type A, or Botox, to reduce the appearance of facial wrinkles has become more

commonplace, and more accessible. (Edmonds, 2013; Berer, 2010; Friedman, 2004).

Whilst direct to consumer advertising by pharmaceutical companies has been established in several countries such as the United States and New Zealand for quite some time, it is a relatively new concept in the UK (Hassell, 2012; Medicines and Healthcare Products Regulatory Agency (MHRA), 2014; Abraham, 2009). According to the MHRA (2014), in the UK pharmaceutical companies are only permitted to advertise 'over the counter drugs', that is pharmaceutical products that do not require a medical prescription and can be bought from pharmacies. The form of permitted advertising is quite diverse and includes the use of the media, television, newspapers, magazines and the internet as well as medical journals (MHRA, 2014). The media, particularly the television and internet, however, are easily accessible and very powerful advertising mediums (Fox and Ward, 2008). Whilst it is recognised that the media can both promote and disparage pharmaceutical companies and their products (Williams et al., 2008), Hassell (2012) argues that advertising can also strongly influence beliefs about health and ill-health and the need for pharmaceutical intervention. In discussing the issue of gastro-oesophageal reflux in infants Hassell (2012) highlighted how subtle advertising aimed at adults in the United States changed perceptions of reflux by creating the new condition of 'acid reflux'. In marketing this new 'illness' as suggested by Busfield (2010) there was a perceived need to seek medicine to neutralise the acid (Hassell, 2012). Common usage of the term by adults then lends itself to be used to describe normal reflux or regurgitation in infants thereby reinforcing the

notion of medicalisation and pharmaceuticalisation by reinventing the disease or condition, only this time involving the younger age group.

2.4.3 Knowledge Acquisition

The rise in the use of the internet to access and acquire health related information (Dumit, 2012; McMullen, 2006; Wald et al., 2007) may have aided pharmaceuticalisation and influenced the doctor-patient relationship. For example, McMullen (2006) and Wald et al. (2007) report the increasing use of the internet to have impacted on the role of the patient during a consultation, and the doctor-patient relationship. They believe the power balance to be shifting with patients becoming active consumers of health information rather than passive participants (McMullen, 2006; Wald et al., 2007). This supports the recommendations of the Scottish Government (2018), Da Silva (2012), and Waneless (2002) who believe that shared decision making between health professionals and patients / clients can improve patient satisfaction and concordance with any prescribed treatment. Alternatively, Anderson (2004) considers the evolving 'active consumer' role to be due to factors such as patients being frustrated or unhappy with the service and information provided by doctors, and their unrealistic expectations of health care provision as a result of the continual advancement of medicine. In some instances, Anderson (2004) indicates that patients believe that internet sources can actually provide better health related information. Furthermore, Hassell (2012) highlights that in the United States pharmaceutical companies can promote and advertise their products direct to the consumer, however by advertising on the internet and world wide web the reach of pharmaceutical companies is infinite. Subtle, and

not so subtle, advertising on the internet by pharmaceutical companies may influence consumers perceptions of health and treatment strategies and this may be a factor influencing the medicalisation of GOR and the increasing use of medicines to manage GOR in infants.

Wald et al. (2007), however, explored the patient-doctor relationship in light of the increased internet use and proposed a tri-partite model consisting of the patient, the internet and the doctor. In this consumer-focused model, Wald et al. (2007) indicate that information gleaned from the internet can be used to supplement the information provided by the doctor, and also facilitate informed decision-making by patients. In turn this is thought to promote concordance with any prescribed treatment (Wald et al., 2007). Britten (2008) views this positively as patients, or 'informed consumers', seeking to enter a partnership with the health professional regarding their diagnosis and subsequent management. Nevertheless, whilst an informed patient or 'consumer' can be advantageous in diagnosing and managing presenting symptoms and illnesses, it can also pose a challenge to the authority and power balance of the medical profession. This is particularly the case if the health information acquired is of poor quality or misleading (Britten, 2008). Consequently, direct to consumer advertising by pharmaceutical companies, especially in countries such as the United States, may have a key role in both informing and misleading consumers, and in shifting the balance of power between patient and doctor (Arney and Merjivar, 2014; Britten, 2008). However, it is not only pharmaceutical companies that can influence consumers, but also the increasing use of the internet, and the growing number of social media sites and self-help groups (Prasad 2013). For

example, the seeds of pharmaceuticalisation could be argued to be sown in websites such as ‘Healthline’, ‘Baby Centre’ and ‘Netmums’ as they all refer to regurgitation in infants as ‘acid’ reflux, suggesting that medicine is needed to neutralise the ‘acid’ reflux. Furthermore, ‘Netmums’ indicates that treatment with domperidone, omeprazole and/or ranitidine may be required. This suggests that multiple players (Brown et al., 2011) operate independently and together and are continually evolving, developing and influencing each other in the process. These social players can also influence the knowledge up-take of active consumers in pursuit of information about their health. Social and cultural changes have resulted in the internet being used more widely and by more people (Eckler et al., 2010). Furthermore, the internet permeates peoples personal and home life and can act as a conduit or channel for a multitude of players to provide health information and to engage in discussion forums and chat rooms. The internet, therefore, has a notable and powerful role in influencing people’s knowledge and understanding of health-related issues including GOR in infants.

In reviewing the literature, it would appear that regurgitation in infants, a common everyday ailment, has been given a medical label and diagnosis, and therefore the condition medicalised. However, many factors could have influenced this change. The perceived authority of ‘medicine’ in exerting social control particularly over women is clear, especially in regard to ‘scientific motherhood’ and the creation of the diagnosis of kleptomania early in the twentieth century. It is also evident in pregnancy and childbirth, a natural phenomenon that has become a highly technical affair and therefore

medicalised. However there also seems to be a change in attitude, with modern women embracing, rather than thwarting medical intervention. With this change in attitude comes a change in the power balance with some women requesting medical intervention, such as caesarean section, in the delivery of their baby as a lifestyle choice rather than a medical need (ISD Scotland, 2018a). Indeed, lifestyle and the use of drugs to address lifestyle needs, is very important to some women as highlighted by Fox and Ward (2008) who indicated that some women have sought a prescription for contraceptive medication to disrupt or postpone menstruation prior to going on holiday or attending an important function or event. The term 'medicalisation' therefore is associated with both positive and negative connotations. However, as suggested by Brown et al. (2011), there are also many social, cultural, economic and political forces and social players to be considered. For example, pharmaceuticalisation, disease mongering and direct to consumer advertising also influence the knowledge up-take by lay people as well as their attitudes and perceptions of health and their expectations of health care and this may be happening regarding the situation of GOR in infants. The use of internet and social media to source health related information is growing and permeates practically every aspect of everyday life via computers, tablets, and smart phones (Prasad, 2013). The internet and social media therefore are very powerful forces that can also impact on the patient-doctor relationship. Whilst information from the internet can be harnessed by health professionals to strengthen their position, authority and power with regard to health care, it can also weaken or shift this balance of power from the health professional to the patient / client.

2.4.4 Professional Decision Making

Given the increasing use of the internet to gain medical knowledge and the changing power balance between doctors and patients, how decisions are made in health care also merits some consideration and discussion. Thomson and Dowding (2002) identify three categories of decision-making: Normative approaches which are concerned with the impact of, and the quality and worth of decisions made. Normative decisions are founded on scientific and mathematical evidence and generally considered rational and logical. However, evidence regarding gastro-oesophageal reflux and pharmaceutical management in infants identified earlier in this chapter is weak. Alternatively, prescriptive approaches aim to enhance decisions and facilitate effective decision-making. Protocols, guidelines and algorithms are common tools used to support prescriptive decision-making in practice. Although international, national and local protocols and guidelines are available to guide decision making regarding the diagnosis and management of GOR in infants (Rosen et al, 2018; NICE, 2015; NHS Grampian, 2012) international studies (Manasfi et al., 2017; Quitadamo et al., 2015; Quitadamo et al., 2014) found that such guidelines were not always followed. This may be the same in Scotland, therefore the use of guidelines by health professionals in Scotland needs to be explored further. Finally, descriptive approaches are concerned with judgmental and decision-making processes that inform how decisions are made, for example the use of intuition or tacit knowledge (Standing, 2010; Thomson and Dowding, 2002). Limited use of clinical guidelines by health professionals (Quitadamo et al.,2014: 2015; Manasfi et al., 2017), combined with the lack of specificity in the criteria guiding the diagnosis of GOR and GORD within clinical

guidelines (NICE, 2015; Rosen et al., 2018) and the weak evidence supporting the use of medicines to manage symptoms of GOR, may have influenced decision-making regarding the diagnosis and management of GOR in infants. It may be that such decisions are based on tacit knowledge and subjectivity, however this requires further exploration to identify what influences health professionals' decision-making in the diagnosis and management of GOR in infants. Nevertheless, all three approaches aim to be evidence based and, therefore, are relevant in primary care and informing decision-making in daily practice.

Evidence based practice is important in health care and refers to the diligent use of the best evidence obtainable to inform clinical practice and decisions about patient / client care (Sackett et al., 1996). The process of decision making is complex and multifactorial, however according to Flemming and Fenton (2002), the four key influences on evidence informed decision-making concern the clinical experience of the practitioner, the research evidence, patient/ client preferences, and the availability of resources. These concepts are all very pertinent to decision making in this instance. For example, much research evidence regarding the management of GOR in infants is weak, and although resources such as NICE (2015) guidelines are available, Orenstein (2010) considers diagnosis guidance within such guidelines to lack clarity and be open to interpretation. Furthermore, the increasing use of the internet and social media (McMullen, 2006; Wald et al., 2007) may influence social diagnosis and parent preferences regarding their infant and symptoms of GOR. As a consequence, the clinical experience of the practitioner may have a crucial

influence on the decisions made regarding the diagnosis and management of GOR in infants.

In addition, McKay et al. (2016) discussed the impact of human factors on health professional's decision making and clinical practice. Human factors that may impact on practitioners' clinical practice and decision making in primary care include work related stress such as high workload, time pressures, interruptions and distractions, physical and emotional demands, and fatigue (Mackay et al., 2016). Numerous factors, therefore may influence health visitors and general practitioner's decision-making in practice.

2.5 Strengths and Limitations

At the time of undertaking this doctoral research there was no requirement to undertake a systematic review approach to the literature review. It is acknowledged that by not following accepted systematic literature review processes and using recognised MeSH headings and search procedures, there is the potential that important literature may have been omitted. Nevertheless, using what were deemed to be the most appropriate data bases and search engines for this field of enquiry, the literature was searched using key terms, synonyms and Boolean operators. In addition to the initial search, the literature was searched regularly throughout the duration of the study and immediately prior to the thesis being submitted to Lancaster University. Therefore, it is believed that at the time of submission, key literature and research relevant to GOR in infants aged 0-1 year was included in this literature review. Following systematic literature review processes and using MeSH terms in future

literature reviews would not only be more robust but more expedient and efficient.

2.6 Conclusion

This literature review has raised some interesting points about the diagnosis and management of GOR in infants and the possibility that physiological GOR in infants has become medicalised. For example, evidence of the efficacy of the key drugs (Gaviscon, domperidone, omeprazole and ranitidine) used in the UK for the management of GOR infants is weak (Tighe et al., 2014). Furthermore, omeprazole (PPI) and ranitidine (H2RA) are not licensed for use in children under 1 year of age (BNFC, 2019). This means these medicines have not been rigorously tested for safety and effectiveness in this age group (Medicines and Healthcare Products Regulatory Agency, 2014). Yet evidence from Belgian (De Bruyne et al., 2014), the US (Hassell, 2012; Barron et al., 2007), New Zealand (Blank and Parkin, 2017) and Australia (Bell et al., 2018) suggest that these medicines are increasingly being used in the management of symptoms of GOR. Evidence regarding the use of these medicines to manage symptoms of GOR in young infants in Scotland, and in the UK, is lacking, therefore this warrants further investigation. This study aims to establish patterns of prescribing regarding the use of these medicines in the 0-1-year age group in Scotland. Why there is an increase in the use of PPI and H2RA medicines to manage symptoms of GOR as identified by Bell et al. (2018), Blank and Parkin (2017), De Bruyne et al. (2014), and Barron et al. (2007) is unclear and suggests a gap in knowledge. However, management and prescribing decisions may be linked to diagnostic decisions as evidence from this literature

review highlighted that the criteria to aid the diagnosis of GOR is vague and that investigative tests may be unreliable (NICE, 2015; Rosen et al., 2018). This suggests that decision-making regarding the diagnosis of GOR may be subjective and based on tacit knowledge rather than empirical evidence. This is interesting as Zola (1972) believed 'diagnosis' to be a key element of 'medicalisation'. This merits further investigation to explore how decisions are made regarding the diagnosis and management of GOR in infants and what influences those decisions. An element of medicalisation highlighted in the literature review that is also of interest is pharmaceuticalisation. Hassell (2012) alludes to subtle advertising by pharmaceutical companies in the US that raises the profile of 'acid' reflux and the need for acid suppressant medicines thereby strengthening the concept of pharmaceuticalisation and medicalisation. This is worth investigating in the UK, as Dumit (2012), McMullen (2006), and Wald et al. (2007) highlight that the internet is increasingly being used to access information about health, therefore, this may be a factor influencing diagnostic and management decisions regarding GOR in infants. Evidence in the literature review also highlighted that the focus of health care is constantly changing and evolving, again this is worth exploring in relation to GOR in infants as changing attitudes may influence parental expectations of parenthood as well as decision-making regarding the diagnosis and management of GOR in infants by health professionals.

In concluding, medicalisation of normality is a useful framework to help understand the issues raised in this literature review. It also resonates well with

the two-stage research design and pragmatic approach to this study that is discussed in chapter 3.

CHAPTER 3: RESEARCH METHODS

3.0 Introduction

Evidence from the previous chapter suggests that prescribing of medicines for the management of GOR in infants is increasing in the US (Hassell, 2012; Barron et al., 2007), Belgium (De Bruyne et al., 2014) and Australia (Bell et al., 2018). However, although it is assumed that prescribing of medicines to manage symptoms of GOR is rising in Scotland and the UK, currently there is very little evidence to validate this assumption. As the previous chapters have illustrated, the existing evidence base (Bell et al.,2018; De Bruyne, 2014; Tighe et al., 2014) highlights a rise in prescribing but also the lack of evidence around efficacy of medicines to manage GOR. This raises an important question about why prescribing rates continue to rise. Theoretically, commentators (Harvey, 2013; Jutel, 2011a; Williams et al., 2008; Apple, 1995) have suggested, that as medical treatments become available, symptoms previously dealt with through non-medical interventions become medicalised. In order to explore how these issues are being played out in the Scottish setting, it was decided to develop a two-stage research study. Stage one aimed to explore patterns of prescribing of alginate, domperidone, omeprazole and ranitidine in Scotland over time, whilst the aim of stage two was to explore factors influencing and underpinning how health professionals and parents perceive and manage symptoms of GOR in infants aged 0-1 year.

This chapter will discuss the research design and research methods used in this study. The rationale for the two-stage design, and the epistemological and

philosophical assumptions that underpin the study will also be discussed. Thereafter, the chosen two-stage research design, the research methods used, including their validity and trustworthiness, will be examined. Finally, the positionality of the researcher and the ethical considerations for the study will be reviewed.

3.1 Two Stage Research Design

The decision to use a two-stage research approach was pragmatic and chosen in a bid to effectively address the research objectives as one method alone would not have been sufficient. In this instance, anecdotal evidence suggested that the prescribing of medicines to manage GOR in infants in Scotland had increased over time, but at the outset of the study the evidence to support this was not yet known, therefore a quantitative research strategy was required in stage one to interrogate the data in order to support or refute this assumption. The quantitative data on its own, however, provided limited information, therefore to gain a more in-depth understanding of the situation and explore reasons for the potential increase in prescribing, qualitative research techniques were used in stage two.

The underpinning epistemological assumption of the two-stage methods research is pragmatism (Adamson, 2005; Robson, 2011) which focuses on the problem to be researched and the consequences of the research, rather than the philosophical and epistemological assumptions and constraints (Feilzer, 2010). In this study, stage one and stage two are two independent studies, therefore a two-stage study research design is appropriate.

Stage one took a quantitative approach, therefore the epistemological position is that of positivism. Positivism favours an empirical approach to research that focuses on cause and effect relationships, and deduction or the testing of theories (Doyle et al 2009). A quantitative approach was appropriate as the purpose of stage one of the study was to identify patterns of prescribing of medicines in the management of GOR in infants aged 0-1 year in Scotland. From an ontological perspective the orientation of quantitative research is that of objectivism in that objective reality exists independently of the influence of the researcher (Sale et al, 2002). The concept of objectivity is relevant to stage one of this study as secondary numerical data were obtained from routine survey data gathered on a national level by ISD Scotland. Although I was not directly involved in the collection of the original data, I conducted the secondary analysis of these datasets. The chosen research method and quantitative approach was appropriate for stage one of this study, as a large and robust set of factual and numerical data from ISD Scotland was used to describe the pattern of prescribing behaviours across Scotland, observe changes over time and address the research aim and objective of stage 1.

In stage two of the study a qualitative research approach was chosen. The epistemological underpinning of the qualitative paradigm is founded on interpretivism and constructivism that is characterised by a focus on subjectivity and a quest for deeper meaning and understanding (Bryman, 2008; Sale et al, 2002). The qualitative paradigm believes that the construction of reality is based on numerous truths or realities that are constantly changing (Sale et al, 2002; Bryman, 2008; Doyle et al., 2009). In other words, there are many internal

and/or external influences that can have an impact on the findings of qualitative studies, or in this instance the perceptions of GOR in infants and the impact on family life. Therefore, a key goal of stage two of the study was to capture the real-life experience, thoughts, perceptions and feelings of health visitors, general practitioners and parents when confronted with an infant suffering from symptoms of GOR. The researcher, therefore, and the participants (health visitors, general practitioners and parents) are generally inextricably linked, mutually interactive, and not separate entities as in the quantitative paradigm (Sale et al. 2002).

3.2 Stage 1: Quantitative Research Method

The study undertook secondary analysis of prescribing data collected over a seven-year period from 2010 – 2016 (inclusive) for all 14 territorial NHS boards in Scotland. The data for the four key medicines (alginate/ Gaviscon, domperidone, omeprazole and ranitidine) prescribed and dispensed to the 0-1-year age group was provided by the Information Services Division of NHS Scotland (ISD Scotland, 2012). In Scotland all NHS patients have a unique Community Health Indicator (CHI) number that is indicated on all prescriptions (ISD Scotland). This enables ISD Scotland to identify patients and the drug dispensed to them (ISD Scotland). The number of items or prescriptions dispensed includes only those with a valid CHI number and details of the CHI completeness for paid items is included in the data. In this study, the patient count refers to the number of infants aged 0-1-year prescribed a specific medicine within one financial year. Therefore, using CHI data infants are counted only once for the drug prescribed per year. In instances where infants

are prescribed two drugs within the year, their CHI number will be recorded once in both drug classes within that year. ISD Scotland also provided mid-year population estimates from the National Records of Scotland for children aged 0-1 year for the whole of Scotland and across NHS Board areas.

The use of this secondary data was considered appropriate for the purpose of stage one as ISD Scotland routinely gather data on prescribing practices across all NHS Boards in Scotland and were able to provide national data on prescribing that included the geographical distribution and pattern of prescribing practices, as well as variation over time. Without these data, the aim and objective of stage one of the study would not have been adequately addressed as the literature search found no studies concerned with prescribing for GOR in infants aged 0-1 year in the UK. National data sources such as ISD Scotland are considered invaluable on several counts (Alvarez et al., 2012). Firstly, ISD Scotland has routinely gathered prescribing data for many years and data relevant to this study was available from 2010, therefore it was possible to observe change over time adding strength to the study. Secondly, this wider dataset provided a larger and more robust database through which to describe the situation across Scotland (Windle, 2010). Consideration was given to other quantitative research designs. For example, an experimental design was considered inappropriate as the intention of the study was to determine if the use of medicines to manage symptoms of GOR in infants had increased, it was not to test the efficacy or compare effectiveness of medicines in managing symptoms. Reviewing medical records from a sample of general practices was also deliberated, however in addition to this being a lengthy and time-

consuming process it would only have provided a snapshot view of prescribing of medicines to manage symptoms of GOR in infants at one point in time. It would not have shown change in prescribing practice over time. It is also possible that the sample selected would have reflected local prescribing preferences and not have been representative of the general population. Furthermore, as the medical records would not be anonymised this would have required further ethical consideration and approval. Secondary data analysis in this instance, was not only convenient but was more effective and efficient in addressing the aim and objective of stage one. In this study the prescribing rate refers to the number of prescriptions dispensed and paid for per 100 head of population (infants aged 0-1 year). Prescriptions that have been dispensed and paid for provide accurate data (based on written prescriptions only) as not all prescriptions written by practitioners are taken by patients to the pharmacy for dispensing.

The prescribing data, however, does have some limitations which need to be acknowledged. For example, the data does not provide insight into the reason why the drugs were being prescribed. Currently such detailed information is not available. Therefore, although it is highly likely that the drugs were prescribed for managing symptoms of GOR in infants not all prescriptions are written for this purpose. For example, omeprazole may be prescribed as part of the regime in the eradication of helicobacter pylori in children, in the treatment of Zollinger-Ellis syndrome, and fat malabsorption (BNFC, 2019), whilst both omeprazole and ranitidine may be used in the treatment of acid related conditions such as gastric or duodenal ulceration (BNFC, 2019). It should also be noted that

domperidone (motility stimulant) is not recommended in the management of GOR, and that neither omeprazole (PPI), or ranitidine (H2-receptor antagonist) are licensed for use in children in the 0-12-month age group in the UK (BNFC, 2019). However, despite these limitations, the ISD Scotland data does provide an important indication of changes in prescribing levels for infants aged under 12 months in Scotland.

3.2.1 Ethical Approval

The protocol for this study was submitted to Lancaster University Ethics Committee and to the Integrated Research Application System (IRAS) and approval gained prior to receiving data (Appendix 9 - FHMREC:23/05/2014; NHS Lothian: 23/20/2014; Grampian: 07/01/2015). The data provided by ISD Scotland was completely anonymous and no individual patient or child health records were identified or involved.

3.2.2 Quantitative Data Analysis

The data analysis plan is presented in table 3.01. Overall the data set included a total of 404757 prescriptions for alginate, domperidone, omeprazole and ranitidine prescribed to 0-1year old infants across all 14 NHS boards between the years 2010 and 2016. The software tool Minitab 16 was used to manage the data provided by ISD Scotland.

Stage one of this study aimed to determine patterns of prescribing for GOR in infants to see if there had been an increase in prescribing of the key medicines used to manage GOR as was assumed at the outset, therefore descriptive

statistics were deemed sufficient to illustrate this and to show key features of the data set (Robson, 2011). Descriptive statistics are essentially concerned with frequencies, averages, and variability (Robson, 2011). Time series plots were used to provide a graphical depiction of the connection or relationship between variables. It also allowed comparisons between the prescribing rates of the four drugs at a national level to be illustrated, as well as comparisons of the prescribing rate of each drug between the 14 NHS boards over the study period (Montgomery et al, 2015).

Regression analysis using the 'least squares' method was used to identify the 'line of best fit' on the time series plots and determine values for the gradient or slope of the line, and the intercept. The intercept being the point where the slope crosses the y axis. (Scott and Mazhindu, 2005/2011). Regression analysis measures changes in the 'y' variable as a result of the 'x' variable and, therefore, was used to identify trends in prescribing and to predict the likely increase in the prescribing of each medicine over time (Robson, 2011; Dancey and Reidy, 2014).

To establish the accuracy and degree of precision of the data, confidence intervals were calculated. These provide an upper and lower limit within which the researcher could be 95% confident that this is where the true prescribing rate lies (Gerrish and Lacey, 2006; O'Rourke, 2009). The narrower, or tighter the confidence interval, the less the margin of error and the greater the precision of the finding (Tilling et al., 2009)

Table 3.01: Data Analysis Plan

Research question	Is prescribing of medicines to manage symptoms of GOR in infants increasing in Scotland?
Dataset to be used	• National prescribing data from the Information Services Division of NHS National Services Scotland. • The dataset involves prescribing data in the 0-1-year age group in Scotland between the years 2010 – 2016 for the following medicines: - Alginate (Gaviscon), - Domperidone (motility stimulant), - Omeprazole (proton pump inhibitor), - Ranitidine (H2-receptor antagonist)
Inclusion/ exclusion criteria	**Inclusion criteria** • Items prescribed and dispensed in Scotland • Items where a valid Community Health Indicator number (CHI) is captured • Items prescribed to infants age 0-1year • Medicines: alginate (Gaviscon), domperidone (motility stimulant), omeprazole (proton pump inhibitor) and ranitidine (H2-receptor antagonist) **Exclusion criteria** • Items with invalid or incomplete CHI • Infants older than 1 year of age • Medicines other than alginate (Gaviscon), domperidone (motility stimulant), omeprazole (proton pump inhibitor) and ranitidine (H2-receptor antagonist)
Missing data	ISD Scotland is a recognised producer of Official Statistics in Scotland and adheres to the Code of Practice for Official Statistics (UK Statistics Authority, 2018), that defines the principles and practises required to produce high quality and trustworthy statistics, therefore the national prescribing data provided by ISD Scotland is the most accurate and robust data available. Therefore, the data provided is deemed to be complete.
Variables to be used in the analysis	**Exposure variables:** - Alginate (Gaviscon), - Domperidone (motility stimulant), - Omeprazole (proton pump inhibitor), - Ranitidine (H2-receptor antagonist) **Outcome variables:** • Prescribing rate **Stratifying variables:** • NHS Scotland • NHS Territorial Boards in Scotland (14 Boards)
Statistical Methods	**Trend Analysis** • Time series plots are used to illustrate changes in prescribing rates over time • 'Least squares' regression analysis is to be used to: o Identify the 'line of best fit' for the regression of prescribing rate against time (*year*), (*with year = 0 ≡ 2009, year = 2 ≡ 2010, etc*) o Model the linear trend in the prescribing rate over time, in particular, the coefficient of *year* (the gradient in the fitted regression equation) to quantify the average annual change in the prescribing rate over the study period. • The coefficient of determination R^2 ($0 \leq R^2 \leq 1$), is calculated for each plot. This statistic provides a measure of how well the straight line fits the data and is interpreted as the proportion of variation in the prescribing rate that is accounted for by the variation in year. **Confidence Intervals:** • While the rates obtained are population figures, they are still subject to random fluctuation. Hence, 95% confidence intervals are used to indicated the precision with which the underlying 'true' rates are measured (95% of intervals calculated will obtain the 'true' rate). However, such intervals are considered to be unreliable when the number of events (patients) is less than about 20 (Buescher, 1997; 2008) **Ranking** of NHS Board prescribing of each drug within each year (rank = 1 ≡ highest rate, etc.) and average rank over the full study period.
Supporting software	MiniTab 16
Key tables and/or figures	• Time series plots • Time series plots with 'line of best fit' • Patient count table • Prescribing rate in Scotland and confidence intervals for each drug • Ranking tables of prescribing of each drug in each NHS Board.

The findings from stage one revealed areas where prescribing of specific medicines used in the management GOR was particularly high. This data was also used to identify study areas for stage two of the research.

3.2.3 Reliability and Validity

ISD Scotland is part of NHS National Services Scotland (NSS) and provides national statistical data that informs decision making and planning within the national health service in Scotland (ISD Scotland, 2010). It has a key role in gathering routine prescribing data on behalf of NSS Practitioner services and therefore, provides the most accurate data. Moreover, ISD Scotland abide by the Code of Practice for Official Statistics within the UK and is a recognised authority by the UK Statistics Agency (ISD Scotland, 2010). The data provided for this study are the most valid and reliable available and provide an accurate reflection of prescribing practices across NHS Scotland (ISD Scotland, 2012b). In this study ISD Scotland provided data on all prescriptions for alginate, domperidone, omeprazole and ranitidine dispensed to infants aged 0-1year in Scotland from the year 2010 to 2016.

3.3 Stage 2: Qualitative Research Method

Stage two of the study focused on gaining a more in-depth understanding of the patterns of prescribing and the changes that were evident from the analysis of the prescribing data from ISD Scotland in stage one. Therefore, qualitative research strategies were used to explain and interpret the findings and assimilate meaning, thereby addressing the remaining research objectives.

The initial intention was for interviews to be held with health visitors and general practitioners from two NHS Board areas and for comparisons to be made between the two board areas. Consideration was given to the use of focus groups to gather data, however social interaction among participants is a key feature of the generation of data in focus groups and this can present challenges to the researcher (Holloway and Galvin, 2017). For example, focus groups can be difficult to lead and to manage, especially if there are dominant participants in the group, and this may affect the outcome of the data collected and can lead to bias. Transcribing of discussions within focus groups can also be challenging as it can be difficult to decipher what is being said if more than one person is speaking at time therefore some valuable discussion may be lost. Furthermore, given the large geographical areas involved it may have been difficult to arrange a suitable time and venue to host a focus group. In comparison, one to one interview's focus on the interviewees own personal experiences and therefore can produce more in-depth data (Holloway and Galvin, 2017). They can also be arranged at a time and place suitable to the participant, allowing them an element of choice and privacy within the process.

The findings from stage one, identified two NHS Boards to consistently have high prescribing rates. NHS Grampian consistently had the highest prescribing rate for ranitidine over the study period, and NHS Lothian consistently had the highest prescribing rate for omeprazole. Therefore, these two boards were selected for sampling and further exploration in stage two of the study. Neither of these medicines are licensed for use in infants under one year of age in the

UK, hence understanding the reasons behind these high prescribing was worthy of further investigation in stage two.

Nevertheless, at an early stage of the study this decision to sample two geographical areas proved challenging, particularly in NHS Lothian where there was an acute shortage of health visitors, recruitment was via a gatekeeper and I did not have the same support from the Director of Nursing as I had in NHS Grampian. Therefore, the decision was taken to focus on one region only: NHS Grampian, but also to include parents of infants with symptoms of GOR. Whilst a comparison of these two regions with differing prescribing practices would have provided useful insights into why health professionals in different areas manage GOR differently, including parents in one area allowed for a more rounded picture of influences on the management of GOR within that area. This had an impact on the overall aim and objectives. Therefore, instead of narrowly focusing on health professionals the aim and objectives were revised to include a broader focus on factors influencing and underpinning how health professionals and parents perceive and currently manage GOR in infants.

The aim of stage two was amended to explore parent's perceptions and experiences of caring for an infant with symptoms of GOR, and what shaped their decisions about whether or not to seek medical advice and support. It also sought to understand what factors influenced the diagnosis of GOR in infants by health visitors and general practitioners and how this shaped their management and prescribing practices.

3.3.1 Participant Selection

The sampling strategy in stage two was influenced by the analysis of the ISD Scotland data undertaken in stage one, with the geographical data and findings from stage one used to inform and deliberately select geographical areas for more qualitative research in stage two. The study focused on NHS Grampian for the following reasons. Firstly, findings from stage one revealed Grampian to be an area in which changes in prescribing rates were high, and that Grampian consistently had the highest prescribing rate for ranitidine over the study period. Secondly, although there was a national shortage of health visitors in Scotland, the Director of Nursing in Grampian was supportive of the study making it more likely that good recruitment would be possible. Thirdly, Grampian was selected for the pragmatic issue of proximity for me, the researcher.

Health visitors and general practitioners were the professional groups selected to recruit to the study because they had specific qualifications, experiences and knowledge deemed important in addressing the research aim and objectives (Moule and Goodman, 2009). For example, every child in Scotland has a named health visitor who, in many cases, is first point of contact for families, whilst currently general practitioners are the key professionals in primary care that prescribe pharmaceutical interventions to manage GOR in infants under 1 year of age. Parents were included to share their perceptions, insights and experiences of caring for their infant with symptoms of GOR, thereby providing a fuller picture of the situation.

3.3.1.1 Recruitment of Health Visitors

Regarding health visitors, the recruitment process involved the researcher contacting the Director of Nursing services in NHS Grampian to seek their approval and support in recruiting health visitors to the study. The Director of Nursing in NHS Grampian supported the study, leading to health visiting team leaders / managers in NHS Grampian being sent electronic information about the study to disseminate to the health visitors in their geographical areas. In addition, I offered and was invited to attend health visitor meetings to provide information about the study and to answer any queries. At the time of the data collection there was an estimated 230 health visitors employed in NHS Grampian (ISD Scotland, 2018c) and of these ten health visitors were recruited to the study from a range of settings that included urban and rural, and affluent and poor areas.

3.3.1.2 Recruitment of General Practitioners

Recruitment of general practitioners was challenging. A letter was sent to the GP Sub-committee to inform them of the study and harbor their support in recruiting participants. However, although seemingly interested in the study, the Chair of the group was not agreeable to disseminating information about the study to general practitioners in Grampian. The researcher therefore sent letters of invitation, participant information and other relevant information (Appendix 3) about the study to 43 medical practices in NHS Grampian. This included urban are rural areas as well as affluent and deprived areas. According to ISD Scotland (2018c) there were approximately 160 general practitioners working in medical practices in NHS Grampian at the time of the study. However, despite

reminder letters and offers to visit medical practices to inform them about the study and answer any questions or concerns, only four general practitioners were recruited. As three of the general practitioners worked in the same health centre and one was of a different gender, it was decided to use androgynous pseudonyms to maintain anonymity. There was also a risk that these three general practitioners shared strong or similar views and biased the findings of the study.

3.3.1.3 Recruitment of Parents

Parents were recruited via parent and baby groups. Initially parent and baby groups in the catchment areas of the recruited health visitors and general practitioners were targeted and sent posters, letters of invitation, and information about the research (Appendix 3), but this was later opened to include a wider geographical area within NHS Grampian. I also offered, and was invited, to attend meetings and groups to share information about the study and to answer any queries. Initially parents with children under one year of age were targeted, but it later became apparent that the children of some parents who were agreeable to participate in the study were now older than 1 year. These parents had reflected on their past experiences of caring for their child with GOR when their infant was under 1-year-old and believed they had a valuable contribution to make to the study. Therefore, after discussion with my research supervisors it was agreed to include parents of infants up to the age of 30 months. An ethics amendment to this effect was submitted to, and accepted by, Lancaster University Research Ethics Committee (Appendix 9: FHMREC – 08/05/2017).

The parents were recruited via a variety of parent and baby groups across Grampian. From 32 parent and baby groups in Grampian targeted, eight parents were recruited to participate in the study. However, although some parents lived in the same catchment area as where some of the general practitioners and health visitors worked, it is not known if these families were registered at these medical centres or known to the practitioners. Whilst this may be a weakness of the study, it also increased the diversity of responses gained.

3.3.2 Setting of Data Collection

The interviews (pilot and main study) were conducted in a private environment and location that was familiar and comfortable to the interviewee. Health professionals chose their workplace, whilst parents preferred to be interviewed in their own homes. This was conducive to a relaxed and positive experience for the participant, and to a more favourable and productive outcome from the interview (Whiting, 2008). In keeping with the principles of lone working cited by the Universities and College Employers Association (2005), details of the venues of the interviews, and the expected time of return were left with work colleagues.

3.3.2.1 Data Collection

Semi-structured interviews were chosen as the main research method of data collection in stage 2. Firstly, because they allow the researcher to develop a schedule of pre-determined themes that can help guide the interview process

to ensure that key issues are discussed (Tod, 2009). Secondly semi-structured interviews permit scope for flexibility so a common set of broad themes relevant to the diagnosis and management of GOR could be explored. Flexibility was important and valuable within this study as it enabled respondents to elaborate and expand on any points that they felt were significant as well as introduce issues they considered important but were not identified by the researcher at the outset. It also allowed the interviewer to be responsive to unexpected but relevant issues, and to probe and explore these in greater depth to unravel factors that both influenced the diagnosis of GOR in infants, and shaped management and prescribing decisions.

3.3.2.2 Semi-Structured Interview Schedules

Two semi-structured interview schedules were developed (Appendix 4), one for health professionals (health visitors and general practitioners) and one for parents. Although similar in some respects, the semi-structured interview schedules differed and provided two broad sets of themes to guide the interviewer when interviewing parents, and health professionals. For example, the schedule for health professionals focused on finding answers to research objectives 2 – 5, whilst the interview schedule for parents focused on research objective 6 and the parents experience of caring for their infant with symptoms of GOR. The content of the semi-structured interview schedules was drawn from the evidence in the literature review regarding gastro-oesophageal reflux and its diagnosis and management in infants, as well as the theoretical underpinnings concerning medicalisation, pharmaceuticalisation, the changing focus of health care, and the influence of social media and the internet.

3.3.2.3 Pilot Study

Two former health visiting colleagues, and one parent (friend) participated in the pilot study. The pilot interviews highlighted several areas for improvement. For example, different terminology was used by the participants to describe GOR, and new issues such as culture and cultural differences were highlighted. The interviews were also much shorter than one hour. This led to the interview schedules being revised and whilst the themes / sections remained same, the order and wording of some of the questions was changed to encourage greater discussion. Also, to ensure that the focus of the study remained the same, the revised questions were reviewed and mapped against the objectives set for the study. Listening to the recordings allowed me to reflect on my interview technique and improve it in the main study by talking more slowly, using less leading and less medically focused questions, and allowing for silences while participants were thinking. During the pilot study interviews, field notes were taken to verify the data collected and to note any nuances within the context of the discussions (Tod, 2009). However, on listening to the audio recordings it was clear this had a detrimental impact on the flow of conversation with the participants waiting until I had finished writing before speaking. Taking field notes also distracted me, preventing me from giving my full attention to the interviewee and the interview. As a result, some important opportunities to probe and explore issues further were missed. Therefore, in the main study it was decided that no field notes would made during the interview, rather they were made soon after completion of the interview.

3.3.2.4 Audio Recording and Field Notes

With the participant's consent, the interviews were audio recorded to ensure a record of the interviews were available for analysis. The recordings also allowed me to reflect on my questioning approach and interview technique and make improvements in subsequent interviews. Whilst cognisance was taken of the intrusive nature imposed by using recording equipment (Tod, 2009), its use led to a more relaxed and informal ambiance during the interviews. This enabled me to focus and give my full attention to the individual being interviewed.

3.3.2.5 Duration of Interviews

On average the interviews lasted around one hour in length. The longest interview was 1 hour, and 25 minutes and the shortest interview was 35 minutes. Longer interviews can lead to respondent and interviewer fatigue and deter others from participating in the research (Robson, 2011).

3.3.2.6 Data Saturation

Due to the in-depth and intense nature of qualitative research and the wealth of rich and prolific data that is gleaned, sample sizes tend to be small (Procter and Allan, 2006). However, there is general agreement that the sample size is appropriate when the data analysis reveals no new data and indicates that thematic saturation has been achieved (Ritchie et al., 2014a; Procter and Allan, 2006; Endacott, 2005). In this instance data saturation was reached on interviewing ten health visitors, and although only four GPs were interviewed, the emergent themes reflected that of the health visitors suggesting that saturation point had been achieved. Saturation point appeared to be reached

when eight parents were interviewed. A total of 22 subjects were thus interviewed and this is in accordance with Ritchie et al. (2014a) who indicate the sample size in qualitative studies to range between 10 and 50 subjects.

3.3.3 Qualitative Data Analysis

The audio recorded interviews were transcribed verbatim and analysed thematically using the Framework Method (Ritchie and Spencer, 2014a). This approach, sometimes referred to as Framework Analysis, provides a flexible yet structured and rigorous way to manage qualitative data (Ward et al., 2013; Parkinson et al., 2016). The approach is explicit with clear steps to follow that support transparency in the analytical process by facilitating an audit trail of how the data are interpreted from the initial interview and raw transcripts, through to the development of theories and summary charts (Ward et al., 2013; Parkinson et al., 2016). The process was iterative and involved revisiting some steps in the framework as well as some themes, and interview data. Only when the findings were written up was the Framework Method of analysis considered complete. Furthermore, the Framework Method complements thematic methodology used to support the thematic analysis of the semi-structured interviews (Ward et al., 2013; Gale et al., 2013). Analysis of qualitative data is often criticised for lack of transparency, therefore the Framework Method, by providing a clear audit trail enhanced the dependability of the research findings. The steps of Framework analysis begin with familiarisation of the data, the development of a theoretical framework, indexing and charting, and summarising of data in an analytical framework and finally synthesis of data by

mapping and interpreting (Spencer et al., 2014a; Ward et al., 2013). The Framework Method was used as follows:

1. **Familiarisation** started with transcribing the interviews then repeatedly reading the transcriptions and listening to the recorded interviews (Spencer et al., 2014a, 2014b). This was done to ensure familiarisation with each transcription and a full understanding of the data. Due to time constraints several interviews were transcribed by a professional transcriber, however when this happened extra vigilance was taken to repeatedly listen to the recordings and read the transcriptions and any field notes. This was to ensure accuracy in the transcriptions as well as to become immersed in, and familiar with the data and any nuances within the interview itself. The familiarisation process was considered complete when the wealth of attributes and elements in the data was understood (Spencer et al., 2014a, 2014b). Thereafter data from each transcript was coded and classified according to the subject group (general practitioner, health visitor or parent) and from this an initial list of topics for each group were identified and described. (Appendix 5 provides an example of the initial list of themes and subthemes from the interviews with general practitioners)

2. **Theoretical framework -** The list of initial topics drawn from the interview data from each subject group was refined, linked and sorted to form a hierarchy of themes and sub-themes. The interview schedule was useful in helping to structure the hierarchy and initial framework, however consideration was also given to new and emerging themes that presented.

In developing a meaningful and purposeful theoretical framework relevant to this research study, the research aims, and objectives were revisited, and always kept in the view of the researcher (Spencer et al., 2014a, 2014b). (Appendix 6 provides an example of some of the revised themes and subthemes mapped to research objectives and the underpinning theoretical framework)

3. **Indexing and charting** was undertaken by applying the draft Framework to the original transcriptions to identify where specific topics relevant to the framework themes and sub-themes are located within the data. The computer assisted qualitative data analysis software (CAQDAS) package NVivo 10 was used to support analysis and code in step 1 (Familiarisation). NVivo 10 proved expedient in indexing the data and charting and sorting the data around key topics to allow for intensive review, and with the added bonus of retaining links with the original transcripts. This allowed for the creation of a working analytical framework that allowed for later reflection on the choices made. All decisions made during indexing and charting were recorded, and any connections to emergent themes and categories documented. (Appendix 7 provides an example of indexing using NVivo)

4. **Summarising data in an analytical framework** involved reducing the volume of data to a manageable level whilst retaining the essence of what each individual subject said (Spencer et al., 2014b). Each theme was given its own matrix with sub-themes entered in columns and participants in rows. The challenge was deciding how much information to include in each cell of

the framework and keeping the summaries succinct. Initially this was done manually on a Word document, however using NVivo, made this easier and more efficient by tracking links back to the transcripts and the original quotes. This enhanced transparency of the audit trail (Ward et al., 2013). (Appendix 8 provides an example of a Data Summary and Display)

5. **Synthesising of data by mapping and interpreting** involved higher analytical and abstract thinking in order to explain and make sense of the data (Spencer et al., 2014a, 2014b; Ward et al., 2013). The identified themes and sub-themes were compared and contrasted to allow further refinement, merging and splitting, whilst the data summaries were continually checked against the original transcripts to ensure accuracy and context. Using NVivo, participant groups (health visitor, general practitioner and parent), and specific attributes within the participant groups, were explored for connections and differences in the data. The aim being to develop meaningful explanations by making logical sense of the patterns within the data (Spencer et al., 2014b)

3.3.3.1 Trustworthiness

Credibility, transferability, dependability and confirmability are the criteria (Bazeley, 2013a; Guba and Lincoln, 1986) used to determine trustworthiness and authenticity, the alternative to reliability and validity in qualitative studies. These criteria are demonstrated throughout and evidenced in the documenting of the steps and decisions made in undertaking this research study and reported in this dissertation. Furthermore, the Framework Method facilitated a clear audit

trail of all decisions and steps taken in the research journey, again enhancing transparency and dependability of the research findings. More specifically, the recording of interviews allowed me to repeatedly return to the original recordings and transcriptions in order to validate data and keep the findings grounded in the data and experiences of the participants and maintain credibility of the findings (Cope, 2014).

3.3.3.2 Positionality and Reflexivity

Reflexivity is a central feature of qualitative research that is concerned with the influence that the researcher wittingly or unwittingly has on the findings of a study (Jootun et al., 2009). The social identity of the researcher, and personal background such as gender, culture and life experiences can all frame the research questions, study design and interpretation of the data collected (Creswell, 2014). Cognisance, therefore, was taken of potential preconceived notions and biases that I may have unconsciously brought to the study. As a female and a health visiting lecturer there was a risk that the interviewee and I were known to each other. For example, some interviewees were former health visiting students and, therefore, may have felt intimidated by me, or alternatively provided responses that they perceived to be 'the right answers' rather than providing a true reflection of their own professional practice and values. To overcome this dilemma, I continuously reflected on my own role and position within the research study and how my own perceptions, personal values, and actions could influence the collection and analysis of data (Creswell, 2014). These reflections were recorded in a reflective log (Jootun et al., 2009). On the other hand, as an experienced health visitor, I was well acquainted with medical

jargon and terminology, and could have full and candid interviews with health professionals using medical terms and language. My health visiting expertise and knowledge of GOR was also useful when interviewing parents as I could explain the purpose of my research in a clear and simple manner. I was also familiar with lay terms and could adapt my questions to suit the participant as well as probe any pertinent issues highlighted. An interviewer without such specialist knowledge and understanding may have missed valuable insights, pertinent points or opportunities to probe matter further.

3.4 Ethical Considerations

Ethical considerations in this research study were guided by NHS Research Scotland (NRS) based on the Research Governance Framework for Health and Community Care (Scottish Executive, 2006) that states:

> *'the dignity, rights, safety and well-being of participants must be the primary consideration in any research study'*

Lancaster University research ethics committee approved the study (Appendix 9: FHMREC – 23/05/2014), and, via the on-line Integrated Research Application System (IRAS), NHS Grampian Research and Development Department also granted ethical approval for stage 1 and stage 2 of the study (Appendix 9: NHS Grampian – 07/01/205). Ethical approval therefore was granted prior to prescribing data from ISD Scotland being analysed in stage 1, and in stage 2 prior to the pilot and main study (Appendix 5). In this study particular attention was given to the ethical areas of informed consent, anonymity and confidentiality, data protection and research governance as follows:

3.4.1 Informed consent

Participants were given information prior to the study allowing them to make an informed decision of whether or not to participate. In addition, the researcher outlined the study and ensured that participants understood what the study involved, how findings would be reported, and what they were consenting to prior to the interview taking place. Participants were also informed of their right to withdraw from the study if they so wished. Details of counselling and support agencies was also made available to participants should they feel distressed at any point before, during or after the interview. None of the participants were distressed by the interview.

3.4.2 Anonymity and Confidentiality

All consent forms were signed by the participant and the researcher and stored separately from the audio recording and transcripts. In addition, and to maintain anonymity, participants were given a personal identification code and pseudonym. Audio recordings and transcriptions were stored electronically, and password protected with the password known only by me, the researcher. Furthermore, it was only me who had access to the raw data and care was taken to ensure anonymity and confidentiality at each stage of the research process and specially when writing up the findings.

3.4.3 Research Governance

At the outset, the study focused on health professionals, therefore initially ethical approval was gained from Lancaster University research ethics committee (Appendix 9: FHMREC 23/05/2014) and, via the Integrated

Research Application System (IRAS), from NHS Grampian, and NHS Lothian (NHS Grampian 07/01/2015; NHS Lothian 23/10/2014). However due to recruitment challenges the research study was revised with the initial plan to include NHS Lothian dropped and the study in NHS Grampian opened up to include parents. The plan was to recruit parents via NHS held baby clinics in the same locations as the health visitors and general practitioners, hence approval was needed from the North of Scotland National Research Ethics Service (NoSRES) was required as well as approval from Lancaster University research ethics committee (Appendix 9: FHMREC – 31/05/2016) . In addition to guidance from Lancaster University, local guidance on the formal process on seeking approval for this amendment was provided by a designated person in NHS Grampian Research and Development (NHSR&D) department. My understanding, therefore, was that the amendment of my study was straightforward and should not pose any difficulties. Subsequently, when I was given the opportunity to attend the NoSRES meeting the following week, I accepted even although my supervisors were both on leave.

The experience of attending the NoSRES meeting was traumatic as the Chair of the meeting clearly misunderstood the role of the ethics committee regarding my study. Whilst I was only seeking approval for an amendment to the study to recruit parents via NHS clinics, the Chair chose to critique the wider study and was unwilling to listen to my explanation. The Chair also seemed adamant that the study was challenging the professionalism of medical colleagues although consent had already been gained for this, and this part of the study completed. The attitude of the Chair left me feeling demoralized and very upset.

Subsequently ethical approval for the amendment was denied. Fortunately, my research supervisors at Lancaster University supported me through this ordeal and a telephone meeting was set up with the Chair of NOSRES, my supervisors, an ethics expert at Lancaster University, and myself. The Chair of NOSRES acknowledged there had been a misunderstanding of the ethics application and agreed to a resubmission. However, given the tight timeframe for completing the study it was decided to recruit parents from Non-NHS parent and baby groups. Ethical approval for this amendment was gained from Lancaster University Research Ethics Committee (Appendix 9: FHMREC 15035– 21/11/2016). A further amendment was made to include infants up to the age of 30 months (Appendix 9: FHMREC – 08/05/2017).

3.5 Reflections on the Research

The overall research experience was positive, and professionals and participants associated with the research were very supportive. However, recruitment to the study was challenging, particularly amongst general practitioners as evident in the literature (Hummer-Praedier et al., 2008; Bonevske et al., 2011). Reflecting on what could have been done differently, it would have been beneficial to have included parents in the study from the outset. Interesting and valuable data was gleaned from the interviews with parents. The ethical process involved in recruiting parents via NHS sources proved challenging, therefore seeking to recruit participants through non-NHS sources where feasible in the future may be more expedient and advantageous. Reflecting further on the study, targeting two contrasting NHS Board areas was

perhaps unrealistic, and the less ambitious approach focusing on one NHS Board area proved more achievable and realistic within the timeframe of the study. It may also have been useful to have targeted key medical centres and to have interviewed health visitors, general practitioners and parents aligned to specific medical practices. This may have helped to gain a better understanding of the situation, and to help explore and explain differences in perceptions of GOR, the experience of caring for an infant with symptoms of GOR, as well as decisions made regarding the diagnosis and management of GOR in infants aged 0-1 year. Consideration was given to data that appeared incongruous with the evidence in the main data set. For example, although Shetland was the highest prescriber of ranitidine in 2016, the confidence intervals were noted to be wide suggesting that the data may be misleading and therefore require greater scrutiny. In this instance the wide confidence intervals reflected the low population in Shetland. This was also typical of data from the other island boards. Reflecting on the findings from the semi-structured interviews, one parent commented that ranitidine had been prescribed following a telephone consultation and without the general practitioner examining the child. Whilst this was an unexpected and deviant finding and not reflected in the data from health visitors, general practitioners and other parents in the study, it was recognized as an important finding that may be a potential factor contributing to the rise in prescribing of ranitidine in infants in the 0-1-year age group.

CHAPTER 4: STAGE ONE: FINDINGS FROM QUANTITATIVE ANALYSIS OF NATIONAL PRESCRIBING DATA

4.0: Introduction

This chapter presents the results from stage one which involved the quantitative analysis of national prescribing data in Scotland. These findings presented address the aim and objective of stage one: to determine patterns of prescribing of Gaviscon (alginate), domperidone (motility stimulant), omeprazole (PPI) and ranitidine (H2RA) in 0-1-year-old infants in Scotland from 2010 – 2016. It begins with the analysis of the population of 0-1-year old infants prescribed Gaviscon (alginate), domperidone (motility stimulant), omeprazole (PPI) or ranitidine (H2RA) in each NHS board. Thereafter, patterns of prescribing of these drugs in the 0-1-year age group in Scotland are presented.

4.1 National Prescribing Data from ISD Scotland

Stage one of the research study concerns the secondary analysis of quantitative data obtained from the Information Services Division of NHS Scotland (ISD Scotland). In Scotland all NHS patients have a unique Community Health Indicator (CHI) number that is indicated on all prescriptions. This enables ISD Scotland to identify patients dispensed a particular drug. In this study, the patient count refers to the number of infants aged 0-1-year prescribed a specific medicine within one calendar year. Therefore, using CHI data infants are counted once for the drug prescribed per year. In instances where infants are prescribed two drugs within the year, their CHI number will be recorded once in both drug classes within that year. The prescribing rate refers to the number of prescriptions dispensed and paid for per 100 head of

population (infants aged 0-1 year). Prescriptions that have been dispensed and paid provide the most accurate data. This is because not all prescriptions written by practitioners for patients are taken to the pharmacy for dispensing. For example, some patients may choose not to follow medical or health care advice, whilst other patients will only use the prescription if their condition worsens or they feel the medicine is required. Therefore, only prescriptions that have been dispensed, administered, and claimed for by pharmacies are paid for. Use of prescribing rates also enables comparisons to be made between populations over time and between NHS Board areas.

4.2 Infant Population in Scotland

According to the National Records of Scotland (NRS, 2019) on the 30th June 2018, the mid-year population of Scotland was estimated to be in the region of 5,438,100. In the years since 1998 (population:5,077,070) the mid-year estimated population of Scotland has increased by 7%. Regarding infants, National Records of Scotland data show that approximately 1% of the Scottish population is aged 0-1-year-old (NRS, 2019), and that the population of infants aged 0-1-year old steadily declined from 59,665 in 2009, to 55,516 infants in 2016. This implies that the birth has fallen and that the overall growth in the general population may be due to migration (Table 4.01).

Table 4.01: Mid-year population estimates from National Records of Scotland for infants aged 0-1 year across health boards in Scotland

Year	2009	2010	2011	2012	2013	2014	2015	2016
Ayrshire & Arran	3,946	3,825	3,946	3,884	3,639	3,544	3,656	3,647
Borders	1,173	1,182	1,173	1,112	1,152	1,149	1,024	1,077
Dumfries & Galloway	1,461	1,520	1,461	1,366	1,370	1,293	1,291	1,299
Fife	4,218	4,235	4,218	4,075	3,911	3,866	3,879	3,737
Forth Valley	3,382	3,467	3,382	3,317	3,085	3,027	3,043	2,996
Grampian	6,395	6,494	6,395	6,360	6,274	6,383	6,265	6,441
Greater Glasgow & Clyde	13,955	14,192	13,955	13,131	12,877	12,668	12,424	12,367
Highland	3,320	3,186	3,320	3,212	2,998	2,958	3,020	2,971
Lanarkshire	6,719	6,528	6,719	7,334	7,105	6,903	7,136	6,960
Lothian	9,950	9,609	9,950	9,729	9,675	9,689	9,470	9,431
Orkney	209	208	209	214	199	177	198	169
Shetland	271	279	271	257	290	235	238	257
Tayside	4,398	4,389	4,398	4,309	4,180	4,035	4,141	3,935
Western Isles	258	221	258	247	244	256	216	229
Scotland	59,655	59,335	59,655	58,547	56,999	56,183	56,001	55,516

*The population estimated from NRS illustrated in table 4.01 were used by ISD Scotland to calculate the prescribing rate for each drug.

NICE (2015) indicate that symptoms of GOR affect at least 40% of infants and that in most cases treatment is not required, therefore the number of infants aged 0-1-year prescribed medicine to manage symptoms of GOR at the NHS Board level is likely to be low. Furthermore, there is wide variation in the demography and population of the 14 territorial NHS Boards in Scotland which will also impact on the patient count / number of infants prescribed medicine. The patient count/ number of infants prescribed Gaviscon, domperidone, omeprazole and ranitidine at the NHS Board level over the 7-year study period are illustrated in tables 4.02, 4.03. 4.04, 4.05. In the low populated island boards of Orkney, Shetland and the Western Isles, the number of infants, and dispensed prescriptions are very small compared to the NHS boards on

mainland Scotland and may account for some variation. For example, Table 4.05 illustrates that the patient count, or number of infants prescribed ranitidine in the years 2010 and 2016 in NHS Orkney were 6 and 16 respectively, compared to NHS Grampian with a patient count of 347 in 2010 and 899 in 2016. On mainland Scotland, NHS Borders and NHS Dumfries and Galloway are rural areas that also have relatively low populations and infants aged 0-1 year (Table 4.01).

Table 4.02: Patient count/ number of infants aged 0-1-year prescribed alginate per NHS Board and Scotland per year*

NHS Board	2010	2011	2012	2013	2014	2015	2016
Ayrshire & Arran	408	457	537	669	729	773	790
Borders	159	175	161	209	216	212	226
Dumfries & Galloway	181	212	232	289	316	322	330
Fife	642	753	903	899	957	925	972
Forth Valley	596	689	783	852	842	759	745
Grampian	1,289	1,463	1,535	1,569	1,563	1,483	1,505
Gt Glasgow & Clyde	2,379	2,747	2,983	3,307	3,554	3,814	3,451
Highland	462	522	614	632	679	651	596
Lanarkshire	1,282	1,397	1,529	1,610	1,844	2,068	2,318
Lothian	1,366	1,611	1,772	1,975	2,117	2,004	2,005
Orkney	15	28	29	33	39	32	31
Shetland	46	37	44	52	49	54	64
Tayside	573	708	767	770	929	877	810
Western Isles	21	22	14	20	40	50	41
Scotland	9,396	10,798	11,873	12,864	13,838	13,932	13,844

*Year refers to the end of financial year i.e. Year 2010 = 1st April 2009 – 31st March 2010. Infants are counted once per drug prescribed per year.

Table 4.03: Patient count/ number of infants aged 0-1-year prescribed domperidone per NHS Board and Scotland per year*

NHS Board	2010	2011	2012	2013	2014	2015	2016
Ayrshire & Arran	23	42	65	58	54	16	4
Borders	25	31	30	38	51	29	21
Dumfries & Galloway	9	15	23	32	28	12	3
Fife	111	138	143	131	162	100	49
Forth Valley	35	54	70	86	96	46	6
Grampian	63	80	85	94	90	41	22
Gt Glasgow & Clyde	49	70	90	116	108	53	21
Highland	16	17	21	25	36	27	12
Lanarkshire	62	49	60	70	69	29	8
Lothian	224	273	340	435	490	288	132
Orkney	2	1	0	2	4	1	1
Shetland	6	1	0	2	4	0	0
Tayside	32	52	45	43	69	42	12
Western Isles	0	2	1	0	0	2	1
Scotland	655	822	969	1,129	1,259	868	291

*Year refers to the end of financial year i.e. Year 2010 = 1st April 2009 – 31st March 2010. Infants are counted once per drug prescribed per year.

Table 4.04: Patient count/ number of infants aged 0-1-year prescribed omeprazole per NHS Board and Scotland per year*

NHS Board	2010	2011	2012	2013	2014	2015	2016
Ayrshire & Arran	1	12	16	22	31	33	45
Borders	9	17	18	16	25	26	27
Dumfries & Galloway	16	21	27	38	52	42	70
Fife	59	65	62	82	128	129	149
Forth Valley	20	38	38	40	62	58	88
Grampian	30	33	37	52	74	92	97
Gt Glasgow & Clyde	88	116	157	200	274	385	404
Highland	20	32	26	29	48	59	86
Lanarkshire	105	107	123	169	186	184	250
Lothian	175	249	312	413	476	532	535
Orkney	0	1	0	2	3	0	1
Shetland	2	1	1	1	0	1	3
Tayside	4	20	28	25	62	78	80
Western Isles	0	0	0	0	1	1	1
Scotland	529	709	845	1,085	1,420	1,608	1,828

*Year refers to the end of financial year i.e. Year 2010 = 1st April 2009 – 31st March 2010. Infants are counted once per drug prescribed per year.

Table 4.05: Patient count/ number of infants aged 0-1-year prescribed ranitidine per NHS Board and Scotland per year*

NHS Board	2010	2011	2012	2013	2014	2015	2016
Ayrshire & Arran	39	56	89	127	166	168	278
Borders	18	37	32	37	70	66	77
Dumfries & Galloway	20	29	28	35	45	34	58
Fife	104	127	174	180	257	297	316
Forth Valley	128	135	149	189	280	316	360
Grampian	347	476	549	665	763	775	899
Gt Glasgow & Clyde	264	353	419	570	746	1052	1149
Highland	65	101	111	148	202	290	326
Lanarkshire	77	115	191	273	364	516	742
Lothian	194	211	305	456	670	741	835
Orkney	6	2	4	12	18	14	16
Shetland	13	12	12	22	22	19	35
Tayside	113	136	150	196	298	319	324
Western Isles	4	4	3	3	2	10	8
Scotland	1,391	1,790	2,213	2,909	3,892	4,592	5,410

*Year refers to the end of financial year i.e. Year 2010 = 1st April 2009 – 31st March 2010. Infants are counted once per drug prescribed per year.

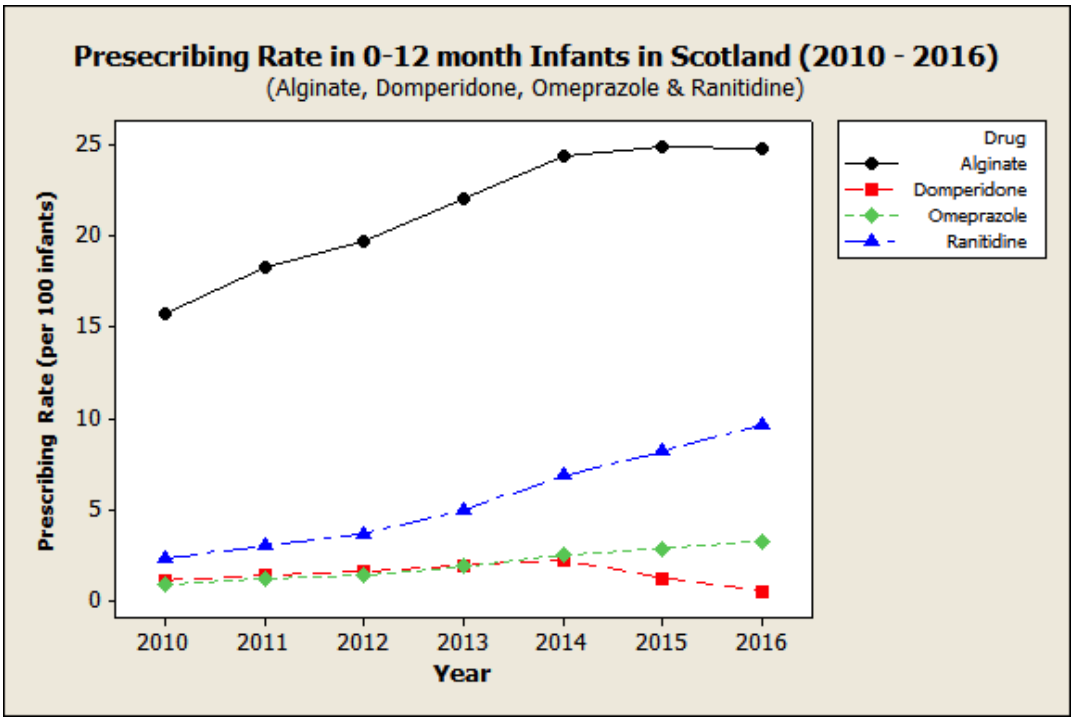
As illustrated in tables 4.02, 4.03. 4.04, 4.05, the data reveal that in the whole of Scotland, the number of infants prescribed alginate, omeprazole and ranitidine increased over the seven years of the study period, whilst population data presented in table 4.01 shows a steady decline in the number of infants aged 0-1 year. This suggests that the prescribing rate of these medicines is increasing.

4.3 Prescribing in Scotland: The National Picture

The data reveal a rise in the prescribing of alginate, omeprazole and ranitidine in infants aged 0 – 1 year between 2010 and 2016 in Scotland. Evidently the prescribing rate for alginate was persistently much higher than for the other medicines used in the management of GOR in infants (Figure 4.01). Although the prescribing rate for alginate shows the greatest absolute increase from 15.75 per 100 infants in 2010 to 24.72 per 100 infants in 2016, the prescribing

rates for ranitidine increased over four-fold from 2.3 per 100 infants in 2010 to 9.7 per 100 infants in 2016, and for omeprazole it increased over three-fold from 0.9 per 100 infants in 2010 to 3.2 per 100 infants in 2016. The prescribing rate for domperidone also showed a steady rise until 2014 but thereafter began to fall. This reflects guidance from the European Medicines Agency (2014) that will be discussed further later.

Figure 4.01: Prescribing rate (per 100 infants) for alginate, domperidone, omeprazole and ranitidine in infants aged 0-1 year in Scotland 2010 – 2016



It is interesting to note that whilst the prescribing rate of both omeprazole and ranitidine have risen steadily, the prescribing rate for alginate began to level out from 2014. To determine the degree of precision of these findings, confidence intervals were calculated. Confidence intervals provide a range of values within which the true population value lies (Bowling, 2009). Based on the standard normal, or Gaussian distribution and using the standard deviation of 1.96, 95% confidence intervals were calculated (Chinn, 2015) using the following formula:

95% Confidence interval = mean value ± 1.96 x Standard error of the mean

According to Chinn (2015) and Tilling et al (2009), the standard deviation of 1.96 is normally used to calculate 95% confidence intervals. The premise being that the sample size is large enough to assume a normal distribution. Buescher (1997) considers a sample size greater than 20, and the Scottish Government (2018) a sample size greater than 30, to have a normal distribution. The sample sizes in this instance exceeded 30. Confidence intervals for the 'true' prescribing rate of alginate, domperidone, omeprazole and ranitidine are presented in Table 4.06. The intervals are typically narrow indicating that the margin of error is small and therefore greater precision of the findings (Tilling et al., 2009). Furthermore, the confidence intervals show statistically significant increases in prescribing each year except for domperidone from 2014 and alginate from 2014.

Table 4.06: Prescribing rate (per 100 infants) and upper and lower confidence interval levels for alginate, domperidone, omeprazole and ranitidine in Scotland (2010 -2016)

Prescribing rate, upper and lower confidence intervals (CI) for infants aged 0-1 year in Scotland (2010 -2016)					
Year		**Alginate**	**Domperidone**	**Omeprazole**	**Ranitidine**
2010	Rate (per 100) (Lower - Upper CI)	15.75 (15.46 - 16.04)	1.10 (1.01 - 1.18)	0.89 (0.81 - 0.96)	2.33 (2.21 - 2.45)
2011	Rate (per 100) (Lower - Upper CI)	18.20 (17.89 - 18.51)	1.39 (1.29 - 1.48)	1.19 (1.11 - 1.28)	3.02 (2.88 - 3.16)
2012	Rate (per 100) (Lower - Upper CI)	19.67 (19.35 - 19.99)	1.61 (1.50 - 1.70)	1.40 (1.30 - 1.49)	3.6 (3.51 - 3.82)
2013	Rate (per 100) (Lower - Upper CI)	21.97 (21.64 - 22.31)	1.93 (1.81 - 2.04)	1.85 (1.74 - 1.96)	4.97 (4.78 - 5.15)
2014	Rate (per 100) (Lower - Upper CI)	24.28 (23.93 - 24.63)	2.21 (2.09 - 2.33)	2.49 (2.36 - 2.62)	6.83 (6.61 - 7.04)
2015	Rate (per 100) (Lower - Upper CI)	24.80 (24.44 - 25.15)	1.22 (1.13 - 1.31)	2.86 (2.72 - 3.00)	8.17 (7.94 - 8.41)
2016	Rate (per 100) (Lower - Upper CI)	24.72 (24.36 - 25.08)	0.52 (0.46 - 0.58)	3.26 (3.11 - 3.41)	9.66 (9.40 - 9.92)

*Prescribing rate is the patient count divided by the mid-year population estimates for the age group 0-1-year, multiplied by 100

Time series plots and regression analysis were used to identify any trend for alginate, domperidone, omeprazole and ranitidine between 2010 and 2016 (Figures 4.02, 4.03, 4.04, 4.05). Time series plots are useful for exploring the relationship between two variables, which in this instance is the prescribing rate and time. The time series plots for alginate, omeprazole and ranitidine all show a rise in prescribing over time.

Figure 4.02: Prescribing rate (per 100 infants) and regression line for alginate in Scotland.

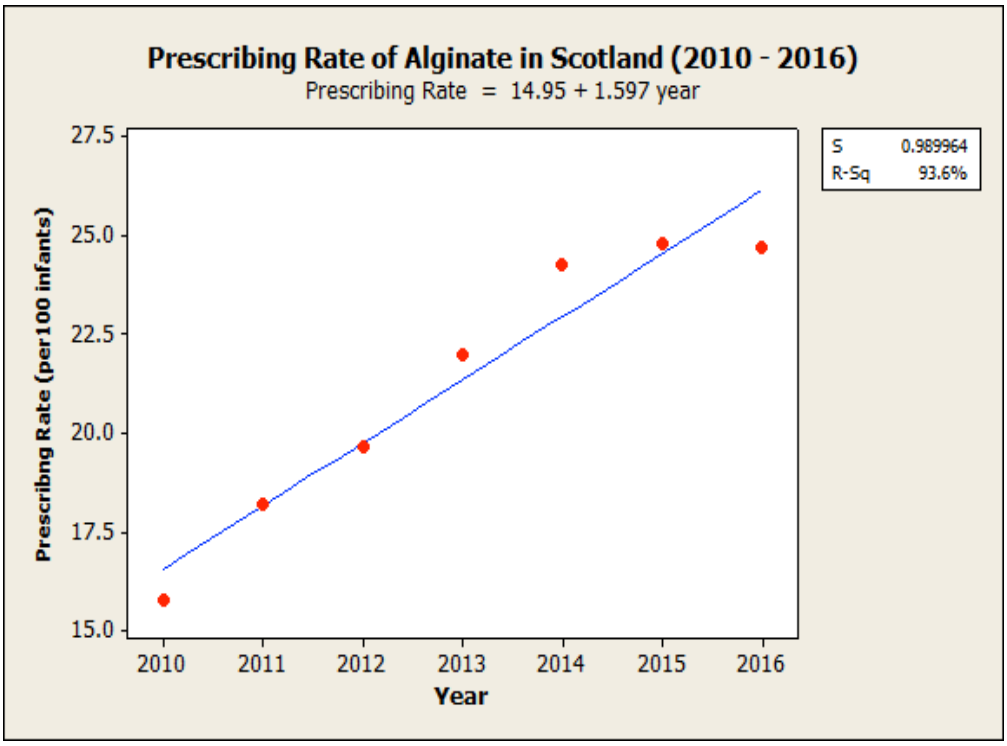


Figure 4.03: Prescribing rate (per 100 infants) and regression line for domperidone in Scotland.

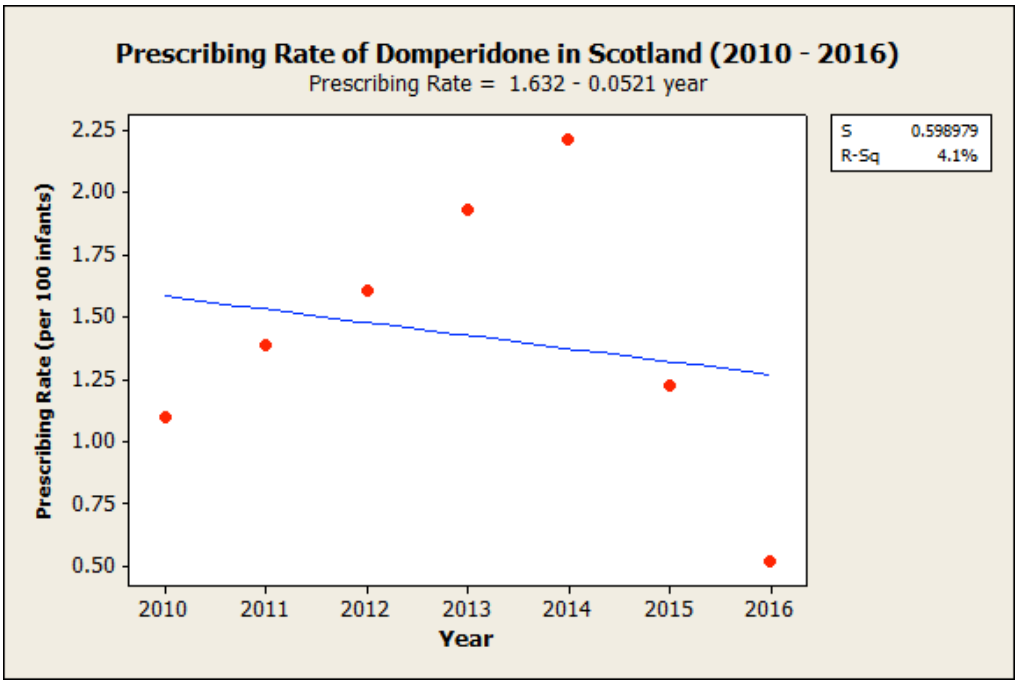


Figure 4.04: Prescribing rate (per 100 infants) and regression line for omeprazole in Scotland.

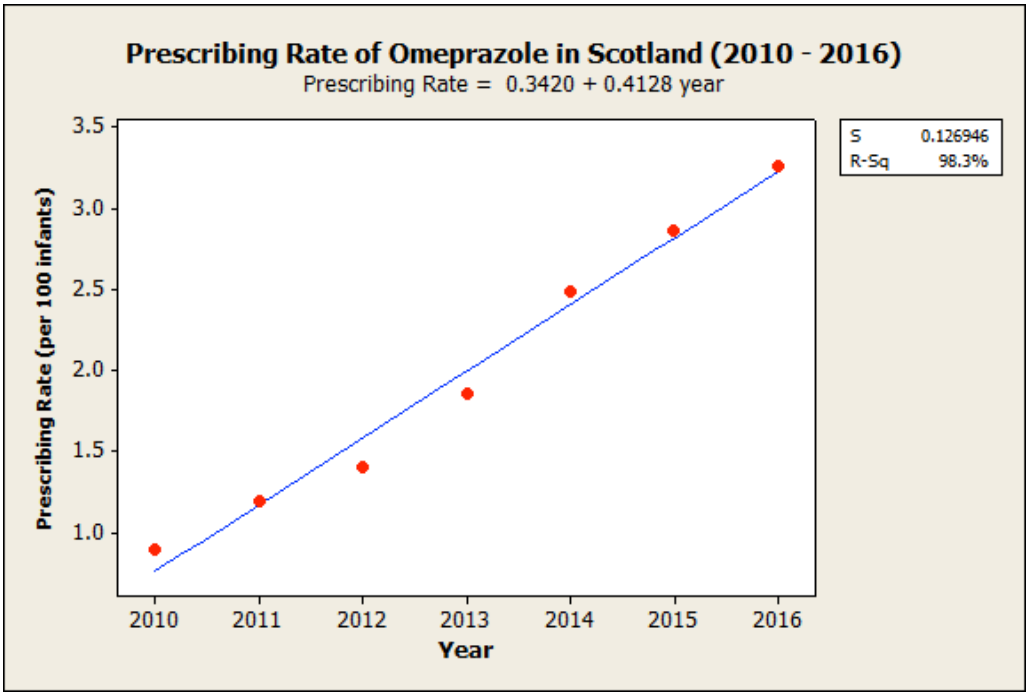
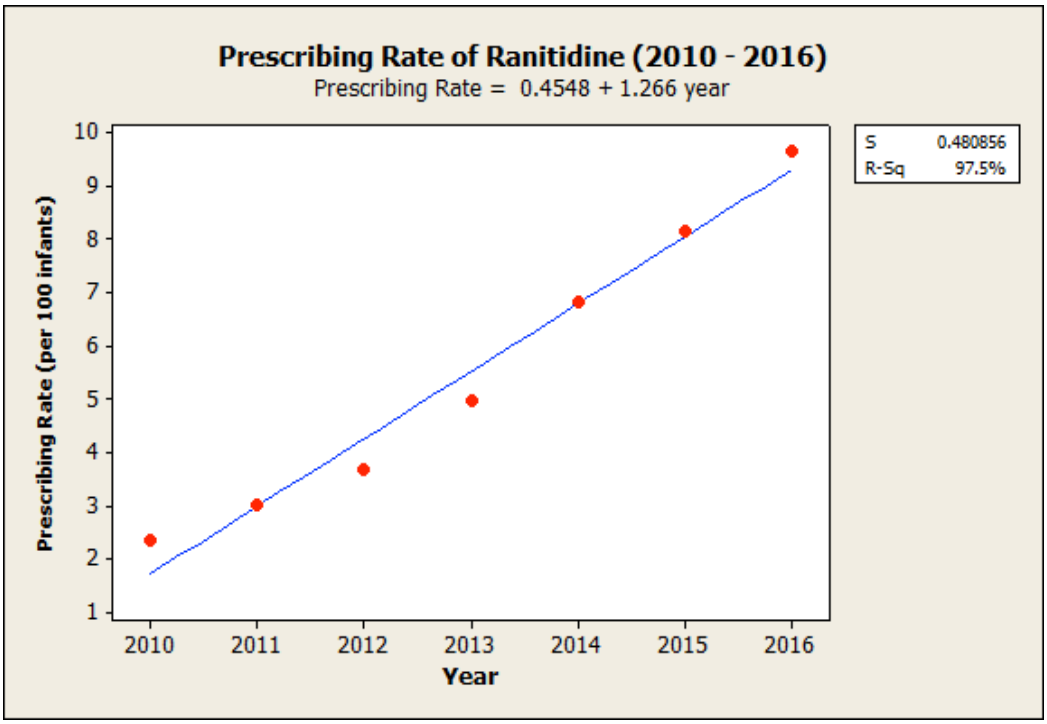


Figure 4.05: Prescribing rate (per 100 infants) and regression line for ranitidine in Scotland.



Regression analysis can provide strong visual evidence of the linear relationship between two variables and in this study simple linear regression, or sum of least squares regression, was used to find the line of best fit in the time series plots, and to indicate, or predict, the likely increase in prescribing of each medicine over time. (Robson, 2011; Gilchrist and Wright, 2009). A linear trend provided a very good fit for three medicines, alginate, omeprazole and ranitidine, with the co-efficient of determination (R^2) for each drug calculated as R^2 = 93.6% for alginate, 98.3% for omeprazole, and 97.5% for ranitidine. The coefficient of determination provides information about the percentage of variation of the data that is most close to the line of best fit. In this study these high R^2 values indicate that the data points are close to the fitted values on the times series plot. The standard error of regression (S) provides further information on the precision of the predictions of the fitted line as it gives an

indication of the distance between the fitted values and the data points (Donnelly and Abdel-Raouf, 2016). Lower S values, as in Figures 4.02, 4.04 and 4.05, indicate that the distance between data points and the fitted line values are smaller, thereby increasing the precision of the data. However, following the advice of the European Medicines Agency (2014) regarding the use of domperidone, the linear trend for domperidone changed and now shows the start of a downward trend with R^2 = 4.1%.

The regression coefficient represents the mean change of the y variable (drug), by one unit of change in the x variable (time). In this study the regression coefficients indicate estimated annual increases of 1.60% for alginate, 0.41% for omeprazole and 1.27% for ranitidine. The plots for omeprazole and ranitidine show no sign of these upwards trends being halted. However, the 2015 and 2016 data for alginate suggest that the overall prescribing rate for alginate in Scotland may have peaked.

4.4 Prescribing at the NHS Health Board Level

The data were further analysed to explore patterns of prescribing for the four drugs in each of the 14 NHS territorial boards in Scotland. The prescribing rates for alginate, domperidone, omeprazole and ranitidine in each NHS board from 2010 to 2016 are illustrated in Figures 4.06, 4.07, 4.08, 4.09. Except for domperidone, the prescribing rates for the drugs increased in all NHS boards over the seven years, however there was also clear variation between board areas. The variation between board areas may, in part, be due to the geography

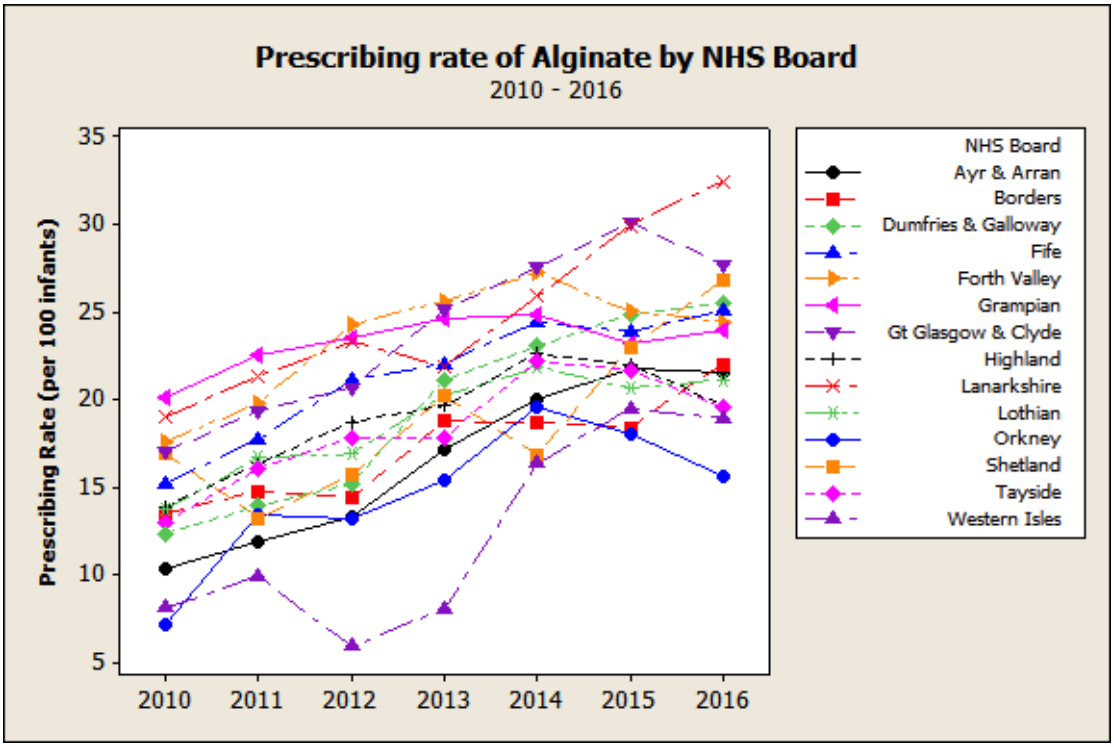
and landscape, and areas of rurality in Scotland as discussed earlier in the Introduction (Chapter 1).

The data were further analysed to describe the prescribing pattern for the four drugs in each of the 14 NHS territorial boards in Scotland. The prescribing rates and confidence intervals for these medicines in each board for each year of the study were calculated and are presented in Appendix 10. In addition, the prescribing rates in each board were ranked for each medicine between 2010 – 2016 and can be found in Appendix 11. The confidence intervals for the top three ranking NHS boards for each drug were also calculated and are presented in Tables 4.07, 4.08, 4.09, 4.10.

4.4.1 Prescribing of Alginate (Gaviscon)

Analysis of the ISD Scotland data identified that the prescribing rate for alginate had risen in all health board areas over the seven years period (Figure 4.06). The prescribing rate was consistently much greater than for the other pharmaceutical products used in the management of GOR in infants. This higher rate in prescribing of alginate is not unexpected and is in line with NICE (2015) guidance that recommends a two-week trial of alginate therapy in breast fed babies. It is also consistent with the stepped-care approach applied to formula fed babies that have shown no improvement following the introduction of a milk thickener or thickened formula (NICE, 2015).

Figure. 4.06: Prescribing rate for alginate per NHS Board 2010 – 2016



The prescribing rates of alginate were ranked (appendix 11), and the top three ranking board areas over the study period presented in Table 4.07. Lanarkshire features in the top three ranks in each of the seven years except for the year 2013 and is ranked highest in 2016. Regardless of the prescribing rate of alginate seeming to have stabilized at other high prescribing boards, the Lanarkshire rate has continued to increase approximately linearly and over the full study period from 19.08 per 100 infants in 2010, to 32.48 per 100 infants in 2016. Forth Valley also features in the top three ranks for each year apart from 2016 although the rate dropped in both of the last two study years. The prescribing rate at Greater Glasgow and Clyde increased sharply from 17.05 per 100 infants in 2010 to 30.11 per 100 infants in 2015, and despite a reduction to 27.78 per 100 infants in 2016 still held the second top ranking. Although Grampian was initially the highest prescriber of alginate it does not appear in

the top three ranks after 2013. The increase in Grampian from 2010 to 2013 of 4.51 is relatively low. In 2016, Shetland held third top ranking, however due to the low population numbers involved, the data may be misleading, and this is evidenced by the wide confidence intervals.

Table 4.07: Top 3 Ranking NHS Boards for prescribing alginate in infants aged 0-1 year (2010 - 2016)

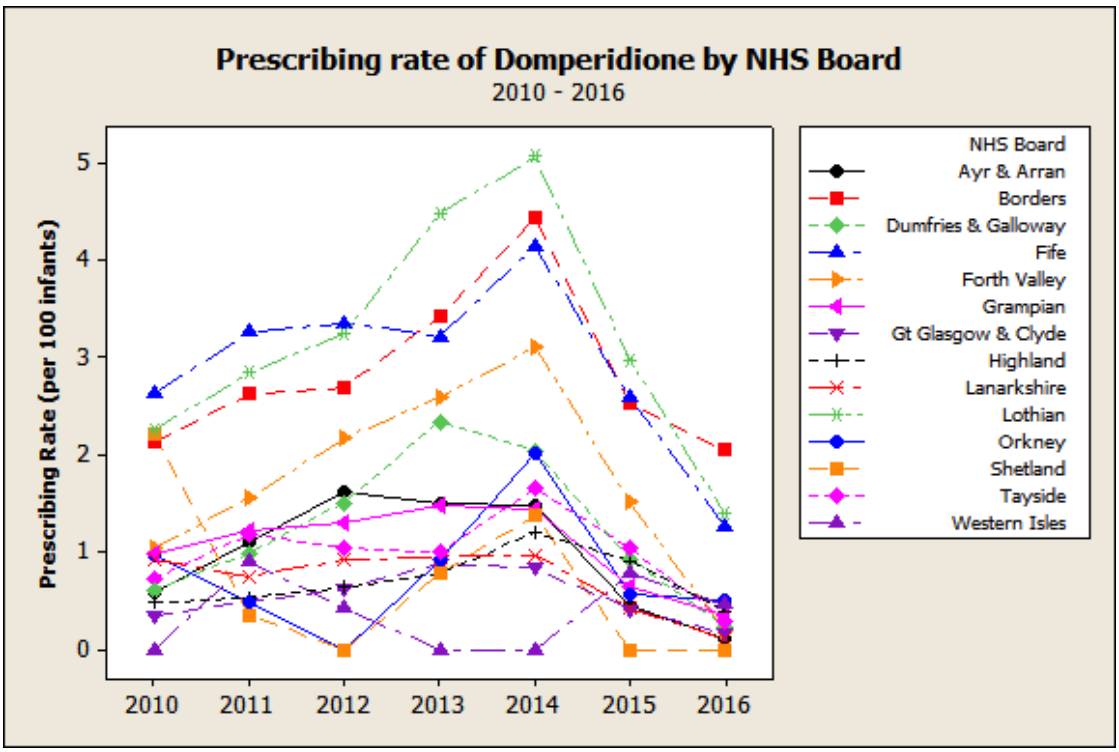
Year	Rank 1 (Highest)	Rank 2	Rank 3
2010	**Grampian**	**Lanarkshire**	**Forth Valley**
Rate (per 100)	20.16	19.08.	17.62
(Lower - Upper CI)	(19.17 - 21.14)	(18.14 - 20.02)	(16.34 - 18.91)
2011	**Grampian**	**Lanarkshire**	**Forth Valley**
Rate (per 100)	22.53	21.40	19.87
(Lower - Upper CI)	(21.51 - 23.54)	(20.40 - 22.39)	(18.54 - 21.20)
2012	**Forth Valley**	**Grampian**	**Lanarkshire**
Rate (per 100)	24.31	23.58	23.35
(Lower - Upper CI)	(22.83 - 25.80)	(22.55 - 24.61)	(22.33 - 24.38)
2013	**Forth Valley**	**Gt Glasgow & Clyde**	**Grampian**
Rate (per 100)	25.69	25.18	24.67
(Lower - Upper CI)	(24.20 - 27.17)	(24.44 - 25.93)	(23.61 - 25.73)
2014	**Gt Glasgow & Clyde**	**Forth Valley**	**Lanarkshire**
Rate (per 100)	27.60	27.29	25.95
(Lower - Upper CI)	(26.83 - 28.37)	(25.72 - 28.86)	(24.93 - 26.97)
2015	**Gt Glasgow & Clyde**	**Lanarkshire**	**Forth Valley**
Rate (per 100)	30.11	29.96	25.07
(Lower - Upper CI)	(29.31 - 30.91)	(28.88 - 31.04)	(23.53 - 26.62)
2016	**Lanarkshire**	**Gt Glasgow & Clyde**	**Shetland**
Rate (per 100)	32.48	27.78	26.89
(Lower - Upper CI)	(31.40 - 33.57)	(26.99 - 28.56)	(21.26 - 32.52)

As alginate, or Gaviscon for infants, can be readily bought over the counter, the recent fall in the prescribing rate of alginate may be due to more parents buying the product themselves rather than seeking a prescription from their GP. Nevertheless, although the efficacy of alginates is weak, evidence supporting its efficacy is stronger than for the other drugs (Tighe, et al., 2014). Alginate is recommended as part of the stepped-care approach by NICE (2015).

4.4.2 Prescribing of Domperidone

The prescribing rate for domperidone, as illustrated in Figure 4.07, shows a steady increase until 2014, thereafter the prescribing rate dropped in all NHS Boards reflecting the national picture and the guidance given by the European Medicines Agency (2014), warning of the risk of cardiac side effects with the use of domperidone.

Figure. 4.07: Prescribing rate for Domperidone in NHS Boards 2010 – 2016



Lothian, Fife and Borders were the highest-ranking boards for prescribing of domperidone over the study period (Table 4.08).

Table 4.08: Top 3 Ranking NHS Boards for prescribing domperidone in infants aged 0-1 year (2010 - 2016)

Year	Rank 1 (Highest)	Rank 2	Rank 3
2010	**Fife**	**Lothian**	**Shetland**
Rate (per 100)	2.63	2.25	2.21
(Lower - Upper CI)	(2.14 - 3.12)	(1.96 - 2.55)	(0.44 - 3.98)
2011	**Fife**	**Lothian**	**Borders**
Rate (per 100)	3.26	2.84	2.62
(Lower - Upper CI)	(2.71 - 3.80)	(2.50 - 3.18)	(1.70 - 3.55)
2012	**Fife**	**Lothian**	**Borders**
Rate (per 100)	3.35	3.25	2.69
(Lower - Upper CI)	(2.80 - 3.90)	(2.90 - 3.60)	(1.73 - 3.66)
2013	**Lothian**	**Borders**	**Fife**
Rate (per 100)	4.47	3.42	3.21
(Lower - Upper CI)	(4.05 - 4.89)	(2.33 - 4.50)	(2.66 - 3.76)
2014	**Lothian**	**Borders**	**Fife**
Rate (per 100)	5.06	4.43	4.14
(Lower - Upper CI)	(4.62 - 5.51)	(3.21 - 5.64)	(3.50 - 4.78)
2015	**Lothian**	**Fife**	**Borders**
Rate (per 100)	2.97	2.59	2.52
(Lower - Upper CI)	(2.63 - 3.32)	(2.08 - 3.09)	(1.60 - 3.44)
2016	**Borders**	**Lothian**	**Fife**
Rate (per 100)	2.05	1.39	1.26
(Lower - Upper CI)	(1.17 - 2.93)	(1.16 - 1.63)	(0.91- 1.62)

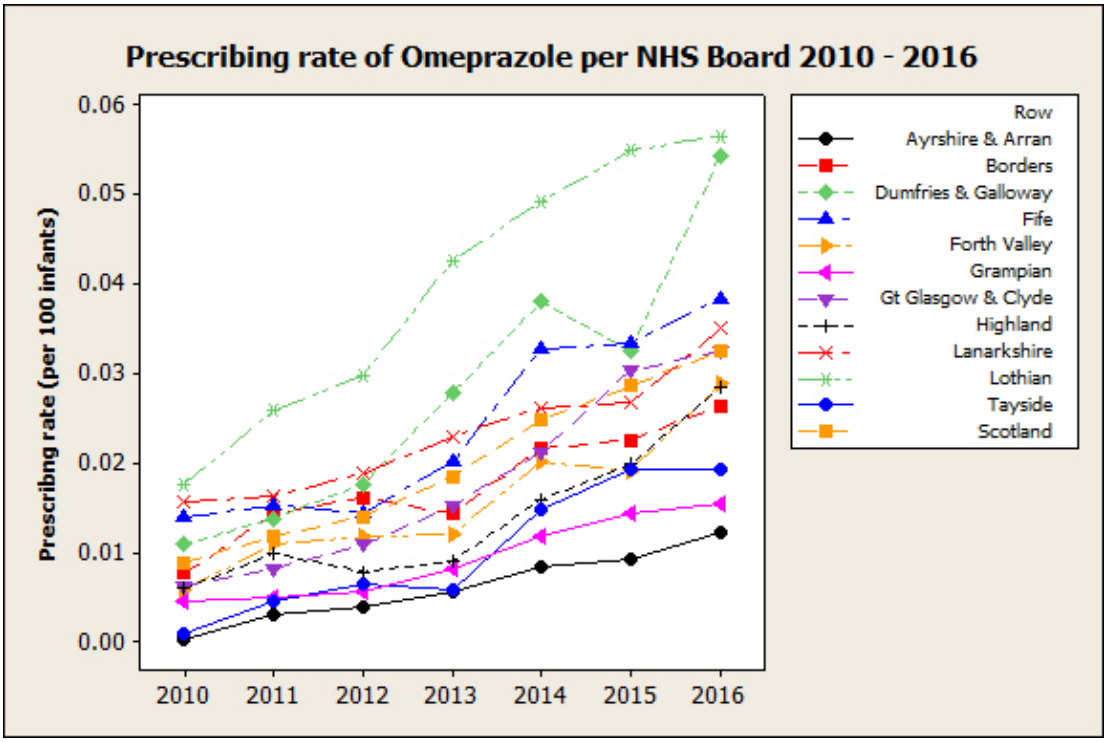
However, despite the falling trend in prescribing of domperidone, Lothian, Fife and Borders continued to have a prescribing rate for domperidone that exceeded the national average (Table 4.06). The reason for this is unclear. Domperidone is no longer recommended for the management of GOR which may explain the falling trend in prescribing (NICE, 2015; Tighe et al., 2014; European Medicines Agency, 2014; Vandenplas et al., 2009). However, domperidone is sometimes prescribed to manage nausea and vomiting in the 0-1-year age group (BNFC, 2019). However, the trend showing a year on year higher than average rate of prescribing of domperidone would suggest this is highly unlikely. Geographically these NHS Boards are in the southeast of Scotland and aligned to the regional hospital in Edinburgh, therefore prescribing practices may have been influenced by prescribing guidelines in Lothian or the

recommendations of the paediatric consultants in Lothian at that time. In contrast, Glasgow and Clyde health board has one of the lowest prescribing rates for domperidone at 0.97 per 100 infants. Again, this may be linked to local guidelines and recommendations by paediatricians in the NHS board area. The reason underlying the high rate of prescribing of domperidone in Lothian and the marked difference in the prescribing practice between Lothian, and Glasgow and Clyde, the two most densely populated health board areas in Scotland, is worthy of further investigation especially if this trend continues.

4.4.3 Prescribing of Omeprazole

Regional variation in prescribing practice is also evident with omeprazole. As illustrated in Figure 4.08, Lothian, Dumfries and Galloway, Fife and Lanarkshire were found to have the highest prescribing rates for omeprazole. In each of these boards the prescribing rate for omeprazole showed an increasing trend over the study period.

Figure. 4.08: Prescribing rate of omeprazole in NHS Boards 2010-2016



Ranking of prescribing rates for omeprazole for each NHS Board area over the seven-year study period is presented in appendix 11. The top three ranking board areas for each year of the study are presented in Table 4.09. Lothian was the top-ranking board in each of the seven years, with the prescribing rate rising from 1.76 per 100 infants in 2010, to 5.65 per 100 infants in 2016. The prescribing rate for omeprazole in Dumfries and Galloway rose sharply in 2016 to 5.40 per 100 infants and was almost level with Lothian. It is also interesting to note that the prescribing rate for omeprazole in Lothian (5.65 per 100 infants) is almost double the prescribing rate for Scotland (3.26 per 100 infants).

Table 4.09: Top 3 Ranking NHS Boards for prescribing omeprazole in infants aged 0-1 year (2010 - 2016)

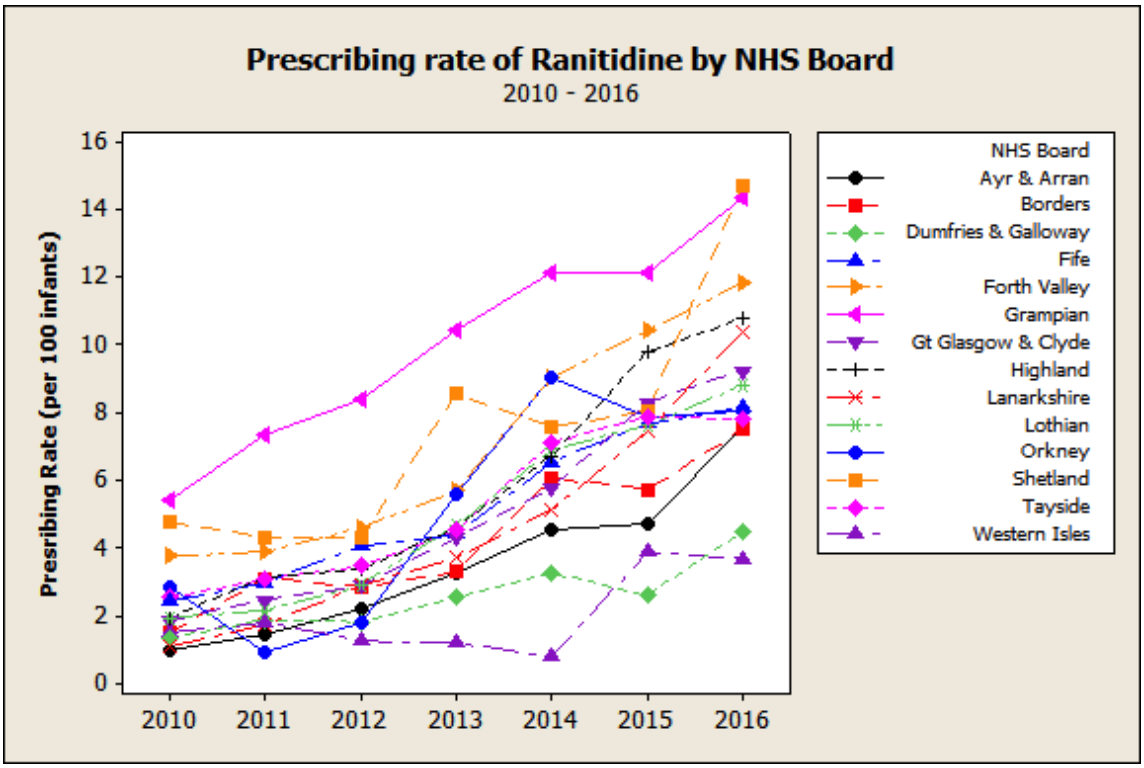
Year	Rank 1 (Highest)	Rank 2	Rank 3
2010 Rate (per 100) (Lower - Upper CI)	**Lothian** 1.76 (1.50 - 2.02)	**Lanarkshire** 1.56 (1.26 - 1.86)	**Fife** 1.40 (1.04 - 1.76)
2011 Rate (per 100) (Lower - Upper CI)	**Lothian** 2.59 (2.27 - 2.91)	**Lanarkshire** 1.64 (1.33 - 1.95)	**Fife** 1.53 (1.16 - 1.91)
2012 Rate (per 100) (Lower - Upper CI)	**Lothian** 2.98 (2.65 - 3.31)	**Lanarkshire** 1.88 (1.55 - 2.21)	**Dumfries & Galloway** 1.77 (1.10 - 2.44)
2013 Rate (per 100) (Lower - Upper CI)	**Lothian** 4.24 (3.84 - 4.65)	**Dumfries & Galloway** 2.78 (1.90 - 3.67)	**Lanarkshire** 2.30 (1.96 - 2.65)
2014 Rate (per 100) (Lower - Upper CI)	**Lothian** 4.92 (4.48 - 5.36)	**Dumfries & Galloway** 3.80 (2.76 - 4.83)	**Fife** 3.27 (2.71 - 3.84)
2015 Rate (per 100) (Lower - Upper CI)	**Lothian** 5.49 (5.02 - 5.96)	**Fife** 3.34 (2.76 - 3.91)	**Dumfries & Galloway** 3.25 (2.27 - 4.23)
2016 Rate (per 100) (Lower - Upper CI)	**Lothian** 5.65 (5.17 - 6.13)	**Dumfries & Galloway** 5.42 (4.15 - 6.69)	**Fife** 3.84 (3.22 - 4.46)

Nevertheless, it is clear from the data that prescribing of omeprazole in the 0 – 1-year age group is increasing in all board areas. This is a concern as proton pump inhibitors, such as omeprazole, are reported to increase the risk of gastric infections such as clostridium difficile (BNFC, 2019; Kierkus et al., 2014). This may have serious health implications for young infants aged 0 – 1 year. Furthermore, cessation of omeprazole may lead to increased sensitivity to gastric acid resulting in an exaggerated reaction, and rebound return of symptoms of dyspepsia and gastro-oesophageal reflux (BNFC, 2019). Consequently, to the uninformed, this may inadvertently suggest a return of symptoms of GOR in infants and lead to further and longer term prescribing of the medicine

4.4.4 Prescribing of Ranitidine

Grampian clearly had the highest prescribing rate for ranitidine over the full study period with the prescribing rate rising linearly from 5.43 per 100 infants in 2010, to 14.35 per 100 infants in 2016 (Figure 4.09).

Figure 4.09: Prescribing rate for ranitidine per NHS Board 2010-2016



The full ranking of the prescribing rate for ranitidine in each NHS Board area is presented in appendix 11. The top three ranking boards for each year of the study are presented in Table 4.10. As well as Grampian and Forth Valley, Shetland also feature consistently near the top of the ranitidine rankings. Due to the relatively small population numbers in Shetland, the individual confidence intervals are wide and indicative of a wide margin for error and less fidelity of the findings.

Table 4.10: Top 3 Ranking NHS Boards for prescribing ranitidine in infants aged 0-1 year (2010 - 2016)

Year	Rank 1 (Highest)	Rank 2	Rank 3
2010	**Grampian**	**Shetland**	**Forth Valley**
Rate (per 100)	5.43	4.80	3.78
(Lower - Upper CI)	(4.85 – 6.00)	(2.19 - 7.40)	(3.13 - 4.44)
2011	**Grampian**	**Shetland**	**Forth Valley**
Rate (per 100)	7.33	4.30	3.89
(Lower - Upper CI)	(6.67 - 7.99)	(1.87 - 6.73)	(3.24 - 4.55)
2012	**Grampian**	**Forth Valley**	**Shetland**
Rate (per 100)	8.43	4.63	4.30
(Lower - Upper CI)	(7.73 - 9.14)	(3.88 - 5.37)	(1.87 - 6.73)
2013	**Grampian**	**Shetland**	**Forth Valley**
Rate (per 100)	10.46	8.56	5.70
(Lower - Upper CI)	(9.70 - 11.21)	(4.98 – 12.14)	(4.89 - 6.51)
2014	**Grampian**	**Forth Valley**	**Orkney**
Rate (per 100)	12.16	9.08	9.04
(Lower - Upper CI)	(11.35 – 12.97)	(8.01 - 10.14)	(4.87 - 13.22)
2015	**Grampian**	**Forth Valley**	**Highland**
Rate (per 100)	12.14	10.44	9.80
(Lower - Upper CI)	(11.34 - 12.94)	(9.35 - 11.53)	(8.67 - 10.93)
2016	**Shetland**	**Grampian**	**Forth Valley**
Rate (per 100)	14.71	14.35	11.83
(Lower - Upper CI)	(10.21 - 19.20)	(13.48 - 15.22)	(10.68 - 12.98)

It is also interesting to note, that in contrast to having one of the highest prescribing rates for omeprazole, Dumfries and Galloway has the second lowest prescribing rate in the mainland boards for ranitidine. Furthermore, Grampian has the highest prescribing rate for ranitidine but had the second lowest mainland board prescribing rate for omeprazole. Conversely Dumfries and Galloway has one of the highest prescribing rates for omeprazole, but for ranitidine has the second lowest prescribing rate in the mainland boards. Compared to most of the other board areas, Ayrshire and Arran had low prescribing rates for all three drugs over the study period although these still show underlying increasing trends.

4.5 Prescribing in NHS Grampian

Due to the high prescribing rate of ranitidine in NHS Grampian, the prescribing data was analysed further. Time series plots and regression were used to identify any linear trend for the prescribing rate for the four drugs in Grampian between 2010 – 2016 (Figure 4.10, 4.11, 4.12, 4.13). A linear trend provided a good fit for omeprazole and ranitidine with R^2 = 94.1% for omeprazole and 97.6% for ranitidine. However, following the advice of the European Medicines Agency (2014) regarding the use of domperidone, the linear trend for domperidone changed and now shows the start of a downward trend with R^2 = 4.1%.

Figure 4.10: Prescribing rate and regression line for ranitidine in infants 0-1 year in NHS Grampian

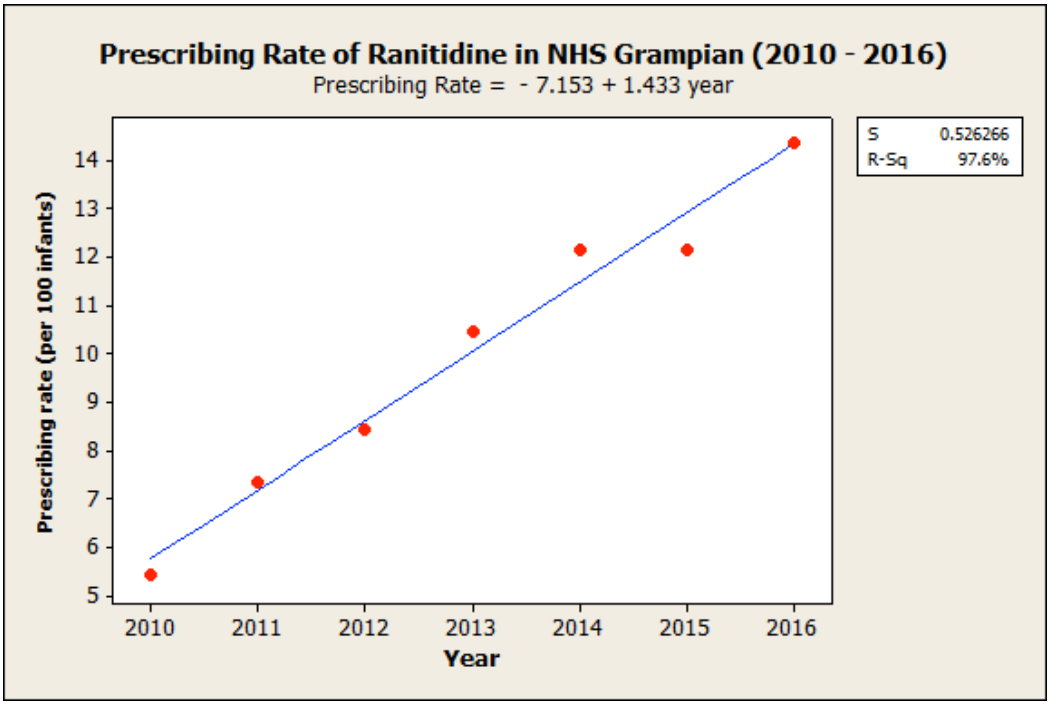


Figure 4.11: Prescribing rate and regression line for alginate in 0-1-year infants in NHS Grampian 2010 -2016

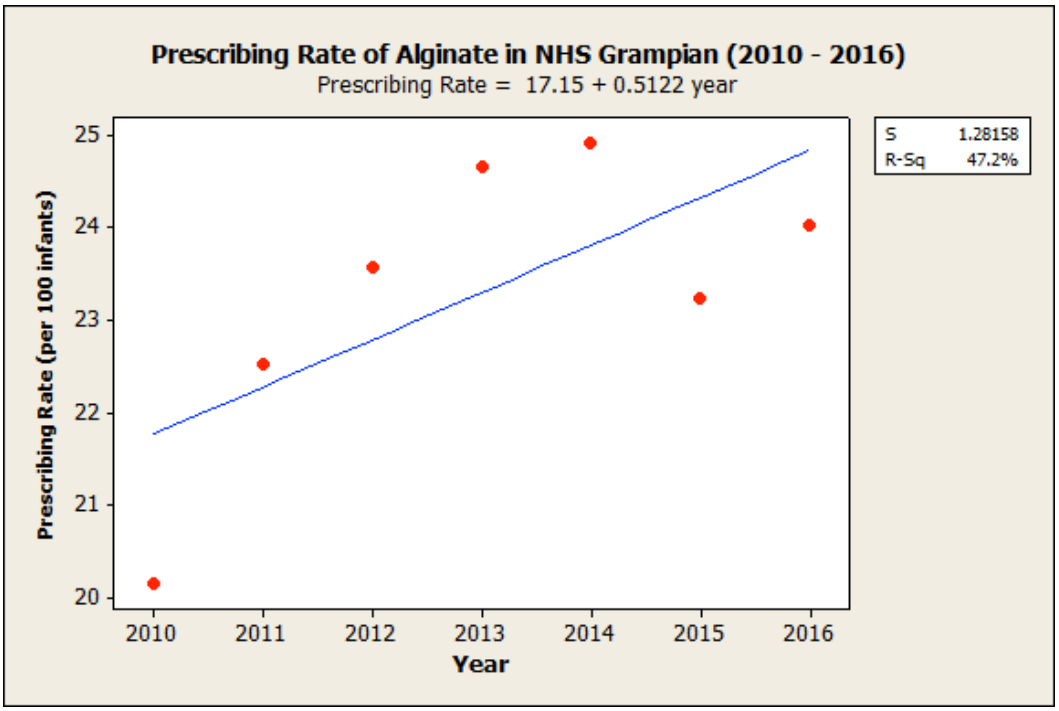


Figure 4.12: Prescribing rate of domperidone in 0- 1-year infants in NHS Grampian 2010 – 2016

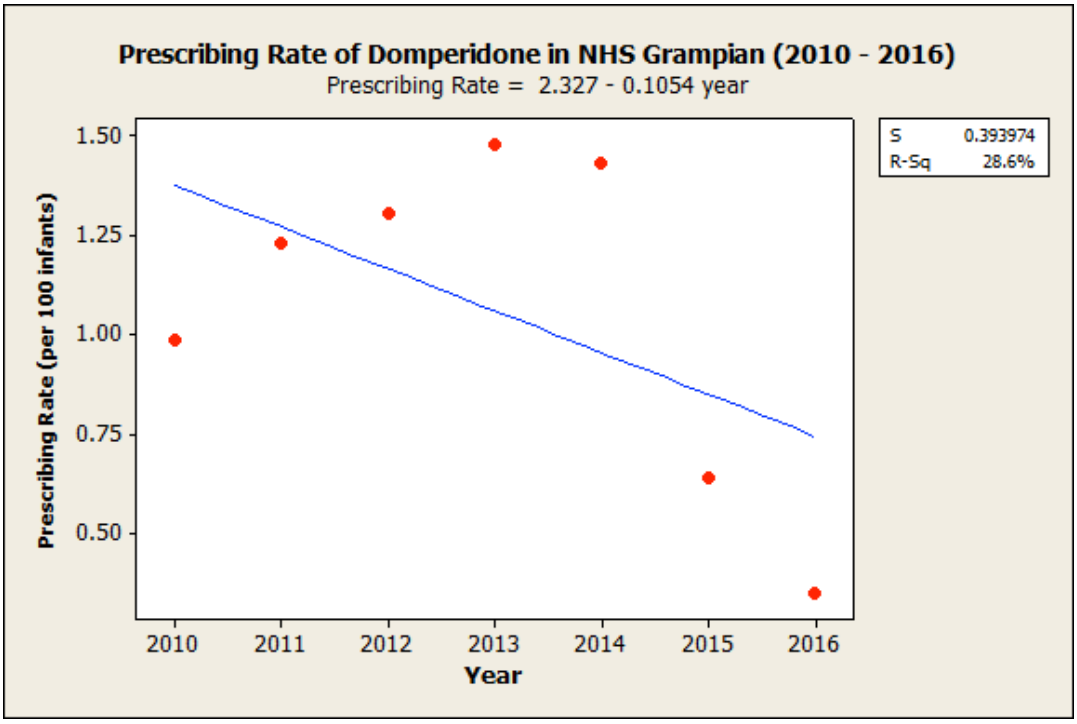
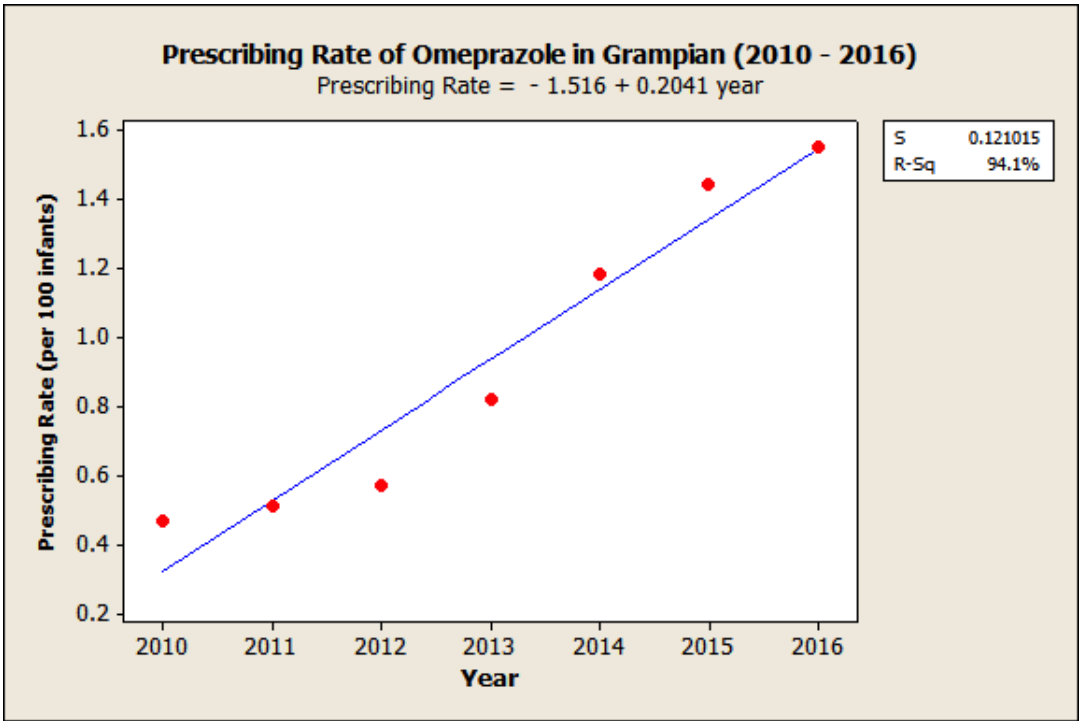


Figure 4.13: Prescribing rate and regression line for omeprazole in 0-1-year infants in NHS Grampian 2010 -2016



The regression coefficients indicate estimated annual increases of 1.43% for ranitidine, 0.20% for omeprazole and 0.51% for alginate. The estimated annual increase of 1.43% for ranitidine exceeds the national estimated increase of 1.27% for the whole of Scotland (section 4.2) and is worthy of further investigation. The plots for omeprazole and ranitidine show no signs of these upwards trends being halted. However, the 2015 and 2016 data for alginate suggest that the overall prescribing rate for alginate in Grampian may be levelling (Figure 4.11).

Interestingly as the prescribing rate for alginate dropped in the year 2015, the prescribing rate for omeprazole continued to rise. The reason for the decrease in the prescribing rates of alginate and ranitidine in 2015 may be revealed in the discussion with practitioners in stage two of the study.

4.6: Conclusion

The findings of the analysis of the national prescribing data from ISD Scotland identified that the population of infants aged 0-1 year in Scotland has steadily declined since 2009 but the number of infants prescribed alginate, omeprazole and ranitidine has risen over the seven-year study period. This is reflected in the increase in the prescribing rate of these medicines and regression analysis shows no sign of this trend abating. The findings also highlight variation in the patterns of prescribing across NHS territorial boards and identified Lothian as consistently having the highest prescribing rate for omeprazole, and Grampian consistently the highest prescriber of ranitidine over the duration of the study. Furthermore, the prescribing rates for the respective drugs in these boards exceeded the national prescribing rates. Currently in the UK, omeprazole and ranitidine are not licensed for use in infants aged 0-1 year, therefore the reason for the high prescribing rates of these medicines in these boards is worthy of further investigation. To develop understanding of the reasons underpinning this rise in prescribing, stage two of this study will focus on NHS Grampian and explore factors influencing and underpinning how health professionals and parents perceive and manage symptoms of GOR in infants aged 0-1 year.

CHAPTER 5: STAGE TWO FINDINGS FROM QUALITATIVE ANALYSIS OF DATA FROM SEMI-STRUCTURED INTERVIEWS

5.0 Introduction

Analysis of national prescribing data in stage one, revealed a rise in prescribing of alginate, omeprazole and ranitidine to manage symptoms of GOR in infants aged 0-1 year. Stage two of the study aimed to explore why there was a rise in prescribing of these medicines to manage symptoms of GOR in this age group. This chapter, therefore, presents data from the qualitative analysis of the semi-structured interviews held with general practitioners, health visitors and parents in the NHS Grampian, the territorial board identified in stage one to have the highest prescribing rate for ranitidine in each year of the 7-year study period.

It should be noted that the health visitors and general practitioners interviewed in NHS Grampian reported very few infants on their caseloads to be prescribed omeprazole (PPI). This reflects the analysis of ISD Scotland data in stage one that identified Grampian as having one of the lowest prescribing rates for omeprazole. Furthermore, the interviews with parents revealed those infants that were prescribed omeprazole had been referred to the hospital and were prescribed omeprazole whilst under the care of a paediatrician as indicated by Maria below:

'Things improved for a little while, but were still not quite right – so, we were then referred to see a paediatrician at the hospital and he prescribed omeprazole alongside the ranitidine, so he is now on a combination of omeprazole and ranitidine.' ***Maria (Parent)***

Consequently, prescribing practice in NHS Grampian and reported in this study primarily relates to Gaviscon (alginate) and ranitidine (H2RA).

The findings from stage one identified a rise in the prescribing of medicines used to manage symptoms of GOR/ GORD in infants, therefore this was explored further in the interviews with health visitors and general practitioners with practitioners asked what they thought had contributed to, or instigated this change in practice. The interviews with parents explored their experience of caring for their infant with symptoms of GOR, their knowledge of GOR, the impact on them and their family, their support networks, and management and coping strategies. The point that parents felt they needed help and support from health professionals was also explored and parents were encouraged to discuss the help, support and advice from health professionals as well as from family, friends, and other sources.

The characteristics of the participants are presented first, thereafter the findings from the data gathered from parents is presented, followed by the analysis of the data gleaned from health visitors and finally analysis of data from the interviews with general practitioners.

5.1 Characteristics of the Participants.

In total 22 subjects participated in the interviews. Eight participants were parents, ten health visitors and four general practitioners.

5.1.1 Parents

All eight parents were women and had partners, and four had older children. All parents chose to breast feed their infant, however, two later changed to formula feeding. Six of the parents lived in a city or urban area and two in more rural locations. Three parents had support from the infant's maternal grandparents, the others (5) did not have family support locally. Six infants were prescribed ranitidine, one parent was offered medicine for her infant but declined it. As indicated in table 5.01 two parents were from outside the UK, and one Scottish parent spent the first 6 months of the infant's life outside the UK. Two infants were later diagnosed with allergies (i.e. cow's milk protein allergy, eggs, nuts).

Table 5.01: Participant Table: Parents
*All names are pseudonyms

Case* (Pseudonym)	**Current Age of Children**	**Partner**	**Feeding**	**Area Type**	**Extended Family Support**	**Medicine prescribed / given**	**Other**
Louise	3-year-old and almost 1-year-old	Yes	Breast	City	None locally	Choose not to give medicine	
Maria	9.5-months	Yes	Breast	City	None in first 5/6 months as living overseas (Norway)	Prescribed Ranitidine and Omeprazole. Referred to RACH and paediatrician	Cow's Milk Protein Allergy, Allergy to eggs Explosive & smelly nappies Lived overseas (Norway) when child born
Penny	3-months	Yes	Bottle (breast fed initially)	Suburb	Maternal grandmother	Prescribed Gaviscon then Ranitidine	
Rachel	3-year old and almost 1-year-old	Yes	Breast	City	Maternal grandfather	Tried Infacol Prescribed Gaviscon then Ranitidine	Dairy Allergy Peanut allergy Eczema Referred to dietician
Susan	2.5-years	Yes	Breast	Village	None locally in first 6 months	Ranitidine prescribed from about 6 weeks	Referred to paediatrician - RACH Early weaning advised
Tanya	1-year	Yes	Breast	Suburb	None locally	Gaviscon then ranitidine	Polish
Ursula	11-year-old and 13-month-old	Yes	Breast	City	None locally	Prescribed Infacol Nelsons colica granules	Swedish
Val	3-year-old and 4-5months	Yes	Breast & anti-reflux milk	Town	Maternal grandparents	Ranitidine	

5.1.2: Health Visitors

Regarding health visitors, and as indicated in table 5.02, four participants had over 10 years of experience as a health visitor, four had between 6-10 years of experience and two health visitors had less than 5 years of experience. All the health visitors in the study were female. Two health visitors worked in a city and the others (8) all worked in rural areas. One health visitor described their caseload area as being deprived, three described their caseload as affluent and the others (6) described their caseload as being areas of mixed affluence and deprivation. Three health visitors also disclosed that one of their own offspring had suffered symptoms of GOR as an infant.

Table 5.02: Participant Table: Health Visitors

Case* (Pseudonym)	**Years of Experience as HV**	**Description of Practice/ Caseload**	**Location**	**Parental experience of own child with symptoms GOR**
Ann	>10 years	Mixed	Rural	Yes
Betty	0-5 years	Mixed	Rural	Yes
Carol	>10 years	Affluent	City	Not known
Dawn	>10 years	Affluent	Rural	Not known
Ella	6-10 years	Mixed	Rural	Not known
Fran	6-10 years	Mixed	Rural	Not known
Hannah	>10 years	Deprived	Rural	Not known
Irene	0-5 years	Affluent	City	Not known
Jane	6-10 years	Mixed	Rural	Not known
Karen	6-10 years	Mixed	Rural	Yes

*All names are pseudonyms

5.1.3: General Practitioners

As indicated in table 5.03, all the general practitioners (4) in the study worked in urban areas and described their practice caseload areas as being affluent.

Three general practitioners had over 10 years of experience and one had less than 5 years of experience. All (4) disclosed that one of their offspring had suffered symptoms of GOR as an infant. Three of the general practitioners worked in the same medical centre. Only one general practitioner was of a different gender, therefore, to maintain anonymity, androgynous pseudonyms are used.

Table 5.03: Participant Table: General Practitioners

Case* (Pseudonym)	**Years of Experience as GP**	**Description of Practice/ Caseload**	**Location**	**Parental experience of own child with symptoms GOR**
Ali	0-5 years	Affluent	Suburb	Yes
Lee	>10 years	Affluent	Suburb	Yes
Jo	>10 years	Affluent	Suburb	Yes
Lesley	>10 years	Affluent	City	Yes

*All names are pseudonyms

5.2 Findings from Analysis of Data from Interviews with Parents

Drawing on the Framework Method (Ritchie and Spencer, 2014a) described in chapter 3, an audit trail of how the data from the interviews were analysed, coded, indexed and finally interpreted within relevant themes was developed (Ritchie and Spencer, 2014a).

This section presents the findings from the interviews with parents and explores the parents' experiences of caring for their infant with symptoms of GOR.

5.2.1 The Parent's 'Reflux' Journey

This theme focuses on the experience of caring for an infant with symptoms of GOR as described by parents, the parent's expectations of parenthood and

caring for a young infant, and also the point or trigger that spurred them to seek help.

Focusing on the 'trigger' to seek help, the interviews with parents revealed that the volume of vomit or regurgitated feeds was a key factor in parents seeking medical help as described by Penny:

' ..... so we got to the point we thought, "This is it." It was no longer a mouthful, it was a proper throw-up, and then we spoke to the health visitor and she referred us to speak to the doctor.' ***Penny (Parent)***

However, seven of the eight parents interviewed were more concerned with the perceived distress and discomfort of their infant as in the excerpt from Maria:

'... pretty soon after he was born, he was really kind of agitated, very uncomfortable and a lot of screaming …. basically all the time and he was having trouble sleeping, so we saw multiple doctors and were told it's colic, it's fine, it's normal, he will be ok …. but, come three months, he will be fine; come four months, he'll be fine; come five months, he'll be fine … but things didn't really get any better.' ***Maria (Parent)***

Regarding expectations, the parents interviewed were all optimistic about parenthood. However, the parents (6) of infants with the more severe symptoms of GOR expressed the view that parenting their infant was more challenging and difficult than they had expected, whilst the parents (2) of infants with

relatively minor symptoms were more accepting of the symptoms considering it to be a normal part of life with a new baby. Nevertheless, Louise whose infant had symptoms of GOR that she chose to manage conservatively commented that it was hard to determine whether, or not, the symptoms were due to GOR. Speaking about GOR she said:

'… I think it (GOR) is a normal thing, but it's hard to understand when it stops becoming normal. I think it's hard to decide when it's a problem, and when to start treating ...' ***Louise (Parent)***

On exploring the expectation of parenting further, parents of infants with severe symptoms of GOR, commented that their experience was not what they expected. The parents understood that their infant may bring back mouthfuls of milk, be unsettled at times and cause them to have a period of sleepless nights. However, they did not anticipate the extent of the distress in their infant and the sheer intensity and persistence of the symptoms, or, that as parents, they could not console or comfort their infant. Rachel, talking about her second baby said:

'I think I felt prepared before he was born and I knew the sort of issues were going to be about managing his relationship with Leo (sibling). I wasn't prepared for there being something physically wrong that I had to manage…. Because, as I said, I'd breast-fed, I was happy that I could comfort him. I knew how to comfort him. I knew how to feed him .... I'd done it before and I felt confident about that ... so, the fact that it wasn't working and I couldn't comfort him ... yeah, then it was quite distressing, really' ***Rachel (Parent)***

Four parents spoke of the impact on their life and being unable to do things such as return to work, go to baby groups, go shopping and so forth because of the regurgitation or the constant crying and distress in their infant. This was not what they expected, and it impacted on their daily life as described in the excerpts from Susan and Maria below:

'.... I was planning on going back to work earlier …. but, there was no way. There was no way with what was going on, and we were just completely, completely flattened by it. We had no idea what was going on. We were shattered. Our entire lives revolved around, basically, vomit'

Susan (Parent)

'He couldn't sleep longer than an hour. He was just upset all the time and we would go to all these baby groups, and he would just be crying. It was just frustrating. We couldn't take him in the car, we couldn't take him in the pram …. he was just screaming, screaming, screaming the whole time.'

Maria (Parent)

Concern for the infant and the perceived distress, discomfort, regurgitation and volume of vomit was a key factor in parents seeking help. However, in some instances, it seems that the trigger to seek help was for the benefit of the parents as much as for the infant. The findings suggest that the symptoms of GOR were impacting on the life and lifestyle of parents as highlighted by Louise and Susan.

'Yes, it was really tough. I was just exhausted. My husband – he slept upstairs in another room because he needed to be ok for work, but I was just like a wreck. I kid you not. I'm sure you must have seen it being a health visitor. I was just utterly, utterly exhausted ….' ***Louise (Parent)***

'Yeah… Going back to the GP after that, he did say it was more for my health. I think he saw me and thought, "Oh, this woman is almost just about to collapse and something needs to be done' ***Susan (Parent)***

On exploring the experience of parents further, the findings suggest that symptoms of GOR presented early in the infant's life and certainly within the first 8 weeks of life. Symptoms were reported to subside when weaning commenced as indicated by Louise and Susan.

'I think he was around four months old when I went to see the GP and he said that was the classic age when it would be at its peak, and that it would stop when he was weaning which was exactly what happened.'

Louise (Parent)

'Now, whether it was a coincidence of his reflux symptoms naturally getting a bit better, or whether the food helped – I don't know.' ***Susan (Parent)***

Regarding symptoms, seven parents reported the infant to spit up, posset, or vomit feeds, however the perceived extent of the regurgitation varied. Susan

described it as being continuous, and on occasions like a ‘vomit fountain’, whereas Louise said that although her baby would regurgitate after every feed, he did not seem bothered by it and she was unsure as to whether, or not, it really was due to GOR. The experience described by the parents interviewed, however, was of infants who were unsettled, agitated, had trouble sleeping, screamed a lot, arched their back and appeared to be in pain. For example, Val said of her daughter,

‘…. she wasn’t sleeping at night initially. We were up every hour. You know, the arching of the back …. the really, really, high-pitched screaming …. although she wasn’t constipated or anything because, at that point, we were just exclusively breastmilk….’ ***Val (parent)***

Three parents described the experience of caring for their infant with symptoms of GOR as being constant and unrelenting as in the excerpt below from Susan:

‘... he was vomiting a huge amount and drinking a huge amount and it was a like a vicious cycle. It got to the point where he would feed, he would vomit. He was obviously then still hungry because he’d just vomited up his feed. I mean, it was all of his feed. It wasn’t just a little mouthful.‘ ***Susan (Parent)***

The intensity and relentlessness of the symptoms were exhausting and very tiring for the parents.

Interestingly, one mother (Ursula) whose infant was unsettled overnight and caused her husband to be anxious, contacted the 'Out of Hours' service for support. The infant was diagnosed with GOR and prescribed Infacol, a medicine more commonly associated with colic.

'*So, I actually went in to out-of-hours support overnight-wise just for support with her and, both times, she fell asleep in the car on the way in, so they didn't see the unsettled baby that we had at home … but, by two different doctors, she was diagnosed as having reflux, and I was given both granules (Nelsons granules) and Infacol to help her.'* ***Ursula (Parent)***

Ursula, however, did not consider her infant to suffer from GOR, instead she perceived the problem to be related to her mastitis and the pain and difficulty experienced when breast feeding. She reported the crying and unsettledness of her infant to have begun and resolve about the same time as the mastitis. Nobody asked Ursula about her breast-feeding experience or how she was coping with breast feeding her baby.

Four parents expressed the perception that friends, family and professionals thought they were exaggerating things and didn't believe the extent of the problem and severity of the symptoms until they witnessed it for themselves as described by Susan:

'...and even with family…. as I say, they were all kind of, "Oh, I've never seen this before." I remember my mother-in-law …. we were on FaceTime one day,

and my husband was speaking to her holding the baby, and he just vomited all over him. She went, "Oh, dear. He's been sick all over you." ..... and he says, "Yeah mum. This is what happens kind of constantly." .... She went, "Oh! I didn't realise it was like that!"..... I mean, when you said, the baby has been sick, everyone just thought that's a bit spit-up sick, and we were just kind of over-the-top first-time parents, rather than instant vomit all the time.'

Susan (Parent)

Two parents also commented that their own mothers (the infant's grandmother) had not known of GOR nor seen infants vomit as much, or to exhibit such severe symptoms when they had been young parents themselves. Penny said of her mother:

'*.... my mum had said she'd never really heard of it like, when we were little. But she'd said she thought a lot of folk just got misdiagnosed as colic because nobody really knew anything about it at that point. That was about thirty years ago … but she says you heard a lot of babies had colic at that point, but was it actually colic, or was it reflux and nobody knew?'* ***Penny (Parent)***

Susan, speaking of her own mother's experience said:

"… I said, "But mum, you had three children." And she said, "None of you had anything like this!" … I said, "How could you cope with three? I'm struggling to cope with one." She said, "But none of my children had this" …'

Susan (Parent)

The advice about conservative or non-pharmaceutical management strategies given to parents from health visitors and general practitioners was reported to be variable. Some health visitors were reported to give advice about conservative or non-medical strategies, others were not. If advice was given by health visitors, it tended to focus on raising the head of the cot or keeping the infant upright for about 20 minutes after feeding. All the parents (8) interviewed reported to get useful tips from family, friends and support groups, whilst seven parents sought advice about the symptoms of GOR from the internet, social media or internet chat rooms.

'It was really like reflux, those kinds of things I Googled, and just advice on how to position the baby when she was eating, how to position her when she was napping, food for me to avoid – those kinds of things.' ***Ursula (Parent)***

All the parents interviewed said they were offered or prescribed medicine for their infant with symptoms of GOR by their general practitioner. A trial period of Gaviscon was prescribed to some infants, whilst for other infant's ranitidine was prescribed as the first choice of medicine by general practitioners. In fact, one parent, Val, commented that the process of diagnosis and decision to prescribe ranitidine was undertaken with the general practitioner over the telephone.

*'**....** I got prescribed Ranitidine before that. I think it was … and that was over a phone consultation ….. so, I hadn't actually been in to see the doctor, but she spoke to me on the phone and said that, if there was no improvement, I would have to go in before they would increase the dose or anything like that .... just*

so that they can give us the once-over to make sure .... so, it was like prescription over the phone which I was a bit shocked at. I thought I would get told to go in.' ***Val (Parent)***

In this instance, the guidance and recommendations of NICE (2015) were not being adhered to.

5.2.2 Emotional and Mental Health Wellbeing

Caring for an infant with severe symptoms of GOR was a grueling experience for parents and created a great deal of stress and anxiety. Five parents described feeling tired and exhausted and being at a very low ebb. Undoubtedly, caring for an infant with symptoms of GOR impacted on their emotional health and mental health wellbeing and this was evident in the excerpts from Susan and Louise:

'There would be days … I mean, I'd be sitting, crying because I was just shattered and didn't know what else to do. In the middle of the night, walk through and my husband's sitting with the baby crying, and he's crying, and he's just like, "I don't know what to do. We don't know what to do to stop this baby … We know he's in distress. We know he is. This can't be nice to be vomiting. We know what it's like to vomit, and he's just a baby." I think it was just that complete desperation and despair. We couldn't do anything and nothing seemed to be helping ....' ***Susan (Parent)***

'I just felt stressed. I just felt there was nothing I could do to help him. You feel helpless. I was just exhausted. I was also just like, "Why is my baby like this?" That's what it felt like. I know there's other babies that have gone through this …. but, it just felt, at the time, that it was just me and people would say, "What's wrong with your baby?" I couldn't do anything. The amount of times I left shopping in the supermarket was just ridiculous. And I just became known as the lady with the screaming baby. People would think you're doing something wrong and blaming me, or blaming my milk and things like that ...'

Maria (Parent)

In some instances, the feelings of helplessness and despair impacted on parent's self-esteem and self-efficacy and two parents felt they were poor parents and were to blame as intimated by Susan.

'I think the most painful thing for me was to see my child in pain and distress and being unable to sort that and to stop it and I was really upset and that just … You know, it's difficult because at the time you think, "What did I do wrong? What am I not doing right? Why can't I make my baby happier? Why is this child so upset?" And you do. And I think you're tired and all these emotions are amplified and you're on your own and you don't know anyone else who is dealing with it, because everyone else you know …. none of their children had this. And you think, "Is it just me? Am I just being a really bad mother, and I can't cope? And is this what everyone has to deal with?"' ***Susan (Parent)***

However, of great concern was the disclosure by one parent that during the time that her infant displayed symptoms of GOR, she had thoughts of self-harm. Her self-esteem had been low, and she had felt helpless and a failure as a parent.

'*When they (health visitors) come over and they make that survey about post-natal depression and they ask you to circle how many times you've thought about taking your own life or .... you know ..... I really fought for survival quite a lot, and you do have really down feelings. When you start to think who to kill first – your child or your baby goes first, and I wasn't able to hurt her, and I wouldn't leave her without being supervised ..... I think that was the only thing why I didn't take my own life!.... You are in such a low place, and it certainly isn't easy.'* ***Tanya (Parent)***

Interestingly, Tanya was not offered any help or support with parenting her infant in the early days of parenthood when she felt it would have benefited her most.

'I think my health visitor knew that I was struggling, but she only offered help at the time when she was better …. so she said, "Oh, there is that ehm … service, the free childcare service that I could maybe refer you for" … But at the time, I didn't need that referral …I needed the referral, especially, in the first two months …. when we had absolutely nobody here to help…. and when I would have welcomed any help I would get. At the time she offered it, she was already

six months. She was getting better, and I was coping better … so, yeah, that was a bit too late for that.' ***Tanya (Parent)***

Moreover, some parents (4) commented that health professionals were only interested in their infant and that he/she was gaining weight. They did not seem interested in the parent's emotional wellbeing and how they were coping. Ursula describes her experience following consultation with a doctor at the 'Out of hours' service.

'*There was no-one who really asked me, "How are you doing? What is your experience?", and asking me a lot of questions about her over the day. It was really just, "If she's unsettled. It is just reflux. It will pass. There's nothing I can really do. It's not going to change overnight." That's what they kept telling me, "It's not going to change overnight. There is no miracle pill." And then I was just expected to go home with her.'* ***Ursula (Parent)***

This suggests that some general practitioners and other medical staff, considered the symptoms of GOR that were perceived to be troublesome by parents to be normal infant behaviours.

There were mixed responses regarding the support received from health professionals. Five parents felt well supported by their health visitor or general practitioner. Often in these instances the symptoms of GOR were less severe, or the health visitor or general practitioner involved were reported by the parents to have had first-hand experience of caring for their own infant with symptoms

of GOR and understood how the parents felt. Nevertheless, three parents expressed that they felt their concerns were not being listened to. For example, Rachel said:

'*I think I was just made to feel that he's just a baby. This is what babies do …. so, even though I'd had a baby who didn't do that, that wasn't … and I was like, "Really? I don't think so because I've had a baby, and yeah, babies cry. I know that, but they don't do this, and they don't vomit like this, and they don't cry like this, and they shouldn't be." I even remember saying he's waking up every forty-five minutes, and they'd just be, "Oh, that must be quite hard." And I'm like, "Yeah …" … but that was it. It wasn't, "Oh, well, maybe we need to find out more about this", or "How can we support you with that?" It was just an "Oh dear, that's terrible.""* ***Rachel (Parent)***

Tanya had a similar experience:

'*You know they (GPs) were just … I find that they weren't really interested because they didn't see a problem. Ehm… I was told that, yes, babies do cry. I appreciate this …. yes, babies cry. But this wasn't a cry. This was a scream ..... a very high-pitched scream. She screamed her lungs out and you know when your hormones are all over the place, and your baby screams like this, I felt my brain really hurt … you know, like your ears and your brain, and you just … It's driving me absolutely mental …. So there is a lot of stress and a lot of anxiety …. and ehm … sometimes you just don't know what to do anymore.'* ***Tanya (Parent)***

Some parents (7), like Tanya in the example below, searched the internet in attempt to try and find out what was troubling their infant and what they could do to help.

'I was Googling quite a lot of stuff. My main concern was, not only that she was screaming that much, the main concern that I had was that she hasn't been sleeping …. so, I searched through quite a lot of articles (at least two thousand, I would say) of both professional and non-professional medical articles and how to get her to sleep, and what could prevent her from sleeping.'

Tanya (Parent)

Regarding family support, few of the parents (3) interviewed had family living locally (see Table 5.01,). Also, some grandparents were reported to still be working, whilst others were caring for their own elderly parents (e.g. infants' great grandparents) or were older grandparents and unwell themselves. All families had good friends who offered support, others found support from attending local baby groups or via social media. Four parents found social media such as Facebook groups useful for support, especially during the night when they were awake with their infant and even during the day if they felt they could not go out. There was always someone on Facebook who they could ask a question or converse with on-line. One parent perceived such Facebook friends as 'extended family' as highlighted in the excerpt from Susan:

'Well, unfortunately, at the time, my mother-in-law was being treated for cancer, so she, obviously, wasn't able to really help out a lot and she's an older

grandparent anyway …..…… I suppose that's why things like Facebook groups and things are useful. It means we get some face-to-face with some of the other groups when it's more difficult to get out. They become like an extended family, I suppose.' ***Susan (Parent)***

' …. my mum couldn't be here to support us because my mum was the main carer to my grandma who has Alzheimer's, so she wasn't able to leave her mum, and there wasn't anybody else who could support us.'

Tanya (Parent)

This suggests that young families nowadays are less likely to have support from extended family in the early stages of parenthood.

5.2.3 Changes Over Time

Reflecting on changes over time, the findings suggest that parents are increasingly using the internet to access information about unsettled infants and symptoms of GOR. This can be positive if reliable web-sites are accessed, however unreliable sites may increase anxiety in vulnerable parents. Most parents (7) also reported using the internet and social media sites to find information about the symptoms GOR in their infant and to contact other parents or to seek advice from support groups.

'I would have just put in Google the search terms, 'vomiting', and then, actually, maybe because I was aware of it, I would have said, 'reflux in babies', 'reflux symptoms', and then you go down the list and you go, tick, tick,

tick – (infants name) has got that; (infants name) has got that …'

Rachel (Parent)

'….. So, we saw a couple of doctors here and then eventually, through looking on the internet, [we said], "Look, could it be silent reflux?"'

Maria (Parent)

'*Mothercare has a 2 a.m. support group on Facebook – so, at 2 a.m., if you're a member, it will pop up, "Good morning, mums. How are you feeling?" So, it's just mum's up breastfeeding or whatever – unsettled night, sort of thing – they can just chat on the Facebook.'* ***Val (Parent)***

'…as I say, three o'clock in the morning, and you're feeding, and you're on Facebook trying to keep awake, you can ask questions and see what's going on.' ***Susan (Parent)***

5.2.4 Conclusion

In summing up, parents felt the experience of caring for their infant with symptoms of GOR to be a challenging and difficult experience and they felt helpless in their efforts to comfort and console their infant. Some families did not have the support of their extended family in the early days after the birth of their baby and valued the support of the health visitor and general practitioner. Others (3) did not find health visitors or general practitioners helpful. Parents in this study were increasingly accessing internet and mobile technology for information, support and advice for a multitude of things including parenting and

symptoms of GOR. This may influence perceptions and expectations of parenthood.

5.3 Findings from the Analysis of Data from Interviews with Health Visitors

This section presents the findings from the analysis of the data gleaned from the semi-structured interviews with health visitors. Analysis of the data helped to gain understanding of how health visitors approach the diagnosis of GOR in infants, as well as explore influences on their decision making when diagnosing and managing symptoms of GOR. None of the health visitors interviewed had current prescribing registration, therefore they did not prescribe medicine to manage GOR in infants.

5.3.1 The Process of Diagnosing GOR

The health visitors all understood GOR to involve the effortless regurgitation of milk feeds back up the oesophagus. This was perceived to be associated with an immaturity of the infant's gut, or a weakness of the valve at the top of the stomach (cardiac sphincter) that keeps contents in the stomach. Whilst most infants vomit back, posset or spit out milk feeds, six health visitors did not consider the visible evidence of vomit necessary for the diagnosis of GOR and seven associated crying, distress and discomfort with symptoms of GOR.

'…. *it would be excessive posseting or vomiting either… ehm.. after a feed or in-between feeds which usually causes a degree of distress to the baby… ehm… because their vomit would be quite acidic ….ehm.. Sometimes, though,*

we find that… ehm… babies are unsettled and aren't actually vomiting, but there's a suggestion that they're regurgitating… ehm… but not actually getting the vomit up, and that is very uncomfortable for them, so they would be extremely unsettled in-between feeds …' ***Ella (HV)***

On further exploration of the cause of the distress and discomfort, the findings revealed that four health visitors perceived infants to be in pain due to regurgitated acid from the stomach irritating the oesophagus. Seven health visitors also spoke of the difficulty of forming a diagnosis due to the symptoms of GOR being similar to other common infant conditions such as colic, and cow's milk protein allergy (CMPA). Three health visitors described diagnosis as a guessing game, or as a process of trial and error.

'You know, it's very hard to define between reflux, cow's milk allergies, and colic, for example. Everyone gets confused a wee bit and they think the research is out there, you know .... It is quite hard to define what's what ....'

Irene (HV)

'It's difficult because colic ... reflux and intolerance .... the baby cannot tell you and you've got to start with the basics and work through and it is, in part, a guessing game. It's nay (not), because you're following guidelines but, in actual fact, it is trial and error and what works with one doesn't work for the another.'

Karen (HV)

Nevertheless, in forming a diagnosis of GOR in young infants eight health visitors spoke of the importance of taking a full history and listening to the parent's concerns. Only three health visitors spoke of observing the infant feeding. However, what the 'history' entailed appeared to be variable. For example, the interviews with Dawn and Betty suggests that the 'history' is generic and based on the parent's perception of the symptoms, whereas the history taken by Karen and Irene focuses on how the infant feeds and is concerned with observing the feeding technique and how much the infant is feeding.

'It tends to be on ..ehm.. the history that you get from the parent and from your clinical … clinical picture that you ...ehm…have of the baby. A lot of it is on parental history… it's what the parents are giving you as that… as that history'

Dawn (HV)

'Well, you obviously get a presentation from what mum is saying and you obviously listen to the pattern of what mum said.' ***Betty (HV)***

'You want their history … the feeding history... you want to know how the baby is fed from birth and, if possible, you want to observe a feed… ehm… In the history you want to know if the volume has gone up, gone down, you want to rule out that the mum is overfeeding the baby … because if, obviously, with the baby being immature, if the tummy is too full then it is going to lead to excess.'

Karen (HV)

'Quite often here, they would want me to watch them do their feed, because they want the reassurance. They want to know they're doing it right, so I do that' ***Irene (HV)***

Nevertheless, there was a perception among the health visitors that if infants were developing normally and gaining weight appropriately, the symptoms of reflux should not cause undue concern as intimated by Karen.

'... If a baby vomits, and is still gaining weight and still happy and content within himself, then that would lead me to believe that this is just a normal process ...that the baby is coping fine with it ... that there is no need for treatment.'

Karen (HV)

The health visitors interviewed all commented that the symptoms of GOR normally resolved when weaning, or the introduction of complementary foods, began at around the age of 6 months.

'Most of them (infants) would grow out, I would say, about six months once they start weaning' ***Hannah (HV)***

Although local guidelines (NHS Grampian) and NICE (2015) guidelines are available, awareness of these guidelines was mixed among the health visitors interviewed. Six health visitors were aware of local guidance and/ or NICE (2015) guidelines, however four health visitors were not aware of any guidelines to support decision-making in the diagnosis and management of GOR.

'Well, there may be (referring to local guidelines), but as I say, I'm not aware of them (local guidelines). I don't know if there's NICE guidelines or SIGN guidelines' ***Carol (HV)***

These findings indicate that despite NICE (2015) and local (NHS Grampian, 2012) guidelines being available, few health visitors accessed them. Those health visitors who were aware of guidelines and protocols did use and refer to them in their work, however others relied on their own professional judgment, or discussed cases with other health visiting colleagues, and / or with general practitioners and dieticians.

'There are no formal guidelines – no – but obviously we liaise with dieticians and also with our paediatricians in (hospital) because that's quite a local contact and, of course, the GPs. We discuss it with GPs. And we discuss it amongst ourselves, really, and as a health-visiting team, and look at what do you think we can do with this situation that's presented.' ***Dawn (HV)***

Further exploration found that health visitors' knowledge of GOR was updated from reading journals or attending local training events from dieticians, although it appeared to be several years since some health visitors had attended such a training event.

'We've also got a talk from dieticians around milk intolerance, reflux … that type of thing.' ***Karen (HV)***

5.3.2 Influences on Decision Making in the Diagnosis of GOR in Infants

In forming a diagnosis of GOR in infants the findings indicate that most health visitors (7) perceived infants to be suffering some pain and discomfort resulting in the infant crying, being unsettled and appearing distressed. These symptoms and behaviours, however, are also typical of other childhood ailments. On further exploration, the findings revealed that four health visitors considered the perceived pain to be due to acid from the stomach irritating the oesophagus. This is interesting as one health visitor (Betty), highlighted learning from a dietician and, did not consider stomach contents to be acidic within two hours of feeding, thereby refuting the belief that acid from the stomach was the cause of pain, distress and discomfort in infants. The belief that regurgitated feeds are 'acidic', and causing pain, may influence diagnostic and prescribing decisions in the management of GOR in young infants.

'.....and they (dieticians) also said ....which is quite interesting....that up to two hours after a feed, when the milk is brought up, it's the same pH level ..... so it shouldn't actually burn .... it shouldn't burn and that's quite interesting.....'

Betty (HV)

On exploring influences on decision making in the diagnosis of GOR, the health visitors interviewed said that they were influenced by the parents' concerns and what the parents told them. The health visitors (10) commented on parents making their own diagnosis of GOR, mainly from information gleaned on the internet. This can present a challenge to health visitors as indicated by Dawn

(below) and may influence decision-making in the diagnosis of GOR in some infants.

'I think now parents are coming to us with ... almost like their own diagnosis. They've .... they've read all about this ... and they've made an assumption about what's going on... and it's quite difficult if they come with that because .... you know, you don't want to say, "Well, actually, I don't believe you", but at the same time ... ehm ... we also can't just jump in to the ... and make that assumption too ... so we have to start again with the history and go through it all in a supportive way without telling them, you know, that we don't agree with them ... ehm, so that's quite difficult sometimes.....' ***Dawn (HV)***

There was also a sense among the health visitors that some parents were anxious, and for the anxiety to transfer to the infant perpetuating the state of unsettledness and distress. Many parents were perceived to be under pressure to return to work, whilst some health visitors (9) believed that some parents had unrealistic expectations of their infant and parenthood. One health visitor associated the high expectation of parenthood with postnatal depression, and feelings of inadequacy and guilt in parents who believed they were failing in their role as a parent. The perception of two health visitors was that these parents wanted a label or diagnosis for the symptoms of GOR in their infant so as to assuage their feelings of guilt and self-blame.

'….we do have a high rate of post-natal depression here and I think it is because of the area (described as affluent) and because of what their expectations were

and I think if they've got high expectations of what it should be like, and then it's not how they perceived it to be, then they are almost really blaming themselves and once they blame themselves and get into that culture … it's their fault, and that's why the baby's being sick because they're not feeding it proper … so they almost want a diagnosis so then they can say, "Well, actually, it's fine, because it's not me." …' ***Irene (HV)***

On probing this further, the interview with Irene (below) suggests that the role of extended family in supporting families has changed and may be a factor exacerbating the stress of parenting.

'....back in the olden days, they always had a lot more family support, they had a lot more ... ehm .... there were lots and lots of people around and someone would take the baby off you or whatever .... whereas, you know, nowadays ... the majority here, anyway ... they're ready to go back to work at six months. They're already juggling everything in their head. Nothing's really changed in their whole life, except .... this baby who's changed everything! But they're still expected to do everything, and they're still expected to do the cooking, cleaning, and go back to work, juggle a baby that's not sleeping like it's meant to ... or not doing what it does in the adverts .... doesn't just have its bottle and go to sleep ... or doesn't just go on a boob and feed... and quickly and all of a sudden they realise this is the reality and it all builds up to make them feel like a failure.'

Irene (HV)

The findings suggest that parental stress and anxiety does influence health visitor's decision-making regarding the diagnosis and management of GOR in infants, and more so if parents appear exasperated and at their wits end as experienced by Betty and Dawn. However, the findings also suggest that by prioritising the needs of parents in this manner, health visitors may be influenced by parents in their decision-making.

'I think if I see a mum that was completely and utterly drained … and exhausted I would probably tell her to go and see the GP sooner….ehm… I'd probably not mess about with her and try and do all this other stuff first (referring to non-pharmaceutical management strategies)……..' ***Betty (HV)***

'... I think, truth be told, I think that professionals ….me included ….. are influenced by parental presentation …. so, I will respond to a mum who is at the end of her tether and it could be that the baby next door has got far worse reflux, but the mum's more tolerant of it so that the baby whose mum is intolerant of it is going to be treated before the baby whose mum is tolerant of it …. so ... I think parental tolerance has got a huge influence on what we do. That's what we respond to … it's the parents.' ***Dawn (HV)***

Three health visitors shared that they had personal experience as a parent caring for their own infant with symptoms of GOR. For example, Betty disclosed that she found caring for her own infant with symptoms of GOR a terrible experience and as a result would never dismiss the possibility of an infant on

her caseload suffering from GOR. Personal experience, therefore, may also influence the decisions and diagnosis made by health visitors.

'I'll never dismiss it (referring to GOR) cos my own daughter had it (GOR) ... and.... I know exactly what, what it's like ... and you know.... it was horrendous – it was absolutely horrendous.... to have a child ... with a diagnosis of that is horrendous ... it is really bad. It puts an awful lot of pressure on the families ... and sleep you know .... that's one of the biggest things ... just because they tend to not sleep .....' ***Betty (HV)***

Again, this suggests a degree of subjectivity by some health visitors when diagnosing GOR in infants and the potential for them to collude with parents.

5.3.3 Changes Over Time

Four health visitors commented that in years gone by, ranitidine was only prescribed to infants with severe symptoms of GOR, that is GORD, following outpatient review and advice from a paediatrician, but now prescriptions for ranitidine are being initiated by general practitioners in primary care.

'..... but you do see far more babies on Ranitidine … early …. rather than a few years ago …. we never would have seen a baby on Ranitidine prescribed by a GP.' ***Ella (HV)***

This may reflect changing perceptions of parenting, baby behaviours and GOR in infants, as well as a more relaxed approach to prescribing.

Other changes over time highlighted within the findings from the interviews with health visitors related to weakening of families ties with young families receiving less support, or no support, from extended family as indicated in table 5.01. The health visitors (10) also noted an increase in the use of the internet and social media sources to access information and support about parenting and symptoms of GOR. This was perceived to cause some parents to have very high or unrealistic expectations of parenting and life with a young infant as highlighted below by Fran and Ella.

'.... I think they've got a lot of forums to go on like Netmums and then they go in and get this whole barrage and sometimes I come in and have a look and I think, "Oh, sweet Lord" – somebody just put on a simple comment and they got a barrage of things back that they never even thought about, and all of a sudden something's gone from something, and all of a sudden they sit and they're thinking of a bigger picture and much more anxiety is put onto them .....'

Fran (HV)

'A lot of the girls talk about Facebooking people, friends, or peers and saying that their baby is sleeping six hours at night and that sort of thing, and whenever a baby is not well, it's very depressing for a mum, and all of us here, we try and tell that mum who is struggling, that that may well be what that girl is saying – that everything is rosy in her garden – but we go into everybody's house, and that's not the case all of the time in every house, and to take it at face value. But there is a degree of pressure, socially, and it's so easily accessible – just go on their phone and that person is there and they ping off a

message. There's no phoning from the phone box at the end of the road and they're not being home. It's so much more accessible…..' ***Ella (HV)***

5.3.4 Conclusion

In summing up the findings from the interviews with health visitors, it seems that health visitors have a crucial role in influencing the diagnosis of GOR. History taking and assessment were considered important in helping to form a diagnosis of GOR, but this practice appears to be variable among the health visitors interviewed. Furthermore, not all the health visitors interviewed were aware of clinical guidelines therefore, the basis of health visitor's knowledge of GOR is unclear and appears to be subjective and strongly influenced by parents. There is also a perception by some health visitors that young parents are influenced by social media and internet sources and as a result had unrealistic expectations of parenthood and were less tolerant of fractious infants that posset and spit back feeds.

5.4 Findings from the Analysis of Data from Interviews with General Practitioners

5.4.1 The Process of Diagnosing GOR

In exploring how general practitioners approached their diagnosis of GOR in infants, it was important to establish their knowledge and perception of what GOR is, its symptoms and the possible causes and consequences. The process of diagnosis builds on this knowledge, and explores the steps taken by practitioners in forming a diagnosis, as well as how they distinguished symptoms of GOR and GORD, and from other conditions such as colic and

cow's milk protein allergy (CMPA). Awareness, and use of protocols and guidelines to support the diagnosis and management of GOR in infants was also explored.

The general practitioners (4) interviewed understood the physiology of reflux to involve the regurgitation of stomach contents, normally milk, back up the oesophagus. Regarding severity of symptoms, two general practitioners described GOR as being on a spectrum with effortless regurgitation of milk feeds at one end and more painful regurgitation and distressed infants at the other end.

'I guess I see it as a bit of a spectrum … so, maybe a refluxy baby is just kind of 'happy spitters', if you like, who do kind of bring up a lot, but they're not bothered by it …. they're developing fine…. they're gaining weight and they're quite happy …. and then you've got, as I see it, a progression along the spectrum. You then get quite unsettled babies who may not always be spitting up or anything, but they seem to be quite distressed a lot of the day….'

Ali (GP)

Three general practitioners, like Ali above, considered GOR to be present without visible evidence of the infant vomiting or posseting feeds. Two general practitioners interviewed considered the distress and discomfort associated with severe symptoms of GOR to be due to acid from the stomach contents irritating the oesophagus as described by Lesley below.

'Well, my understanding of it is sort of acid … ehm … coming up from the stomach irritating the oesophagus and causing pain and discomfort and can ... ehm … lead to vomiting …ehm… but doesn't always lead to vomiting.'

Lesley (GP)

The symptoms of GOR were said by the general practitioners (4) to be similar to other conditions such as colic and cow's milk protein allergy (CMPA) making diagnosis difficult and this was reflected in the interviews with Lesley and Lee.

'Well, I get a little bit lost, if I'm being completely honest, between, like what we discussed …ehm.. between milk intolerance and sort of reflux and the sort of overlap between the two. Is, actually, what we think of as reflux, actually milk intolerance, and vice versa, and that area there is a bit of a grey area – but even just a kinda awareness of the fact that … it could be one or the other, I think, is good to have …' ***Lesley (GP)***

'…… and I see plenty of unsettled babies and if you're honest with the parents, it could be a bit of colic, a bit of reflux …. it could be a bit of intolerance, all mixed in. That's often my chat …. a bit of everything going on here … a little bit of trial and error.' ***Lee (GP)***

This suggests the criteria for diagnosing symptoms of GOR is unclear and the diagnosis dependent on the subjective experiences of the general practitioners. Nevertheless, in forming a diagnosis, the general practitioners highlighted the

importance of taking a good history of the presenting symptoms and situation from parents as indicated below by Lesley and Lee.

'But a lot of it comes from the history I think …. from the mum … you know and sometimes you can sort of ehm … see that the baby is groaning and unsettled and when it is picked up … sort of upright … it just immediately seems calmer… ehm but no I would definitely want to, you know, examine ehm … feel the abdomen ... You know, you wouldn't want something like pyloric stenosis or something like that…. a vomiting baby … although they tend to present much younger ……..... The history is the main thing, with reasonable weight gain ...'

Lesley (GP)

'So, yes, gathering all that information first of all to get a clear picture, and then, obviously, assessing the child to see, is it likely to be reflux, or is it something else?' ***Lee (GP)***

Lee also valued the time spent with parents listening to their concerns and offering reassurance during consultations and commenting on such consultations said:

'…….. but it is time-consuming because often that consultation does take a bit of time….. to examine the baby, make sure you're happy with its growth development …. but even that process is quite valuable …. spending time because often the baby is not even examined. It is just a bit of reflux. Yeah, here's some whatever…… If you can actually ... The parents appreciate that,

and then I can say, "Well, actually, here's another way to go at the moment. Let's just hold back'' …..I do lots of these consultations. There's a cost to that, if you like, there's a resource implication but, you know, that's fine – that's what I do.' ***Lee (GP)***

Regarding awareness of guidelines and protocols to guide the diagnosis of GOR, the general practitioners (4) interviewed were aware of local guidelines, although they did not use these local guidelines or conceded that it had been quite some time since they had accessed them.

'Well, there's NHS Grampian guidelines…. ehm ….there are some sort of guidelines there as such. I wouldn't say I kind of rigidly stick to that though. Again, I draw on a lot of personal experience which maybe is the right or wrong thing to do … I don't know.' ***Ali (GP)***

None of the general practitioners (4) interviewed had accessed the NICE (2015) guideline. On pursuing this further, it appeared that the general practitioners in this study drew on their own personal and subjective experience or liaised with other health professionals for support as indicated by Lee below.

'*We have an old guideline from the Children's Hospital and we have that on our formulary and a link from our own practice formulary to that guideline, but it hasn't been updated for quite some time – but, again, we work quite closely with health visitors and the dieticians of Sick Kids as well ….'* ***Lee (GP)***

Further investigation revealed that the general practitioners updated their knowledge of GOR by undertaking 'GP Hot Topics' courses, or as evidenced by Lesley by attending local training events on the topic of GOR. One general practitioner accessed informal support from medical friends and colleagues within their own social network.

'I heard a talk (about GOR) from the dietician at the Children's Hospital to a group of GPs. It's a few years ago now…..' ***Lesley (GP)***

'I'm happy to phone up my paediatric buddies and say, "I have a kid I'm just not sure about", and they're often fine and give me some advice, but that's a very informal kind of way of doing it, but the parents like that as well. They like the fact that you've had a chat with some specialist about their kid … put your heads together and came up with a plan … they like that' ***Lee (GP)***

This raises the question of where dieticians and paediatricians get their information and evidence about GOR to inform their practice and / or teaching.

5.4.2 Influences on Decision Making in the Diagnosis of GOR in Infants

Although history taking was considered important in forming a diagnosis, further exploration revealed that in some instances health visitors influenced decision-making in the diagnosis of GOR in young infants by general practitioners.

'I think by the time a health visitor refers someone on to me, they've done a fair bit of work with that family, and they have just decided it's reflux …. make an

appointment with the GP…. We, as GPs, have to be sensitive to that as well.'

Lee (GP)

In some cases, it seems that it may be the health visitor that makes the initial diagnosis of GOR, or strongly influences the general practitioner's decision to diagnosis GOR. On exploring this further, the general practitioners acknowledged the expertise and time invested by health visitors to promote non-pharmaceutical strategies to manage symptoms of GOR and to support anxious parents. They also recognised, as general practitioners, they encountered much fewer infants with symptoms of GOR than health visitors and were also more likely to see the more severe end of the spectrum of GOR.

All the general practitioners reflected back on their own experience of caring for their own unsettled infant with symptoms of GOR. Caring for their own unsettled infant changed one general practitioners' perception of GOR and subsequently may have influenced their professional judgement, and decision-making regarding the diagnosis of GOR.

'As I say, I think kinda the first time I became aware of it (GOR) was …. finding out when my own young one was unsettled and ….. something's not right and … and I think … being a medic I was like, "Ach, I'm fine, you know…. it's just one of these … an unsettled child …. you know we see them all the time … they're fine" (laugh)… ehm but I think there's just that kind of instinct about you like… that something's not right …ehm and I think that's how I came about it. …cos I didn't know it (GOR) existed … that was a potential thing…'

Ali (GP)

Interestingly, Ali was the only general practitioner interviewed with less than 5 years' experience as a general practitioner (see Table 5.03). Moreover, one mature general practitioner who, as part of a return to general practice programme, joined a group of young trainee general practitioners on a training event about GOR in infants, commented that a large number of trainee general practitioners in the group had given their own infant medicine to relieve symptoms of GOR.

'I was returning to work and doing a trainee post, I was training alongside much, much younger GPs … a lot of them female, and I still go to an annual learning group. We all meet up once a year and get together and we go through some educational lectures and things like that … and a chap came to speak to us from The Sick Children's Hospital here …… and he was speaking to us about this (GOR) and it became apparent, around the table of about 15 to 20 GPs, most of whom were young females, that a huge number of them had medicated their own children … their own babies …. and, as a .. (age).. (parent) of teenage children, I found it quite shocking, and I did wonder … It would be interesting to look back at me sitting with a cohort of my contemporaries when I was having my babies, if they were all GPs (and a lot of them would have been GPs at that time), how many of them were medicating their babies, and it would have been zero at that time.' ***Jo (GP)***

This suggests that attitudes to unsettled infants with symptoms of GOR among general practitioners is changing. It seems that infant behaviours that were previously perceived as normal, are now being considered as an illness

requiring treatment with medication, and therefore being diagnosed as GOR. It also suggests that medication is perceived by some parents (within the general practitioner population in this instance) to be a resource or asset that enables them to return to their normal working life and daily routines.

The findings also identified that there was a perception among the general practitioners that parents were anxious, therefore, this may be a factor influencing diagnostic decisions. All the general practitioners in the study attributed parental anxiety to the transition and adaptation to parenthood and the responsibility of caring for a new baby. They also associated the anxiety with high or unrealistic expectations of life with a new infant, and lack of support from extended family. Background anxiety was also highlighted as an issue. This centered on the pressure on parents to return to work early due to mortgages and other financial commitments. Parents were considered to have busy working lives and busy home lives that added to their anxiety and stress.

'I think it kinda all depends on what the parents are saying ehm (referring to making the diagnosis of GOR) ….cos a lot of the time, there may be quite a lot of parental anxiety about it.' ***Ali (GP)***

'I also think…. I wonder … if it's (referring to parents presenting babies with symptoms of reflux) to do with their background levels of anxiety in a lot of these parents, you know that ehm…. they're all busy working… busy lives ehm…. and I think when there is a background ….. of just anxiety… not significant anxiety, but just sort of health anxieties….' ***Lee (GP)***

'….. I think probably a lot of the mums that I see that are well-educated and working, maybe don't have the family around – the family support. I mean, I'm making sweeping assumptions here, but just kind of thinking about it – maybe they don't have a mum in the background helping out. It's just them there with the baby themselves and you can see how you can be tearing your hair out if it's getting .....' ***Lesley (GP)***

This differs from the perception of parents. However, it also suggests that some parents consciously or unconsciously attend their general practitioner when their infant is unsettled and has symptoms of GOR when in reality, these parents may be finding it hard to cope with their own personal stress and anxiety, as well as caring for a young infant, and may be in more need of help themselves. By conferring a diagnosis of GOR in infants in instances where parents are perceived to be stressed, general practitioners could be argued to be colluding with parents. Parents, therefore may influence general practitioner's decision-making in the diagnosis of GOR in young infants.

5.4.3 Influences on Prescribing Decisions Regarding GOR in Infants

Regarding influences on prescribing decisions, the findings suggest that decisions made on whether, or not, to prescribe medicine were influenced by the general practitioners understanding of the cause of the symptoms of reflux and their own subjective personal and professional experience. The lack of clarity in forming a diagnosis also led to a process of trial and error in the management and prescribing of medicines for GOR.

'I think it can be quite difficult to know whether to try … If they're quite distressed with, what you'd say, reflux, then you often try maybe just a wee bit of Ranitidine to see if it helps. I do find that often it (Ranitidine) helps in the short term. Even if they increase in weight, there seems to be a point …. where it (Ranitidine) doesn't seem to be as effective … but I would often suggest maybe trialling a diary-free diet quite early on. Again, part of that is personal experience ……'

Ali (GP)

'… and I see plenty of unsettled babies and if you're honest with the parents, it could be a bit of colic, a bit of reflux …. it could be a bit of intolerance all mixed in…. that happens often… a bit of everything going on here … a little bit of trial and error.' ***Lee (GP)***

Other influences on prescribing that emerged from the interviews with general practitioners centred on parent's expectation that medicine be prescribed to manage their infants' symptoms of GOR, the acquiescence of GPs to prescribe, and the concept of defensive medicine. Health visitors were also found to have a role in influencing decisions to prescribe medicine to manage symptoms of GOR. Regarding health visitors, the findings revealed that not only do health visitors influence the diagnosis of GOR by general practitioners, but in some instances they influence general practitioners' decision to prescribe medication.

'Most of the babies that we will see where there is a query diagnosis of reflux, will have been seen by health visitors and they will have been advised to come and see us to… ehm.. to perhaps, explore things a bit further, often already with

a suggestion from the health visitors of something that we may wish to prescribe…. ehm… Sometimes we'll get messages on our ….. doctor screen just asking us to prescribe …. You know suggesting that we prescribe something based on a diagnosis having been made by the health visitor.'

Jo (GP)

On discussing the medical management of GOR further and the length of time infants with symptoms of GOR were prescribed medicine, it was disclosed that in some instances decisions regarding the continued prescribing of medicines, such as ranitidine, were made by health visitors.

'I think, in my mind and consciousness, I'm sort of leaving some of the follow-up and decision-making about Ranitidine to a health visitor, but it is ultimately me that's prescribing it, but if you put it on our system with just one repeat on it, they can't go off and give it to the baby for two years.' ***Jo (GP)***

This suggests that general practitioners value the knowledge, skills and expertise of health visitors in supporting families caring for infants with symptoms of GOR and the decisions and recommendations they make.

The influence of parents on prescribing decisions was interesting. All the general practitioners interviewed highlighted the importance of spending time listening to, talking to and reassuring parents about their infant, the symptoms of GOR and non-pharmaceutical management strategies as well as the potential medicines available as intimated by Lee:

I'll give a little bit of reassurance about the natural history of it – so, they've often had some advice about nursing, posture, feeding and may have had advice about thickeners as well. ***Lee (GP)***

However, on further investigation the findings revealed that all the general practitioners had felt under pressure to prescribe medicine by parents, or that parents expected a prescription for medicine to manage the symptoms of GOR in their infant.

'I'm not aware, when they come to see me, that they've got a great understanding of the natural history of the reflux problem and the sort of treatments available, but many of them do come in knowing that there are drugs like Ranitidine and Omeprazole and they have those words and you know that, obviously, that's their expectation …. that they know there's a drug that can cure their baby's problem.' ***Lee (GP)***

'….. so, by the time they're sitting in front of us, there's a different expectation and often … we're now seeing the next … the second and the third babies in the same family with mum sitting in front of us saying, "Gaviscon sorted this one", or "Ranitidine sorted that one, can we just have it?" They're absolutely asking for it outright.' ***Jo (GP)***

On exploring where parents sourced information on the symptoms of GOR and the medicines available, all the general practitioners (4) believed parents to learn about GOR from health visitors whilst three commented on parents

sourcing information on-line. This suggests that some parents may 'self-diagnose' GOR in their infant, based on information on the internet and consult their general practitioner with the expectation of getting a prescription for medicine.

'They've usually Googled something, or they've been on forums like Mumsnet and that kind of thing. They're quite popular sites to go on, so if they come in with some problem, they've already kind of … they've got an expectation there or they have an idea in their heads.' ***Ali (GP)***

Nevertheless, the findings indicate that general practitioners were aware that some parents were anxious, and that caring for an unsettled infant with symptoms of GOR can be stressful and exhausting, therefore, some general practitioners, as highlighted by Lesley, are acquiescent and willing to prescribe medicine to manage GOR in infants whose parents are perceived to be stressed and have difficulty coping. One general practitioner raised the notion of defensive medicine which suggests that subliminally, some general practitioners may be colluding with parents or feel under pressure to prescribe medicine for their infants' symptoms of GOR or do something to help stressed and anxious parents. In such instances the prescribed medicine may act as a placebo.

'The importance is to reassure parents because… you know… if they have a screaming, unsettled child it's… especially if it's a first child and….. what you're doing with a new baby, "Am I doing this right?", and it can really affect one's

confidence …. you know… and have an impact on their mental health…. That's why I think…. that it's one of the reasons why I think if administering Ranitidine in any small way might help, I tend to be quite happy to prescribe it.'

Lesley (GP)

'We're guilty of ... Defensive medicine as well ... You think, "Well, I'd better do something." It's easier to prescribe…. keep them happy… they want something….fair enough. Perhaps it's harder, and takes longer to say, "Maybe that's not the right way to do it."' ***Lee (GP)***

5.4.4 Changes Over Time

Regarding changes over time, the findings from general practitioners suggest that the increasing use of the internet by parents may be a factor leading to a rise in the prescribing of medicines for GOR in infants. It appears that some parents are active consumers in their health care, and during the consultation share their learning from the internet with the general practitioner and actively engage and participate in the decisions made regarding the diagnosis and management of GOR in their infant. The changing role and reliance on extended family for support in the early days following the birth of the baby may also be a factor influencing parental coping as well as diagnostic and prescribing decisions by general practitioners. The findings also suggest a change in the criteria by which a diagnosis of GOR is made. This may be linked to changing societal expectations of parenthood and normal infant behaviours.

Two general practitioners, however, expressed concerns about prescribing practices and the increase in prescribing. For example, one general practitioner commented that the more widespread a prescribing practice is, the more relaxed practitioners become about prescribing medicines such as ranitidine. This was likened to the prescribing of thalidomide to pregnant women in the 1960's when it became socially accepted to prescribe medicine to manage morning sickness. Another general practitioner alluded to 'defensive medicine', meaning that on occasions it may be easier to prescribe medicine, as they feel under pressure to do something to alleviate the symptoms of GOR for anxious parents. This suggests that some parents expect to get a prescription when attending their general practitioner and that prescribing medicine to manage symptoms of GOR by some general practitioners is be becoming normal practice.

'But the more widespread a practice is, the less reticence there will be among practitioners to engage in that practice and to do that prescribing, perhaps without stopping and thinking enough about the fact that it's not been validated in the longer, longer, longer term and, presumably, if mothers were fully aware …' ***Jo (GP)***

This general practitioner also expressed concern about the impact of drugs such as ranitidine on the gastric mucosa of young infants.

'My own concern is that this is a drug (ranitidine) that acts on the lining of the stomach and, is that what tiny wee physiological gastric mucosa's need, or can

they withstand that sort of interference in terms of the longer term …. you know, the maturation process of these cells, and of the baby's digestive and immune system? I don't know. There must be some scientists in the world who are concerned about this.' ***Jo (GP)***

5.4.5 Conclusion

The lack of clear criteria on which to make a diagnosis of GOR creates challenges for general practitioners in diagnosing and managing infants with symptoms of GOR, resulting in a reliance on their own tacit knowledge and subjective experience. Parental expectations were also found to influence diagnostic and prescribing decisions by general practitioners, whilst other parents were perceived by general practitioners to suffer underlying anxiety and stress. The findings also suggest that health visitors may influence general practitioner's decision making in the diagnosis and management of GOR in infants. Furthermore, it appears, that over the years prescribing practice has become more relaxed and it has become socially acceptable and normal for infants to be prescribed medicines to manage symptoms of GOR.

5.5 Conclusion

Stage two of the study focused on NHS Grampian and explored why there was an increase in the prescribing of medicines to manage symptoms of GOR. The aim was to understand the situation from the perspective of health visitors and general practitioners as well as from parents of infants with symptoms of GOR and try to unveil what, if anything, had changed over time to help explain the rise in prescribing of medicines in the management of symptoms of GOR.

The findings reflect a lack of clarity in the diagnosis of GOR with many of the health visitors and general practitioners relying on their own personal experiences rather than clinical guidelines and evidence-based sources when diagnosing GOR in young infants. Other influences identified include parental anxiety. However, whilst health visitors, general practitioners and parents acknowledged that parents of infants with symptoms of GOR experienced stress and anxiety, the cause of the stress and anxiety was understood differently between the health professionals and the parents. Health visitors and general practitioners alluded the stress and anxiety to be attributed to high or unrealistic expectations of parenthood, the pressure to return to work and the absence of support from grandparents and extended family as well as reliance on the internet and social media. The parents interviewed, considered their stress due to the incessant screaming and distress of their infant and their inability to console the infant. This led to sleepless nights, exhaustion and a feeling of isolation, particularly if grandparents were not at hand to lend support, and support from other sources such as health professionals was lacking. Pressure from parents and parental anxiety, therefore, influences health visitors and general practitioner's decision making regarding the diagnosis and management of GOR in infants.

The findings also revealed some changes over time that may be relevant and have an influence on the management and prescribing decisions of health professionals when faced with infants with symptoms of GOR. A change identified in the findings relates to the diagnosis of GOR and the understanding now that the presence of overt regurgitation, posset or vomit is no longer a

requirement in the diagnosis of GOR. Family networks and family support is also reported to be changing. Most families in the study lived at a distance from extended family and grandparents. This suggests a weakening of family support networks and was also reflected in the interviews with health visitors and general practitioners. Another change of interest that may have influenced management strategies and prescribing practices concerns the increasing use of the internet and social media. Several parents reported to access the internet and social media for information and support, whilst health visitors and general practitioners also commented on the increasing use of social media by patients and clients. Interestingly the findings also suggested that there is a perception amongst some parents that the symptoms of GOR may be more severe or exaggerated nowadays compared to previous generations. This is interesting and requires further research and investigation to explore this further.

CHAPTER 6: DISCUSSION OF FINDINGS FROM STAGE ONE AND STAGE TWO

6.0 Introduction

This chapter interprets the findings and explores influences on the diagnosis and management of symptoms of GOR in infants. Essentially, the findings reveal a rise in prescribing of Gaviscon (alginate), omeprazole (PPI) and ranitidine (H2RA) to manage symptoms of GOR in infants, as well as potential factors that may be contributing to this rise. Analysis of the data in stage one indicates this trend is likely to continue, whilst the data from stage two highlight that the decisions and actions of health visitors and general practitioners regarding symptoms of GOR are strongly influenced by parents. Furthermore, the unclear diagnostic pathway regarding GOR has led to some general practitioners relying on the opinion of health visitors whom they perceive to be experts in infant and early child care, or on their own personal and professional experiences. This is contrary to the recommendations of current guidelines (NICE, 2015; Rosen et al., 2018), and suggests that normal infant behaviour, such as symptoms of GOR, has become medicalised. This chapter, therefore, will begin with a discussion of the findings of the study in relation to the literature on the diagnosis and management of GOR by health visitors and general practitioners, and the parents' experience of caring for infants with symptoms of GOR. Thereafter the theoretical framework, the medicalisation of normality, will be discussed in relation to everyday child care and the symptoms of GOR and the contribution of the study to this literature. Finally, strengths and limitations of the study will be presented.

6.1 Patterns of Prescribing of Medicines in the Management of GOR in Infants

The findings from stage one identified that the number of infants aged 0-1year in Scotland and prescribed alginate, omeprazole and ranitidine increased over the 7-year study period and that the prescribing rates for these medicines in this age group in Scotland also increased. Whilst the findings highlight a rise in the number of infants aged 0-1-year prescribed these medicines, population statistics from the National Records of Scotland indicate that over the study period there was a decline in the overall number of infants aged 0-1 year. Therefore, reflecting on these demographic changes, the proportion of infants aged 0-1-year in Scotland prescribed these medicines to manage symptoms of GOR may be rising more sharply than the study data suggests.

The data revealed that in Scotland, both the number of infants prescribed omeprazole, and the prescribing rate for omeprazole increased over three-fold between the years 2010 and 2016. These findings replicate data from other studies (Table 6.1) in New Zealand, Australia, Belgium and the United States that reported an increase in the use of PPI medicines, including omeprazole, in infants aged 0-1 year (Hudson et al, 2012; Blank and Parkin, 2017; Bell et al., 2018; Illueca et al., 2014; De Bruyne et al., 2014; Chen et al., 2012; Barron et al., 2007). The findings of this study indicate that the upward trend in prescribing of omeprazole is likely to continue with regression coefficients indicating estimated annual increases of 0.4% for prescribing of omeprazole in Scotland.

Table 6.1 International Comparison of Change in Use of PPI Medicine in 0-1-year infants

Country	Publication	Change in use of PPI medicine	Years of study
Scotland	Cowie et al. 2018	Omeprazole (PPI) > over 3-fold	2009 - 2016
United States	Illueca et al., 2014	PPI > over 2-fold	2004 - 2008
	Chen et al., 2014	PPI > 11-fold	2002 - 2009
	Barron et al., 2007	PPI > 4-fold	2000 - 2003
Australia	Bell et al., 2018	PPI > over 2-fold	2006/8 – 2014/16
New Zealand	Blank and Parkin, 2017	PPI > over 2-fold	2005 - 2010
	Hudson, 2012	Omeprazole (PPI) > over 4-fold	2005 - 2010
	Reith, 2011	Omeprazole (PPI) > 2-fold	2006 - 2010
Belgium	De Bruyne et al., 2014	PPI > 30-fold	1997 - 2009

The picture is similar for ranitidine. The findings revealed that the number of infants in Scotland prescribed ranitidine, and the prescribing rate of ranitidine both increased almost four-fold between 2010 to 2016. Studies investigating prescribing patterns of ranitidine and other H2RA medicines, however, are limited. This study, therefore, adds to the body of literature regarding ranitidine use in infants aged 0-1 year. Of the studies available, De Bruyne et al (2014) reported an increase in prescribing of H2RA medicine (i.e. ranitidine) in infants age 0-1 year in Belgium, whilst Bell et al., (2018) reported that in Australia the prescribing rate of H2RA medicine (i.e. ranitidine) declined from 2012. The reason for the decline in prescribing of H2RA medicines in Australia is unclear, however it may be linked to the reported rise in the rate of diagnosis of GORD and decline in the diagnosis of GOR in infants aged 0-1 from 2012 (Bell et al, 2018). Bell et al., 2018), indicate that there was a preference among practitioners to prescribe PPI medicines (i.e. omeprazole) to infants diagnosed with pathological GORD, and HR2A medicine (i.e. ranitidine) to infants diagnosed with physiological GOR. As with the findings of this study, the findings of the study by Bell et al. (2018) suggest that symptoms of physiological GOR in infants has become medicalised. Regarding the current study, the

findings indicate that the upward trend in prescribing of ranitidine shows no sign of abating with regression coefficients indicating estimated annual increases of 1.3% for prescribing of ranitidine in Scotland. In NHS Grampian, the area selected for further study in stage two, the prescribing rate for ranitidine consistently exceeded the national average throughout the study period. Furthermore, the regression coefficient estimated an annual increase of 1.4% for prescribing of ranitidine in NHS Grampian which is greater than the national estimated increase of 1.3%.

As discussed in the literature review evidence of the efficacy of omeprazole and ranitidine to manage symptoms of GOR is weak, and neither medicine is licensed for use in the 0-1-year age group, the population of interest in this study. Therefore, the reason for the increase in the use of these medicines to manage symptoms of GOR in infants needed to be explored further in stage two of this study.

6.2 Influences on Decisions to Diagnosis GOR in Infants

Parents were found to have a key influence on decisions regarding the diagnosis of GOR. However, what drove parents to seek a 'label' or diagnosis for the symptoms of GOR in their infant exposed new insights into the medicalisation of normality (Zola, 1972; Jutel 2011a).

6.2.1 Parental Stress and Anxiety

Analysis of the findings revealed parents of infants with symptoms of GOR to be anxious and stressed. There was a perception among health visitors and

general practitioners in this study that parents nowadays want to carry on with life and social activities as it was before the infant was born. For example, the health visitors and general practitioners interviewed reported that nowadays women need to return to work soon after their infant is born to maintain financial commitments such as mortgage repayment, whereas in previous generations many women gave up paid work to raise their family (Cornwell, 1984; Giddens and Sutten, 2014). According to the health visitors and general practitioners interviewed, this creates stress and feelings of failure in parents who cannot achieve this ideal. Furthermore, such parents were perceived by the health visitors and general practitioners in this study to be less tolerant of symptoms of GOR such as crying, distress and regurgitation, that they generally considered to be normal infant behaviours. The findings, therefore, suggest that the impact of these symptoms of GOR on the parent's lifestyle and stress levels is a key driver for some parents seeking medical help, and a diagnosis to confirm the symptoms. A confirmed medical diagnosis facilitated access to prescription medicine, that is perceived to relieve symptoms of GOR and allow parents to return to their normal routines and activities.

In contrast to the findings from the health visitors and general practitioners, parents in this study indicated that they were optimistic about parenthood. They expected sleepless nights and for their infant to posset and be unsettled at times. However, they did not anticipate these symptoms being as frequent or as intense as they were and for their infant to be upset and distressed. Even those parents who had older children were not prepared for the unrelenting persistence of the symptoms and distress, or their inability to console and

comfort their infant. This suggests that the symptoms of GOR that are perceived by parents to be troublesome, severe and distressing to the infant are generally considered to be normal infant behaviours by some health visitors and general practitioners. Consequently, this may have influenced decision-making and led to less infants being diagnosed with GOR.

The reason for the dissonance in views between health professionals and parents is unclear but may be linked to the older maternal age of women when having their first child (ISD Scotland, 2018, 2018b) that will be discussed further in section 6.2.2. For example, a study by McConachie et al (2008) that focused on maternal wellbeing reported older and more educated mothers to find parenting more stressful than younger mothers. Compared to younger mothers McConachie et al (2008) found that older (over the age of 30 years) and more educated mothers perceived 'daily hassles' such as cleaning up the mess of their infant posseting or being sick, and unpredictable baby behaviours, such crying and unsettledness that are typical of symptoms of GOR, to be more severe and frequent.

According to the health visitors and general practitioners interviewed, it seems that attitudes and expectations of parenthood have changed and that some parents have a reduced tolerance of these 'unexplained symptoms' that are typical of GOR, and previously considered normal infant behaviours. Consequently, this adds to their feelings of stress and anxiety, as well as feelings of inadequacy and a failure as a parent if they cannot alleviate the symptoms or soothe and comfort their baby. Some parents, therefore, are

driven to find a medical diagnosis or medical explanation for their infants behaviour or ‘unexplained symptoms’. Having the medical diagnosis of GOR exonerates them from blame and failure as a parent. It also reinforces their rationale and demand for a prescription for medicine that is perceived to alleviate the symptoms of GOR and in turn allow them to resume their normal routine and lifestyle. Furthermore, having a medical diagnosis of GOR increases the likelihood that medicine will be prescribed. This is reflected in the steady increase in the prescribing of medicine that is evident in the findings in stage one of this study. Consequently, this suggests that it is parents rather than health professionals who are driving the medicalisation of these normal infant behaviors, and the increase in prescribing of medicines for symptoms of GOR.

Interestingly, some infants in this study who were reported, by their parents, to be very distressed and to exhibit severe symptoms of GOR were later diagnosed with cow’s milk protein allergy (CMPA). This indicates the need for health visitors and general practitioners to exclude other conditions with similar symptoms, such as CMPA, when making diagnostic decisions regarding symptoms typical of GOR in infants and lead them to seek out medical approaches to address this issue.

Reflecting on their experience, some parents expressed that the stress of caring for their infant and symptoms of GOR resulted in them feeling exhausted, low in mood and in extreme cases feeling depressed and suicidal. This accords with the existing evidence base that associates maternal mood, anxiety and

depression with unsettled and crying behaviours in infants (Don et al., 2002; Matthies et al., 2017; Petzoldt, 2018). However, the direction of the causal effect appears to be two-way with maternal mood influencing infant behaviours, and infant behaviours influencing maternal mood (Don et al., 2002). Whilst the health visitors and general practitioners were aware of links between low maternal mood and depressive illness with unsettled infants, the parents in this study perceived that health professionals were only interested in the infant and were not concerned about their maternal health, emotional wellbeing or coping.

The health visitors and general practitioners interviewed all stated that they listened to parents and their concerns, however some parents whose infants had severe symptoms of GOR, reported poor experiences in their encounters with health professionals, claiming that they (health visitors, general practitioners, accident and emergency paediatricians) did not listen to them or were not interested in their concerns. This resonates with literature regarding medically unexplained symptoms in adults, whereby people with symptoms that have no pathological underpinning and no scientific or evidence based medical explanation, such as myalgic encephalomyelitis, feel disbelieved and discredited by health professionals (Page and Wessely, 2003; Nettleton et al., 2006; Werner and Malterud 2003). Symptoms of GOR in infants are medically unexplained as there is no definitive diagnostic test, and diagnostic criteria in clinical guidelines are vague and open to interpretation (NICE, 2015; Rosen et al., 2018). Furthermore, existing evidence suggests that people with medically unexplained symptoms are generally dissatisfied with encounters with medical practitioners (Johansen and Risor, 2017; Nettleton, 2006; Werner and Malterud,

2003). This was also the experience of some parents in this study but by proxy, or regarding their infant's symptoms of GOR.

The data from this study also identified that for some parents, labelling the symptoms with the diagnosis of GOR, served to authenticate their concerns about their infant's symptoms and to remove feelings of inadequacy, blame and failure as a parent. In contrast, those parents in this study who experienced diagnostic uncertainty regarding their infant's symptoms of GOR felt despondent and powerless to help their child and this impacted on their self-esteem. This mirrors the experience of adults with medically unexplained symptoms (Nettleton et al., 2005; Nettleton, 2006; Page and Wessely, 2003). The need for a diagnosis and to have their infants' symptoms of GOR validated and their experience and stress of caring for their infant and the symptoms acknowledged, is a key factor driving parents to seek a medical diagnosis. Furthermore, Nettleton (2006) highlights that people with medically unexplained symptoms are often highly motivated to find a diagnosis, and Werner and Malterud (2003) in their study of women with unexplained back pain, found that the women in their study went to great efforts to be perceived as credible and have their symptoms acknowledged as being genuine by doctors. Motivation by some parents to have a diagnosis of GOR for their infants' symptoms, and access to prescription medicine, was evident in this study and was a factor driving the diagnosis of GOR and the subsequent rise in prescribing of ranitidine that is evident in the findings.

6.2.2 Shifting Social Support Structures

Why parents are perceived to be more stressed nowadays than in previous generations is interesting and may be linked with changing family support structures and increasing use of the internet and social media.

According to the findings many new parents lack family support compared to previous generations when grandmothers supported their daughters to look after and care for their children (Cornwell, 1984). In this study, the findings indicate that many families do not have support from extended family in the early days with a new baby due to extended family living at a distance, grandparents still being in employment, being a carer for their own parents, or being elderly themselves and in poor health. This finding suggests changing family and social support structures. Interestingly, ISD Scotland (2018, 2018b) data, indicates that between the years 1998 and 2017, the birth rate among women aged 30 – 34 remained relatively stable whilst the birth rate among women aged 35 – 39 rose substantially by around 40% (1998: 6677 births; 2017:9379 births). Furthermore, the birthrate in women aged 25 years and under declined during this period (1998:10174 births; 2017: 8128 births). According to ISD Scotland (2018, 2018b) women are now older when having their first baby. In the year 2017-2018, 54% of first-time mothers were aged 30 years or older, and 46% of first-time mothers were younger than 30 years of age. Therefore, as first-time mothers are older, it is logical to assume that grandparents will also be older. Whilst many older grandparents will be in good health and look forward to the role of grandparent, others will be in poor health and unable to support their offspring (Margolis and Iciaszczyk, 2015). Also

impacting on the role of grandparents is the deferment of the age of retirement and eligibility for the State Pension in the UK. This is particularly pertinent to women who in some cases may have their pension deferred by up to 7 years beyond the age of 60 (Gov.UK, 2018). Furthermore, the Scottish Government (2017) highlights that divorce rates increase after the age of 45. Consequently, this has implications for the ability of some grandmothers to support their offspring with grandchildren. Not all grandmothers will be financially secure and may need to continue working till they reach retirement age; therefore, some may not be available to support or share child care responsibilities. As the age of retirement is set to rise further, this may have longer term implications on family structures and support. Furthermore, the inability of grandparents, especially grandmothers, to be actively involved in caring for their grandchildren may result in valuable tips and parenting skills not being shared or passed down generations. The findings of this study suggest that lack of family support may add to the stress and anxiety of being a new parent thereby pushing parents to seek a medical diagnosis and explanation for the symptoms of GOR from health professionals, along with a prescription for medicine to treat it.

Whilst extended family ties may be diminishing, it appears from this study that parents are seeking support from other sources such as parenting support groups, the internet and social media sites. This reflects Scottish Government (2017) data that indicates the use of the internet by adults for personal use increased from 62.7% in 2007 to 83.4% in 2016. Furthermore, health visitors, general practitioners and parents in this study reported the use of Facebook as a communication medium, with parents regularly posting pictures and sharing

experiences of their ‘perfect' infant with family and friends. However, for those parents with unsettled infants it was acknowledged, by the health visitors, general practitioners and parents interviewed, that this can have a negative impact leaving parents feeling inadequate, incompetent and that they are to blame for their infant bringing up feeds and being upset and unsettled. Several parents in the study accessed online support groups and chat rooms on Facebook and social media that can be accessed day and night, and offer immediate support to stressed parents, particularly at night-time. One mother even likened her ‘Facebook’ friends to extended family. This suggests a social and cultural change regarding the support available to, and sought by, parents and may reflect diminishing ties between parents and grandparents (Giddens and Sutten, 2014).

Diminishing family ties may be a factor impacting on the stress and coping strategies of new parents and their ability to resume their normal daily routines. It may also be linked to parents using the internet and social media to seek health information and support. Moreover, to shift blame and remove feelings of inadequacy, some parents use the information gleaned from the internet or social media to find a medical diagnosis, that they then present to their general practitioner to purport a prescription for medicine to manage their infants’ symptoms of GOR.

6.2.3 Sources of ‘Medical’ Knowledge

It was also evident in the findings that some parents use the internet to fulfil their natural curiosity and learn more about their infant and parenting, whilst

others use the internet and social media because they are dissatisfied with the advice and support offered by health professionals. This reflects the experience of people with medically unexplained symptoms discussed earlier and their efforts to find a diagnosis by searching the internet for information, evidence or research to support a medical diagnosis and access to treatment (Nettleton, 2006). With technological advances and increasing use of technology in the home, several parents in this study searched for, and accessed information about the symptoms of GOR on the world wide web (Dumit, 2012). Parents in this study reported to use Google to search for information about the symptoms of GOR, and in many instances to make their own diagnosis of the condition, that they then presented to their general practitioner along with a request for a prescription for medicine. This suggests a shift in the balance of power between health professionals and patients, with patients becoming active consumers of health information rather than passive participants (Wald et al., 2007; McMullen, 2005). Alternatively, it may be linked to the unclear criteria for diagnosing GOR in the NICE (2015) guideline, along with the motivation of parents to seek a medical diagnosis and explanation for their infant's symptoms as discussed by Nettleton (2006). Furthermore, Johansen and Risor (2017) highlight that general practitioners often feel uncomfortable, helpless and frustrated when confronted with symptoms that are vague or medically unexplained, thereby shifting the power balance in favour of patients. Consequently, this suggests that the unclear guidance for diagnosing GOR, along with parents 'new knowledge' gained from the internet, is enabling parents to self-diagnosis GOR in their infant. In turn, pressure from parents to have their internet informed self-diagnosis of GOR validated by their general practitioner has driven the

diagnosis of GOR in infants and the subsequent rise in prescribing of medicine that is identified in stage one of this study.

Whilst most health practitioners in this study considered the use of the internet by parents positively and engaged with parents regarding the diagnosis and management of their infant, it was also recognised that some parents cannot discern between good and bad sources of information. Prasad (2013) highlights that although the internet and social media are useful tools to support health care a lot of health-related information on the internet is unregulated and therefore should be used wisely and with caution. For example, Netmums was highlighted by health visitors in this study as a social media resource that aimed to support parents but, in some instances, served to heighten anxiety as it presented anxious parents with a list of minor ailments and serious conditions that parents then perceive their infant to have. Netmums also suggests that a trial of medicine may be helpful in the management of GOR and names the drugs domperidone, omeprazole and ranitidine. This could be argued to be a subtle form of advertising by pharmaceutical companies. For example, evidence from the US (Tyrawaski and DeAndrea, 2015; Mogull and Balzhiser, 2015) highlights increasing use of social media sites such as Facebook to promote pharmaceutical products. Furthermore, findings from stage one of this study identified a steady increase in prescribing of omeprazole and ranitidine in infants aged 0-1 year over the 7-year study period.

Although direct to consumer advertising is restricted in the UK, parents and other consumers can readily access Facebook as well as US based websites

such as ‘Healthline’ and ‘BabyCentre’. Both these US websites and Netmums state that the regurgitated stomach contents are acidic in nature. This is misleading to parents and a form of pharmaceuticalisation (William et al., 2008; Harvey, 2013), as research has found that regurgitated stomach content in young infants is not acidic (Garza et al., 2011; Mitchell et al., 2001). Accessing poor or biased sources of information on the internet, therefore, not only creates anxiety in parents but can present a challenge to the power balance of health professionals, when parents self-diagnose the condition of GOR in their infant and then demand a prescription for medicine to treat the symptoms of GOR. Pharmaceutical companies, therefore, by using subtle advertising strategies on social media and the internet have a powerful impact on parents’ perceptions of GOR in their infant. In turn this strengthens the motivation and power of parents to influence diagnostic and prescribing decisions by health visitors and general practitioners. Subtle marketing of pharmaceutical products on the internet is influencing parents understanding of GOR and driving their demand for medicine and contributing to the rise in prescribing of medicine to manage symptoms of GOR in young infants.

6.3 Professionals Approach to Diagnosis

Although a national guideline (NICE, 2015) is available to support health professionals to diagnose and manage symptoms of GOR in infants, health visitors and general practitioners in this study appeared to either not know about the guideline or chose not to refer to it. Instead the health visitors and general practitioners preferred to rely on their own professional judgement and subjective experiences when diagnosing GOR in infants. Of those in this study

who were aware of the guideline, some practitioners did not find the guideline useful. This reflects evidence on the use of guidelines in an international study by Quitadamo et al. (2014) that found that paediatricians did not adhere to the 2009 NASPGHAN - ESPGHAN guideline. Furthermore, McCracken (2014) considers poor implementation of clinical guidelines to be due to poor promotion and awareness raising, or because practitioners do not consider the guideline effective or useful. Guidance on the diagnosis of physiological GOR and pathological GORD in infants is unclear in current clinical guidelines (NICE, 2015; Rosen et al., 2019). This leads to health professionals relying on their own tacit knowledge and subjective experiences.

In this study decisions by general practitioners to diagnose GOR in infants were strongly influenced by the views of health visitors, as well as by parents, and the general practitioners own personal experience and intuition. Some general practitioners, for example, considered infant feeding, and related issues, to be within the domain of health visiting and as such they relied on the knowledge and expertise of health visitors in this area. General practitioners often assumed that health visitors had undertaken a full feeding history and thorough feeding assessment prior to an infant being referred to them. However, the findings suggest variance in obtaining and undertaking a feeding history and assessment by health visitors. For example, some health visitors focused on the clinical symptoms of GOR that presented and took a generic history from the parents, whereas others were more focused on observing the feeding technique and assessing how infants feed, and in obtaining a full feeding history. Consequently, this may have influenced diagnostic decisions.

Furthermore, whilst health visitors in this study relied on tacit knowledge, the findings also revealed that they are strongly influenced by the concerns of the parents.

Parents in this study consulted the internet to gain medical knowledge and self-diagnose GOR in their infant. The internet, therefore, is a powerful medium that influences people's beliefs and understanding of a multitude of issues, including health and GOR in infants (Prasad 2013). The internet is now an integral part of daily life (Eckler et al., 2010) allowing parents easy access to a vast array of health-related information which may be biased and unreliable, but which parents trust. In turn, this new 'medical' knowledge from the internet appears to empower parents to form their own self-diagnosis of GOR in their infant, and to challenge the knowledge and expertise of health visitors and general practitioners and demand medicine to treat the symptoms. The findings, therefore, indicate that general practitioners are being influenced in their diagnosis and prescribing of GOR by health visitors who, in turn, are being influenced by parents who gain their information from the internet. This suggests that in some instances it is parents and not health professionals who are driving the diagnosis and medicalisation of GOR in infants, and the subsequent rise in prescribing of medicines.

6.4 Influences on Prescribing Decisions

The perception and interpretation of an infants distressed behaviour by parents, is a factor influencing the diagnosis of GOR in infants by health visitors and general practitioners. As chapter 5 reveals, this also appears to influence the

prescribing of medicines to manage symptoms of GOR in infants. Some decisions made by general practitioners regarding the diagnosis of GOR are influenced by health visitors or made based on the perceived effectiveness of the medicine prescribed. Interestingly views on the efficacy of ranitidine in this study was mixed among parents and practitioners. Ranitidine was effective in managing symptoms of GOR for some infants but not for others. This reflects the findings of a Cochrane systematic review (Tighe et al., 2014) that found the available evidence supporting the use of alginates (Gaviscon), and H2RAs (Ranitidine), and PPI (Omeprazole) limited and conflicting, particularly in relation to infants under one year of age. This process of 'trial and error' in the diagnosis and management of GOR is unscientific and surprising given the weak evidence base underpinning the efficacy of these medicines. Nevertheless, the findings did highlight that some health visitors, general practitioners and parents perceived the regurgitated stomach contents to be acidic in nature. This belief that the regurgitated stomach contents are acidic may have attributed to the increase in prescribing of acid suppressant drugs such as ranitidine (H2RA) and omeprazole (PPI). Of interest, however, is research from Garza et al. (2011), and Mitchell et al. (2001) that found milk (breast and formula) to have a buffering and neutralising effect on gastric acidity for up to two hours post prandial. The parents interviewed in this study reported symptoms of GOR to occur within 20 – 30 minutes after feeding, therefore according to Garza et al. (2011) and Mitchell et al. (2001) the regurgitated feeds would not be acidic in nature. This suggests that the perceived pain and discomfort experienced by some infants may not be due to gastric acid burning the oesophagus, but due to something else and therefore acid suppressant

medicines (ranitidine and omeprazole) are not required. This may, in part, explain the findings of the Cochrane systematic review (Tighe et al., 2014) that found the evidence of the effectiveness of ranitidine and omeprazole to manage symptoms of GOR in infants to be weak. Nevertheless, these acid suppressant drugs, ranitidine and omeprazole, are unlicensed in the 0-1-year age group and are being prescribed off-label to neutralize perceived ‘acid reflux’ in infants. Furthermore, Crawford et al. (2018) highlights that calculating and measuring accurate dosage of unlicensed medicines for young children can be challenging and, in some instances, may lead to overdosing of some medicines. In their examination of UK National Poisons Information Service data, Crawford et al. (2018) found 79% of cases of ranitidine overdose in children under 5 years of age, involved infants aged 0-6 months. The lack of evidence supporting the use of these medicines in this age group is a concern and clearly contravenes the advice from the GMC (2013) that requires the prescriber to be convinced of the safety and efficacy of the medicine being prescribed.

As with the diagnosis of GOR, the findings indicate that general practitioners’ decisions to prescribe medicine to manage symptoms of GOR are influenced by health visitors. There was also a perception among general practitioners that a range of conservative management strategies had been advised by health visitors and tried by parents to manage symptoms of GOR prior to the infant being presented or referred to them for consultation and, therefore, the infants presented for consultation had more extreme symptoms of GOR. The findings also reveal that some health visitors and general practitioners did not consider conservative measures or treatment with Gaviscon to be effective and

expressed a preference for ranitidine as the first line of treatment. This is contradictory to the advice from NICE (2015). Furthermore, the findings highlight that in some instances follow-up of the infant and the decision to continue treatment with ranitidine is made by health visitors. Health visitors were perceived to have more frequent contact with families and to have built good rapport and relationships with parents, and to have the skills to review the infant and symptoms of GOR. This contravenes the GMC (2013) and Medicines and Healthcare Products Regulatory Agency (2014) prescribing guidance which clearly states that when medicines, such as ranitidine, are prescribed off-label (or unlicensed), the prescriber is responsible for follow-up and monitoring of the patient. This raises questions about the evidence base for diagnostic and prescribing decisions and the source and depth of the health visitors and general practitioners' knowledge. Nevertheless, the findings indicate that general practitioners rely on the expertise of health visitors to inform their prescribing decisions, and that health visitors are influenced by parents who are influenced by information from the internet, therefore, this suggests that it is parents who are instigating the medicalisation of GOR and the increasing use of medicine that is evident in the findings in stage one of this study.

Along with the lack of clarity, subjectivity and 'trial and error' approach to forming a diagnosis, the findings suggest complacency in prescribing medicine by some general practitioners. On deeper analysis of the data the findings suggest that the perceived complacency in prescribing ranitidine, an unlicensed medicine, is linked to pressure from some parents to get medicine to manage the symptoms of GOR in their infant. However, it may also be influenced by the current

emphasis on shared decision making in health care policy and practice (Scottish Government, 2018; Da Silva, 2012; Waneless, 2002). Health professionals are encouraged to actively involve patients in decision-making regarding their treatment and care (Scottish Government, 2018). Therefore, rather than having a passive role in their health care, patients are becoming more active and engaged in health care decisions (Wald et al., 2007; McMullen, 2006). As discussed, many parents access health information on the internet prior to the consultation with their general practitioner. Using information from the internet, they often have their own perception of their infants' symptoms and have formed a diagnosis of GOR prior to consultation with their general practitioner, and present with an expectation that a prescription for medicine will be prescribed. On exploring the influence of patients on prescribing practice, Britten (2008) highlights that patient expectation strongly influences prescribing decisions. According to Britten (2008) patients who expect a prescription are twice as likely to receive one, however the chance of getting a prescription is seven times higher in situations where the general practitioner perceives the patient to expect a prescription. This may help explain the rise in prescribing in this study whereby parents expected or demanded a prescription for their infants' symptoms of GOR. The practice of prescribing acid suppressant medicines such as ranitidine and omeprazole to young infants may be likened to the prescribing of antibiotics. Similar to the findings of this study, a systematic review (Bosley et al., 2018) found many parents expected to be prescribed antibiotics for their children, and that practitioners felt pressured by parents to prescribe antibiotics. In situations where antibiotics were prescribed, parents felt their concerns about their child's condition were validated. Arguably this is

reflected in this study where parents who self-diagnosed GOR, and demanded, and were prescribed ranitidine for their infant, had their concerns reinforced and their diagnosis of GOR ratified. Subsequently this has contributed to the rise in prescribing of medicines and the medicalisation of normal infant behaviours that are typical of symptoms of GOR.

As discussed earlier, some parents were perceived by general practitioners to suffer underlying anxiety and stress that was masked by parents seeking support for their unsettled infant and their symptoms of GOR. In such instances where medicine was prescribed to manage the infant's symptoms of GOR, general practitioners could be argued to be acquiescent or colluding with parents. This acquiescence and collusion with parents, therefore, may be a factor influencing the prescribing of medicines to manage symptoms of GOR in infants

6.5 Changes Over Time

Reflecting on changes over time that may have influenced the diagnosis and management of GOR and prescribing practices, several factors have been identified. Firstly, there appears to have been a change in the criteria used to diagnose GOR. According to current clinical guidelines (Rosen et al., 2018; NICE, 2015), overt regurgitation and vomiting is no longer required as evidence for the diagnosis of GOR. Previously these symptoms were a hallmark sign of GOR in infants (Paton et al., 1988; Vandenplas et al., 1993; Vandenplas and Hegar, 2000). This suggests a broadening of criteria on which to determine GOR and may have contributed to a rise in the diagnosis of GOR in infants.

Secondly, expectations and attitudes to parenthood are perceived to have changed. The findings suggest that mothers now want to resume their previous lifestyle or return to work quite soon after the infant is born. Consequently, some parents are stressed and less tolerant of symptoms of GOR. Furthermore, among parents within the general practitioner population, there was a perception that medication is a resource that supports them to return to work and their daily routine. This may be a factor influencing the perception of complacency in prescribing by general practitioners. Another change relates to ranitidine now being prescribed in primary care, whereas in years gone by ranitidine was only prescribed in secondary care following referral to a consultant paediatrician.

The increasing use of the internet and social media by parents is another factor that may have influenced the diagnosis and management of symptoms of GOR in infants. In some instances, information from the internet and social media sites has led to parents self-diagnosing GOR in their infant and expecting, or demanding medicine be prescribed. This also suggests a shift in the power balance between health professionals and patients. In previous generations patients were passive participants in the consultation with their general practitioner, whereas nowadays, patients are ‘active-consumers’ and want to be involved in the decisions made regarding their health care (Scottish Government, 2018). Furthermore, social media depicts an idyllic image of parenthood that can be demoralising and unachievable for some parents whose infant is unsettled, posseting and has symptoms of GOR.

Another shift relates to the perception that symptoms of GOR are more severe or frequent nowadays than was experienced in previous generations and this may be linked to the change in the age recommended to introduce complementary foods or to start weaning. In this study some parents reported that their own parents (the infants' grandparents) had not known of GOR when they were young parents themselves. Other grandparents were reported to perceive the symptoms of GOR to be worse nowadays, or more severe and frequent than they had experienced 25 - 30 years ago with their own infants. This may be linked to changing trends in infant feeding and weaning practices over time. For example, Koplin and Allen (2013) highlight that in the 1960's most infants were introduced to solid food at 12 - 16 weeks of age. However, the COMA Report (Department of Health, 1994) later recommended that weaning be delayed till between 4 and 6 months. This recommendation remained until 2003 when the Department of Health following the advice of the World Health Organisation (2001) recommended that infants be exclusively breast fed for 6 months and the introduction of complementary / solid foods, or weaning, begin from the age of 6 months. Consequently, the introduction of solid food to infants is now up to 10 weeks later than in the 1990's, therefore it is assumed that older and larger infants will want to consume larger volumes of milk to satiate their appetite. It may be that milk feeds are not enough to quell the appetite in some infants with the result that older and hungrier infants demand volumes of milk greater than the capacity of their stomach and therefore regurgitate or vomit the excess feed. This may, in part, explain the perception that symptoms of GOR are more severe now than in previous generations. Older, larger and hungry infants will consume larger volumes of milk and therefore regurgitate larger

volumes of milk feed. Furthermore, participants in this study reported symptoms of GOR to subside when weaning commenced. Therefore, it may that by delaying weaning till 6 months, symptoms of GOR persist for longer giving the impression that more infants have GOR nowadays compared to previous generations.

Evidence from Nelson et al. (1997) and Martin et al. (2002) found the peak age for symptoms of GOR to occur was 4 months. However, when these studies were conducted, the recommendation was for solid food to be introduced at 16 weeks. Furthermore, a survey by Hamlyn et al. (2002) conducted in 2000, found that almost 50% of mothers, at that time, introduced solids to their infant earlier than 16 weeks. As solid food is now recommended to be introduced to infants when they are older (around 6 months/ 26 weeks) this may be a reason for the perception that more infants are displaying symptoms of GOR. Also, it may be that the peak age of GOR has shifted and infants now older. If replicated today it would be interesting to see if the studies by Nelson et al. (1997) and Martin et al. (2002), would produce the same result and peak age for symptoms of GOR in infants.

The Department of Health (2003) in recommending that the introduction of solid foods be delayed till the age of 6 months, also recognise that infants are all individual, have individual needs and grow and develop at a different pace. Health professionals, therefore, are permitted to use their professional judgement to inform their decisions regarding the earlier introduction of solid foods to infants. This clause, however, appears to be largely ignored by health

professionals. Nevertheless, when making decisions about the earlier introduction of solid food, health professionals are advised to take cognisance of the stage of development, and nutritional needs of each infant. They also need to heed the recommendation of the Comma Report (Department of Health, 1994) that advised solid food to be introduced between 4 and 6 months. The introduction of solid food before 17 weeks / 4 months is not recommended as infants may not have the neuromuscular coordination or physiological maturity to cope with the weaning diet (Department of Health, 1994). The British Dietetic Association (2013) and ESPGHAN Committee on Nutrition (2008) agree with the Comma Report recommendation (Department of Health, 2003), and support its flexibility. Furthermore, the British Dietetic Association (2013) and ESPGHAN Committee on Nutrition (2008) highlight that there is limited evidence that the introduction of solid food between 4 and 6 months is harmful to infants.The findings of this study highlighted weaning, or the introduction of solid foods, as a time when symptoms of GOR subsided, therefore the later onset of weaning may be factor contributing to the medicalisation of GOR and the subsequent rise in prescribing.

6.6 Medicalisation of GOR

It is evident from the findings of this study that normal infant behaviours such as regurgitation, crying and unsettledness have been given the diagnostic label of GOR and become medicalised. Several factors have contributed to the medicalisation of GOR in infants. However, unlike other literatures in this field that focus on the dominance of the medical profession (Clark, 2010; McLaren, 2015; Szasz, 2007), the findings of this study point to parents as being the

driving force propelling the medicalisation of GOR in infants. The findings of this study, therefore, adds new theoretical knowledge and insight to the medicalisation of normality.

A key factor influencing the medicalisation of GOR is the changing power balance between parents and health professionals. According to Cornwell (1984), decades ago medical practitioners were held in high esteem, and deemed to be superior due to their scientific and medical knowledge. Consequently, patients tended to adopt a passive role with doctors being more authoritative. In recent years, however there has been growing interest in shared decision-making between health care practitioners and patients (Scottish Government, 2018). This change from passive patient to 'active consumer' is evident in the findings of this study with parents consulting their general practitioner having first formed their own diagnosis of GOR in their infant from information gleaned from the internet and social media. Furthermore, the reason for regurgitation, crying and unsettledness in infants is not always known, therefore these symptoms are medically unexplained. As highlighted by Nettleton et al. (2005) and evident in the findings, some parents are determined to find a medical explanation for these unexplained infant behaviours and scour the internet in search of a medical diagnosis, such as GOR, that they then present to their general practitioner with the expectation of getting a prescription for medicine. According to Jutel (2009), 'diagnosis' is a sophisticated and powerful skill that allows medical practitioners to interpret symptoms and assign a label as appropriate. However, the findings indicate that this skill, that traditionally has been within the domain and power of the

medical profession, is now being challenged and tested by parents. Furthermore, having the diagnosis of GOR, validates parent's concerns about their infant, and according to Jutel (2011a, 2011b) justifies their insistence and expectation of medicine to treat it, thereby driving the rise in prescribing of medicines and the resultant medicalisation of normal everyday behaviour in infants.

In forming a diagnosis of GOR, several health visitors, general practitioners and parents in this study believed the infants regurgitated stomach contents to be acidic in nature. Some even referred to the regurgitation as 'acid reflux'. This is interesting and supports the concept of pharmaceuticalisation proposed by Williams et al. (2012) and the suggestion from Hassell (2012) that in the US advertising products to manage 'acid reflux' in adults by pharmaceutical companies has transposed to children and now influences perceptions of GOR in infants. Suggesting that refluxed stomach contents are acidic implies the need for acid suppressant medicines such as ranitidine and omeprazole to neutralise the acid. In the UK pharmaceutical companies are only permitted to advertise 'over the counter drugs' or drugs that do not require a prescription (MHRA, 2012). Nevertheless, the internet and social media sites are widely available and easily accessible, and it is recognized that control of advertising on the internet is very difficult, therefore, parents are highly likely to be exposed to, and to be influenced by such advertising (Mintzes, 2016). Parents in this study accessed the internet and engaged with social media to gain medical knowledge and were exposed to this form of subtle advertising by pharmaceutical companies. For example, Netmums was cited as a website

commonly accessed by parents. Netmums is a sponsored website that claims to be the most influential and trusted parenting brand in the UK, to have 5 million unique followers each month, and a following of 1.2 million on social media. Netmums, therefore is a powerful platform that is tremendous in its reach to parents. Information on Netmums implies that the regurgitated stomach contents in infants are acidic. This is misleading and a subtle form of pharmaceuticalisation (Williams et al., 2012) that leads parents to believe that their infant needs acid suppressant medicine to neutralise the acid. Netmums also suggests a trial of medicine naming the acid suppressant medicines omeprazole and ranitidine. Armed with this information from Netmums, or other internet sources, parents in this study believing their infant has 'acid reflux', challenged the authority and expertise of the medical profession insisting their infant has GOR and needed a prescription for medicine, often naming ranitidine. Consequently, this has contributed to the steady rise in prescribing of medicine in the 0-1-year age group that is evident in the findings. It also suggests that parents are being influenced by unreliable information and subtle advertising on the internet. Parents then use this 'medical' knowledge to challenge health professionals, and pressurise them to diagnose GOR in their infant and to prescribe medicine. Parents, therefore, are driving the medicalisation of GOR in infants.

The findings also highlighted weaning, or the introduction of solid foods, as a time when symptoms of GOR subsided. The Department of Health (2003) advise the introduction of solid food from 6 months of age.The later onset of weaning may lead to some infants being hungry and it is possible that the

distress, crying and unsettledness associated with hunger is now being misdiagnosed as being symptomatic of GOR, and deemed to require treatment with medicine, thereby contributing to the rise in prescribing of medicines evident in this study. This reflects the concept of social diagnosis proposed by Brown et al. (2011), in that the diagnosis of GOR is influenced by social, cultural and political factors and by social actors. For example, the WHO (2001) and Department of Health (2003) as social actors, are political stakeholders recommending that weaning be delayed till the age of 6 months. This expert, or political, opinion is then promoted by other social actors (health professionals) to mothers as being the best for their infant. Other social actors reinforcing this social diagnosis of GOR include parenting groups and the wide array of internet and social media sites that are readily accessible, and bombard parents with parenting information. Equally parents are contributing to the medicalisation of every day by accessing and using information from the internet to find a diagnosis and to demand medicine for their infants' 'hunger' or symptoms of GOR from their general practitioner, and this is evident in the findings.

6.7 Strengths and Limitations of the Study

A strength of this study is that it is the first to analyse prescribing data for medicines used in the management of GOR in the 0-1-year age group in Scotland. It is also the first to explore factors contributing to the rise in the diagnosis and prescribing for GOR from the perspective of both practitioners and parents. It is also the first to highlight the influence of parents as a driving force contributing to the medicalisation of GOR in infants.

In stage one, the prescribing data obtained for secondary analysis from ISD Scotland is the most accurate, robust and reliable in Scotland (ISD Scotland, 2010, 2012b). This is because ISD Scotland routinely gather prescribing data nationally from across Scotland. Furthermore, this study is the first to examine patterns of prescribing to manage symptoms of GOR in the 0 to 1-year age group in Scotland and therefore has added new knowledge that has the potential to influence practice in the treatment and management of GOR in infants. Nevertheless, stage one of the research is not without limitations. Firstly, as some alginate preparations for young infants can be bought over the counter, it is possible that the use of alginate (Gaviscon) in infants aged 0-1 year is higher than the ISD Scotland data would imply. A second limitation concerns the age of the infants prescribed alginate, domperidone, omeprazole and ranitidine. It is acknowledged that GOR is a self-limiting condition that resolves of its own accord as the child grows (Cohen et al., 2015; Hassell, 2012; Bhsavar et al., 2011). NICE (2015) indicate that at least 40% of infants experience symptoms of GOR, however by the age of six or seven months only 14% of infants continue to exhibit symptoms (Nelson et al., 1997) and by one year of age symptoms of GOR persist in less than 10% of infants (NICE, 2015; Martin et al., 2002; Nelson et al., 1997). The data from ISD Scotland do not detail the actual age in months of the infant prescribed these medicines, therefore it is not known whether these medicines were prescribed consistently for 12 months or if prescribing peaked at set ages. A further limitation concerns the reason for prescribing the medicines. Whilst alginate (Gaviscon), H2RA (ranitidine) and PPI (omeprazole) are medicines used primarily in the management of GOR, it cannot be assumed that all prescriptions were written

in this regard. Despite these limitations, the results do clearly show a rise in the use of all three medicines but particularly the unlicensed medicines, ranitidine and omeprazole.

Stage two of the study aimed to explore why the use of medicines to manage symptoms of GOR was increasing and this a strength in that this study appears to be the first to do this. Most research to date, has focused on the efficacy of these medicines and/ or made comparisons between medicines (Tighe et al., 2014; Chen et al., 2012; Gieruszszak-Bialek et al., 2015). A second strength of the study is that it explores perceptions of GOR in infancy from the perspective of the key players involved in the management of GOR within the community, that is health visitors, general practitioners and parents. It also explores potential predisposing factors and influences on decision making regarding the diagnosis and management of symptoms of GOR in infants. On exploring the literature, there is a dearth of evidence focusing on parents' perceptions and experience of caring for an infant with symptoms of GOR, and there is little evidence of research exploring factors that may influence practitioners' decisions regarding the diagnosis and management of GOR in young infants in day to day practice. The use and flexibility of semi-structured interviews was also a strength in that it allowed both the researcher and the interviewee to explore and discuss key issues relevant to the diagnosis and management GOR in infants. A further strength of the study was my experience as a nurse, midwife and health visitor. Often in qualitative research there is a risk that the researcher's personal knowledge and experience can influence the behaviour and responses of participants, however this was not so in this study. Instead,

my knowledge of GOR and experience as a health visitor gave me better understanding of what the participants were saying and to explore pertinent issues further. For instance, I understood medical terminology and jargon used by practitioners, and could speak in layman terms to parents about their infant's GOR and the impact on their family. For example, one parent commented that their infant was prescribed 'Infacol' (simethicone) for the symptoms of GOR, however Infacol (simethicone) is a remedy associated with infant colic rather than GOR. This was probed further and suggested lack of understanding of the symptoms, diagnosis and management of GOR by the practitioner consulted. A researcher without health visiting experience may not have been aware of this. This reflects the experience of ethnography by Goodwin et al. (2003) who highlight the value to the outcome of research by the researcher being closely associated with the population being studied. Another strength of the study is the focus on changes over time. This appears to be the first study that explores change over time and what triggered or underlies this change in prescribing practice and management strategies for infants aged 0-1 year presenting with symptoms of GOR.

Limitations of stage two concern the focus on one NHS Board only. Initially the study focused on two research sites (NHS Board areas) but unfortunately due to recruitment difficulties one research site was closed. This was a great pity as the research site that was closed had the highest prescribing rate for omeprazole (PPI) whilst the site included in the study, NHS Grampian, was the highest prescriber of ranitidine (H2RA). Comparison between the two areas and exploration of factors influencing drug choice may have strengthened the study.

The second limitation relates to the number of general practitioners recruited to the study. Only four general practitioners were recruited and three were from the same medical centre. However, although the themes identified from the analysis of the general practitioner interview data was similar to that of the health visitors, it may be that recruitment of more general practitioners may have strengthened the study. The third limitation relates to the combination of research participants. Recruitment of participants to the study was challenging, therefore the health visitors, general practitioners and parents came from throughout Grampian and were not aligned to the same medical practices or health centres. Recruitment of participants aligned to the same medical practices may have strengthened the study and facilitated further probing of particular issues in later interviews, or during analysis to expose deeper understanding. A fourth limitation concerns the focus on health visitors and general practitioners as the only health professionals, as inclusion of paediatricians may have provided useful data, particularly in relation to prescribing omeprazole as participants in the study indicated that omeprazole was generally prescribed following consultation with a paediatrician at the Children's Hospital. Despite these limitations, this research study does provide some valuable insight of parent's experiences of caring for an infant with GOR, as well as factors influencing health professionals' decisions regarding the management and prescribing of medicines to manage symptoms of GOR in infants aged 0-1 year.

6.8 Conclusion

This study adds new empirical knowledge in that it identifies that prescribing of Gaviscon (alginate), omeprazole (PPI), and ranitidine (H2RA) in the 0-1-year age group is steadily rising in Scotland, and there is regional variation in the patterns of prescribing. Although several factors are contributing to this rise in prescribing, the findings point to parents, and their use of the internet and social media, as being the key driving force. Diagnostic and prescribing decisions by general practitioners are being informed by health visitors whom they assume have expert knowledge and expertise. However, health visitors' diagnostic decisions are strongly influenced by parents. In turn, parents' expectations of parenthood and perceptions of normal infant behaviours are being shaped by information on the internet and from social media. Subtle advertising by pharmaceutical companies on the internet and social media shapes parent's medical knowledge. Consequently, regurgitation in infants is now being referred to as 'acid reflux' implying that acid suppressant medicine is required. Believing their infant is unsettled and upset due to 'acid reflux' parents presented to health visitors and general practitioners with their own diagnosis of GOR. Validating the diagnosis of GOR confirmed the parent's concerns and supported their demand and expectation of a prescription for acid suppressant medicine such as ranitidine. This study adds to the body of theoretical knowledge by highlighting that rather than the medical profession, it is parents that are driving the medicalisation of normal infant behaviours as typical of symptoms of GOR.

CHAPTER 7: CONCLUSION

In concluding this thesis, it is evident that the aim and objectives set at the outset of the study have all been addressed and that the research provides new knowledge and greater insight of factors that have shaped the diagnosis, management, and prescribing of medicines for symptoms of gastro-oesophageal reflux (GOR) in infants aged 0-1year.

Analysis of national prescribing data in stage one provides evidence of a steady increase in prescribing of alginate, omeprazole and ranitidine in infants aged 0 to 1 year in Scotland as well as regional variation in patterns of prescribing over the 7-year study period. This steady rise in prescribing shows no sign of abating.

The findings of stage two of the study unveiled several factors that may have influenced and shaped management and prescribing practice over time and contributed to the rise in prescribing. For example, the lack of scientific evidence and robust criteria within clinical guidelines (NICE, 2015; Rosen et al., 2018) led many practitioners to rely on tacit knowledge and subjective experiences when diagnosing GOR in infants. The findings also revealed that general practitioners relied on the knowledge and expertise of health visitors to inform their diagnostic and management decisions, but health visitors in this study appeared to rely heavily on information from parents as well as their own tacit knowledge. Furthermore, the findings highlighted that while a feeding history is important to assessing and diagnosing GOR in infants, its application as part of the assessment process needs to be more consistent.

The process of diagnosing therefore, appears to be influenced by social and cultural factors that are influencing contemporary parenting behaviours, especially changing perceptions of parenthood and parental expectations, with the result that over time there appears to be a shift in what is considered acceptable and within the parameters of normal infant behaviour. Baby behaviours previously considered as 'normal' such as those displayed in symptoms of GOR are now seen as an illness by parents and, as highlighted by Jutel (2011a), now legitimised by being assigned the label of GOR. The desire to have a medical resolution for this baby behaviour is in part driven by changing family networks. Nowadays, many young parents no longer have the same close support of grandparents from whom they may learn valuable parenting skills and conservative approaches to the management of GOR. Consequently, many families look to other sources of support, such as the internet and social media, many of which promote a medical approach. Furthermore, with the increasing use of the internet and social media, parents are unwittingly exposed to subtle advertising strategies by pharmaceutical companies that influence their understanding of common and unexplained baby behaviours. Whilst normal infant behaviours such as crying, unsettledness and regurgitation are now being recognised as symptoms of GOR, internet sources were found to refer to GOR as 'acid reflux' suggesting the need for medicine to neutralise the acid, and in some cases naming the acid suppressant medicines, omeprazole and ranitidine. Armed with 'medical' information from the internet and social media, parents take this new-found knowledge to health visitors and general practitioners forming their own diagnosis of GOR and expect or demand to get a prescription for medicine. The findings of this study therefore add to the

body of theoretical knowledge by highlighting that the medicalisation of GOR in infants, rather than be led by the medical fraternity, is in fact being driven by the changing expectations and demands of parents.

7.1 Recommendations:

1. To reduce the use of medicines in the management of GOR in infants aged 0-1 year it is recommended that:
    - A new practice standard should be introduced that requires conservative strategies to be adopted as the primary approach to the management of symptoms of GOR in infants. Medical approaches should only be considered as a last resort when all non-medical strategies have been tried and proven non-effective, or when clinically indicated i.e. weight loss in the infant
    - Practice guidelines should clearly set out:
        - The process to be followed and tools to be used by health professionals to ensure a robust and consistent approach when undertaking a feeding history and assessment of an infant with symptoms of GOR.
        - Conservative strategies to be recommended to parents to try in the first instance to comfort their infant and to alleviate the symptoms of GOR.

2. To reduce the dissonance between health professionals and parents and help health professionals to better understand the experience and

context of a family caring for an infant with symptoms of GOR and what is important to them, it is recommended that:

- The ‘What matters to you?’ conversation (Healthcare Improvement Scotland, 2019) be adopted as an integral part of day-to-day practice for health visitors and general practitioners to encourage them to:
    - Listen to what parents are saying, hear their concerns and what matters to them.
    - Practice in a person-centred way.

3. Research be undertaken to:
    - Explore the extent to which the findings of this small study in one NHS Board holds relevance in other areas of Scotland.
    - Understand why there is variation in the medicines prescribed for GOR in infants across the NHS Boards in Scotland.
    - Establish the effectiveness of weaning as a management strategy for GOR

4. General practitioners and health visitors be upskilled regarding common infant behaviours, GOR and use of ‘off-label’ medicines by:
    - Strengthening this learning within health visitor and general practitioner programmes.
    - Implementing a programme of continuing professional development for the wider health visiting and general practitioner workforce.

REFERENCE LIST

Abraham, J., 2011. Evolving sociological analyses of 'pharmaceuticalisation': a response to Williams, Martin and Gabe. *Sociology of Health and Illness.* 33:5, pp.726-728.

Abraham, J., 2010. Pharmaceuticalization of Society in Context: Theoretical, Empirical and Health Dimensions. *Sociology.* 44:4, pp.603-622.

Abraham, J., 2009. Partial Progress: Governing the Pharmaceutical Industry and the NHS, 1948–2008. *Journal of Health Politics, Policy and Law*. 34:6, pp.931-977.

Adamson, J., 2008. Chapter 10, 'Combined qualitative and quantitative designs' in Bryman, A. 2008. *Social Research Methods.* 3rd Edn. Oxford: Oxford University Press.

Adamson, J., 2005. Chapter 10 'Combined qualitative and quantitative design' in Bowling, A. 2005. *Research Methods in Health: Investigating health and health services.* 3rd Edn. Maidenhead: McGraw Hill & Open University Press.

Agostoni, C., Desci, T., Fretwell, M., Goulet, O., Kolacek, S., Koletzko, B., Michaelsen, K., Moreno, L., Puntis, J., Rigo, J., Shamer, R., Szajewska, H., Turck, D., van Goudoever, J. 2008. Complementary Feeding: A Commentary by the ESPGHAN Committee on Nutrition. *Journal of Paediatric Gastroenterology and Nutrition.* 46, pp.99-110.

Aldgate, J., Jones, D. 2006., Chapter 4, 'The Place of Attachment in Children's Development' in Aldgate, J., Jones D., Rose, W., Jeffrey, C. Eds., 2006. *The Developing World of the Child.* London: Jessica Kingsley Publications.

Alvarez, J., Canduela, J., Raeside, R., 2012., Knowledge creation and the use of secondary data. *Journal of Clinical Nursing.* 21, pp.2699- 710.

Anderson, J.G., 2004., Consumers of e-health: patterns of us and barriers. *Social Science Computer Review.* 22, pp.242-248.

Apple, R.D. 2006., *Perfect Motherhood. Science and Childrearing in America*. London: Rutgers University Press.

Apple, R.D., 1995. Constructing Mothers: Scientific Motherhood in the Nineteenth and Twentieth Centuries. *The Society for the Social History of Medicine*. 8:2, pp.161-178.

Armstrong, D., 2011. Diagnosis and nosology in primary care. *Social Science and Medicine.* 73, pp. 801-807.

Armstrong, K.L., Previtera, N., McCallum, R.N., 2000. Medicalizing normality? Management of irritability in babies *Journal of Paediatrics and. Child Health.* 36, pp.301-305.

Arney, J., Merjivar, C. 2014 Disease Mongering in Direct-to-Consumer Advertising and the Expansion of the Antidepressant Market. *Sociological Inquiry*. 84:4, pp.519-544.

Azizollahi, H.R., Rafeey, M., 2016. Efficacy of proton pump inhibitors and H2 blocker in treatment of symptomatic gastroesophageal reflux disease in infants. *Korean Journal of Pediatrics.* 59:5, pp.226-230.

BabyCentre.
Available from: https://www.babycentre.co.uk/a567208/reflux
or https://www.babycenter.com/0_reflux-and-gerd-in-babies_10900.bc
Accessed: 25/04/2019

Balgowan, R., Greer, L.C., D'Auria, J.P., 2016. Infant Gastroesophageal Reflux Information on the World Wide Web. *Journal of Pediatric Health Care.* 30:2, pp.165-172.

Barron, J. J., Tan, H., Spalding, J., Bakst, A. W., Singer, J., 2007. Proton pump inhibitor utilization patterns in infants. *Journal of Pediatric Gastroenterology and Nutrition*. 45:4, pp.421-427.

Bazeley, P., 2013a. *Qualitative Data Analysis. Practical Strategies*. London: SAGE.

Bazeley, P., Jackson, K., 2013b. *Qualitative Data Analysis with NVIVO.* 2nd Edn. London: SAGE.

Beattie, R. M., 2009. Current Pharmacological Management of Gastro-Esophageal Reflux in Children: An Evidence-Based Systematic Review. *Pediatric Drugs.* 11:3, pp.185-202.

Bell, J.C., Schneuer, F.J., Harrison, C., Trevena, L., Hiscock, H., Elshaug, A.G., Nassae, N., 2018. Acid Suppressants for managing gastro-oesophageal reflux and gastro-oesophageal reflux disease in infants: a national survey. *Archives of Disease in Childhood.* 103, pp.660-664.

Bell, S.E., Figert, A.E., 2012. Medicalization and pharmaceuticalization at the intersections: Looking backward, sideways and forward. *Social Science and Medicine.* 75, pp.775-783.

Berer, M., 2010. Cosmetic surgery, body image and sexuality. *Reproductive Health Matters,* 18:35, pp.4-10.

Bhavsar, H., Cullen, M., Beattie, M. R., 2011. Gastro-oesophageal Reflux in Infancy. *Paediatrics and Child Health.* 21:9, pp.394-400.

Blair, P.S., Sidebotham, P., Berry, P.J., Evans, M., Fleming, P.J., 2006. Major epidemiological changes in sudden infant death syndrome: a 20-year population-based study in the UK. *Lancet*. 367, pp.314-319.

Blank, M., Parkin, L., 2017. National Study of Off-label Proton Pump Inhibitor Use Among New Zealand Infants in the First Year of Life (2005-2012). *Journal of Pediatric Gastroenterology and Nutrition*. 65:2, pp. 179-184.

Bolling, K., Grant, C., Hamlyn, B., Thornton, A., 2007. *Infant Feeding Survey 2005*. The Information Centre.
Available on-line from:
http://content.digital.nhs.uk/catalogue/PUB00619/infa-feed-serv-2005-rep.pdf
Accessed 25/04/2019

Bonaccorso, S.N., Sturchio, J.L., 2002. Direct to consumer advertising is medicalising normal human experience: Against. *British Medical Journal*. 2002. 324: 7342, pp.910-911

Bonevske, B., Magin, P., Horton, G., Fraser, M., Gigis, A., 2011. Response rates in GP surveys. Trialling two recruitment strategies. *Australian Family Physician*. 40:6, pp.427-430.

Bosley, H., Henshall, C., Appleton, J. V., Jackson, D., 2018. A systematic review to explore influences on parental attitudes towards antibiotic prescribing in children. *Journal of Clinical Nursing*. 27: 5-6, pp.892-905.

Bowling, A., 2005. *Research Methods in Health: Investigating health and health services*. 3rd Edn. Maidenhead: McGraw Hill & Open University Press.

Braun, V., Clarke. V., 2013. *Successful Qualitative Research. A practical guide for beginners*. London: SAGE.

British Dietetic Association (BDA)., 2013. *Policy Statement. Complementary Feeding: Introduction of Solid Food to an Infants Diet*. The British Dietetic Association.
Available on-line from:
https://www.bda.uk.com/improvinghealth/healthprofessionals/policy_statement_complementary_feeding
Accessed 25/04/2019

British National Formulary (BNF)., 2019.
Available on-line from: https://bnf.nice.org.uk/
Accessed: 25/04/2019

British National Formulary For Children (BNFC)., 2019
Available on-line from: https://bnfc.nice.org.uk
Accessed: 25/04/2019

Britten, N., 2008. *Medicines and Society. Patients, Professionals and the Dominance of Pharmaceuticals*. Basingstoke: Palgrave MacMillan

Brown, P., Lyson, M., Jenkins, T., 2011. From diagnosis to social diagnosis. *Social Science and Medicine.* 73, pp.939-943.

Brown, P., 1995. Naming and Framing: The Social Construction of Diagnosis and Illness. *Journal of Health and Social Behaviour.* 35, pp.34-52.

Brown P., 1990. The Name Game: Towards a Sociology of Diagnosis. *The Journal of Mind and Behaviour*. 11:3, pp.385.
Available on-line from: http://www.brown.uk.com/brownlibrary/PB.htm
Accessed: 25/04/2019

Bryman, A., 2008. *Social Research Methods.* 3rd Edn. Oxford: Oxford University Press.

Buckland, L., 2014. *GP shortage causing crisis for Scots Primary care.*
Available on-line from: http://www.scotsman.com/news/health/gp-shortage-causing-crisis-for-scots-primary-care-1-3407282
Accessed: 25/04/2019

Buescher, PA., 1997 (Revised 2008). Problems with Rates Based on Small Numbers. Raleigh, USA: Center for Health Statistics.

Busfield, J. 2017. The concept of medicalization reassessed. *Sociology of Health and Illness*. 39:5, pp759-774.

Busfield, J., 2010. 'A pill for every ill': Explaining the expansion in medicine use. *Social Science and Medicine*. 70, pp.394-400.

Buts, J.P., Barudi, C., Otte, J.B., 1987. Double-blind controlled study on the efficacy of sodium alginate (Gaviscon) in reducing gastroesophageal reflux assessed by 24 h continuous pH monitoring in infants and children. *European Journal of Pediatrics*. 146:2, pp.156-158.

Caffarelli, C., Baldi, F., Bendandi, B., Calzone, L., Marani, M., Pasquinelli, P., 2010. Cow's milk protein allergy in children: a practical guide. *Italian Journal of Paediatrics*. 35:5. Available on-line from:
http://www.ijponline.net/content/36/1/5
Accessed: 25/04/2019

Campanozzi, A., C., Boccia, G., Pensabene, L., Fabio, P., Marseglia, A., Strisciuglio, P., Barbera, C., Guiseppe, M., Pettoello-Mantovani, M., Staiano, A., 2009. Prevalence and Natural History of Gastroesophageal Reflux: Pediatric Prospective Survey. *Pediatrics*. 123, pp.799-783.

Canani, R.B., Cirillo, P., Roggero, P. Romano, C., Malamisuri, B., Terrin, G., Passariello, A., Manguso, F., Morelli, L., Guarino, A., 2006. Therapy with gastric acidity inhibitors increases the risk of acute gastroenteritis and community-acquired pneumonia in children. *Pediatrics.* 117:5, pp.817-820.

Carr, E, C, J., 2008. Understanding inadequate pain management in the clinical setting: the value of the sequential explanatory mixed method study. *Journal of Clinical Nursing.* 18, pp.124-131.

Carter, S., Henderson, L., 2005. Chapter 9, 'Approaches to qualitative data collection in social science'. in Bowling, A. 2009. *Research Methods in Health: Investigating health and health services.* 3rd Edn. Maidenhead: McGraw Hill & Open University Press.

Centers for Disease Control and Prevention (CDC)., 2017. *Myalgic Encephalomylitits/ Chronic Fatigue Syndrome.*
Available on-line from: https://www.cdc.gov/me-cfs/about/index.html
Accessed: 25/04/2019

Chantry, C.J., Howard, C.R, Auinger, P., 2007. Full Breastfeeding Duration and Risk for Iron Deficiency in U.S. Infants. *Breastfeeding Medicine*. 2:2, pp.63-73.

Chao, H.C., Vandenplas, Y., 2007. Comparison of the effect of a cornstarch thickened formula and strengthened regular formula on regurgitation, gastric emptying and weight gain in infantile regurgitation. *Diseases of the Esophagus*. 20, pp.155-160.

Chellani, H., Dabas, A., Arya, S., 2015., Gastro-esophageal Reflux: Spitting and Posseting in a Neonate. Indian Journal of Pediatrics. 82:1, pp.39-43.

Chen, I., Gao, W., Johnson, A.P., Niak, A., Troiani, J., Korvick, J., Snow, N., Estes, K., Taylor, A., Griebel, D., 2012. Proton Pump Inhibitor Use in Infants: FDA Reviewer Experience. *Journal of Pediatric Gastroenterology and Nutrition*. 54:1, pp.8-14.

Chinn, D., 2015. Study Guide 13: How to Make Sense of Numbers. Fife: NHS Fife Research and Development Office.

Christiaens, W., Nieuwenhuijze, M.J., de Vries, R., 2013. Trends in the medicalisation of childbirth in Flanders and the Netherlands. *Midwifery*. 29. pp. e1-e8.

Clarke, A., 2010. *The Sociology of Healthcare.* 2nd Edn. Harlow: Pearson Education.

Clarke, J. N., 2013. Medicalisation and changes in advice to mothers about children's mental health issues 1970 to 1990 as compared to 1991 to 2010: evidence from Chatelaine magazine. *Health, Risk and Society.* 15:5, pp.416-431.

Clinical Knowledge Summary (CKS)., 2009. *GORD in Children*
Available on-line from: http://cks.nice.org.uk
Accessed 25/04/19

Cohen, S., Bueno de Mesquita, M., Mimouni, F.B., 2015. Adverse effects reported in the use of gastroesophageal reflux disease treatments in children: a 10 years literature review. *British Journal of Clinical Pharmacology.* 80:2, pp.200-208.

Conrad, P., 1992. Medicalization and Social Control. *Annual Reviews in Sociology*. 18, pp.209-32.

Conrad, P., Barker, K.K., 2010. The Social Construction of Illness: Key Insights and Policy Implications**.** *Journal of Health and Social Behavior*. 51(S), pp.S67–S79.

Conrad, P., Mackie, T., Mehrotra, A., 2010. Estimating the costs of medicalisation. *Social Science and Medicine.* 70. pp.1943-1947.

Cooke, L., McCrann, U., Higgins, C., 2013. Managing weaning problems and complementary feeding. *Paediatrics and Child Health*. 23:8, pp.346-350.

Cope, D.G., 2014. Methods and Meanings: Credibility and Trustworthiness of Qualitative Research. *Oncology Nursing Forum*. 41:1, pp.89-91.

Cornwell, J., 1984. *Hard-earned Lives. Accounts of Health and Illness from East London*. London: Tavistock Publications.

Corvaglia, L., Aceti, A., Mariani, E., De Giorgi, M., Capretti, M.G., Faldella, G., 2011. The efficacy of sodium alginate (Gaviscon) for the treatment of gastro-oesophageal reflux in pre-term infants. *Alimentary Pharmacology and Therapeutics*. 33, pp.466-470.

Corvaglia, L., Martini, S., Faldella, G., 2013. Gastro-oesophageal reflux: pathogenesis, symptoms, diagnostic and therapeutic management. *Early Human Development*. 8954, pp.518-519.

Corvaglia, L., Rotatori, R., Ferlini, M., Aceti, A., Ancora, G., Faldella, G., 2007. The effect of Body Positioning on Gastroesophageal Reflux in Premature Infants: Evaluation by Combined Impedance and pH Monitoring. *The Journal of Pediatrics*. 151, pp.591-596.

Cowie, J., 2013. Interventions for infant colic: a literature review. *Primary Health Care*. 23:2, pp.16-20.

Coyer, S.M., Gallo, A.M., 2005. Secondary Analysis of Data. *Journal of Pediatric Health Care.* 19:1, pp.60-63.

Crawford, C., Anderson, M., Cooper, G., Jackson, G., Thompson, J., Vale, A., Thomas, S., Eddleson, M., Bateman, D. 2018. Overdose in young children treated with anti-reflux medications: Poisons enquiry evidence of excess 10-fold dosing errors with ranitidine. *Human and Experimental Toxicology.*37: 4, pp. 343-349.

Cresi, F., Marinaccio, C., Russo, MC., Miniero, R., Silvestro, L,. 2008. Short-term effect of domperidone on gastroesophageal reflux in newborns assessed by combined intraluminal impedance and pH monitoring. *Journal of Perinatology.* 28, pp. 766–770.

Creswell, J.W., 2014. *Research Design.* 4th Edn. London: SAGE.

Critical Skills Appraisal Programme (CASP). 2018.
Available from: https://casp-uk.net/
Accessed: 25/04/2019

Critical Appraisal Skills Programme (CASP)., 2017. *Qualitative Checklist.*
Available on-line from: https://casp-uk.net/casp-tools-checklists/
Accessed: 25/04/2019

Cucchiara, S., Gobio-Casali, L., Balli, F., Magazzu, G., Staiano, A., Astolfi, R., Amarri, S., Conti-Nibali, S., Guandalini, S., 1989. Cimetidine treatment of reflux esophagitis in children: an Italian multicentric study. *Journal of Pediatric Gastroenterology and Nutrition*. 8:2, pp.150-156.

Cucchiara, S., Minella, R., Campanozzi, A., Salvia, G., Borelli, O., Ciccimarra, E., Emiliano, M., 1997. Effects of Omeprazole on Mechanisms of Gastroesophageal Reflux in Childhood. *Digestive Diseases and Sciences.* 42:2, pp.293-299.

Cucchiara, S., Minella, R., Lervolino, C., Franco, M.T., Campanozzi, A., Franceschi, M., et al., 1993. Omeprazole and high dose ranitidine in the treatment of refractory reflux oesophagitis. *Archives of Disease in Childhood*. 69: pp.655-9.

Czinn, S.J., Blanchard, S., 2013. Gastroesophageal Reflux Disease in Neonates and Infants. How and when to Treat. *Pediatric Drugs*. 15, pp.19-27.

Dahlen, H.G., Foster, J.P., Psaila, K., Spence, K., Badawi, N., Fowler, C., Schmeid, V., Thornton C., 2018. Gastro-oesophageal reflux: a mixed methods study of infants admitted to hospital in the first 12 month following birth in NSW (2000-2011). *BioMed Central Pediatrics.* 18:30.
Available on-line from:
https://bmcpediatr.biomedcentral.com/articles/10.1186/s12887-018-0999-9
Accessed: 25/04/2019

Dalbye, R., Calais, E., Berg, M., 2011. Mothers' experiences of skin-to-skin care of healthy full-term newborns – A phenomenology study. *Sexual & Reproductive Healthcare.* 2, pp.107-111.

Dancey, C.P., Reidy, J., 2014. *Statistics Without Maths for Psychology*. 6th Edn. Harlow: Pearson Education Limited.

Da Silva, J., 2012. *Helping people share decision making. A review of evidence considering whether shared decision making is worthwhile*. London: The Health Foundation.

De Bruyne, P., Christiaens, T., Strichele, R.V., Van Winckel, M., 2014. Changes in Prescription Patterns of Acid-Suppressant Medications by Belgian Pediatricians: Analysis of the National Database, [1997 – 2009]. *Journal of Paediatric Gastroenterology and Nutrition*. 58:2, pp.220-225.

De Bruyne, p., Ito S. 2018. Toxicity of long-term use of proton pump inhibitors in children
Archives of Disease in Childhood. 103, pp. 78–82.

Del Buono, R., Wenzl, T.G., Ball, G., Keady, S., Thomson, M., 2005. Effect of Gaviscon Infant on gastro-oesophageal reflux in infants assessed by combined intraluminal impedance/pH. *Archives of Disease in Childhood*. 90, pp.460-463.

Dent J., El-Serag, HB., Wallander, MA., Johansson, S., 2005. Epidemiology of Gastro-oesophageal Reflux Disease: A Systematic Review. *Gut.* 54, pp. 710-717.

Department of Health 2003. *Infant Feeding Recommendation*
Available on-line from:
https://webarchive.nationalarchives.gov.uk/20120503221049/http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4097197
Accessed 25/04/2019

Department of Health., 1994. *Weaning and the Weaning Diet. Report of the Working Group on the Weaning Diet of the Committee on Medical Aspects of Food Policy. Report on Health and Social Subjects No 45*. London: HMSO.

Ditty, A., Garg, A., Leggett, C., Turner, S., 2014. Are proton pump inhibitors over-prescribed in infants? *Journal of Pharmacy Practice and Research*. 44, pp.220-223.

Don, N., McMahon, C., Rossiter, C., 2002. Effectiveness of an individualized multidisciplinary programme for managing unsettled infants. *Journal of Paediatrics and Child Health.* 38, pp.563-567.

Donnelly, R., Abdel-Raouf, Fatma., 2016. *Statistics*. 3rd Edn. Indianapolis, USA: Alpha /Penguin Random House LLC.

Donovan, J., Saunders, C., 2005. Key issues in the analysis of qualitative data. in Bowling, A,. Ebrahim, S. (Eds). 2005. *Handbook of Health Research Methods*. Investigation, Measurement, and Analysis. Maidenhead: Open University Press.

Douglas, P.S., 2013. Diagnosing gastro-oesophageal reflux disease or lactulose intolerance in babies who cry a lot in the first few months overlooks feeding problems. *Journal of Paediatrics and Child Health.* 49, pp.E252-E256.

Douglas, P.S., 2005. Excessive crying and gastro-oesophageal reflux disease in infants: misalignment of biology and culture. *Medical Hypotheses*. 64, pp.887-898.

Doyle, L., Brady, A., Bryne, G. 2009. An overview of mixed methods research. *Journal of Research in Nursing*. Vol. 14 (2) pp. 145 - 185.

Drug and Therapeutics Bulletin., 2010. Managing gastro-oesophageal reflux in infants. *British Medical Journal.* 341, pp.495-498.

Dumit, J., 2012. *Drugs for Life. How Pharmaceutical Companies Define Our Health*. London: Duke University Press.

Eckler, P., Worsowicz, G., Rayburn, W., 2010. Social Media and Health Care: An Overview**.** *American Academy of Physical Medicine and Rehabilitation*. 2, pp.1046-1050.

Edmonds, A., 2013. Can Medicine Be Aesthetic?: Disentangling Beauty and Health in Elective Surgeries. *Medical Anthropology Quarterly.* 27:2, pp.233-252.

El-Serag, HB., Sweet, S., Winchester, CC., Dent, J., 2014. Update on the epidemiology of gastro-oesophageal reflux disease: a systematic review. *Gut*. 63: 6, pp.871-880.

Endacott, R., 2005. Clinical research 4: qualitative data collection and analysis. *Intensive and Critical Care Nursing.* 21, pp.123-127.

Espposito, C., Roberti, A., Turra, F., Escolino, M., Cerulo, M., Settimi, A., Farini, A., Vecchio, P., Di Mezzi, A., 2015. Management of gastroesophageal reflux disease in pediatric patients: a literature review. *Pediatric Health, Medicine and Therapeutics.* 6, pp.1-8.

European Medicines Agency., 2014. *CMDh confirms recommendations on restricting use of domperidone-containing medicines.*
Available on-line from:
http://www.ema.europa.eu/ema/index.jsp?curl=pages/news_and_events/news/2014/04/news_detail_002083.jsp&mid=WC0b01ac058004d5c1
Accessed 25/04/19

Feilzer, M. Y., 2010. Doing Mixed Methods Research Pragmatically: Implications for the Rediscovery of Pragmatism as a Research Paradigm. *Journal of Mixed Methods Research.* 4:1, pp.6-16.

Fetters, M.D., Curry, L.A., Creswell, J.W., 2013. Achieving Integration in Mixed Methods Designs - Principles and Practices. *Health Services Research.* 48:6, pp.2134-2156.

Fewtrell, M.C., Wilson, D.C., Booth, I., Lucas, A., 2011. When to wean? How good is the evidence for six months' exclusive breastfeeding? *British Medical Journal.* 342, pp.209-212.

Flemming, K., Fenton, M., 2002. Ch. 7 'Making sense of research evidence to inform decision making' in Thomson, C., Dowding, D. (Eds). 2002. *Clinical Decision Making and Judgement in Nursing*. Edinburgh: Churchill Livingston.

Forbes, D., Hodgson, M., Hill, R., 1986. The effects of Gaviscon and metoclopramide in gastroesophageal reflux in children. *Journal of Pediatric Gastroenterology and Nutrition.* 5:4, pp.556-559.

Fox, N. J., Ward, K.J., 2008. Pharma in the bedroom…and the kitchen….The pharmaceuticalisation of daily life. *Sociology of Health and Illness.* 30:6, pp.856-868.

Freeman, J., Walters, S., 2006. Ch 28 'Descriptive Analysis of Quantitative Data' in Gerrish K., Lacey A. 2006. *The Research Process in Nursing*. 5th Edn. Oxford: Blackwell Publishing.

Friedman, L.D. (Ed)., 2004. *Cultural Sutures. Medicine and Media.* London: Duke University Press.

Friedson, E., 1970. *Profession of Medicine; A Study of the Sociology of Applied Knowledge.* New York: Dodd, Mead and Co.

Gale, N.K., Heath, G., Cameron, E., Rashid, S., Redwood, S., 2013. Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BioMed Central Medical Research*. 13:117.

Garza, J.M., Nylundet, C.M., Kaul, A., 2011. Time to Stop Blaming Gastroesophageal Reflux. *Clinical Pediatrics*. 50:12, pp.1110-1115.

General Medical Council (GMC)., 2013. *Good practice in prescribing and managing medicines and devices.*
Available on-line from: https://www.gmc-uk.org/ethical-guidance/ethical-guidance-for-doctors/prescribing-and-managing-medicines-and-devices Accessed: 25/04/2019

Gerrish K., Lacey, A. Eds., 2006. 5th Edn. *The Research Process in Nursing.* Oxford: Wiley- Blackwell.

Giddens, A., Sutten, P.W., 2014. *Essential Concept in Sociology*. Cambridge: Polity.

Giddings, L.S., 2006. Mixed -methods research: Positivism dressed in drag? *Journal of Nursing Research.* 11:3, pp.195-203. Alimentatry

Gieruszczak-Bialek, D., Konarska, Z., Skorka, A., Vandenplas, Y., Szajewska, H., 2015. No effect of Proton Pump Inhibitors on Crying and Irritability in Infants: Systematic Review of Randomized Controlled Trials. *The Journal of Pediatrics.* 166, pp.767-770.

Gilchrist M., Wright C., 2009. Ch 22 'Analysis of Quantitative Data' in Moule P., Goodman M. (Eds). 2009. *Nursing Research. An Introduction.* London: SAGE.

Gold, BD., 2004. Review article: epidemiology and management of gastro-oesophageal reflux in children. *Alimentary Pharmacology & Therapeutics*. 19 (Suppl. 1), pp. 22-27.

Goodwin, D., Pope, C., Mort, M., Smith A., 2003. Ethics and Ethnography: An Experiential Account. *Qualitative Health Research*. 13:4, pp. 567-577.

Gov.UK. 2019., *Check Your State Pension Age.*
Available from: https://www.gov.uk/state-pension-age
Accessed: 25/04/2019

Guba, E.G., Lincoln, Y.S., 1986. "But Is It Rigorous? Trustworthiness and Authenticity in Naturalistic Evaluation." In D. Williams (ed.), *Naturalistic Evaluation. New Directions for Evaluation*, no. 30. San Francisco: Jossey-Bass, 1986.

Gullard, A., 2017 Protesters march to stop NHS from being "hung out to dry". *British Medical Journal*. 356, p.1204.

Hains, C.M., Hulbert-Williams, N.J., 2013. Attitudes toward euthanasia and physician-assisted suicide: a study of the multivariate effects of healthcare training, patient characteristics, religion and locus of control. *Journal of Medical Ethics*. 39:11, pp.713-716.

Hamlyn, B., Brooker, S., Oleinikova, K., Wands, S., 2002. *Infant Feeding 2000.* London: The Stationary Office.
Accessible on-line from:
http://webarchive.nationalarchives.gov.uk/20121205214756/http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4059763.pdf
Accessed: 25/04/2019

Harvey, K., 2013. Medicalisation, pharmaceutical promotion and the Internet: a critical multimodal discourse analysis of hair loss websites. *Journal of Social Semiotics.* 23:5, pp.691-714.
Available on-line from:
https://www.tandfonline.com/doi/abs/10.1080/10350330.2013.777596
Accessed: 25/04/2019.

Hassell, E., 2008. Talk is Cheap, Often Effective: Symptoms in Infants Often Respond to Non-Pharmacologic Measures. *The Journal of Pediatrics.* 152, pp.301-303.

Hassell, E., 2012. Over-Prescription of Acid-Suppressing Medications in Infants: How It Came About, Why It's Wrong, and What to Do About It. *The Journal of Pediatrics.* 160:2, pp.193-196.

Healthcare Improvement Scotland. 2019. *What Matters to You?* Available on-line from: https://www.whatmatterstoyou.scot/ Accessed: 30/01/2020

Healthline., 2017. *Treating Acid Reflux in Infants.* Available on-line from: https://www.healthline.com/health/gerd/infants-treatment Accessed: 25/04/2019

Hegar, B., Dewanti, N.R., Kadim, M., Alatas, S., Firmansyah, A., Vandenaplas, Y., 2009. Natural evolution of regurgitation in healthy infants. *Acta Pediatrica.* 98, pp.1189-1193.

Heine, R.G., 2008. Management of gastro-oesophageal reflux disease in childhood. *Pediatrics and Child Health.* 18:10, pp.448-452.

Hibbs, A. M., Lorch, S. A., 2006. Metoclopramide for the Treatment of Gastroesophageal Reflux Disease in Infants: A Systematic Review. *Pediatrics*. 118, pp.746-752.

Holloway, I., Galvin K., 2017. *Qualitative Research in Nursing and Healthcare*. 3rd Edn. London: John Wiley and Sons Ltd.

Horvath, A., Dziechciarz, P., Szajewska, H., 2008. The Effect of Thickened-Feed Interventions on Gastroesophageal Reflux in Infants: Systematic Review and Meta-analysis of Randomized, Controlled Trials. *Pediatrics.* 122. pp.1268-1277.

Howarth, G., 2007. *Death and Dying. A sociological introduction*. Cambridge: Polity.

Howitt, D., Cramer, D., 2014. *Introduction to Research Methods in Psychology*. 4th Edn. Harlow: Pearson Education Limited.

Huang, R.C., Forbes, D., Davies, M.W., 2009. Feed thickener for newborn infants with gastro -oesophageal reflux (Review). *Cochrane Database of Systematic Reviews*. Issue 1.

Hummer-Praedier E., Scheudt-Nave, C., Martin, H., Heinemann, S., Kochen, M., Himmel, W., 2008; Simply no time? Barriers to GPs' participation in primary health care research. Family Practice. 25:2, pp.105-112.

Indrio, F., Riezzo, G., Raimondi, F., Cavello, L., Francavilla, R., 2009. Regurgitation in healthy and non-healthy infants. *Italian Journal of Pediatrics*. 35:39.
Available on-line from:
https://ijponline.biomedcentral.com/track/pdf/10.1186/1824-7288-35-39
Accessed: 25/04/2019

Illueca, M, Alemayehu B, Shoetan N, Yang, J. 2014. Proton Pump Inhibitor Prescribing Patterns in Newborns and Infants. *Journal of Pediatric Pharmacology Therapy*. 19:4, pp.283–287.

Information Services Division of NHS Scotland (ISD Scotland)., 2018a. *Births in Scottish Hospitals. Year ending March 2018. A National Statistics Publication for Scotland.*
Available on-line from: https://www.isdscotland.org/Health-Topics/Maternity-and-Births/Publications/2018-11-27/2018-11-27-Births-Report.pdf
Accessed: 25/04/2019

Information Services Division of NHS Scotland (ISD Scotland)., 2018b. *Births in Scottish Hospitals*
Available on-line from: http://www.isdscotland.org/Health-Topics/Maternity-and-Births/Publications/2017-11-28/visualisation.asp
Accessed: 25/04/2019

Information Services Division of NHS Scotland (ISD Scotland)., 2018c. *Workforce Dashboards 5th June 2018*
Available on-line from: http://www.isdscotland.org/Health-Topics/Workforce/Publications/2018-06-05/Nursing-and-Midwifery.asp
Accessed: 25/04/2019

Information Services Division of NHS Scotland (ISD Scotland)., 2016. *Primary Care Workforce Survey Scotland 2015. A Survey of Scottish General Practices and General Practice Out of Hours Services.* 2016.
Available on-line from:
http://www.isdscotland.org/Health-Topics/General-Practice/Publications/2016-06-14/2016-06-14-PrimaryCareWorkforceSurveyScotland2015-Summary.pdf
Accessed: 25/04/19.

Information Services Division of NHS Scotland (ISD Scotland)., 2012a. *ISD Scotland Statistical Disclosure Control Protocol Version 2.3.*
Available on-line from:
http://www.isdscotland.org/About-ISD/About-Our-Statistics/
or
https://www.isdscotland.org/About-ISD/Confidentiality/
Accessed: 25/04/2019

Information Services Division of NHS Scotland (ISD Scotland)., 2012b. *Guide to Prescribing Services. Helping you to make best use of prescribing information and intelligence.*
Available on-line from: http://www.isdscotland.org/Health-Topics/Prescribing-and-medicines/ISD-Guide-to-Prescribing-Services-Web-Accessible-Version-V1.pdf
Accessed: 25/04/2019

Information Services Division NHS Scotland (ISD Scotland)., 2010. *Products and Services*.
Available on-line from: http://www.isdscotland.org/Products-and-Services/index.asp
Accessed: 25/04/2019

Johansen, M., Risor, B.R., 2017. What is the problem with medically unexplained symptoms for GPs? A meta-synthesis of qualitative studies. *Patient Education and Counseling.* 100, pp.647-654.

Johanson, R., Newburn, M., 2001. Promoting Normality in Childbirth. *British Medical Journal.* 323, pp.1142-1143.

Johanson R., Newburn, M., Macfarlane, A., 2002. Has the medicalisation of childbirth gone too far? *British Medical Journal*. 324, pp.892-895.

Jootun, D., McGhee, G., Marland, G., 2009. Reflexivity: promoting rigour in qualitative research. *Nursing Standard.* 23:23, pp.42-46.

Jutel, A., 2011a. *Putting a Name to it. Diagnosis in Contemporary Society*. Baltimore, USA: The John Hopkins University Press.

Jutel, A., 2011b. Classification, Disease, and Diagnosis. *Perspectives in Biology and Medicine*. 54:2, pp.189-205.

Jutel, A., 2009. Sociology of diagnosis: a preliminary review. *Sociology of Health and Illness.* 31:2, pp.278-299.

Kanieski, M. A., 2010. Securing attachment: The shifting medicalisation of attachment and attachment disorders. *Health, Risk and Society*. 12:4. pp.335-344.

Kettles, A.M., Creswell, J.W., 2011. Mixed methods research in mental health nursing. *Journal of Psychiatric and Mental Health Nursing.* 18, pp.535-542.

Khoshoo, V., Edell, D., Thompson, A., Rubin, M., 2007. Are We Overprescribing Antireflux Medications for Infants With Regurgitation? *Pediatrics.* 120:5, pp.946-949.

Khoshoo, V., Ross, G., Brown, S., Edell, E., 2000. Smaller volume, thickened formulas in the management of gastroesophageal reflux in thriving infants. *Journal of Pediatric Gastroenterology and Nutrition.* 31:5, pp.554-556.

Kierkus, J., Oracz, G., Korczowski, B., Szymanska, E., Wiernicka, A., Woynarowkski, M., 2014. Comparative Safety and Efficacy of Proton Pump Inhibitors in Paediatric Gastroesophageal Reflux Disease*. Drug Safety*. 37, pp.309-316.

Kinny, H.C., Thach, B.T., 2009 The sudden infant death syndrome. *New England Journal of Medicine.* 361:8, pp.795-805.

Kirby, C.N., Segal, A.Y., Hinds, R., Jones, K.M., Piterman, L., 2016. Infant gastro-oesophageal reflux disease (GORD): Australian GP attitudes and practices. *Journal of Paediatrics and Child Health*. 52, pp.47-53.

Kolimarala V., Beattie, M., Batra, A., 2019. Gastro-oesophageal reflux in infancy. *Paediatrics and Child Health*. 29: 9, pp. 377–383.

Koplin, J.J., Allen, K.J., 2013. Optimal timing for solids introduction – why are the guidelines always changing? *Clinical and Experimental Allergy.* 43, pp.826-834.

Kramer, M.S., Kakuma, R., 2002. Optimal duration of exclusive breast feeding. *Cochran e Database of Systematic Reviews.* Issue 8
Available on-line from:
http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD003517.pub2/epdf
Accessed: 25/04/2019

Kwok, TC., Ojha, S., Dorling, J., 2017. Feed thickener for infants up to six months of age with gastro-oesophageal reflux. Cochrane Database of Systematic Reviews 2017, Issue 12.
Available from: https://www.cochranelibrary.com/search
Accessed on: 18/01/2020

Lacobucci, G., 2017. MPs urge government to stop “bickering” with NHS Leaders and solve financial crisis. *British Medical Journal.* 356, p.1014.

Lacey, A., 2006. Chapter 2: ‘The Research Process’ in GERRISH, K., LACEY, A. Eds. 2006. *The Research Process in Nursing.* Oxford: Wiley- Blackwell.

Lanigan, J.A., Bishop, J., Kimber, A.C., Morgan, J., 2001. Systematic review concerning the age of introduction of complementary foods to the healthy full-term infant. *European Journal of Clinical Nutrition.* 55, pp.309-20.

Lant, A., Holleran, K., 2016. Clinical Audit: The Management of Gastro-oesophageal Reflux in Infants Presenting to Childrens Accident and Emergency. *Archives of Disease in Childhood*. 101, pp.A23 –A24.

Lambert, J., Mobassalej, M., Grand, R.J., 1992. Efficacy of cimetidine for gastric acid suppression in pediatric patients. *Journal of Pediatrics*. 120:3, pp.474-478.

Lawson, M., 2003. Gastro-oesophageal reflux in infants: an evidence-based approach. *British Journal of Community Nursing.* 8:7, pp.296-301.

Lenz, T., MagShamhráin, M., 2012. Inventing Diseases: Kleptomania, Agoraphobia and Resistance to Modernity. *Global Society*. 49, pp.279-283.

Leung AKC, Hon KL. 2019. Gastroesophageal reflux in children: an updated review. *Drugs in Context.* Vol.8
Accessible on-line from: https://www.drugsincontext.com/gastroesophageal-reflux-in-children-an-updated-review/
Accessed: 18/01/2020

Lightdale, J.R., Gremse, D.A., and Section on Gastroenterology, Hepatology, and Nutrition., 2013 Gastroesophageal Reflux: Management Guidance for the Pediatrician. *Pediatrics.* 131, pp.1684-1695.

Lucassen, P., 2010. Colic in infants. *Clinical Evidence.* 2, p.309.

MacDonald, S., Morrison, J., Maxwell, M., Munoz-Arroyo, R., Power, A., Smith, M., Sutton, M., Wilson, P., 2009. 'A coal face option': GPs' perspectives on the rise in antidepressant prescribing. *British Journal of General Practice.* 59:566, pp.299-307.

Mahant, S., 2017. Pharmacological treatment of children with gastro-oesophageal reflux. *Paediatrics and Child Health*. 22:1, pp.30-32.

Maltby, J., Williams, G., McGarry, J., Day, L., 2010. *Research Methods for Nursing and Healthcare.* London: Pearson.

Manasfi, H., Hanna-Wakim, R., Akel, I., Yazbeck, N., 2017. Questionnaire-based survey in a developing country showing non-compliance with paediatric gastro-oesophageal reflux practice guidelines. *Acta Paediatrica*. 106, pp.316-321.

Margolis, R., Iciaszczyk, N., 2015. The changing health of Canadian grandparents**.** *Canadian Studies in Population.* 42:3-4, pp.63-76.

Martin, A.J., Pratt, N., Kennedy, J.D., Ryan, P., Ruffin, R.E., Miles, H., Marley, J., 2002. Natural history and familial relationships of infant spilling to 9 years of age. *Pediatrics.* 109:6, pp.1061-7.

Mason, T., 2018. *Warnings of 'GP crisis' as one of Aberdeen's largest GP surgeries to shut its doors.* Tom Mason MSP North East Scotland.
Available on-line from: https://www.tommasonmsp.co.uk/news/warnings-gp-crisis-one-aberdeens-largest-gp-surgeries-shut-its-doors
Accessed: 25/04/19

Matthies, L.M., Wallwiener, S., Müllerb, M., Dostera, A., Plewnioka, K., Fellera, S., Sohna, C., Wallwienera, M., Reckb, C., 2017. Maternal self-confidence during the first four months postpartum and its association with anxiety and early infant regulatory problems. *Infant Behavior and Development.* 49, pp.228-237.

McAndrew, F., Thompson, J., Fellows, L., Large, A., Speed, M., Renfrew, M.J., 2012. *Infant Feeding Survey 2010.* Health and Social Care Information Centre.
Available on-line from:
http://www.content.digital.nhs.uk/catalogue/PUB08694/Infant-Feeding-Survey-2010-Consolidated-Report.pdf
Accessed: 25/04/2019

McCaffery, K., Jansen, J., Scherer, L.D., Thornton, H., Hercsch, J., Carter, S.M., Barratt, A., Sheridan, S., Moynihan, R., Waller, J., Brodersen, J., Pickles, K., Edwards, A., 2016. Walking the tightrope: communicating overdiagnosis in modern healthcare. *British Medical Journal.* 352, p.i348.

McColl, P. 1994. Homosexuality and mental health services. Homosexuals shouldn't have to suffer their doctors prejudices*. British Medical Journal*. 308, pp.550-551.

McCracken, M., 2014. Gastro-oesophageal Reflux Guidelines: The European Experience. *Journal of Pediatric Gastroenterology and Nutrition.* 58, pp.395-396.

McKay, J., Pickup, L., Atkinson, S., McNab, D., Bowie, P., 2016. Human factors in general practice = early thoughts on the educational focus for specialty training and beyond. *Education for Primary Care.* 27:3, pp.162-171.

McLaren, E., 2015. *Birth Characteristics in England and Wales: 2014*.
Available on-line from:
https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/livebirths/bulletins/birthcharacteristicsinenglandandwales/2015-10-08
Accessed: 25/04/2019

McLennan, S., Augood, C., Cash-Gibson, L., Logan, S., Gilbert, R.E., 2010. Cisapride treatment for gastro-oesophageal reflux in children (Review). *The Cochrane Collaboration*. Issue 4.

McMullan, M., 2006. Patients using the Internet to obtain health information: How this affects the patient–health professional relationship. *Patient Education and Counseling.* 63, pp.24-28.

Medicines and Healthcare Products Regulatory Agency (MHRA)., 2014. *The Blue Guide Advertising and Promotion of Medicines in the UK.* 3rd Edn. London: The Advertising Standards Unit.

Meyers, W.F., Herbst, J.J., 1982. Effectiveness of positioning therapy for gastro-esophageal reflux. *Pediatrics.* 69, pp.768-772.

Mezoff, E.A., Cohen, M.B., 2013. Acid Suppression and the Risk of Clostridium difficile Infection. *The Journal of Pediatrics*. 163:3, pp.627-630.

Miller, S., 1999. Comparison of the Efficacy and Safety of a New Aluminium-free Paediatric Alginate Preparation and Placebo in Infants with Recurrent Gastroesophageal Reflux, *Current Medical Research and Opinion.* 15:3, pp.160-168.

Mintzes, B., 2002. For and Against: Direct to Consumer Advertising Is Medicalising Normal Human Experience. *British Medical Journal.* 324:7342, pp.908-909.

Mitchell, D.J., McClure, B.G., Tubman, T.R.J., 2001. Simultaneous monitoring of gastric and oesophageal pH reveals limitations of conventional oesophageal pH monitoring in milk fed infants. *Archives of Disease in Childhood.* 84: pp.273-276.

Miyazawa, R., Tomomasa, T., Kaneko, H., Morikawa, A., 2006. Effect of formula thickened with locust bean gum on gastric emptying in infants. *Journal of Pediatrics and Child Health*. 42. pp.808-812.

Miyazawa, R., Tomomasa, T., Kaneko, H.,Tachibana, A., Ogawa, T., Morikawa, A., 2002. Prevalence of gastro-esophageal reflux-related symptoms in Japanese infants. *Pediatrics International.* 44. pp.513-516

Mogull, S.A., Balzhiser, D., 2015. Pharmaceutical Companies are Writing the Script for Health Consumerism. *Communication Design Quarterly.* No. 3.

Moore, D.J., Tao, B.S., Lines, D.R., Hirte, C., Heddle, M.L., Davidson, G.P., 2003. Double-blind placebo-controlled trial of omeprazole in irritable infants with gastroesophageal reflux. *Journal of Pediatrics.* 143:2, pp.219-223.

Montgomery, DC., Jennings, CL., Kulahchi, M., 2015. 2nd Edn. Introduction To Time Series Analysis And Forecasting. New Jersey, USA: Wiley.

Morrison, J., Anderson, M., Sutton, M., Munoz-Arroyo, R., McDonald, S., Maxwell, M., Power, A., Smith, M., Watson, P., 2009. Factors influencing variation in prescribing of antidepressants by general practitioners in Scotland. *British Journal of General Practice*. 59:559, pp.e25-31.

Moule, P., Goodman, M., 2009. *Nursing Research: An Introduction.* London: SAGE

National Collaboration Centre for Women's and Children' Health., 2015. *Gastro-oesophageal reflux disease in children and young people. Gastro-oesophageal reflux disease: recognition, diagnosis and management in children and young people. NICE Guideline 1 Methods, evidence and recommendations.* National Collaborating Centre for Women's and Children's Health.
Available on-line from: https://www.nice.org.uk/guidance/ng1/evidence/full-guideline-pdf-1784557
Accessed: 25/04/2019

National Institute for Health and Clinical Excellence (NICE)., 2014 (Updated 2019). *Gastro-oesophageal reflux disease and dyspepsia in adults: investigation and management.*
Available on-line from: https://www.nice.org.uk/guidance/cg184
Accessed: 18/01/2020

National Institute for Health and Clinical Excellence (NICE)., 2016. *Gastro-oesophageal reflux in children and young people.* Quality Standard.
Available on-line form: www.nice.org.uk/guidance/qs112
Accessed: 25/04/2019

National Institute for Health and Clinical Excellence (NICE)., 2015. *Gastro-oesophageal reflux disease in children and young people: diagnosis and management.* NICE Guideline
Available on-line from: www.nice.org.uk/guidance/ng1
Accessed 25/04/2019.

National Institute for Health and Clinical Excellence (NICE).,2014*. NICE recommends home births for some mums.*
Available on-line from: https://www.nhs.uk/news/pregnancy-and-child/nice-recommends-home-births-for-some-mums/
Accessed: 25/04/2019

National Institute for Health and Care Excellence (NICE)., 2011*. Food allergy in under 19s: assessment and diagnosis*.
Available on-line from: www.nice.org.uk/guidance/cg116
Accessed: 25/04/2019.

National Institute for Health and Clinical Excellence (NICE)., 2009. *GORD in Children*
Available on-line from: https://cks.nice.org.uk/gord-in-children
Accessed 25/04/19

National Records of Scotland., 2016. *Mid-2015 population estimates Scotland and corrected population estimates for mid-2012, mid-2013 and mid-2014*
Available on-line from:
https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/mid-year-population-estimates/mid-2015-and-corrected-mid-2012-to-mid-2014/list-of-tables
Accessed: 25/04/19

Nelson, S.P., Chen, E.H., Syniar, G.M., Christoffel, K.K., 1997. Prevalence of Symptoms of Gastroesophageal Reflux During Infancy. *Archives of Pediatric Adolescent Medicine.* 151, pp.569-572.

Netmums., 2016. *Coping with reflux: one mums story*
Available on-line from: https://www.netmums.com/baby/coping-with-reflux-one-mums-story
Accessed: 25/04/2019

Nettleton, S., 2006. 'I just want permission to be ill': Towards a sociology of medically unexplained symptoms. *Social Science & Medicine.* 62, pp.1167-1178.

Nettleton, S., Watt, I., O'Malley, L., Duffey, P., 2005. Understanding the narratives of people who live with medically unexplained illness. *Patient Education and Counseling.* 56, pp.205-210.

Neu, M., Pan, Z., Workman, R., Marcheggiani-Howard, C., Furuta, g., Laudenslager, ML., 2014. Benefits of Massage Therapy for Infants with Symptoms of Gastroesophageal Reflux Disease. *Biological Research for Nursing.* 16:4, pp. 387-397.

Neu, M., Corwin, E., Lareau, S.C., Marcheggiani-Howard, C., 2012. A review of non-surgical treatment for the symptoms of irritability in infants with GERD. *Journal for Specialists in Pediatric Nursing*. 17, pp.177-192.

NHS Grampian., 2015. *The Development of General Practice in Grampian*
Available from:
http://foi.nhsgrampian.org/globalassets/foidocument/dispublicdocuments---all-documents/item9.1PCBoard020415final1.pdf
Accessed: 25/04/2019

NHS Grampian., 2012. *NHS Grampian Infant Feeding Guidelines For Health Professionals in Grampian*. (Issue 3). Aberdeen: NHS Grampian.

NHS Lothian., 2011. *Lothian Joint Formulary - Child*
Available on-line from:
https://www.ljf.scot.nhs.uk/LothianJointFormularies/Child/1.0/Pages/default.aspx
Accessed: 25/04/2019

NHS Lothian. 2014.*Paediatric Gastroenterology and Nutrition Department, Management Guidelines for Paediatric Gastroenterology: Gastro-oesophageal Reflux – A Quick Reference Guide.*
Available from:
https://apps.nhslothian.scot/refhelp/guidelines/ResourcesLinks/Paediatrics%20G.I%20paed%20constipation-final.pdf
Accessed: 25/04/2019

NHS., 2017. *Overview of chronic fatigue syndrome (CFE/ ME)* Available online from: https://www.nhs.uk/conditions/chronic-fatigue-syndrome-cfs/
Accessed: 25/04/2019

O'Rourke, A., 2009 Ch. 4 'Critical Appraisal' in Bowling, A., 2005. *Research Methods in Health: Investigating health and health services*. 3rd Edn. Maidenhead: McGraw Hill & Open University Press.

Oakley, A., 1979. *Becoming a Mother*. Oxford: Martin Robertson.
Oakley, A., 1980. *Women Confined. Towards a Sociology of Childbirth*. Oxford: Martin Robertson.

Onwuegbuzie, A.J., Leech, N.L., 2005. On Becoming a Pragmatic Researcher: The Importance of Combining Quantitative and Qualitative Research Methodologies, *International Journal of Social Research Methodology,* 8:5, pp.375-387.

Onyeador, N., Paul, S.B., Sandhu, B.K., 2014. Paediatric gastoesophageal reflux clinical practice guidelines. *Archives of Disease in Childhood Education and Practice Education*. 99: 190-193.

Orenstein, S.R., 2010. Symptoms and Reflux in Infant: Infant Gastroesophageal Reflux Questionnaire Revised (I-GERQ-R) – Utility for Symptom Tracking and Diagnosis. *Current Gastroenterology Rep.* 12, pp.431-436.

Orenstein, S.R., Hassall, E., Furmaga-Jablonska, W., Atkinson, S., Raanan, M. 2009. Multicenter, double-blind, randomized, placebo-controlled trial assessing the efficacy and safety of proton pump inhibitor lansoprazole in infants with symptoms of gastroesophageal reflux disease. *Journal of Pediatrics.* 154:4, pp.514-520.

Orenstein, S,R,. Hassall, E., 2007. Infants and proton pump inhibitors: tribulations, no trials. *Journal of Pediatric Gastroenterology and Nutrition*. 45:4, pp.395-398.

Orenstein, S.R., McGowan, J.D., 2008. Efficacy of Conservative Therapy as Taught in the Primary Care Setting for Symptoms Suggesting Infant Gastroesophageal Reflux. *The Journal of Pediatrics.* 152. pp.310-314.

Page, L.A., Wessley, S., 2003. Medically unexplained symptoms: exacerbating factors in the doctor–patient encounter. *Journal of the Royal Society of Medicine.* 96, pp.223-227.

Papachrisanthou, M.M., Davis, R.L., 2015. Clinical Practice Guidelines for the Management of Gastroesophageal Reflux and Gastroesophageal Reflux Disease: Birth to 1 Year of Age. *Journal of Pediatric Health Care.* 29, pp.558-564.

Parkinson, S., Eatough, V., Holmes, J., Stapley, E., Midgley, N., 2016. Framework analysis: a worked example of a study exploring young people's experiences of depression. *Qualitative Research in Psychology,* 13:2, pp.109-129.

Patience, S., 2012. Identifying gastro-oesophageal reflux disease in infants. *Community Practitioner*. 85:11, pp.46-48.

Paton, J.Y., Nanayakkhara, C.S., Simpson, H., 1988. Vomiting and gastro-oesophageal reflux. *Archives of Disease in Childhood.* 63, pp.837-856.

Pettinger, K., 2017. Gastro-oesophageal reflux in infants. *InnovAiT.* 10:4, pp.197-201.

Petzoldt, J., 2018. Systematic review on maternal depression versus anxiety in relation to excessive infant crying: it is all about the timing. *Archives of Womens Mental Health*. 21, pp.15-30.

Pfefferkorn, M.D., Croffie, J.M., Gupta, S.K., Molleston, J.P., Eckert, G.J., Corkins, M.R., et al., 2006. Nocturnal acid breakthrough in children with reflux esophagitis taking proton pump inhibitors. *Journal of Pediatric Gastroenterology and Nutrition.* 42, pp.160-165.

Pope, C., Mays, N. (Eds)., 2006. Qualitative Research in Health Care. 3rd Edn. Oxford: Blackwell Publishing.

Prasad, B., 2013. Social media, health care, and social networking. *Gastrointestinal Endoscopy*. 77:3, pp.492-495.

Pritchard, D.S., Baber, N., Stephenson, T., 2005. Should domperidone be used for the treatment of gastro-oesophageal reflux in children? Systematic review of randomized controlled trials in children aged 1 month to 11 years old. *British Journal of Clinical Pharmacology.* 59:6, pp.725-729.

Procter, S., Allan, T., 2006. Chapter 12, 'Sampling' in Gerrish K., Lacey, A. Eds. 2009. *The Research Process in Nursing.* 5th Edn. Oxford: Wiley-Blackwell.

Puntis, J.W., 2015. Gastro-oesophageal reflux in young babies: who should be treated? *Archives of Disease in Childhood.* 100, pp.989-993.

Quitadamo, P., Micle, E., Alongi, A., Brunese, F.P., Di Cosimo, M.E., Ferrara, D., Gambotto, S., Lamborghini, A., Mercuri, M., Pasinato, A., Sansone, R., Vitale, C., Villani, A., Staiano, A., 2015. Italian survey on general pediatricians' approach to children with gastroesophageal reflux symptoms. *European Journal of Pediatrics*. 174, pp.91-96.

Quitadamo, P., Papadopoulou, A., Wenzl, T., Urbonas, V., Kneepkens, C.M.F., Roman, E., Orel, R., Pavkov, D.J., Dias, J.A., Vandenplas, Y., Kostovski, A., Miele, E., Villani, A., Staiano, A., 2014. European Pediatricians' Approach to Children with GER Symptoms: Survey of the Implementation of the 2009 NASPGHAN-ESPGHAN Guidelines. *Journal of Pediatric Gastroenterology and Nutrition.* 58, pp.505-509.

Reilly, J.J., Wells, J.C., 2005. Duration of exclusive breast-feeding: Introduction of complementary feeding may be necessary before 6 months of age. *British Journal of Nutrition*. 94, pp.869-872.

Reith, D., Leathart, C., Alderton, A., 2011. Irritable Infant Reflux and GORD. *Best Practice Journal*. 40, pp. 30 - 37.

Richards, L., 2015. *Handling Qualitative Data. A practical Guide* 3rd Edn. London: SAGE.

Rimmer, R., Hiscock, H., 2013. National survey of Australian paediatrians' approach to infant crying. *Journal of Paediatrics and Child Health*. 50, pp.202-207.

Ritchie, J., Spencer, L., 1994. 'Qualitative data analysis for applied policy research' in Bryman, A., Burgess, R.G., [eds.] *Analyzing qualitative data*, 1994, pp.173- 194.

Ritchie, J., Lewis, J., Elam, G., Tennant, R., Rahim, N., 2014a. Chapter 5, 'Designing and Selecting Samples' in Ritchie, J., Lewis, J., McNaughton Nicholls, C., Ormiston, R. 2014. *Qualitative Research Practice. A guide for social science students and researchers.* London: SAGE.

Ritchie, J., Lewis, J., McNaughton Nicholls, C., Ormiston, R. 2014. *Qualitative Research Practice. A guide for social science students and researchers.* London: SAGE.

Robson, C., 2011. Real World Research. *A Resource for Users of Social Research Methods in Applied Settings*. 3rd Edn. Chichester: Wiley

Roller, C.G., 2005. Getting to Know You: Mothers' Experiences of Kangaroo Care. *Journal of Obstetric, Gynaecological and Neonatal Nursing*. 34:2, pp.210-217.

Rosen, R., Vandenplas, Y., Singendonk, M., Cabana ,M., DiLorenzo, C., Gottrand, F., Gupta, S., Langendam, M., Staiano, A., Thapar, N., Tipnis, N., Tabbers, M., 2018. Pediatric Gastroesophageal Reflux Clinical Practice Guidelines: Joint Recommendations of the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition. *Journal of Pediatric Gastroenterology and Nutrition*. 6:3, pp.516-554.

Rosen, R., 2014. Gastroesophageal Reflux in Infants. More than Just a pHenomenon. *Journal of the American Medical Association Pediatrics*. 168:1, pp.83-89.

Rubin, H.J., Rubin, I.S., 2012. *Qualitative Interviewing. The art of hearing data.* 3rd Edn. London: SAGE.

Ruigómez A, Wallander MA, Lundborg P, et al. Gastroesophageal reflux disease in children and adolescents in primary care. 2010. Scandinvian Journal of Gastroenterology. 45, pp. 139–46.

Ryan, B., Joiner, B., Cryer, J., 2013. *Minitab Handbook. Updated for Release 16*. 6th Edn. USA: Brooks/Cole Cengage Learning.

Sackett, D., Rosenberg, W., Gray, M., Haynes, B., Richardson, S., 1996. Evidence based medicine: what it is and what it isn't [internet]. *British Medical Journal.* 312:71
Available from: http://www.bmj.com/content/312/7023/71
Accessed: 25/04/2019

Safe, M., Chan, W.H., Leach, S.T., Sutton, L., Lu, K., Krishanan, U., 2016. Widespread use of gastric inhibitors in infants: Are they needed? Are they safe? *World Journal of Gastrointestinal Pharmacology and Therapeutics.* 7:4, pp.531-539.

Sale, J.E.M., Lohfeld, L.H., Brazil, K., 2002. Revisiting the Quantitative - Qualitative Debate: Implications for Mixed-Methods Research. *Quality and Quantity*. 36, pp.43-53.

Salvatore, S., Ripepi, A., Huysentruyt, K., van de Maele, K., Nosetti, L., Agosti, M., · Salvatoni, A., Vandenplas, Y., 2018. The Effect of Alginate in Gastroesophageal Reflux in Infants. *Pediatric Drugs.* 20, pp. 75–583

Salvatore, S., Hauser, B., Salvtoni, A., Vandenplas, Y., 2006. Oral ranitidine and duration of gastric pH > 4.0 in infants with persisting reflux symptoms. *Acta Paediatrica*. 95, pp.176-181.

Salvatore, S., Vandenplas, Y., 2003. Gastro-oesophageal reflux disease and motility disorders. Best Practice and Research. *Clinical Gastroenterology*. 17:2, pp.163-179.

Santana, R.N.S., Santos, V.S., Ribeiro-Junior, R.F., Freire, M.S., Menezes, M.A.S., Cipolotti, R., Gurgel, R.Q., 2017. Use of ranitidine is associated with infections in newborns hospitalized in a neonatal intensive care unit: a cohort study. *BioMed Central Infectious Diseases*. 17, p375.

Schellack, N., 2012. Infants and children with gastro-oesophageal reflux disease. *South African Pharmaceutical Journal.* 79:1, pp.4-19.

Scherer, L.D., Zikmun-Fisher, B.J., Fagerin, A., Tarini, B.A., 2013. Influence of 'GERD' Label on Parents' Decision to Medicate Infants. *Pediatrics.* 131:5, pp.839-845.

Scott, B., 2012. Question 2 How effective is domperidone at reducing symptoms of gastro-oesophageal reflux in infants? *Archives of Disease in Childhood.* 97, pp.752-755.

Scott, I., Mazhindu, D., 2005. *Statistics for Health Care Professionals*. London: SAGE

Scottish Executive Health Department., 2006. 2nd Edn. *Research Governance Framework for Health and Community Care*. Edinburgh: Chief Scientist Office.

Scottish Government., 2019. *Scottish Index of Multiple Deprivation*.
Available on-line from: http://simd.scotland.gov.uk/publication-2012/local-authority-summaries-simd-2012/
Accessed: 25/04/2019

Scottish Government., 2018. *Practicing Realistic Medicine*. Edinburgh: Scottish Government.
Available from:
https://www.gov.scot/binaries/content/documents/govscot/publications/progress-report/2018/04/practising-realistic-medicine/documents/00534374-pdf/00534374-pdf/govscot%3Adocument
Accessed: 25/04/2019

Scottish Government 2017a. NHS Scotland assets and facilities 2016: annual report
Available on-line form: https://www.gov.scot/publications/annual-state-nhsscotland-assets-facilities-report-2016/
Accessed 02/05/2019

Scottish Government., 2017b. *Scottish Household Survey. Scotland's People. Annual Report.*
Available online from: https://www.gov.scot/publications/scotlands-people-annual-report-results-2016-scottish-household-survey/pages/2/
Accessed; 25/04/19

Scottish Government., 2014. *500 New Health Visitors*
Available on-line from:
https://www.wiredgov.net/wg/news.nsf/articles/500+new+health+visitors+19062014163000?open
Accessed: 25/04/2019

Scottish Government., 2008. *Delivering for Remote and Rural Healthcare: The Final Report of the Remote and Rural Workstream*. Edinburgh: Scottish Government.
Available on-line from:
http://www.scotland.gov.uk/Publications/2008/05/06084423/4
Accessed 25/04/2019

Shekhar, S., Goel, A., 2012. Euthanasia: India's Position in the Global Scenario. *American Journal of Hospice & Palliative Medicine.* 30:7, pp.628-631.

Sherman, P.M., Hassall, E., Fagundes-Neto, U., Gold, B.D., Kato, S., Koletzko., Orenstein, S., Rudolph, C., Vakil, N., Vandenplas, Y., 2009. A Global, Evidence-Based Consensus on the Definition of Gastroesophageal Reflux Disease in the Pediatric Population. *American Journal of Gastroenterology.* 104, pp.1278-1295.

Siegel, Z.A., Brown, A., Devendorf, A., Collier, J., Jason, L.A., 2018. A content analysis of chronic fatigue syndrome and myalgic encephalomyelitis in the news from 1987 to 2013. *Chronic Illness*. 14:1, pp.3-12.

Skand, S., Ashish, G., Shekhar, S., 2012. Euthanasia. *American Journal of Hospice and Palliative Medicine*. 30:7, pp.628-631.

Smith, C.H., Israel, D.M., Schreiber, R., Goldman, R.D., 2013. Proton pump inhibitors for irritable infants. *Canadian Family Physician.* 59, pp.153-156.

Spencer, L., Ritchie, J., Lewis, J. and Dillon, L., 2003. *Quality in Qualitative Evaluation: A framework for assessing research evidence.* Government Chief Social Researcher's Office, London: Cabinet Office.

Spencer, L., Ritchie, J., Ormston, R., O'Connor, W., Barnard, M., 2014a. Ch. 10 'Analysis: Principles and Processes' in Ritchie, J., Lewis, J., McNaughton Nicholls, C., Ormiston, R. 2014. *Qualitative Research Practice. A guide for social science students and researchers.* London: SAGE.

Spencer, L., Ritchie, J., O'Connor, R., Morrell, G., Ormston, R., 2014b. Ch. 11 'Analysis in Practice' in Ritchie, J., Lewis, J., McNaughton Nicholls, C., Ormiston, R. 2014. *Qualitative Research Practice. A guide for social science students and researchers.* London: SAGE.

Standing, M., 2010. Ch 1 'Perceptions of clinical decision-making: a matrix model'. In Standing M. 2010. *Clinical Judgement and Decision-Making in Nursing and Interprofessional Healthcare*. Maidenhead: McGraw-Hill & Open University Press.

Sun, H., Peters, R.L., Allen, K.J., Dharmage, S.C., Tang, M.L.K., Wake, M., Foskey, R., Heine, R.G., 2015. Medical intervention in parent-reported infant gastro-oesophageal reflux: A population-based study. *Journal of Paediatrics and Child Health*. 51, pp.515-523.

Sutphen, J.L., Dilliard, V.L., 1988. Effect of feeding volume on early postcibal gastroesophageal reflux in infants. *Journal of Pediatric Gastroenterology and Nutrition.* 7, pp.185-188.

Szasz, T., 2007. *The Medicalisation of Everyday Life. Selected Essays*. New York: Syracuse University Press.

Szasz, T., 1960. The myth of mental illness. *American Psychologist*, 15, pp.113-118.

Terrin, G., Passariello, A., De Curtis, M., Maanguso, F., Salvia, G., Lega, L., Messinna, F., Paludetto, R., Canani, R.B., 2012. Ranitidine is Associated with Infections, Necrotizing Enterocolitis, and Fatal Outcome in Newborns. *Pediatrics.* 129:1, pp.e40.

Tessier, R., Cristo, M., Velez, S., Girón, M,, Figueroa de Calume, Z., Ruiz-Paláez, J.G., Charpak, Y., Charpak, N., 1998. Kangaroo Mother Care and the Bonding Hypothesis. *Pediatrics.* 102:2, pp.17-25.

The British Pain Society. 2005. *Using medicines beyond license. Information for patients*. London: The British Pain Society.

Thomson, C., Dowding, D. (Eds)., 2002. *Clinical Decision Making and Judgement in Nursing.* Edinburgh: Churchill Livingston.

Tighe, M., Afzal, N.A., Bevan, A., Hayen, A., Munro, A., Beattie, R.M., 2014. Pharmacological treatment of children with gastro-oesophageal reflux. *Cochrane Database of Systematic Reviews*. Issue 11.

Tighe, M.P., Beattie, R.M., 2010. Managing gastro-oesophageal reflux in infancy. *Archives of Disease in Childhood.* 95, pp.243-244.

Tighe, M.P., Nadeem, A., Bevan, A., Beattie, M.,2009. Current Pharmacological Management of Gastro-Esophageal Reflux in Children. An Evidence-Based Systematic Review. *Pediatric Drugs* .11:3, pp.185-202.

Tilling, K., Peters, T., Sterne, J., 2009. Ch. 21 'Key issues in the statistical analysis of quantitative data in research on health and health services' in Bowling, A. 2005. *Research Methods in Health: Investigating health and health services.* 3rd Edn. Maidenhead: McGraw Hill & Open University Press.

Tobin, J.M., McCloud, P., Cameron, D.J.S., 1997. Posture and gastro-oesophageal reflux: a case for left lateral positioning. *Archives of Disease in Childhood.* 76:254-258.

Tod, A., 2009. Chapter 22, 'Interviewing" in Gerrish, K., Lacey, A. Eds., 2009. *The Research Process in Nursing.* Oxford: Wiley- Blackwell.

Toila, V., Vandenplas, Y., 2009 Systematic review: the extra-oesophageal symptoms of gastro-oesophageal reflux disease in children. *Alimentary Pharmacology & Therapeutics.* 29, 258–272.

Topping, A., 2006. Ch. 11, 'The Quantitative – Qualitative Continuum' in Gerrish K., Lacey, A. Eds., 2006. 5th Edn. *The Research Process in Nursing.* Oxford: Wiley- Blackwell.

Tuller, D., 2007. Chronic Fatigue No Longer Seen as 'Yuppie Flu'. *New York Times.* 17/07/2007
Available on-line from:
https://www.nytimes.com/2007/07/17/science/17fatigue.html
Accessed: 25/04/2019.

Tyrawaski, J., DeAndrea DC. 2015.Pharmaceutical Companies and Their Drugs on Social Media: A Content Analysis of Drug Information on Popular Social Media Sites. *Journal of Medical Internet Research.* 17:6, pp.e130.
Available on-line from:
https://www.researchgate.net/publication/277600692_Pharmaceutical_Companies_and_Their_Drugs_on_Social_Media_A_Content_Analysis_of_Drug_Information_on_Popular_Social_Media_Sites
Accessed: 25/04/2019

UK Statistics Authority. 2018. *Code of Practice for Statistics Ensuring official statistics serve the public.*
Available on-line from: https://www.statisticsauthority.gov.uk/code-of-practice/
Accessed 19/02/2020

United States Food & Drug Administration. 2018. *Babies spitting up – normal in most cases*
Available on-line from:
https://www.fda.gov/ForConsumers/ConsumerUpdates/ucm363693.htm
Accessed: 25/04/2019

Universities and College Employers Association., 2005. '*Guidance on Safety in Fieldwork'.*
Available on-line from:
https://www.lancaster.ac.uk/depts/safety/files/fieldguidance.pdf
or
https://www.lancaster.ac.uk/depts/safety/files/Fieldwork.pdf
Accessed on: 25/04/2019

van der Pol, RJ., Smits, MJ., van WIJK, MP., Omari, TI., Tabbers, MM., Benninga, MA., 2011. Efficacy of Proton-Pump Inhibitors in Children With Gatroesophageal Reflux Disease: A Systematic Review. *Pediatrics.* 127:5, pp. 925-935.

Vandenplas, Y., Ashkenazi, A., Belli, D., Boige, N., Bouquet, J., Cadranel, S., Cezard, J.P., Cucchiara, S., Dupont, C., Geboes, K., Gottrand, F., Heymans, H.S.A., Jasinki, C., Kneepkens, C.M.F., Koltetzko, S., Milla, P., Mougenot, J.F., Nussle, D., Navarro, J., Newell, S.J., Olafsdottir, E., Peeters, S., Ravelli, A., Polanco, I., Sandhu, B.K., Tolboom, J., 1993. A proposition for the diagnosis and treatment of gastro-oesophageal reflux disease in children: a report from a working group on gastro-oesophageal reflux disease. *European Journal of Pediatrics*. 152, pp. 704-711.

Vandenplas, Y., Heger, B., 2000. Diagnosis and treatment of gastro-oesophageal reflux disease in infants and children. *Journal of Gastroenterology and Hepatology*. 15, pp.593-603.

Vandenplas, Y., 2009. Thickened Infant Formula Does What It Has To Do: Decrease Regurgitation. *Pediatrics.* 123, pp.549-550.

Vandenplas, Y., Rudolph, C.D., Lorenzo, C.D., Hassell, E., Liptak, G., Mazur, L., Sondheimer, J., Staiano, A., Thomson, M., Veereman-Wauters, G., Wendzl, T. 2009. Pediatric Gastroesophageal Reflux Clinical Practice Guidelines: Joint Recommendations of the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition (NASPGHAN) and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN). *Journal of Pediatric Gastroenterology and Nutrition.* 49, pp.498-547.

Vandenplas, Y., Salvatore, S., Hauser, B. 2005. The diagnosis and management of gastro-oesophageal reflux in infants. *Early Human Development.* 81, pp.1011-1024.

Wald, H.S., Dube, C.E., Anthony, D.C., 2007. Untangling the Web – The impact of Internet use on health care and the physician-patient relationship. *Patient Education and Counselling*. 68, pp.218-224.

Walsh, D., 2006. Subverting the assembly-line: Childbirth in a free-standing birth centre. *Social Science & Medicine*. 62, pp.1330-1340.

Waneless, D., 2002. *Securing our Future Health: Taking a Long-Term View.* London: HM Treasury.

Ward, R.M., Kearns, G.L., 2013. Proton Pump Inhibitors in Pediatrics Mechanism of Action, Pharmacokinetics, Pharmacogenetics, and Pharmacodynamics. *Paediatric Drugs.* 15:2, pp.119-131.

Wellard, S., 2010. Grandparents: an underestimated resource for children's health and development: the contribution that grandparents make to children's upbringing is largely unrecognised and unsupported. *Journal of Family Health Care.* 20:5, pp.150-152.

Wendzl, T.G., Schneider, S., Scheele, F., Silny, J., Heimann, G., Skopnik, H., 2003. Effects of Thickened Feeding on Gastroesophageal Reflux in Infants: A Placebo-Controlled Crossover Study Using Intraluminal Impedence. *Pediatrics.* 111, pp.355-359.

Werner, A., Malterud, K., 2003. It is hard work behaving as a credible patient: encounters between women with chronic pain and their doctors. *Social Science & Medicine*. 57, pp.1409-1419.

Whiting, L.S., 2008. Semi-structured interviews: guidance for novice researchers. *Nursing Standard.* 22:23, pp.35-40.
Wiggins, B.J., 2011. Confronting the Dilemma of Mixed Methods. *Journal of Theoretical and Philosophical Psychology.* 31:1, pp.44-60.

Williams, S.J., Coveney, .CM., Gabe, J., 2013. Medicalisation or customisation? Sleep, enterprise and enhancement in 24/7 society. *Social Science and Medicine.* 73, pp.40-47.

Williams, S.J., Martin, P., Gabe, J., 2011. The pharmaceuticalisation of society? A framework for analysis. *Sociology of Health and Illness.* 33, pp.710-725.

Williams, S.J., Martin, P., Gabe, J., 2011. Evolving sociological analyses of 'Pharmaceuticaliation': a reply to Abraham. *Sociology of Health and Illness.* 33:5, pp.729-730.

Williams, S.J., Gabe, J., Davis, P., 2008. The sociology of pharmaceuticals: progress and prospects. *Sociology of Health and Illness.* 30:6, pp.813-824.

Wilson, C., 2011. Nurses issue health visitor warning. *Herald Scotland*. Available on-line from: http://www.heraldscotland.com/news/health/nurses-issue-health-visitor-warning.14282666
Accessed: 25/04/2019

Windle, P,E., 2010. Secondary Data Analysis: Is It Useful and Valid? *Journal of PeriAnesthesia Nursing.* 25:5, pp.322-324.

World Health Organisation., 2001. *The Optimal Duration of Exclusive Breastfeeding. Report of an Expert Consultation.* Geneva: WHO.

World Health Organisation., 2002. *Complementary Feeding. Report of the global consultation. Summary of guiding principles.* Geneva: WHO.

Xinias, I., Mouane, N., Le Luyer, B., Spiroglou, K., Demertzidou, V., Hauser, B., Vandenplas, Y., 2005. Cornstarch thickened formula reduces oesophageal acid exposure time in infants. *Digestive and Liver Disease.* 37, pp.23-27.

Zola, I.K., 1972. Medicine as an Institution of Social Control. *The Sociological Review*

Zola, I.K., 1973. Pathways to the Doctor – From Person to Patient. *Sociology of Science and Medicine.* 1973, Vol. 7, pp677-689.

Zola, I.K., 1975. In the Name of Health and Illness: On Some Socio-Political Consequences of Medical Influence. *Social Science and Medicine*. 9, pp.83-87.

APPENDICES

Appendix 1: Quality Appraisal Tools

Appendix 2: Studies Included in Literature Review

Appendix 3: Letters of Invitation and Participant Information Sheet

- 3a: Health Professionals
  - Letter of Invitation
  - Participant Information Sheet
- 3b: Parents
  - Letter of Invitation
  - Participant Information Sheet

Appendix 4: Semi-structured Interview Schedules

- 4a: Health Professionals (Health Visitor & General Practitioner)
- 4b: Parents

Appendix 5: Example of list of initial themes & sub-themes from interviews with general practitioners

Appendix 6: Example of some early themes, sub-themes mapped to research aim and underpinning theoretical framework (medicalisation**)**

Appendix 7: Example of indexing in NVivo

Appendix 8: Example of part of Data Summary and Display: Influence on Diagnosis

Appendix 9: Ethical Approval

- 9a: Consent Form
- 9b: Letters of Approval Lancaster University
- 9c: Letter of Approval NHS Grampian Research & Development
- 9d: Confidentiality Agreement for the Transcription of Qualitative Data

Appendix 10: Prescribing Rates and Confidence Intervals for Each Drug and NHS Board

Appendix 11: Ranking Tables

Appendix 12: Public Output
12a: Journal of Health Visiting

APPENDIX 1

Quality Appraisal – Systematic Reviews

Quality Appraisal – Systematic Review	
Author(s)	Tighe M., Afzal NA., Bevan A., Hayen A., Munro A., Beattie M.
Year	2014
Title	Pharmacological treatment for children with gastro-oesophageal reflux
Abstract	**Background:** Gastro-oesophageal reflux (GOR) is a common disorder, characterised by regurgitation of gastric contents into the oesophagus. GOR is a very common presentation in infancy in both primary and secondary care settings. GOR can affect approximately 50% of infants younger than three months old (Nelson 1997). The natural history of GOR in infancy is generally that of a functional, self-limiting condition that improves with age; < 5% of children with vomiting or regurgitation continue to have symptoms after infancy (Martin 2002). Older children and children with co-existing medical conditions can have a more protracted course. The definition of gastro-oesophageal reflux disease (GORD) and its precise distinction from GOR are debated, but consensus guidelines from the North American Society of Gastroenterology, Hepatology and Nutrition (NASPGHAN-ESPGHAN guidelines 2009) define GORD as 'troublesome symptoms or complications of GOR.' **Objectives:** This Cochrane review aims to provide a robust analysis of currently available pharmacological interventions used to treat children with GOR by assessing all outcomes indicating benefit or harm. **Search Methods:** We sought to identify relevant published trials by searching the Cochrane Central Register of Controlled Trials (CENTRAL) (2014, Issue 5), MEDLINE and EMBASE (1966 to 2014), the Centralised Information Service for Complementary Medicine (CISCOM), the Institute for Scientific Information (ISI) Science Citation Index (on BIDS-UK General Science Index) and the ISI Web of Science. We also searched for ongoing trials in the metaRegister of Controlled Trials (mRCT) (www.controlled-trials.com).Reference lists from trials selected by electronic searching were handsearched for relevant paediatric studies on medical treatment of children with gastro-oesophageal reflux, as were published abstracts from conference proceedings (published in Gut

Quality Appraisal – Systematic Review	
	and Gastroenterology) and reviews published over the past five years.No language restrictions were applied. **Selection Criteria:** Abstracts were reviewed by two review authors, and relevant RCTs on study participants (birth to 16 years) with GOR receiving a pharmacological treatment were selected. Subgroup analysis was considered for children up to 12 months of age, and for children 12 months to 16 years of age, and for those with neurological impairment. **Data Collection And Analysis:** Trials were critically appraised and data collected by two review authors. Risk of bias was assessed. Meta-analysis data were independently extracted by two review authors, and suitable outcome data were analysed using RevMan. **Main Results:** A total of 24 studies (1201 participants) contributed data to the review. The review authors had several concerns regarding the studies. Pharmaceutical company support for manuscript preparation was a common feature; also, because common endpoints were lacking, study populations were heterogenous and variations in study design were noted, individual drug meta-analysis was not possible. Moderate-quality evidence from individual studies suggests that proton pump inhibitors (PPIs) can reduce GOR symptoms in children with confirmed erosive oesophagitis. It was not possible to demonstrate statistical superiority of one PPI agent over another. Some evidence indicates that H_2antagonists are effective in treating children with GORD. Methodological differences precluded performance of meta-analysis on individual agents or on these agents as a class, in comparison with placebo or head-to-head versus PPIs, and additional studies are required. RCT evidence is insufficient to permit assessment of the efficacy of prokinetics. Given the diversity of study designs and the heterogeneity of outcomes, it was not possible to perform a meta-analysis of the efficacy of domperidone. In younger children, the largest RCT of 80 children (one to 18 months of age) with GOR showed no evidence of improvement in symptoms and 24-hour pH probe, but improvement in symptoms and reflux index was noted in a subgroup treated with domperidone and co-magaldrox (Maalox(®)). In another RCT of 17 children, after eight weeks of therapy. 33% of participants treated with domperidone noted an improvement in symptoms (P value was not significant). In neonates, the evidence is even weaker; one RCT of 26 neonates treated with domperidone over 24 hours showed that although reflux frequency was significantly increased, reflux duration was significantly improved. Diversity of RCT evidence was found regarding efficacy of compound alginate preparations(Gaviscon Infant(®)) in infants, although as a result of these studies, Gaviscon Infant(®) was changed to become aluminium-free and has been assessed in its current form in only two studies since 1999. Given the diversity of study designs and the heterogeneity of outcomes, as well as the evolution in formulation, it was not possible to perform a meta-analysis on the efficacy of Gaviscon Infant(®) . Moderate

Quality Appraisal – Systematic Review	
	evidence indicates that Gaviscon Infant(®) improves symptoms in infants, including those with functional reflux; the largest study of the current formulation showed improvement in symptom control but was limited by length of follow-up. No serious side effects were reported. No RCTs on pharmacological treatments for children with neurodisability were identified. **Authors' Conclusions:** Moderate evidence was found to support the use of PPIs, along with some evidence to support the use of H_2 antagonists in older children with GORD, based on improvement in symptom scores, pH indices and endoscopic/histological appearances. However, lack of independent placebo-controlled and head-to-head trials makes conclusions as to relative efficacy difficult to determine. Further RCTs are recommended. No robust RCT evidence is available to support the use of domperidone, and further studies on prokinetics are recommended, including assessments of erythromycin. Pharmacological treatment of infants with reflux symptoms is problematic, as many infants have GOR, and little correlation has been noted between reported symptoms and endoscopic and pH findings. Better evidence has been found to support the use of PPIs in infants with GORD, but heterogeneity in outcomes and in study design impairs interpretation of placebo-controlled data regarding efficacy. Some evidence is available to support the use of Gaviscon Infant(®) , but further studies with longer follow-up times are recommended. Studies of omeprazole and lansoprazole in infants with functional GOR have demonstrated variable benefit, probably because of differences in inclusion criteria. No robust RCT evidence has been found regarding treatment of preterm babies with GOR/GORD or children with neurodisabilities. Initiation of RCTs with common endpoints is recommended, given the frequency of treatment and the use of multiple antireflux agents in these children.

Quality Appraisal – Systematic Review			
	Yes	No	Don't Know
Did the review address a clearly focused issue?	√		
Did the authors look for the right papers?	√		
Do you think all the important, relevant studies were included?	√		
Did the review's authors do enough to assess the quality of the included studies?	√		
It the results of the review have been combined, was it reasonable to do so?	√		
What are the overall results of the review?	√		
How precise are the results?	√		
Can the results be applied to the local population, or in your context?	√		
Were all important outcomes considered?	√		
Are the benefits worth the harms and costs?	√		
	Good	Moderate	Weak
Overall quality of research?	√		
Comments: Robust systematic review of studies focused on the effectiveness of medicines used in the management of GOR in infant. Gaviscon (alginate), domperidone (motility stimulant), omeprazole (PPI) and ranitidine (H2RA) included within the systematic review. Systematic review process clearly outlined. Inclusion and exclusion criteria identified. Overall results indicated in abstract above			

Quality Appraisal – RCT

Quality Appraisal - RCT	
Author(s)	Del Buono R., Wenzl TG., Ball G., Keady S., Thomson M.
Year	2005
Title	Effect of Gaviscon Infant on gastro-oesophageal reflux in infants assessed by combined intraluminal impedance/ pH
Abstract	**Background:** Gaviscon Infant (GI) has been recommended for gastro-oesophageal reflux (GOR) in infants. Its efficacy has not been examined with a physiologically appropriate denominator to define the degree of GOR. **Aim:** To investigate the influence of Gaviscon Infant on GOR in infants using combined pH and intraluminal impedance measurement. **Methods:** Twenty infants (mean age 163.5 days, range 34–319 days) exclusively bottle fed, with symptoms clinically suggestive of GOR, underwent 24 hour studies of intra-oesophageal 6 channel impedance and dual channel pH monitoring, during which six random administrations (3+3) of Gaviscon Infant (625 mg in 225 ml milk) or placebo (mannitol and Solvito N, 625 mg in 225 ml milk) were given in a double blind fashion. Impedance/pH reflux data were recorded and analysed blind by one observer. **Results:** The median number of reflux events/hour (1.58 *v* 1.68), acid reflux events/hour (0.26 *v* 0.43), minimum distal or proximal pH, total acid clearance time per hour (time with pH below pH 4), and total reflux duration per hour were not significantly different after GI than after placebo. Reflux height was marginally lower after GI (median 66.6% *v* 77.3% oesophageal length) compared with placebo. **Conclusions:** Results showed a marginal but significant difference between Gaviscon Infant and placebo in average reflux height, and raises questions regarding any perceived clinical benefit of its use.

Quality Appraisal - RCT			
	Yes	No	Don't Know
Did the trial address a clearly focused issue?	√		
Was assignment of patients to treatments randomized?			√
Were all patients who entered the trial properly accounted for at its conclusion?			√
Were patients, health workers and study personnel 'blind' to treatment?			√
Were the groups similar at the start of the trial?	√		
Aside from experimental intervention, were the groups equally treated?			√
How large was the treatment effect?			√
How precise was the estimate of the treatment effect?	√		
Can the results be applied to the local population, or in your context?	√		
Are all clinically important outcomes considered?	√		
Are the benefits worth the harms and costs?		√	
	Good	Moderate	Weak
Overall quality of research?			√
Comments	Randomisation method unclear Small sample Funded by Reckitt Benckisor – Manufacturer of Gaviscon Results may be biased.		

APPENDIX 2

Studies Included in Literature Review

Included Literature: Prevalence

Author /Country	Publication	Title	Method/ design/sample	Quality
Nelson SP, Chen EH, Synair GM, Christoffel KK. United States	Archives of Pediatric and Adolescent Medicine 1997. Vol. 151 (6) pp 569-72	Prevalence of Symptoms of Gastroesophageal Reflux During Infancy	Cross-sectional survey Sample size 948	Good
Martin AJ, Kennedy JD, Pratt, N, Ryan P, Ruffin RE, Miles H, Marley J.	Pediatrics 2002. 109:6 pp1061	Natural History and Familial Relationships of Infant Spilling to 9 Years of Age	Prospective study Sample size 693 infants	Good
Miyazawa R, Tomomasa T, Kaneko H, Tachibana A, Ogawa T, Morikawa A.	Pediatrics International. 2002. 44, pp 513–516	Prevalence of gastro-esophageal reflux-related symptoms in Japanese infants	Survey Sample: 921 mothers of infants aged 0-1 in one area interviewed	Fair
Hegar B, Dewanti NR, Kadim M, Alatas S, Firmansyah A, Vandenplas Y. Indonesia	Acta Paediatrica 2009. 98, pp1189- 1193	Natural evolution of regurgitation in health infants.	1-year Prospective study Sample = 130 infant / mother dyads	Good
Campanozzi A, Boccia G, Pensabene L, Panetta F, Marseglia A, Strisciuglio P, Barbera C, Maguzzu G, Pettoello-Mantovani M, Staiano A Italy	Pediatrics. 2009. 123: 3, pp779 – 783	Prevalence and Natural History of Gastroesophaeal Reflux: Pediatric Prospective Survey	Prospective survey Sample: 2642 infants aged 0-1 year	Fair
Sun H, Peters RL, Allen KJ, Dharmage SC, Tang MLK, Wake, M, Foskey R, Heine RG. Australia	Journal of Paediatrics and Child Health 2015. 51, pp 515 -523	Medical intervention in parent-reported infant gastro-oesophageal reflux: A population-based study.	Longitudinal population based study Sample 4674 parents	Good

Included Studies: Guidelines

Author /Country	Publication	Title	Method/ design/sample	Quality
Quitadamo P, Papadopoulou A, Wenzl T, Urbonas V, Kneepkens F, Roman E, Orel R, Pavkov DJ, Dias JA, Vandenplas Y, Kostovski A, Miele E, Villani A, Staiano A. 11 Countries in Europe	Journal of Pediatric Gastroenterology and Nutrition. 2014. 58:4 , pp505 -509	European Pediatricians' Approach to Children with GER Symptoms: Survey of the Implementation of the 2009 NASPGHAN-ESPGHAN Guidelines	Survey Sample: 567 (42% response rate) paediatricians from 11 European countries	Good
Quitadamo P, Miele E, Alongi A, Brunese FP, Di Cosimo ME, Ferrara D, Gambotto S, Lamborghini A, Mercuri M, Pasinato, A, Sansone R, Staiano A.Vitale C, Villani A, Italy	European Journal of Pediatrics. 2015. 174, pp91-96	Prevalence and Natural History of Gastroesophaeal Reflux: Pediatric Prospective Survey	Prospective study Questionnaires given to paediatricians Sample: 100	Good
Manasfi H, Hanna-Wakim R, Akel I, Yazbeck N Lebanon	Acta Paediatrica 2017. 106. pp316-321	Questionnaire-based survey in a developing country showing noncompliance with paediatirc gastro-oesophageal reflux practice guidelines.	Survey 114 responses – 21% response rate	Fair

Grey Literature: Guidelines

Author /Country	Year	Title
Rosen R, Vandenplas Y, Singendonk M, Cabana M, DiLorenzo C, Gottrand F, Gupta S, Langendam M, Staiano A,Thapar N, Tipnis N,	2018	Pediatric Gastroesophageal Reflux Clinical Practice Guidelines: Joint Recommendations of the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition
National Institute for Clinical Excellence (NICE)	2015	Gastro-oesophageal reflux disease: recognition, diagnosis and management in children and young people. NICE Guideline
NHS Lothian, Paediatric Gastroenterology and Nutrition Department	2014	Management Guidelines for Paediatric Gastroenterology
NHS Grampian	2012	Infant Feeding Guidelines for Health Professionals
Vandenplas Y, Rudolph CD, Di Lorenzo C, Hassell E, Liptak G, Mazur, L, Sondheimer J, Staiano A, Thomson M, Veerman-Wauters G, Wenzl TG.	2009	Pediatric Gastroesophageal Reflux Clinical Practice Guidelines: Joint Recommendations of the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition (NASPGHAN) and the European Society for Pediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN)
Sherman PM, Hassall E, Fagundes-Neto U, Gold BD, Kato S, Koletzko S, Orenstein S, Rudolph C, Vakil N, Vandenplas Y.	2009	A Global, Evidence-Based Consensus on the Definition of Gastroesophageal Reflux Disease in the Pediatric Population

Included Studies: Conservative Management

Author /Country	Publication	Title	Method/ design/sample	Quality
Kwok TC, Ojha S, Dorling JKwok TC, Ojha S, Dorling J	Cochrane Database of Systematic Reviews 2017, Issue 12. Art. No.: CD003211.	ReviewsFeed thickener for infants up to six months of age with gastro-oesophageal reflux	Systematic Review	Good
Neu M, Pan Z, Workman R, Marcheggiani-Howard C, Furuta G, Laudenslager ML. United States	Biological Research for Nursing 2014., 16:4, pp387-397	Benefits of Massage Therapy for Infans wwith Symptoms of Gastroesophageal Reflux Disease	Randomised controlled trial Sample 43	Good
Huang RC, Forbes D, Davies MW.	Cochrane Database of Systematic Reviews. Issue 1 2009	Feed thickener for newborn infants with gastro -oesophageal reflux (Review).	Systematic review of RCTs	Good
Horvath A, Dziechciarz A, Szajewska H.	Pediatrics. 2008., Vol. 122	The Effect of Thickened-Feed Interventions on Gastroesophageal Reflux in Infants: Systematic Review and Meta-analysis of Randomized, Controlled Trials.	Systematic review and meta-analysis of RCTs 14 studies	Good
Orenstein SR, McGowan JD. United States	The Journal of Pediatrics. 2008	Efficacy of Conservative Therapy as Taught in the Primary Care Setting for Symptoms Suggesting Infant Gastroesophageal Reflux	Double-blind, randomized placebo-controlled trial Sample size =37	Fair
Chao HC, Vandenplas Y. Belgium	Diseases of the Esophagus 2007., 20, pp 155 -160	Comparison of the effect of a cornstarch thickened formula and strengthened regular formula on regurgitation, gastric emptying and weight gain in infantile regurgitation.	Prospective randomized controlled trial Sample size = 81	Fair
Xinias NM, Le Luyer B, Spiroglou K, Demertzidou V, Hauser B, Vandenaplas Y. Greece, Morocco, France, Belgium	Digestive and Liver Disease 2005., 37, pp 23-27	Cornstarch thickened formula reduces oesophageal acid exposure time in infants	Blinded, prospective, randomized trail - intervention study 96 infants	Fair
Khoshoo V, Ross G, Brown S, Edell E. United States	Journal of Pediatric Gastroenterology and Nutrition. 2000., Vol. 31 (5).	Smaller volume, thickened formulas in the management of gastroesophageal reflux in thriving infants.	Oesophageal pH monitoring Sample size = 6	Weak

Included Studies: Medical Management

Author /Country	Publication	Title	Method/ design/sample	Quality
Bell JC, Schneuer FJ, Harrison C, Trevena L, Hiscock H, Elshaug AG, Nassar N. Australia	Archives of Disease in Childhood 2018., 103, pp660-664	Acid suppressants for managing gastro-oesophageal reflux and gastro-oesophageal reflux disease in infants: a national survey	Cross sectional survey of GP activity	Good
Crawford C, Anderson M., Cooper G., Jackson G., Thompson J., Vale A., Thomas SHL., Eddleston M., Bateman DN United Kingdom	Human and Experimental Toxicology 2018., 37: 4., pp343 - 349	Overdose in young children treated with anti-reflux medications: Poisons enquiry evidence of excess 10-fold dosing errors with ranitidine	Analysis of data routinely collected by UK's National Poisons Information Service (NPIS)	Good
Salvatore S., Ripepi A., Huysetrust K., vande Maele K., Nosetti L., Agosti M.	Pediatric Drugs 2018., 20. pp. 575–583	The Effect of Alginate in Gastroesophageal Reflux in Infants	Prospective, pharmacological, observational case–control study Sample size = 43	Good
Blank M., Parkin L. New Zealand	Journal of pediatric gastroenterology and nutrition 2017., 65: 2, pp. 179- 184	National Study of Off-label Proton-Pump Inhibitor Use Among New Zealand Infants in the First Year of Life (2005-2012)	Population based study using routinely gathered dispensing data Sample size: 22,643	Good
De Mattos AZ., Marchese GM., Fonseca BB., Kupski C., Machado MB.	Arq Gastroenterology 2017., 54:4, pp271-280	Antisecretory treatment for pediatric gastroesophageal reflux disease- a systematic review.	Systematic Review of PPI & H2RA use	Fair
Azizollahi, H.R., Rafeey, M	Korean Journal of Pediatrics. 2016., 59:5, pp.226-230.	Efficacy of proton pump inhibitors and H2 blocker in treatment of symptomatic gastroesophageal reflux disease in infants.	Randomized double blind trial and parallel-group study. Sample size = 60	Fair
Gieruszczak-Bialek D, Konarska Z, Skorka A, Vandenplas Y, Szajewska H.	The Journal of Pediatrics 2015., 166, pp 767-770.	No Effect of Proton Pump Inhibitors on Crying and Irritability in Infants: Systematic Review of Randomized Controlled Trials	Systematic Review 5 RCT studies	Good
Kierkus J, Oracz G, Korczowski B, Szymanska E, Wiernicka A, Woynarowkski M.	Drug Safety. 2014; 37: 309 – 316.	Comparative Safety and Efficacy of Proton Pump Inhibitors in Paediatric Gastroesophageal Reflux Disease	Comparative Review Sample size unclear	Weak

Tighe M, Afzal NA, Bevan A, Hayen A, Munro A, Beattie RM.	Cochrane Database of Systematic Reviews 2014, Issue 11	Pharmacological treatment of children with gastro-oesophageal reflux.	Systematic review of RCTs	Good
De Bruyne P, Christiaens T, Vander Stichle R, Van Winckel M. Belgium	Journal of Pediatric Gastroenterology and Nutrition	Changes in Prescription Patterns of Acid-Suppressant Medications by Belgian Pediatricians: Analysis of the National Database, [1997-2009]	Analyis of national prescribing data	Good
Chen I, Gao W, Johnson A, Niak A, Troiani J, Korvick J, Snow N, Estes K, Taylor A, Griebel D.	Journal of pediatric gastroenterology and nutrition 2012., Vol. 54 (1)	Proton pump inhibitor use in infants: FDA reviewer experience."	Systematic review of RCTs	Good
Scott, B.	Archives of Disease in Childhood. 2012., 97,	How effective is domperidone at reducing symptoms of gastro-oesophageal reflux in infants?	Systematic review	Fair
Van der Pol RJ., Smits MJ., van Wijk MP., Omari TI., Tabbers MM., Bennings MA.	Pediatrics 2011., 127:5., pp. 925 -935.	Efficacy of Proton-Pump Inhibitors in Children With Gastroesophagea Reflux Disease: A Systematic Review	Systematic Review	Good
Cresi F, Marinaccio C, Russo MC., Miniero R., Silvestro L.	Journal of Perinatology 2008., 28, pp. 766–770	Short-term effect of domperidone on gastroesophageal reflux in newborns assessed by combined intraluminal impedance and pH monitoring	Prospective randomized controlled study model Sample 26 (13 of which were controls)	Fair
Barron J, Tan H, Spalding J, Bakst AW, Singer J. United States	Journal of Pediatric Gastroenterology and Nutrition. 2007., Vol. 45, pp 421- 427	Proton Pump Inhibitor Utilization Patterns in Infants	Retrospective observational study Sample size 2469	Good
Khoshoo V, Edell D, Thompson A, Rubin M. United States	Pediatrics. 2007. 120 (5) p946 -9	Are we overprescribing Antireflux Medications for Infants With Regurgitation?	Retrospective review of medical records Sample size 64.	Fair
Salvatore S, Hauser B, Salvatoni A, Vandenplas Y Belgium	Acta Paediatrica 2006., 96, pp176-181	Oral ranitidine and duration of gastric pH>4.0 in infants with persisting reflux symptoms.	Two-channel pH study 103 infants	Fair
Del Buouno R., Wenzl, TG., Ball G., Keady S., Thomson M.. United Kingdom	Archives of Disease in Childhood. 2005. 90: 460 – 463.	Effect of Gaviscon Infant on gastro-oesophageal reflux in infants assessed by combined intraluminal impedence/pH	Randomised placebo controlled double blind study Sample 20	Weak
Pritchard DS, Baber N, Stephenson T.	British Journal of Clinical Pharmacology.	Should domperidone be used for the treatment of gastro-oesophageal reflux	Systematic review of RCTs 4 RCT included	Weak

	2005., Vol. 59 (6)	in children? Systematic review of randomized controlled trials in children aged 1 month to 11 years old.		
Moore, D. J., Tao, B. S., Lines, D. R., Hirte, C., Heddle, M. L., Davidson, G. P.	Journal of Pediatrics. 2003., 143:2, pp. 219 - 223.	Double-blind placebo-controlled trial of omeprazole in irritable infants with gastroesophageal reflux.	Randomized, double-blind, placebo- controlled crossover trial. Sample size 64	Fair
Cucchiara S, Minella R, Lervolino C, Franco M T, Campanozzi A, Franceschi M, et al. Italy	Archives of Disease in Childhood. 1993; 69: 655–9.	Omeprazole and high dose ranitidine in the treatment of refractory reflux oesophagitis.	RCT Sample size 32	Weak
Miller S. United Kingdom	Current Medical Research and Opinion. 1999. 15:3, 160-168	Comparison of the Efficacy and Safety of a New Aluminium-free Paediatric Alginate Preparation and Placebo in Infants with Recurrent Gastroesophageal Reflux,	Double-blind, randomised, parallel-group study Sample size 90	Good

Date

Dear,

Research Study: **Factors influencing and shaping the diagnosis and management of gastro-oesophageal reflux in babies**

I am undertaking a research project as part of my studies towards a PhD in Public Health. The study aims to explore patterns of prescribing behaviours amongst health professionals and to develop an understanding of the factors that have shaped and influenced decision making with regard to the diagnosis and management of gastro-oesophageal reflux in infants. As part of this study I invite you to take participate in an interview that would last no longer than one hour. I have enclosed a participant information sheet with further details of the study that may help you decide whether or not to take part in the interview.

If you are willing to take participate, please contact me by e-mail or telephone to arrange a suitable date, time and venue for the interview to take place. My contact details are below.

Should you require more information about the research study or the actual interview please do not hesitate to contact me.

Thanking you in advance for your time and cooperation.

Yours sincerely,

Jean Cowie
PhD Student, Lancaster University

Educational Projects Manager – Health Visiting
NHS Education for Scotland,
Aberdeen Dental Education Centre (ADEC),
Argyll House, Cornhill Road,
Aberdeen, AB25 2ZR.

Tel. 07798 700710
E-mail:
j.cowie@lancaster.ac.uk
Jean.Cowie@nes.scot.nhs.uk

Participant Information Sheet

Factors influencing and shaping the management of, and prescribing practices for infants aged 0-12months presenting with symptoms of gastro-oesophageal reflux

My name is Jean Cowie and I am conducting research into, 'Factors influencing the management of, and prescribing practices for infants presenting with symptoms of gastro-oesophageal reflux (GOR)', for my PhD in Public Health at Lancaster University, Lancaster, UK.

What is the study about?
The purpose of this study is to explore patterns of prescribing behaviours amongst health professionals and to develop an understanding of the factors that have shaped and influenced their decision making with regard to the diagnosis and management of GOR in infants.

Why have I been approached?
You have been approached because the study requires information from health professionals who regularly come in contact with infants presenting with symptoms of GOR and make decisions regarding the diagnosis and treatment of the symptoms.

Do I have to take part?
No. It's completely up to you whether or not you take part. If you decide to take part you will be given this information sheet to keep and asked to sign a consent form. If at any time you change your mind about taking part, you will still be free to withdraw from the study up to 2 weeks after the interview without giving a reason. Your participation in the study, however, will be of great value and hopefully add to the body of knowledge regarding best practice in the diagnosis and management of symptoms of GOR in infants. Your participation will be greatly appreciated as it will help to develop a better understanding of the factors that shape the management of GOR in infants.

What will I be asked to do if I take part?
If you decide to take participate, you will be invited to take part in an interview to explore the factors that influence and shape decision making with regard to the diagnosis and management of GOR in infants. The interview will be last no longer than 60 minutes and will take place on a day, time and location that is convenient to you. The interviews will be audio recorded then transcribed to ensure the information provided by you is recorded and documented accurately. I will conduct the interview and transcribe the data with the support of another transcriber.

Will my data be confidential?
The information you provide is confidential. All data collected will be stored electronically and be password protected in order to maintain confidentiality as defined by the Data Protection Act (1998).

The interviews will be audio recorded then transcribed with the collected data anonymised, encrypted and stored electronically. Within 5 years of completion of the research study all data including the transcriptions and audio recordings will be destroyed by me. Assurance is also given that the data collected will be used solely for the purpose of this research study and will not be used in any other study or passed on to any third parties.

The data collected for this study will be stored securely and only the researchers conducting this study will have access to this data:

- Audio recordings will destroyed and/or deleted after they have been transcribed and checked.
- The files on the computer will be encrypted (that is no-one other than the researcher will be able to access them) and the computer itself password protected. All data will be erased within 5 years of completion of the study.
- The typed version of your interview will be made anonymous by removing any identifying information including your name. Anonymised direct quotations from your interview may be used in the reports or publications from the study, so your name will not be attached to them.

There are some limits to confidentiality: if what is said in the interview makes me think that you, or someone else, is at significant risk of harm, I will have to break confidentiality and speak to my research supervisor about this. If possible, I will tell you if I have to do this.

What will happen to the results?
The results will be summarised and reported in a thesis and may be submitted for publication in an academic or professional journal such as the Journal of Advanced Nursing or the British Medical Journal. The findings of the study may also be presented at conferences and to colleagues in the NHS.

Are there any risks?
There are no risks anticipated with participating in this study. However, if you experience any distress following the interview you are encouraged to inform the researcher and contact the resources provided at the end of this sheet

Are there any benefits to taking part?
Although you may find participating interesting, there are no direct benefits in taking part. However, you should note that the project aims to inform policy so although there are no immediate benefits there may be some benefit to practice in the longer term.

Who has reviewed the project?
This study has been reviewed by the Faculty of Health and Medicine Research Ethics Committee, and approved by the University Research Ethics Committee at Lancaster University and NHS Grampian, Research and Development Office.

Where can I obtain further information about the study if I need it?
If you have any questions about the study, please contact the main researcher:

Jean Cowie
PhD Public Health Student
Lancaster University
E-mail: j.cowie@lancaster.ac.uk / Jean.Cowie@nes.scot.nhs.uk
Tel: 07798 770710

Complaints
If you wish to make a complaint or raise concerns about any aspect of this study and do not want to speak to the researcher, you can contact:

Director of Research: Dr Katherine Froggatt
Tel: (01524) 593308
Email: k.froggatt@lancaster.ac.uk
Division of Health Research
Lancaster University
Lancaster
LA1 4YD

If you wish to speak to someone outside of the Public Health Doctorate Programme, you may also contact:

Professor Roger Pickup Tel: +44 (0)1524 593746
Associate Dean for Research Email: r.pickup@lancaster.ac.uk
Faculty of Health and Medicine
(Division of Biomedical and Life Sciences)
Lancaster University
Lancaster
LA1 4YG
Thank you for taking the time to read this information sheet.

Resources in the event of distress
Should you feel distressed either as a result of taking part, or in the future, the following resources may be of assistance.

Go Health
https://gohealthservices.scot.nhs.uk/attachments/category/15/GO_Counselling_Leaflet.pdf

Aberdeen Counselling and Information Services
http://www.mha.uk.net/services/acis/index.php

Cairns Counselling
http://cairnscounselling.org.uk

Choices Aberdeen
https://www.choicesaberdeen.org.uk

Samaritans
http://www.samaritans.org

APPENDIX 3b

Health & Medicine | Lancaster University

Date

Dear,

I am undertaking a research project as part of my studies towards a PhD in Public Health. The study aims to explore perceptions, and experiences, of gastro-oesophageal reflux in infants, and to develop an understanding of the factors that have shaped and influenced its the diagnosis and management in infants. As part of this study I invite you to take participate in an interview that would last no longer than one hour. I have enclosed a participant information sheet with further details of the study that may help you decide whether or not to take part in the interview.

If you are willing to take participate, please contact me by e-mail or telephone to arrange a suitable date, time and venue for the interview to take place. My contact details are below.

Should you require more information about the research study or the actual interview please do not hesitate to contact me.

Thanking you in advance for your time and cooperation.

Yours sincerely

Jean Cowie
PhD Student, Lancaster University

Educational Project Manager
NHS Education for Scotland
Forest Grove House,
Forresterhill Road
Aberdeen
AB10 7QG
Tel. 07798 700710

E-mail:
j.cowie@lancaster.ac.uk

Jean.Cowie@nes.scot.nhs.uk

Participant Information Sheet

Factors influencing and shaping the management of, and prescribing practices for infants aged 0-12months presenting with symptoms of gastro-oesophageal reflux

I am conducting research into, 'Factors influencing the management of, and prescribing practices for infants presenting with symptoms of gastro-oesophageal reflux (GOR)', for my PhD in Public Health at Lancaster University, Lancaster, UK.

What is the study about?

The purpose of this study is to explore parents perceptions, and experiences, of gastro-oesophageal reflux in infants, and to develop an understanding of the factors that have shaped and influenced its diagnosis and management in infants.

Why have I been approached?

You have been approached because the study requires information from parents / carers of infants who have experienced symptoms of reflux (vomiting, regurgitation and bringing back feeds).

Do I have to take part?

No. It's completely up to you whether or not you take part. If you decide to take part you will be given this information sheet to keep and asked to sign a consent form. If at any time you change your mind about taking part, you will still be free to withdraw from the study up to 2 weeks after the interview without giving a reason. Your participation in the study, however, will be of great value and hopefully add to the body of knowledge regarding best practice in the diagnosis and management of symptoms of GOR in infants. Your participation will be greatly appreciated as it will help to develop a better understanding of the factors that shape the management of GOR in infants.

What will I be asked to do if I take part?

If you decide to take participate, you will be invited to take part in an interview to explore parental perceptions, and experiences, of gastro-oesophageal reflux in infants, and to develop an understanding of the factors that have shaped and influenced its diagnosis and management. The interview will be last no longer than 60 minutes and will take place on a day, time and location that is convenient to you. The interviews will be audio recorded then transcribed to ensure the information provided by you is recorded and documented accurately. I will conduct the interview and transcribe the data with the support of another transcriber.

Will my data be confidential?

The information you provide is confidential. All data collected will be stored electronically and be password protected in order to maintain confidentiality as defined by the Data Protection Act (1998). The interviews will be audio recorded then transcribed with the collected data anonymised, encrypted

and stored electronically. Within 5 years of completion of the research study all data including the transcriptions and audio recordings will be destroyed by me. Assurance is also given that the data collected will be used solely for the purpose of this research study and will not be used in any other study or passed on to any third parties.

The data collected for this study will be stored securely and only the researchers conducting this study will have access to this data:

- Audio recordings will destroyed and/or deleted after they have been transcribed and checked.
- The files on the computer will be encrypted (that is no-one other than the researcher will be able to access them) and the computer itself password protected. All data will be erased within 5 years of completion of the study.
- The typed version of your interview will be made anonymous by removing any identifying information including your name. Anonymised direct quotations from your interview may be used in the reports or publications from the study, so your name will not be attached to them.

There are some limits to confidentiality: if what is said in the interview makes me think that you, or someone else, is at significant risk of harm, I will have to break confidentiality and speak to my research supervisor about this. If possible, I will tell you if I have to do this.

What will happen to the results?

The results will be summarised and reported in a thesis and may be submitted for publication in an academic or professional journal. The findings of the study may also presented at conferences and to colleagues in the NHS.

Are there any risks?

There are no risks anticipated with participating in this study. However, if you experience any distress following the interview you are encouraged to inform the researcher and contact the resources provided at the end of this sheet

Are there any benefits to taking part?

Although you may find participating interesting, there are no direct benefits in taking part. However, you should note that the project aims to inform
policy so although there are no immediate benefits there may be some benefit to practice in the longer term.

Who has reviewed the project?

This study has been reviewed by the Faculty of Health and Medicine Research Ethics Committee, and approved by the University Research Ethics Committee at Lancaster University and NHS Grampian, Research and Development Office.

Where can I obtain further information about the study if I need it?

If you have any questions about the study, please contact the main researcher:

Jean Cowie
PhD Public Health Student
Lancaster University
E-mail: j.cowie@lancaster.ac.uk

Tel: 07798700710

Complaints

If you wish to make a complaint or raise concerns about any aspect of this study and do not want to speak to the researcher, you can contact:

Director of Research: Dr Katherine Froggatt
Tel: (01524) 593308
Email: k.froggatt@lancaster.ac.uk
Division of Health Research
Lancaster University
Lancaster
LA1 4YD

If you wish to speak to someone outside of the Public Health Doctorate Programme, you may also contact:

Professor Roger Pickup Tel: +44 (0)1524 593746
Associate Dean for Research Email: r.pickup@lancaster.ac.uk
Faculty of Health and Medicine
(Division of Biomedical and Life Sciences)
Lancaster University
Lancaster
LA1 4YG

Thank you for taking the time to read this information sheet.

Resources in the event of distress

Should you feel distressed either as a result of taking part, or in the future, the following resources may be of assistance.

AVENUE
Alliance House
493 Union Street
Aberdeen
AB10 1RX
Tel. 01224 587571
Website: Aberdeen@avenue-info.com
E-mail: www.avenues-info.com

APPENDIX 4a

INTERVIEW SCHEDULE FOR HEALTH PROFESSIONALS

1. I'll start by first asking you some general questions about you, your career history and place of work?

a. When you first qualified?
b. How long have you worked as a GP / HV?
c. How long have you worked at this practice?
d. What drew you to become a GP / HV?
e. A bit about your caseload/ population you serve

2. **Infant Reflux (Ob 2, 3)**

What is your understanding of 'reflux' in young babies?
What terms are used to describe it - (reflux)?
Are these terms used interchangeably or do they have different meanings with regard to reflux?
What, in your opinion, are the key symptoms of reflux?
If different terms used - how do you distinguish between the terms used?
ie when GOR become GORD
What leads you to your decision that an infant has reflux?
Are there any tools/ guidelines/ protocols used to guide your decision making?
If tool used - how effective?
Are there political, economic, cultural or social influences?
In the time that you have been a HV/ GP, have you noticed any change in the pattern, or number of babies that are presenting with symptoms of reflux? Why do you think this is?

1. **Parents of infants with reflux (Ob 2, 3)**

Can you tell me about the parents of babies presenting with symptoms of reflux?
Have you noticed any pattern among the parents of the babies with symptoms of reflux?
ie Family networks / support; Single, couples; Young/mature; Culture; Nationality; Employment status; Rural/ city dweller etc
How would you describe their parenting skills, adaptation to parenthood/motherhood?
How do the parents react to their baby with the symptoms of reflux?
What coping strategies do they have?
Do you have experience of the parents getting information/ support from elsewhere? Where? How do you feel about this
How would you describe your relationship with the parents?

2. **Management (Ob 4,)**

What management strategies do you use to support parents with infants presenting with symptoms of reflux? / How do you manage infants presenting with symptoms of reflux?
What influences your management decisions? - social, cultural, economic, political; Marketing/ Advertising
Do the parents have any influence on your management decisions? why?
How would you describe your relationship with the GP / HV? Does this influence the management?
How do you feel about the support you give to parents of infants with symptoms of reflux?
Is there anything you would like to do differently?

5. **Effectiveness and Efficacy (Ob 4,5)**

What are your thoughts on the management options available and their efficacy and effectiveness?
ie Conservative management , pharmaceutical products etc

6. **What do you think has contributed to the rise in the number of parents presenting babies with reflux and the increase use of medicines? (Ob 3,4,5)**

Changing expectations of parenthood / motherhood?; Availability of pharmaceutical products?; Internet, social media? Advertising etc?
How do you think this has this influenced or shaped how reflux is diagnosed and managed?

Thank you

APPENDIX 4b

PARTICIPANT INTERVIEW SCHEDULE (PARENTS)

As I don't know much about you, it would be good if you could tell me a bit about yourself, your baby…. your family… Ie work – type of work, full-time/ part-time etc

Baby – age, feeding, first, second baby etc
Family – partner, children, extended family etc

Can you tell me about your experiences of being a parent to…….. (new baby

- Is it what you expected?
- How does being a parent and caring for…. (new baby)….. compare to being a parent and caring for your other children when they were this young?

Your baby has been vomiting and bringing up feeds – can you tell me about this?

- What's been happening?
- How often are feeds been brought up / vomited?
- When did it start? How long it's been going on for / how long went on for?
- Are there any other symptoms? Ie weight loss
- How does the regurgitation of feeds affect your baby?
- Any pattern – timing, link to feed, nappies (wet/ dirty nappies)

What's your experience of looking after your baby when he / she is vomiting or bringing up feeds? (and/ or unsettled / distressed)

- Can you tell me how did this make you feel? (vomiting, ?unsettledness etc)
- To what extent does this affect you and your family? (sleep, social activities, relationship with partner etc)

What did you think's happening with your baby …… or causing him/ her to bring back feeds……. or cry or be unsettled and distressed?
(may be opportunity here to probe or explore source of information – family, friends, internet, health professionals etc)

Can you tell me how you tried to comfort and care for your baby when he/ she was vomiting……and/or crying or unsettled and distressed?

- Was there anything else happening in your life that may have impacted on how you managed and coped with the regurgitation and vomiting…….. and crying / distress/ unsettledness?
  Ie pressure of work – full-time/ part-time employment? Managing time and plans to go out etc

At what point did you feel you needed to seek help and support to manage the vomiting and regurgitation?

- Where, or from whom, did you seek help?
  Family, friends, HV, GP, internet, social media etc.
  What influenced this decision?
  What were your expectations from the HV, GP…. or others?

Can you tell me about the advice, support, reassurance …. that you received

- What was your experience of the advice, support reassurance given……
- To what extent did you feel your concern was addressed?
- How satisfied were you with the advice, support, reassurance received?
- Was a condition or illness diagnosed?

Can you tell me of any medicines or remedies that you are aware of to alleviate the symptoms for your baby?

- How did you know about these medicines / remedies? Ie family, friends, internet, health professional
- Can you tell me how these medicines/ remedies can be accessed? Are they available over the counter from the pharmacist? Do you need a prescription?
- How did you access these medicines? Were you offered a prescription for these medicines? Did you ask for a prescription?

Can you tell me about the support you received from health professionals ie HV / GP's etc?

- How satisfied did you feel with the support you received?

Is there anything else you'd like to say or share with me about your experience,
Thank you.

APPENDIX 5

Example of list of initial themes & sub-themes from interviews with General Practitioners

Understanding of reflux:
- What it is / physiology
- Diagnosis - mis/over/ under
- Terms used
- Prevalence
- Duration
- Colic/ CMPA
- Protocols & Guidelines

Parents:
- Social class
- Culture
- Family support/ social support networks
- Parenting skills/ attachment
- Coping strategies
- Expectations
- Anxiety
- Finncial / social pressure

Source of Information:
- HV
- Magazines – parenting & baby
- Internet
- Social media
- Community group/ M&B groups etc

Management
- Protocols
- Decision to prescribe
- Practice
- Efficacy of medicine
- Reason for increase

Health Visitors
- Role of HV – some referring to GP. Some asking for prescriptions, Some reviewing and deciding whether to continue or stop medicine

Other
- Impact of medicines on mucosa
- Parallel to anti-emetics in pregnant women ie thalidomide
- Attitude / practice of medical profession when evidence to use drugs not strong.
- Long term effect of using medicines

APPENDIX 6

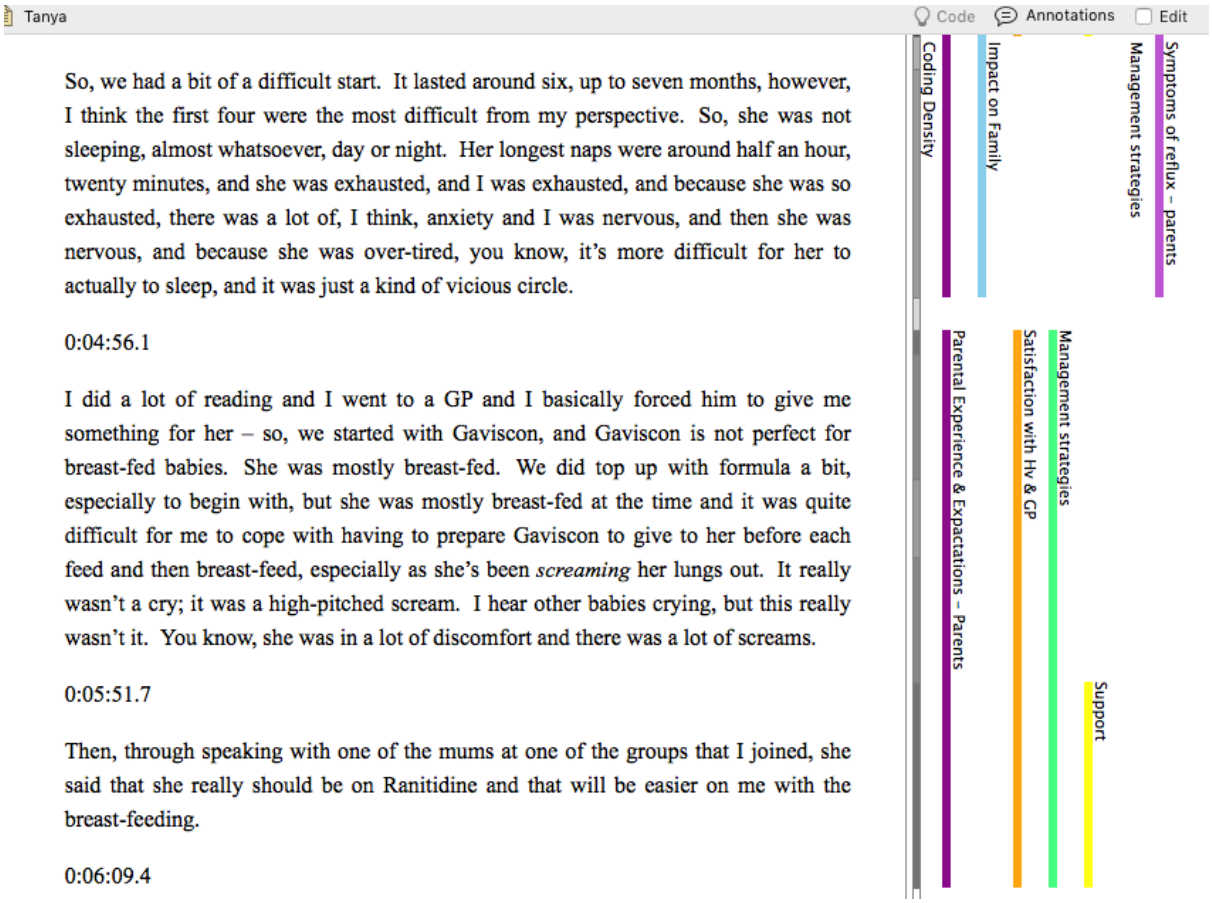
Example of some early themes, sub-themes mapped to research aim and underpinning theoretical framework (medicalisation)

Themes	Sub-theme	Description	Research Question	Theoretical Framework / Literature Review
Parent				
	Educated / Professional Parent	Thought to be more educated Professional parents presenting babies. Young parents / parents from lower SEG seem to cope better or to accept GOR.	3. To explore factors influencing health professionals decision making in the diagnosis of GOR in infants.	Social diagnosis Scientific motherhood
	Parental anxiety	Pressure to return to work, mortgages to pay etc	3. To explore factors influencing health professionals decision making in the diagnosis of GOR in infants.	Social diagnosis
	Parental Expectations, Attitudes	Parents thought to have unrealistic expectation of baby and parenthood. Parents thought to have low intolerance to crying and sicky baby	5. To assess changes over time in the management strategies for dealing with GOR in infants and what underpins these changes	Social diagnosis
	Self Blame	Maternal feelings of guilt or self-blame - failing to manage to sooth baby. Looking for a label ie GOR to remove blame	3. To explore factors influencing health professionals decision making in the diagnosis of GOR in infants.	Social diagnosis

Themes	Sub-theme	Description	Research Question	Theoretical Framework / Literature Review
Social Media				
	Self-diagnosis	Many parents using technology to explore problem and to self-diagnose Many parents using technology to explore problem and to self-diagnose	5. To assess changes over time in the management strategies for dealing with GOR in infants and what underpins these changes	Internet & Social media Social diagnosis
	Increasing use of technology	Parents always on mobile phone or laptop	5. To assess changes over time in the management strategies for dealing with GOR in infants and what underpins these changes	Internet & Social media Social diagnosis
		Use of Facebook, netmums, google etc	5. To assess changes over time in the management strategies for dealing with GOR in infants and what underpins these changes	Internet & Social media Social diagnosis
Diagnosis of Reflux				
	Understanding of reflux	Variety of descriptions /perceptions of reflux in babies	2. To understand how health professionals approach their diagnosis of GOR and GORD in infants	Medicalisation Diagnosis

Themes	Sub-theme	Description	Research Question	Theoretical Framework / Literature Review
	Under, over & mis diagnosis; colic intolerance etc	Some no change in symptoms and babies but difference is related to under or over diagnosis. Or perhaps mis diagnosis	2. To understand how health professionals approach their diagnosis of GOR and GORD in infants. 5. To assess changes over time in the management strategies for dealing with GOR in infants and what underpins these changes	Medicalisation Diagnosis
	Guidelines / Protocols	Not all are aware of, or refer to, protocols or guidelines	2. To understand how health professionals approach their diagnosis of GOR and GORD in infants.	Medicalisation Diagnosis
	Incidence / Prevalence	Some think it is much more common. Some think reflux is the new colic Others think it is better diagnosed now Some think it is increased due to parental expectations and intolerances Seems more common in white Scottish / British	5. To assess changes over time in the management strategies for dealing with GOR in infants and what underpins these changes	Medicalisation Diagnosis Social Diagnosis Pharmacueticalisation

Example of indexing in NVivo



So, we had a bit of a difficult start. It lasted around six, up to seven months, however, I think the first four were the most difficult from my perspective. So, she was not sleeping, almost whatsoever, day or night. Her longest naps were around half an hour, twenty minutes, and she was exhausted, and I was exhausted, and because she was so exhausted, there was a lot of, I think, anxiety and I was nervous, and then she was nervous, and because she was over-tired, you know, it's more difficult for her to actually to sleep, and it was just a kind of vicious circle.

0:04:56.1

I did a lot of reading and I went to a GP and I basically forced him to give me something for her – so, we started with Gaviscon, and Gaviscon is not perfect for breast-fed babies. She was mostly breast-fed. We did top up with formula a bit, especially to begin with, but she was mostly breast-fed at the time and it was quite difficult for me to cope with having to prepare Gaviscon to give to her before each feed and then breast-feed, especially as she's been *screaming* her lungs out. It really wasn't a cry; it was a high-pitched scream. I hear other babies crying, but this really wasn't it. You know, she was in a lot of discomfort and there was a lot of screams.

0:05:51.7

Then, through speaking with one of the mums at one of the groups that I joined, she said that she really should be on Ranitidine and that will be easier on me with the breast-feeding.

0:06:09.4

Example of part of Data Summary and Display: Influence on Diagnosis

Name	Symptoms	Parents	Parental Anxiety
Ali (GP)	I think it all depends on what the parents are saying because, a lot of the time, there might be quite a lot of parental anxiety about it – so, I think if the child is quite distressed by it, and they're particularly unsettled …	I think, I'd probably say most people I see about it are working middle class who seem to be reasonable, sensible people. Whether they've got, maybe, too much expectation in a way, that they should have a nice lovely child and baby, and remain in control of their work environment and suddenly they've got a child who's doing nothing that is in their control and that's again – certainly from a personal perspective – this was a complete change. I'm usually in control of things, and suddenly you're like, "What is going on?" I think that causes a lot of stress and anxiety when they're not in control of a situation.	I think … I don't know – there's lots of social media going around; everyone's posting their pictures of their perfect little bundles who … You know, I guess the pictures portray these perfect little things. You don't actually know what's going on, so I think everyone has that kind of expectation that they should have perfect children who don't cry, who sleep well, who feed well and so, I think there is maybe more of an expectation that children should be like that, and get into a routine – and that's not really the case, though. So, maybe, there's a wee bit more anxieties about what is normal, I guess. A lot of people just come with normal kind of problems, but they're maybe thinking it's not right. I don't know if social media had anything … 0:12:21.9 Yes, an 'unsettled' child, and you kind of feel you're on your own and you kind of feel a bit isolated – I think that doesn't make it any easier and makes it a wee bit more pressured and you maybe don't go out as much and stuff. I do think that is, maybe, with people who don't have that kind of family support – it might be a bit more difficult for them. So, maybe them having support groups and stuff. I think that's maybe lacking a wee bit. I don't think there's much in this area in terms of support groups and kind of social things that……. I think if there's maybe more of that – maybe…. 0:33:01.2
Ella (HV)	Often there is an impact on weight in that there would be a faltering growth and which would have been a failure to thrive before, or slow weight gain. The stool, I think, can vary from a very loose stool to a constipated stool, really…	The big difference might be …. but whether it makes a difference on the management of reflux …. would be the lack of extended family support for a large proportion of my client group and that is certainly wearing for parents……. It's the mum's ability to manage and cope with it, and trying to keep the stress levels down because, obviously, that's an impact then as well on the baby. 0:15:12.8	The partners would feel that mum's job is to care for the baby and look after herself, whereas the local men – white Western men would be expecting the house cleaned, and dinner on the table, and just carry on as per normal – so, that may well have an impact because that's all extra stress. If you've had a rough night, and then you try to get your baby fed and changed, and it vomited and is upset – how can you get anything done? And it just adds stress to the whole set-up then as well. So, that, certainly ... 0:42:41.4 I think, maybe mums now expect the babies to fit into their lifestyles as opposed to the whole lifestyle changing once you've had a

			baby, and that may well have a bearing on it. 0:43:24.5
Fran (HV)	The weight. I think if they're not actually putting on weight, or the weight is …. they're not actually putting on a minimum amount of acceptable weight-gain, then I'd be considering that they need something to help them keep that milk down, or, if they're a very unsettled baby with all this possetting and refluxing, I would say again, we could do a trial with Gaviscon with that. It is more the weight I'm looking at rather than anything else. 0:16:01.7		Sometimes you find it's anxiety on the mum's behalf that's adding to it as well because I think there must be nothing worse for a mum who has been looking forward to this baby and then find out they've got a baby that cries an awful lot and they're looking for ways to answer why that crying is, rather than it just being maybe their baby and it's something you kind of sit and think, "Maybe you just have one of those babies that's doing really well and appears to be thriving every time I come in." I think the idea of just doing well, and being a mum and having this contented baby, and when it doesn't happen like that, that is quite distressing for the mum as well. It doesn't help the situation because you're trying to tell them, "Look, if you're feeling maybe anxious and you're holding your baby, your baby will pick up from all these queues as well." And it's just going to be a revolving circle for them. 0:11:50.0 0:24:30.6Yes, a lot of it (referring to parental anxiety) I think is due to technology – the fact that they're looking up everything; they're trying to solve problems themselves; and they're often doing stuff. I mean, twenty years ago, when I had my children, you would Google up stuff and you would go on, but it wasn't as – you know, just go and do, "Oh, yeah, I'll do that, I'll just go and look it up." I think a lot of them dwell on it. They don't get the answer they want. I think they've got a lot of forums to go on like Netmums and then they go in and get this whole barrage and sometimes I come in and have a look and I think, "Oh, sweet Lord" – somebody just put on a simple comment and they got a barrage of things back that they never even thought about, and all of a sudden something's gone from something, and all of a sudden they sit and they're thinking of a bigger picture and much more anxiety is put onto them then at that particular time. You do get a lot of parents that don't feel they have the same support networks that they had and they do look around them for what's out there on a computer. Sometimes they may ask somebody to do that and that builds up their own anxieties.

			0:26:13.5
Jo (GP)	I think that, within the practice, there is an expectation amongst our population and amongst our health visitors that we prescribe for reflux simply on the basis of pain, wriggling, perhaps difficulty winding, and I think that is probably happening within the practice. I don't know if it's happening on a wider scale. We're learning now what we've been told now is that they don't necessarily have to posset or vomit with any degree of force or volume or regularity; that pain and discomfort may be a sign of what is now accepted to be a diagnosis of gastro-oesophageal reflux. Sometimes we'll get messages on our doctor screen suggesting that we prescribe something based on a diagnosis having been made by a health visitor.	My own feeling is it might be the kind of middle class to lower social class parents who are living in a new house in our area and their expectations are quite high as to how things might go with a new baby and what life might be like with a new baby. That may be just a prejudice within myself in deciding that there is a core of mums who are finding it difficult to accept that it is difficult. 0:09:47.1 And like I say, I'm not … It's not the poor souls that you think do need support …. perhaps the single teenage mums etcetera who are coming to us looking for a better pattern here; looking for a better, more manageable situation. It's the ones, most often, it's people who have all the expected benefits in place. They have a partner, they have their own house, they have separate bedrooms for a child and many of their other children and they have a car that they can transport a child in to necessary appointments etcetera. So, is this just a bit of the jigsaw that doesn't fit the expectation? I do wonder about that. I feel quite strongly that that may well be a driving force in some of this health-seeking behaviour amongst young … yes, perhaps professional or semi-professional mums. 0:22:39.4	My own feeling is it might be the kind of middle class to lower social class parents who are living in a new house in our area and their expectations are quite high as to how things might go with a new baby and what life might be like with a new baby. That may be just a prejudice within myself in deciding that there is a core of mums who are finding it difficult to accept that it is difficult. 0:09:47.1

APPENDIX 9a

Consent Form

Study Title: Factors influencing and shaping the management of, and prescribing practices for infants aged 0 -12 months presenting with symptoms of gastro-oesophageal reflux (GOR).

I am asking if you would like to take part in a research project that aims to explore factors influencing the management of, and prescribing practices for infants presenting with symptom of gastro-oesophageal reflux (GOR).
Before you consent to participating in the study we ask that you read the participant information sheet and mark each box below with your initials if you agree. If you have any questions or queries before signing the consent form please speak to the principal investigator, Jean Cowie.

Please initial box after each statement:

1. I confirm that I have read the information sheet and fully understand what is expected of me within this study ☐
2. I confirm that I have had the opportunity to ask any questions and to have them answered. ☐
3. I understand that my interview will be audio recorded and then made into an anonymised written transcript. ☐
4. I understand that audio recordings will be kept until the research project has been examined. ☐
5. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my legal rights being affected. ☐
6. I understand that once my data have been anonymised and incorporated into themes it might not be possible for it to be withdrawn, though every attempt will be made to extract my data, up to the point of publication. ☐
7. I understand that the information from my interview will be pooled with other participants' responses, anonymised and may be published ☐
8. I consent to information and quotations from my interview being used in reports, conferences and training events. ☐
9. I understand that any information I give will remain strictly confidential and anonymous unless it is thought that there is a risk of harm to myself or others, in which case the principal investigator will need to share this information with her research supervisor. ☐
10. I consent to Lancaster University keeping written transcriptions of the interview for 5 years after the study has finished. ☐
11. I consent to take part in the above study. ☐

Name of Participant_____

Signature_____

Date _____

Name of Researcher _____

Signature _____

Date _____

APPENDIX 9b

LANCASTER UNIVERSITY

Applicant name: Jean Cowie
Supervisor: Prof Christine Milligan
Department: DHR

23 May 2014

Dear Jean and Christine,

Re: Factors influencing & shaping the management of, and prescribing practices for infants aged 0-12 months presenting with symptoms of gastro-oesophageal reflux (GOR)

The University of Lancaster undertakes to perform the role of sponsor in the matter of the work described in the accompanying grant application. The sponsor as we understand it assumes responsibility for monitoring and enforcement of research governance. As principal investigator you will confirm that the institution's obligations are met by ensuring that, before the research commences and during the full term of the grant, all the necessary legal and regulatory requirements in order to conduct the research are met, and all the necessary licenses and approvals have been obtained. The Institution has in place formal procedures for managing the process for obtaining any necessary or appropriate ethical approval for this grant. Full ethical approval must be in place before the research commences and should be reviewed at all relevant times during the grant.

Yours sincerely,

Fiona Aiken,
University Secretary,
Chair, University Research Ethics Committee.

Cc Sarah Taylor, Secretary, UREC.

Research Support Office
Research and Enterprise Services

Lancaster University
Bowland Main
Lancaster LA1 4YT
United Kingdom

Tel: +44 (0) 1524 592002
Fax: +44 (0) 1524 593229
Web: http://www.lancs.ac.uk

Applicant: Jean Cowie
Supervisor: Christine Milligan
Department: Health Research
FHMREC Reference: FHMREC16096

08 May 2017

Dear Jean

Re: Factors influencing and shaping the management of, and prescribing practices for infants aged 0 -12 months presenting with symptoms of gastro oesophageal reflux.

Thank you for submitting your research ethics amendment application for the above project for review by the **Faculty of Health and Medicine Research Ethics Committee (FHMREC)**. The application was recommended for approval by FHMREC, and on behalf of the Chair of the Committee, I can confirm that approval has been granted for the amendment to this research project.
As principal investigator your responsibilities include:

- ensuring that (where applicable) all the necessary legal and regulatory requirements
in order to conduct the research are met, and the necessary licenses and approvals have been obtained;

- reporting any ethics-related issues that occur during the course of the research or arising from the research to the Research Ethics Officer at the email address below (e.g. unforeseen ethical issues, complaints about the conduct of the research, adverse reactions such as extreme distress);

- submitting details of proposed substantive amendments to the protocol to the Research Ethics Officer for approval.

Please contact me if you have any queries or require further information.
Tel:- 01542 592838
Email:- fhmresearchsupport@lancaster.ac.uk

Yours sincerely,

Dr Diane Hopkins
Research Integrity and Governance Officer, Secretary to FHMREC.

Health & Medicine | Lancaster University

Applicant: Jean Cowie
Supervisor: Christine Milligan
Department: Health Research
FHMREC Reference: FHMREC16035

21 November 2016

Dear Jean

Re: Factors influencing and shaping the management of, and prescribing practices for infants aged 0 -12 months presenting with symptoms of gastro oesophageal reflux.

Thank you for submitting your research ethics amendment application for the above project for review by the **Faculty of Health and Medicine Research Ethics Committee (FHMREC)**. The application was recommended for approval by FHMREC, and on behalf of the Chair of the Committee, I can confirm that approval has been granted for this research project.

As principal investigator your responsibilities include:

- ensuring that (where applicable) all the necessary legal and regulatory requirements
in order to conduct the research are met, and the necessary licenses and approvals have been obtained;

- reporting any ethics-related issues that occur during the course of the research or arising from the research to the Research Ethics Officer at the email address below (e.g. unforeseen ethical issues, complaints about the conduct of the research, adverse reactions such as extreme distress);

- submitting details of proposed substantive amendments to the protocol to the Research Ethics Officer for approval.

Please contact me if you have any queries or require further information.
Tel:- 01542 592838
Email:- fhmresearchsupport@lancaster.ac.uk

Yours sincerely,

Dr Diane Hopkins
Research Integrity and Governance Officer, Secretary to FHMREC.

Health & Medicine | Lancaster University

Applicant: Jean Cowie
Supervisor: Christine Milligan and Paula Holland
Department: Health Research
FHMREC Reference: FHMREC15084
31 May 2016

Dear Jean

Re: Factors influencing and shaping the management of, and prescribing practices for infants aged 0 -12 months presenting with symptoms of gastro oesophageal reflux.

Thank you for submitting your research ethics amendment application for the above project for review by the Faculty of Health and Medicine Research Ethics Committee (FHMREC). The application was recommended for approval by FHMREC, and on behalf of the Chair of the University Research Ethics Committee (UREC), I can confirm that approval has been granted for this research project. **The approval is given with the caveat that NHSREC ethical approval be sought as appropriate.**

As principal investigator your responsibilities include:

- ensuring that (where applicable) all the necessary legal and regulatory requirements in order to conduct the research are met, and the necessary licenses and approvals have been obtained;

- reporting any ethics-related issues that occur during the course of the research or arising from the research to the Research Ethics Officer (e.g. unforeseen ethical issues, complaints about the conduct of the research, adverse reactions such as extreme distress);

- submitting details of proposed substantive amendments to the protocol to the Research Ethics Officer for approval.

Please contact the Diane Hopkins (01542 592838
fhmresearchsupport@lancaster.ac.uk) if
you have any queries or require further information.

Yours sincerely,

Dr Diane Hopkins
Research Development Officer
CC Ethics@Lancaster; Professor Roger Pickup (Chair, FHMREC)

APPENDIX 9c

Research and Development

Foresterhill House Annexe
Foresterhill
ABERDEEN
AB25 2ZB

NHS Grampian

Miss Jean Cowie
The Robert Gordon University
School of Nursing and Midwifery
Garthdee Campus
Garthdee Road
AB10 7QG

Date 07/01/2015
Project No 2014GA002
Enquiries to
Extension 53846
Direct Line 01224 553846
Email
grampian.randdpermissions@nhs.net

Dear Miss Cowie

Management Permission for Non-Commercial Research

STUDY TITLE: Factors influencing and shaping the management of, and prescribing practice for infants aged 0 - 12 months presenting with symptoms of gastro-oesophageal reflux (GOR)
PROTOCOL NO: Research Proposal
REC REF: N/A
NRS REF: N/A

Thank you very much for sending all relevant documentation. I am pleased to confirm that the project is now registered with the NHS Grampian Research & Development Office. The project now has R & D Management Permission to proceed locally. This is based on the documents received from yourself and the relevant Approvals being in place.

All research with an NHS element is subject to the Research Governance Framework for Health and Community Care (2006, 2nd edition), and as Chief or Principal Investigator you should be fully committed to your responsibilities associated with this.

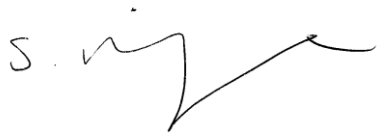
It is particularly important that you inform us when the study terminates.

The R&D Office must be notified immediately and any relevant documents forwarded to us if any of the following occur:

- A change of Principal Investigator, Chief Investigator or any additional research personnel
- Premature project termination
- Any amendments – substantial or non-substantial (particularly a study extension)
- Any change to funding or any additional funding

We hope the project goes well, and if you need any help or advice relating to your R&D Management Permission, please do not hesitate to contact the office.

Yours sincerely



Susan Ridge
Non-Commercial Manager

Sponsor: University of Lancaster

APPENDIX 9d

University Hospitals Division

NHS Lothian

Queen's Medical Research Institute
47 Little France Crescent, Edinburgh, EH16 4TJ

FM/NM/approval

23 October 2014

Research & Development
Room E1.12
Tel: 0131 242 3330

Email:
R&DOffice@nhslothian.scot.nhs.uk

Director: Professor David E Newby

Miss Jean Cowie
The Robert Gordon University
School of Nursing and Midwifery
Garthdee Campus
Garthdee Road
AB10 7QG

Dear Miss Cowie

Lothian R&D Project No: 2014/0343

Title of Research: Factors influencing and shaping the management of, and prescribing practice for infants aged 0 - 12 months presenting with symptoms of gastro-oesophageal reflux (GOR)

REC No: N/A

Participant Information Sheet:
Participant Information Sheet

Consent Form:
Consent Form

Protocol:
Research Proposal

I am pleased to inform you that this study has been approved for NHS Lothian and you may proceed with your research, subject to the conditions below. This letter provides Site Specific approval for NHS Lothian.

Please note that the NHS Lothian R&D Office must be informed if there are any changes to the study such as amendments to the protocol, recruitment, funding, personnel or resource input required of NHS Lothian.

Substantial amendments to the protocol will require approval from the ethics committee which approved your study and the MHRA where applicable.

Please inform this office when recruitment has closed and when the study has been completed.

I wish you every success with your study.

Yours sincerely

Fiona McArdle.

Ms Fiona McArdle
Deputy R&D Director

CC Ms Pamela Shand, NRS, Aberdeen

Health & Medicine | Lancaster University

Confidentiality Agreement for the Transcription of Qualitative Data

Name of Study:	**Factors influencing and shaping the management of, and prescribing practices for infants aged 0-12months presenting with symptoms of gastro-oesophageal reflux (GOR).**
Study PI:	**Jean Cowie**

In accordance with the Research Ethics Committee at Lancaster University (UREC), all participants in the above-named study are anonymised. Therefore any personal information or any of the data generated or secured through transcription will not be disclosed to any third party.

By signing this document, you are agreeing:

- not to pass on, divulge or discuss the contents of the audio material provided to you for transcription to any third parties
- to ensure that material provided for transcription is held securely and can only be accessed via password on your local PC
- to return transcribed material to the research team when completed and do so when agreed in password protected files
- to destroy any audio and electronic files held by you and relevant to the above study at the earliest time possible after transcripts have been provided to the research team, or to return said audio files.

Your name (block capitals) KITTA ROOS POTGIETER

Your signature K.R. Potgieter

Date 25 April 2016

Version: [1]
Date: [25/04/16]

Prescribing rate of Alginate (per 100) and confidence intervals (lower – upper) for infants aged 0-1 year in each NHS Board (2010-2016 **APPENDIX 10**

NHS Board	2010	2011	2012	2013	2014	2015	2016
Ayrshire & Arran	10.34 (9.39-11.29)	11.95 (10.92-12.98)	13.35 (12.30-14.41)	17.22 (16.04-18.41)	20.03 (18.73-21.33)	21.81 (20.45-23.17)	21.61 (20.27-22.94)
Borders	13.55 (11.60-15.51)	14.81 (12.78-16.83)	14.45 (12.39-16.52)	18.79 (16.50-21.09)	18.75 (16.50-21.00)	18.45 (16.21-20.69)	22.07 (19.53-24.61)
Dumfries & Galloway	12.39 (10.70-14.08)	13.95 (12.21-15.69)	15.23 (13.43-17.04)	21.16 (18.99-23.32)	23.07 (20.84-25.30)	24.90 (22.55-27.26)	25.56 (23.18-27.94)
Fife	15.22 (14.14-16.30)	17.78 (16.63-18.93)	21.18 (19.95-22.40)	22.06 (20.79-23.33)	24.47 (23.12-25.82)	23.93 (22.58-25.27)	25.06 (23.69-26.42)
Forth Valley	17.62 (16.34-18.91)	19.87 (18.54-21.20)	24.31 (22.83-25.79)	25.69 (24.20-27.17)	27.29 (25.72-28.87)	25.07 (23.53-26.62)	24.48 (22.95-26.01)
Grampian	20.16 (19.17-21.14)	22.53 (21.51-23.54)	23.58 (22.55-24.61)	24.67 (23.61-25.73)	24.91 (23.84-25.98)	23.23 (22.20-24.27)	24.02 (22.96-25.08)
Gt Glasgow & Clyde	17.05 (16.42-17.67)	19.36 (18.71-20.01)	20.72 (20.06-21.38)	25.18 (24.44-25.93)	27.60 (26.83-28.37)	30.11 (29.31-30.91)	27.78 (26.99-28.56)
Highland	13.92 (12.74-15.09)	16.38 (15.10-17.67)	18.77 (17.43-20.10)	19.68 (18.30-21.05)	22.65 (21.15-24.15)	22.01 (20.52-23.50)	19.74 (18.32-21.15)
Lanarkshire	19.08 (18.14-20.02)	21.40 (20.41-22.40)	23.35 (22.33-24.38)	21.95 (21.01-22.90)	25.95 (24.93-26.97)	29.96 (28.88-31.04)	32.48 (31.40-33.57)
Lothian	13.73 (13.05-14.40)	16.77 (16.02-17.51)	16.94 (16.22-17.66)	20.30 (19.50-21.10)	21.88 (21.06-22.70)	20.68 (19.88-21.49)	21.17 (20.35-21.99)
Orkney	7.18 (3.68-10.68)	13.46 (8.82-18.10)	13.18 (8.71-17.65)	15.42 (10.58-20.26)	19.60 (14.08-25.11)	18.08 (12.41-23.75)	15.66 (10.59-20.72)
Shetland	16.97 (12.50-21.44)	13.26 (9.28-17.24)	15.77 (11.49-20.05)	20.23 (15.32-25.15)	16.90 (12.58-21.21)	22.98 (17.60-28.36)	26.89 (21.26-32.52)
Tayside	13.03 (12.03-14.02)	16.13 (15.04-17.22)	17.82 (16.68-18.97)	17.87 (16.73-19.01)	22.22 (20.96-23.49)	21.73 (20.46-23.01)	19.56 (18.35-20.77)
Western Isles	8.14 (4.80-11.48)	9.95 (6.01-13.90)	5.93 (2.92-8.95)	8.10 (4.70-11.50)	16.39 (11.75-21.04)	19.53 (14.67-24.39)	18.98 (13.75-24.21)

* The number of patients is < 20 therefore the confidence interval may be unreliable.

Prescribing rate of domperidone (per 100) and confidence intervals (lower – upper) for infants aged 0-1 year in each NHS Board (2010-2016)

NHS Board	2010	2011	2012	2013	2014	2015	2016
Ayrshire & Arran	0.58 (0.35-0.82)	1.10 (0.77-1.43)	1.62 (1.23-2.01)	1.49 (1.11-1.87)	1.48 (1.09-1.88)	0.45 (0.23-0.67)	0.11 *
Borders	2.13 (1.30-2.96)	2.62 (1.71-3.53)	2.69 (1.74-3.64)	3.42 (2.35-4.49)	4.43 (3.24-5.61)	2.52 (1.62-3.43)	2.05 (1.18-2.92)
Dumfries & Galloway	0.62 *	0.99 *	1.51 (0.90-2.12)	2.34 (1.54-3.14)	2.04 (1.29-2.79)	0.93 *	0.23 *
Fife	2.63 (2.15-3.11)	3.26 (2.72-3.79)	3.35 (2.81-3.89)	3.21 (2.67-3.76)	4.14 (3.52-4.77)	2.59 (2.09-3.09)	1.26 (0.91-1.61)
Forth Valley	1.03 (0.69-1.38)	1.56 (1.15-1.97)	2.17 (1.67-2.68)	2.59 (2.05-3.13)	3.11 (2.50-3.72)	1.52 (1.08-1.96)	0.20 *
Grampian	0.99 (0.74-1.23)	1.23 (0.96-1.50)	1.31 (1.03-1.58)	1.48 (1.18-1.77)	1.43 (1.14-1.73)	0.64 (0.45-0.84)	0.35 (0.20-0.50)
Greater Glasgow & Clyde	0.35 (0.25-0.45)	0.49 (0.38-0.61)	0.63 (0.50-0.75)	0.88 (0.72-1.04)	0.84 (0.68-1.00)	0.42 (0.31-0.53)	0.17 (0.10-0.24)
Highland	0.48 *	0.53 *	0.64 0.37-0.92	0.78 (0.47-1.08)	1.20 (0.81-1.59)	0.91 (0.57-1.26)	0.40 *
Lanarkshire	0.92 (0.69-1.15)	0.75 (0.54-0.96)	0.92 (0.69-1.15)	0.95 (0.73-1.18)	0.97 (0.74-1.20)	0.42 (0.27-0.57)	0.11 *
Lothian	2.25 (1.96-2.54)	2.84 (2.51-3.17)	3.25 (2.91-3.59)	4.47 (4.06-4.88)	5.06 (4.63-5.50)	2.97 (2.63-3.31)	1.39 (1.16-1.63)
Orkney	0.96 *	0.48 *	0.00 *	0.93 *	2.01 *	0.56 *	0.51 *
Shetland	2.21 *	0.36 *	0.00 *	0.78 *	1.38 *	0.00 *	0.00 *
Tayside	0.73 (0.48-0.98)	1.18 (0.86-1.50)	1.05 (0.74-1.35)	1.00 (0.70-1.29)	1.65 (1.26-2.04)	1.04 (0.73-1.35)	0.29 *
Western Isles	0.00 *	0.90 *	0.42 *	0.00 *	0.00 *	0.78 *	0.46 *

* The number of patients is < 20 therefore the confidence interval may be unreliable.

Prescribing rate of omeprazole (per 100) and confidence intervals (lower – upper) for infants aged 0-1 year in each NHS Board (2010-2016)

NHS Board	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Ayrshire & Arran	0.03 *	0.31 *	0.40 *	0.57 (0.33-0.80)	0.85 (0.55-1.15)	0.93 (0.61-1.25)	1.23 (0.87-1.59)
Borders	0.77 *	1.44 *	1.62 *	1.44 *	2.17 (1.33-3.01)	2.26 (1.40-3.12)	2.64 (1.66-3.62)
Dumfries & Galloway	1.10 *	1.38 (0.79-1.97)	1.77 (1.11-2.44)	2.78 (1.91-3.65)	3.80 (2.78-4.81)	3.25 (2.28-4.21)	5.42 (4.19-6.66)
Fife	1.40 (1.04-1.75)	1.53 (1.16-1.91)	1.45 (1.09-1.81)	2.01 (1.58-2.44)	3.27 (2.72-3.83)	3.34 (2.77-3.90)	3.84 (3.24-4.45)
Forth Valley	0.59 (0.33-0.85)	1.10 (0.75-1.44)	1.18 (0.81-1.55)	1.21 (0.83-1.58)	2.01 (1.51-2.50)	1.92 (1.43-2.40)	2.89 (2.30-3.49)
Grampian	0.47 (0.30-0.64)	0.51 (0.34-0.68)	0.57 (0.39-0.75)	0.82 (0.60-1.04)	1.18 (0.91-1.45)	1.44 (1.15-1.73)	1.55 (1.24-1.85)
Greater Glasgow & Clyde	0.63 (0.50-0.76)	0.82 (0.67-0.97)	1.09 (0.92-1.26)	1.52 (1.31-1.73)	2.13 (1.88-2.38)	3.04 (2.74-3.34)	3.25 (2.94-3.56)
Highland	0.60 (0.34-0.87)	1.00 (0.66-1.35)	0.79 (0.49-1.10)	0.90 (0.58-1.23)	1.60 (1.15-2.05)	1.99 (1.49-2.50)	2.85 (2.25-3.44)
Lanarkshire	1.56 (1.27-1.86)	1.64 (1.33-1.95)	1.88 (1.55-2.21)	2.30 (1.96-2.65)	2.62 (2.25-2.99)	2.67 (2.29-3.05)	3.50 (3.08-3.93)
Lothian	1.76 (1.50-2.02)	2.59 (2.27-2.91)	2.98 (2.66-3.31)	4.25 (3.84-4.65)	4.92 (4.49-5.35)	5.49 (5.04-5.94)	5.65 (5.18-6.11)
Orkney	0.00 *	0.48 *	0.00 *	0.93 *	1.51 *	0.00 *	0.51 *
Shetland	0.74 *	0.36 *	0.36 *	0.39 *	0.00 *	0.43 *	1.26 *
Tayside	0.09 *	0.46 0.26-0.65	0.65 0.41-0.89	0.58 0.35-0.81	1.48 1.12-1.85	1.93 1.51-2.36	1.93 1.51-2.35
Western Isles	0.00 *	0.00 *	0.00 *	0.00 *	0.41 *	0.39 *	0.46 *

* The number of patients is < 20 therefore the confidence interval may be unreliable.

Prescribing rate of ranitidine (per 100) and confidence intervals (lower – upper) for infants aged 0-1 year in each NHS Board (2010-2016)

NHS Board	2010	2011	2012	2013	2014	2015	2016
Ayrshire & Arran	0.99 (0.68-1.30)	1.46 (1.08-1.84)	2.21 (1.76-2.67)	3.27 (2.71-3.83)	4.56 (3.88-5.24)	4.74 (4.04-5.44)	7.60 (6.74-8.46)
Borders	1.53 *	3.13 (2.14-4.12)	2.87 (1.89-3.85)	3.33 (2.27-4.38)	6.08 (4.70-7.46)	5.74 (4.40-7.09)	7.52 (5.90-9.13)
Dumfries & Galloway	1.37 (0.77-1.96)	1.91 (1.22-2.60)	1.84 (1.16-2.51)	2.56 (1.72-3.40)	3.28 (2.34-4.23)	2.63 (1.76-3.50)	4.49 (3.36-5.62)
Fife	2.47 (2.00-2.93)	3.00 (2.49-3.51)	4.08 (3.49-4.67)	4.42 (3.79-5.05)	6.57 (5.79-7.35)	7.68 (6.84-8.52)	8.15 (7.29-9.01)
Forth Valley	3.78 (3.14-4.43)	3.89 (3.25-4.54)	4.63 (3.90-5.35)	5.70 (4.91-6.49)	9.08 (8.06-10.09)	10.44 (9.35-11.53)	11.83 (10.68-12.98)
Grampian	5.43 (4.87-5.98)	7.33 (6.70-7.96)	8.43 (7.76-9.11)	10.46 (9.70-11.21)	12.16 (11.35-12.97)	12.14 (11.34-12.94)	14.35 (13.48-15.22)
Greater Glasgow & Clyde	1.89 (1.67-2.12)	2.49 (2.23-2.74)	2.91 (2.64-3.19)	4.34 (3.99-4.69)	5.79 (5.39-6.20)	8.30 (7.82-8.78)	9.25 (8.74-9.76)
Highland	1.96 (1.49-2.43)	3.17 (2.56-3.78)	3.39 (2.77-4.01)	4.61 (3.88-5.33)	6.74 (5.84-7.64)	9.80 (8.73-10.88)	10.79 (9.69-11.90)
Lanarkshire	1.15 (0.89-1.40)	1.76 (1.44-2.08)	2.92 (2.51-3.33)	3.72 (3.29-4.16)	5.12 (4.61-5.64)	7.48 (6.85-8.10)	10.40 (9.69-11.11)
Lothian	1.95 (1.68-2.22)	2.20 (1.90-2.49)	2.92 (2.59-3.24)	4.69 (4.27-5.11)	6.93 (6.42-7.43)	7.65 (7.12-8.18)	8.82 (8.25-9.39)
Orkney	2.87 *	0.96 *	1.82 *	5.61 *	9.05 *	7.91 *	8.08 *
Shetland	4.80 *	4.30 *	4.30 *	8.56 (5.14-11.98)	7.59 (4.54-10.63)	8.09 *	14.71 (10.21-19.21)
Tayside	2.57 (2.10-3.04)	3.10 (2.59-3.61)	3.49 (2.94-4.03)	4.55 (3.93-5.17)	7.13 (6.35-7.91)	7.91 (7.07-8.74)	7.82 (7.01-8.64)
Western Isles	1.55 *	1.81 *	1.27 *	1.21 *	0.82 *	3.91 *	3.70 *

* The number of patients is < 20 therefore the confidence interval may be unreliable.

APPENDIX 11

Ranking* of NHS Boards for prescribing of alginate in infants age 0-1 year (2010-2016)

NHS Board	Year							
	2010	2011	2012	2013	2014	2015	2016	Mean rank
Ayrshire & Arran	12	13	12	12	10	9	9	11.0
Borders	9	9	11	10	12	13	8	10.3
Dumfries & Galloway	11	10	10	6	6	4	4	7.3
Fife	6	5	4	4	5	5	5	4.9
Forth Valley	3	3	1	1	2	3	6	2.7
Grampian	1	1	2	3	4	6	7	3.4
Greater Glasgow & Clyde	4	4	5	2	1	1	2	2.7
Highland	7	7	6	9	7	8	11	7.9
Lanarkshire	2	2	3	5	3	2	1	2.6
Lothian	8	6	8	7	9	11	10	8.4
Orkney	14	11	13	13	11	14	14	12.9
Shetland	5	12	9	8	13	7	3	8.1
Tayside	10	8	7	11	8	10	12	9.4
Western Isles	13	14	14	14	14	12	13	13.4

*Ranking: 1= highest rank

Ranking* of NHS Boards for prescribing of domperidone in infants age 0-1 year (2010-2016)

NHS Board	Year							
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**Mean rank**
Ayrshire & Arran	11	7	5	6	8	11	13	8.71
Borders	4	3	3	2	2	3	1	2.57
Dumfries & Galloway	10	8	6	5	5	6	9	7.00
Fife	1	1	1	3	3	2	3	2.00
Forth Valley	5	4	4	4	4	4	10	5.00
Grampian	6	5	7	7	9	9	7	7.14
Greater Glasgow & Clyde	13	12	11	11	13	13	11	12.00
Highland	12	11	10	12	11	7	6	9.86
Lanarkshire	8	10	9	9	12	12	12	10.29
Lothian	2	2	2	1	1	1	2	1.57
Orkney	7	13	13.5	10	6	10	4	9.07
Shetland	3	14	13.5	13	10	14	14	11.64
Tayside	9	6	8	8	7	5	8	7.29
Western Isles	14	9	12	14	14	8	5	10.86

*Ranking: 1= highest rank

Ranking of NHS Boards for prescribing of omeprazole in infants age 0-1 year (2010-2016)

NHS Board	Year							
	2010	2011	2012	2013	2014	2015	2016	Mean rank
Ayrshire & Arran	12	13	11	12	12	11	12	11.83
Borders	5	4	4	6	5	6	8	5.50
Dumfries & Galloway	4	5	3	2	2	3	2	2.83
Fife	3	3	5	4	3	2	3	3.33
Forth Valley	9	6	6	7	7	9	6	6.83
Grampian	10	9	10	10	11	10	10	10.00
Greater Glasgow & Clyde	7	8	7	5	6	4	5	5.83
Highland	8	7	8	9	8	7	7	7.67
Lanarkshire	2	2	2	3	4	5	4	3.33
Lothian	1	1	1	1	1	1	1	1.00
Orkney	13.5	10	13.5	8	9	14	13	11.25
Shetland	6	12	12	13	14	12	11	12.33
Tayside	11	11	9	11	10	8	9	9.67
Western Isles	13.5	14	13.5	14	13	13	14	13.58

*Ranking: 1= highest rank

Ranking* of NHS Boards for prescribing of ranitidine in infants age 0-1 year (2010-2016)

NHS Board	Year							
	2010	2011	2012	2013	2014	2015	2016	Mean rank
Ayrshire & Arran	14	13	11	12	12	12	11	11.83
Borders	11	5	10	11	9	11	12	9.67
Dumfries & Galloway	12	10	12	13	13	14	13	12.50
Fife	6	7	4	8	8	8	8	7.17
Forth Valley	3	3	2	3	2	2	3	2.50
Grampian	1	1	1	1	1	1	2	1.17
Greater Glasgow & Clyde	9	8	9	9	10	4	6	7.67
Highland	7	4	6	6	7	3	4	5.00
Lanarkshire	13	12	7	10	11	10	5	9.17
Lothian	8	9	8	5	6	9	7	7.33
Orkney	4	14	13	4	3	6	9	8.17
Shetland	2	2	3	2	4	5	1	2.83
Tayside	5	6	5	7	5	7	10	6.67
Western Isles	10	11	14	14	14	13	14	13.33

*Ranking: 1= highest rank

APPENDIX 12

Public Output

Cowie, J., Holland, P., Pirie, I., Milligan, C. 2018. Patterns of prescribing of gastro-oesophageal reflux in infants in Scotland. *Journal of Health Visiting*. 6:9, pp.440-446.