Training doctors to manage patients with multimorbidity

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Supervisor: Professor Susan Smith

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Declaration

I declare that this thesis which I submit to RCSI for examination in consideration of the award of degree of Master of Science is my own personal effort. Where any of the content presented is the result of input or data from a related collaborative research programme this is duly acknowledged in the text such that it is possible to ascertain how much of the work is my own. I have not already obtained a degree in RCSI or elsewhere on the basis of this work. Furthermore, I took reasonable care to ensure that the work is original and to the best of my knowledge does not break copyright law and has not been taken from other sources except where such work has been sited and acknowledged within the text.

Signed _____

Dr Clíona Lewis

Student number 97203

Date _____

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List of abbreviations

BMJ	British Medical Journal
BST	Basic specialist training
CME	Continuing medical education
COPD	Chronic obstructive pulmonary disease
CT	Computed tomography
EBM	Evidence-based medicine
ED	Emergency department
EGPRN	European General Practitioners Research Network
GIM	General internal medicine
GMS	General medical services
GP	General practitioner
HST	Higher specialist training
ICGP	Irish College of General Practitioners
MeSH	Medical subject heading
MRC	Medical research framework
N/A	Not applicable
NICE	National Institute of Health and Care Excellence
nRCT	Non-randomised controlled trial
NSD	National specialist director
OR	Odds ratio
PRISMA	Preferred reporting items for systematic review and meta-analysis
PROSPERO	International prospective register of systematic reviews
QOF	Quality and outcomes framework

RCPI	Royal College of Physicians in Ireland
RCGP	Royal College of General Practitioners
RCSI	Royal College of Surgeons in Ireland
RCT	Randomised controlled trial
REC	Research ethics committee
ROBINS-I	Cochrane collaboration risk of bias in non-randomised studies assessment tool
RR	Relative risk
SpR	Specialist registrar
START	Screening Tool to Alert doctors to Right Treatment
STOPP	Screening Tool of Older Persons' Prescription
TIA	Transient ischaemic attack
UK	United Kingdom
USA	United States of America
WHO	World health organisation

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Summary

Background

Multimorbidity is defined as the presence of two or more chronic diseases in an individual patient. It presents significant clinical, organisational, and educational challenges which are increasingly being addressed by academic and clinical bodies. The overall aim of this project was to assess the training needs, if any, of doctors managing patients with multimorbidity, and to develop an intervention aimed specifically at addressing these needs. The objectives were to thoroughly examine the published literature relating to management of patients with multimorbidity; to robustly assess the relevant learning needs of doctors; and to develop and implement an intervention to address any gaps in training.

Methods

A comprehensive review of the multimorbidity literature, and a systematic review of the educational literature, were completed. An electronic survey and focus groups of volunteers were carried out to assess the learning needs of GP and physician trainees in multimorbidity. Integrating the results of the survey with data collected from focus groups of trainees in general practice resulted in the proposal of a curriculum for training, and the development, feasibility study, and evaluation of a training intervention for general practitioners (GPs) using the Medical Research Council (MRC) Guidelines for Developing and Evaluating Complex Interventions.

Results

The quantitative findings demonstrated a need for training in management of patients with multimorbidity: Only 36% of survey respondents reported experiencing dedicated multimorbidity training, and 75.3% expressed an interest in attending such training if it was available. This was reflected in the qualitative

results which revealed perceived deficiencies in training in relation to multimorbidity. A workshop was developed and a feasibility workshop involving fifteen GPs was completed. The well-received workshop suggested that the format was acceptable to the target audience of working GPs, and though numbers were small, feedback from participants was uniformly encouraging.

Conclusions

This study demonstrated a gap in training in management of patients with multimorbidity and proposes a curriculum and workshop to address these training needs. Further research is required to implement training on a broader scale and to develop robust evaluation tools to ensure that training is relevant, efficient and, most of all, effective in improving outcomes in patients with multimorbidity.

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Chapter one

Introduction

Chapter one Introduction to the thesis

1.1 Introduction

1.1.1 Definition

Multimorbidity is a term which was initially introduced in the medical literature in 1976, but seemed to be almost exclusively used in Germany until the early to mid 1990s (1, 2). It has been defined by the World Health Organisation (WHO) and van den Akker et al. as the presence of two or more chronic diseases in an individual patient (2), and this is usually in the situation where no condition is more prominent than other illnesses present (1, 3). This is a simple and memorable definition, which was cited over 500 times in the literature. However it was felt by some that this definition was insufficient in reflecting the holistic approach of primary care and family medicine doctors. Such was the debate and confusion produced by over 100 published definitions discovered that the European General Practitioners Research Network (EGPRN) carried out a systematic review to design a new, comprehensive definition of multimorbidity, which has been translated into ten European languages and was published in 2013:

> 'Multimorbidity is defined as any combination of chronic disease with at least one other disease (acute or chronic) or bio-psychosocial factor (associated or not) or somatic risk factor. Any bio-psychosocial factor, any somatic risk factor, the social network, the burden of diseases, the health care consumption and the patient's coping strategies may function as modifiers (of the effects of Multimorbidity). Multimorbidity may modify the health outcomes and lead to an increased disability or a decreased quality of life or frailty'(4).

For the purposes of this study, a composite definition of Van den Akker & Boyd's definitions was used: the presence of two or more chronic conditions in a

patient, where one condition is not more prominent than another (2, 5) . The EGPRN definition was published at the time that this project commenced: as such, the multimorbidity literature, in particular that surrounding prevalence and demographics, was based primarily on the existing WHO definition at the time, and there was yet to be a commentary about the new proposed definition. The wide-ranging components of the EGPRN definition include bio-psychosocial factors, and this is likely to further increase the prevalence of multimorbidity (by their definition) when measured in the community. This further highlighted the relevance of the topic in practice, and confirmed that the project was addressing a topic of interest to those in the area.

1.2 Background

Since the mid-1990s multimorbidity has been increasingly the subject of research, as its impact on patients and the health system has been recognised (3). While most older patients have multimorbidity, its distribution is such that the majority of patients with multiple chronic diseases are under the age of 65 years old, and thus it is a topic which is of relevance to all doctors, regardless of specialty (2, 3).

Patients with multiple chronic conditions are now recognised as the norm in general practice, with studies of prevalence indicating that up to 72% of patients attending primary care have multimorbidity (2, 3). Multimorbidity is more common in older patients, in areas of deprivation, and in patients with lower levels of education, and patients with psychiatric disease or intellectual disability are also recognised to be at greater risk of multiple chronic diseases (6).

Patients with multimorbidity have high levels of health care utilisation, or ‘burden’ on the healthcare system, including increased primary care consultations, outpatient visits, and hospital admissions (2). This increased burden of care appears to be related to the multiplicity of disease rather than chronicity, although the management of chronic disease has been generally the

focus of research (7, 8). Increasing prevalence of multimorbidity in the community has led to a surge in related research and publications culminating in the publication in late 2016 of guidance in the clinical assessment and management of multimorbidity by the National Institute of Health and Care Excellence (NICE) (9-11). This guidance, along with a clinical review of management of patients with multimorbidity published in the British Medical Journal (BMJ), address some of the previously highlighted limitations of most current clinical guidelines which are predominantly single-disease focused and often inappropriate when applied to patients with multimorbidity (12-14).

The impact of multimorbidity on a patient's life is often all-encompassing: it effects physical functioning, psychological well-being, quality of life, social and family relationships, finances and occupation (15). It is thus easy to understand that the management of these patients poses challenges for doctors involved in their care. The doctor-patient relationship is crucial to the successful navigation of the journey of a multimorbid patient: gathering information, keeping accurate and concise records, attending to changing priorities over time, and coordinating the care of the patient between multiple healthcare providers and clinicians (16) . The ability of the doctor to manage these complex cases requires that training be provided to upskill doctors in the provision of competent and confident management of patients with multimorbidity, with the ultimate aim to improve outcomes for this patient group (17).

The complexity of management of these patients has been well described, and will be explored in section 2.6, and it has been suggested that coordination of care in complexity can be either reduced or embraced (18-21). Given that multimorbidity is increasing particularly with our ageing population, and with successful treatments of serious illness encountered earlier in life, it is reasonable for patients to expect that the complexities of their medical care in relation to multimorbidity can be adequately and competently addressed both in primary and secondary care.

While provision of appropriate care to patients with multimorbidity is clearly dependent on the education and training of doctors, the realm of medical education in multimorbidity at undergraduate, postgraduate, and continuing professional development level has largely been ignored to date. The lack of evidence and guidelines in the topic has contributed to uncertainty in relation to best practice, but recent publications are improving the evidence base of management of multimorbidity.

1.3 Aims

The overarching aims of this project were to comprehensively review the literature related to training of doctors in management of patients with multimorbidity; to assess the training needs, if any, of doctors; and to develop and pilot an intervention aimed at providing multimorbidity training for doctors.

This involved the following objectives:

- To examine the published literature relating to management of patients with multimorbidity, and to systematically review the educational literature in this field
- To carry out a mixed-methods training needs assessment of doctors managing patients with multimorbidity
- To design, deliver, and pilot a training intervention to doctors addressing any training needs found, using the guidance provided by the Medical Research Council Framework for the design and evaluation of complex interventions (22-24).

1.4 Thesis outline

This project comprised four parts: a literature review of the literature related to multimorbidity; a systematic review of the educational literature in the area; a

mixed methods needs assessment; and an interventional component, a feasibility study of which was delivered and evaluated.

The systematic review reported in chapter two particularly focuses on the educational and training aspects of management of patients with multimorbidity, and provides a basis for the remaining research work outlined in the thesis.

The literature review (chapter three) allowed a broad overview of multimorbidity and the evidence relating to it, particularly addressing the prevalence, risk factors, and impact on the patient and the health service.

Chapter four describes the needs assessment which was carried out to explore the subjective training needs of doctors managing patients with multimorbidity in both primary and secondary care. This needs assessment involved both qualitative and quantitative methods to allow deeper exploration of the needs of participants who were all qualified doctors. The quantitative work involved an online survey of doctors who were enrolled on postgraduate specialist training schemes, and of their trainers. The results of this quantitative research guided the qualitative study which followed. Focus groups which explored the training needs of doctors in more depth were convened: these are reported in chapter four, and the results integrated with the quantitative results to give a comprehensive report of the subjective needs of doctors managing patients with multimorbidity.

Chapter five outlines the development, feasibility study, and evaluation of a pilot intervention which comprised a multimorbidity workshop for doctors training to be general practitioners. The workshop included some basic information about multimorbidity, and then outlined a proposed multimorbidity consultation framework. Some multimorbidity cases were then discussed and the consultation framework applied to their situations, for discussion amongst the workshop attendees. Participants evaluated the pilot workshop in terms of acceptability and usefulness immediately after the intervention.

The discussion in chapter six summarises the thesis and explores some implications for future research in the area.

1.5 Ethical considerations

Ethical approval for this research project was granted by the Royal College of Surgeons in Ireland (RCSI) Research Ethics Committee (REC) in December 2012. This approval was extended until the end of the project as two periods of leave were taken during that time.

As the researcher is a member of the RCSI REC, it is noted that she was not involved in any way with the process of discussion and approval of the REC application.

All participants consented to their participation in the project, either online or in writing. Any participants in the workshop who did not sign consent forms (even if they filled in the questionnaire) were excluded from the research. This did not affect their participation in the intervention. Consent forms were securely stored in line with RCSI policy, and all data will be destroyed in five years or less in compliance with the Data Protection Act (DPA) of 2008.

Chapter two

Systematic review

Systematic review

2.1 Introduction

This chapter outlines a systematic review of the literature which was undertaken in order to establish whether there are education and training formats for training doctors to manage patients with multimorbidity.

The background, objectives, methods and results of the systematic review will be outlined. A discussion will then follow, before the chapter concludes.

This systematic review was carried out and reported according to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) standardised reporting guidelines, and was published in the Journal of Comorbidity in 2016 (Appendix 1) (25).

2.2 Background

As outlined in the introduction, patients with multimorbidity are now the norm in clinical practice, with prevalence ranging from 13-72% depending on the methodology used and setting (26). Factors such as social deprivation, psychiatric illness and coexisting intellectual disability are associated with an increased prevalence of multimorbidity (27).

Patients with complex medical needs require comprehensive management which addresses their medical, psychological, social and therapeutic issues, and this requires medical staff who are appropriately trained and experienced in its delivery.

2.3 Objective

This systematic review aimed to ascertain whether there are education and training formats which have been used to train postgraduate medical doctors in the management of patients with multimorbidity in primary and/or secondary care, and which have been shown to improve knowledge, skills, attitudes and/or patient outcomes.

2.4 Methods

2.4.1 Protocol

The systematic review protocol was registered with the International prospective register of systematic reviews (PROSPERO). This registration can be found in appendix 2.

2.4.2 Inclusion and exclusion criteria

The inclusion and exclusion criteria proposed for this systematic review were as follows:

2.4.2.1 Types of study

As no previous review had been conducted in this area we aimed to identify all published evidence relating to training and included articles of any type which addressed postgraduate medical education and training related to management of patients with multimorbidity in primary or secondary care. Both observational and experimental study designs were eligible for inclusion, as were editorials and expert reviews which had an educational focus. Studies which addressed only multimorbidity epidemiology, clinical management or organisational interventions for patients with multimorbidity were excluded.

2.4.2.2 Types of participants

Studies were eligible for inclusion if they recruited graduate medical doctors in primary or secondary care. Studies were excluded if they related only to either undergraduate training, or training only for health care professionals other than doctors. Publications including mixed health professional groups which included doctors in their participants were included in this review.

2.4.2.3 Types of interventions

Studies which described any educational format addressing management of patients with multimorbidity in primary or secondary care were eligible for inclusion in this systematic review. This included print material, workshops, lectures, on-line resources and training courses.

2.4.2.4 Types of outcome measures

Primary outcomes were any measure of doctor knowledge, attitude or skills that related to the content of the training programme. Secondary outcomes included any patient outcomes reported in a study that examined an intervention designed to train doctors to manage multimorbidity including patient-reported outcome measures, for example – health-related quality of life and health service utilisation in patients with multimorbidity.

2.4.3 Search

2.4.3.1 Search methods for identification of studies

Initial scoping searches in late 2012 suggested that there was very little published literature regarding multimorbidity and education, so our search was widened to include editorials, news pieces and commentaries in an effort to maximise yield of relevant papers. The principal challenge of this search was the fact that there is currently no MeSH term for multimorbidity. A search string was initially developed using keywords to capture the concept of multimorbidity, based on previous published searches (28).

Systematic literature searches were initially conducted in April 2013 and updated regularly up to January 2016. Databases were searched from 1996 onwards, as the concept of multimorbidity was defined in 1998 by Van den Akker (29, 30).

2.4.3.2 Search strategy

Initial search strings included individual diseases – for instance, 'multimorbidity' included:

'*Chronic disease OR chronic illness / condition / disorder / syndrome OR multiple medication OR multidisease / multi-disease OR multimorbidity / multi-morbidity OR multi-morbid / multimorbid OR co-morbid / comorbid OR diabetes mellitus OR hypertension OR high blood pressure OR heart disease / disorder / failure OR arrhythmia OR cardiac disorder / disease / failure OR cardiovascular disease / disorder / failure OR coronary disorder / disease OR cerebrovascular disorder / disease OR vascular disease / disorder OR (carotid AND disease) OR (arter* AND disease) OR (arter* AND disorder) OR asthma OR pulmonary disease / disorder OR chronic obstructive pulmonary disease OR COPD OR hyperlipidaemia OR hypercholesterolaemia OR hypertriglyceridaemia OR thyroid disease / disorder OR rheumatoid arthritis OR mental disorder / disease OR anxiety disorder / disease OR mood disease / disorder OR psychological disease / disorder OR depression OR schizophrenia OR psychosis OR substance abuse OR addiction OR epilepsy OR HIV OR AIDS / acquired immune deficiency syndrome OR Kidney disease / disorder OR liver disease / disorder OR osteoporosis OR co-exist* OR concur* OR multiple OR chronic' -* similar to Smith et al. (31).

However, using this search on PubMed yielded over five million potential titles in October 2014, reducing to 381,322 titles when combined with our education search string (*Learning OR e-learning OR workshop OR lecture OR education OR continuing education OR medical postgraduate curriculum OR training programme OR training OR education).* Limiting these results to publications

related to human adults after January 1996 reduced the volume to 162,598, which was still unmanageable.

A pragmatic decision was made to remove the individual disease search strings, similar to searches of Huntley et al. (8, 32) to reduce the volume of titles identified. The final PubMed search string included the following keywords and MeSH terms: 'multi(-) morbidity', 'co(-)morbidity', 'education', 'training' and 'teaching'.

2.4.3.3 Search databases

The following electronic bibliographic databases were searched:

- The Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library, latest issue)
- MEDLINE (1950 to Jan 2016) via Pubmed interface
- EMBASE (1980 to Jan 2016)
- CINAHL (1982 to Jan 2016)
- AMED (Allied and Complementary Medicine Database) (1985 to Jan 2016)
- The Cochrane Database of Systematic Reviews (The Cochrane Library, latest issue)
- Database of Abstracts of Reviews of Effects (DARE) (The Cochrane Library, Jan 2016)
- Electronic dissertation/theses databases: ProQuest Dissertations & Theses Database (PQDT)
- ClinicalTrials.gov (http://clinicaltrials.gov/)
- Current Controlled Trials (www.controlled-trials.com)
- Trials Central (www.trialscentral.org)
- UK Clinical Research Network Portfolio database (http://public.ukcrn.org.uk/search/)
- BEME (Best Evidence Medical and Health Professional Education) (http://www.bemecollaboration.org)

Reference lists of included articles and other articles of interest were hand-searched. Authors involved in multimorbidity research were contacted, as well as those who had published related or pilot work. The International Research Community on Multimorbidity archive was searched (33, 34). Papers were not excluded on the basis of language.

2.4.4 Study selection

The researcher screened all 75,110 titles and abstracts, and full-text copies of 65 potentially relevant papers were obtained for further evaluation. These were assessed for eligibility by the researcher and one other reviewer (either the researcher's supervisor, Professor Susan Smith SS, or a co-author of the systematic review, Dr Emma Wallace EW). The final included studies included in the review were confirmed as eligible by the researcher, SS, and EW.

2.4.5 Data collection

Two review authors independently extracted data from each included paper, using a data extraction form specifically designed for this study (appendix 3). Data extracted included study design; setting and definition of multimorbidity; intervention; characteristics of participating providers of intervention; characteristics of participating doctors (being trained); quality criteria; source of funding; ethical approval; outcome measures; and length of post-intervention follow-up period. Disagreements were resolved by discussion and consensus.

2.4.6 Data analysis

It was anticipated that meta-analysis would not be possible and that a narrative synthesis of included studies would be conducted.

2.4.7 Risk of bias assessment

Risk of bias of the included studies was assessed using the Cochrane Collaboration risk of bias in non-randomised studies assessment tool (ROBINS-I) (1).

2.5 Results

Two studies met the inclusion criteria for the review, as outlined in the flow diagram in figure 2.1. Excluded studies and reasons for exclusion can be found in appendix 4.

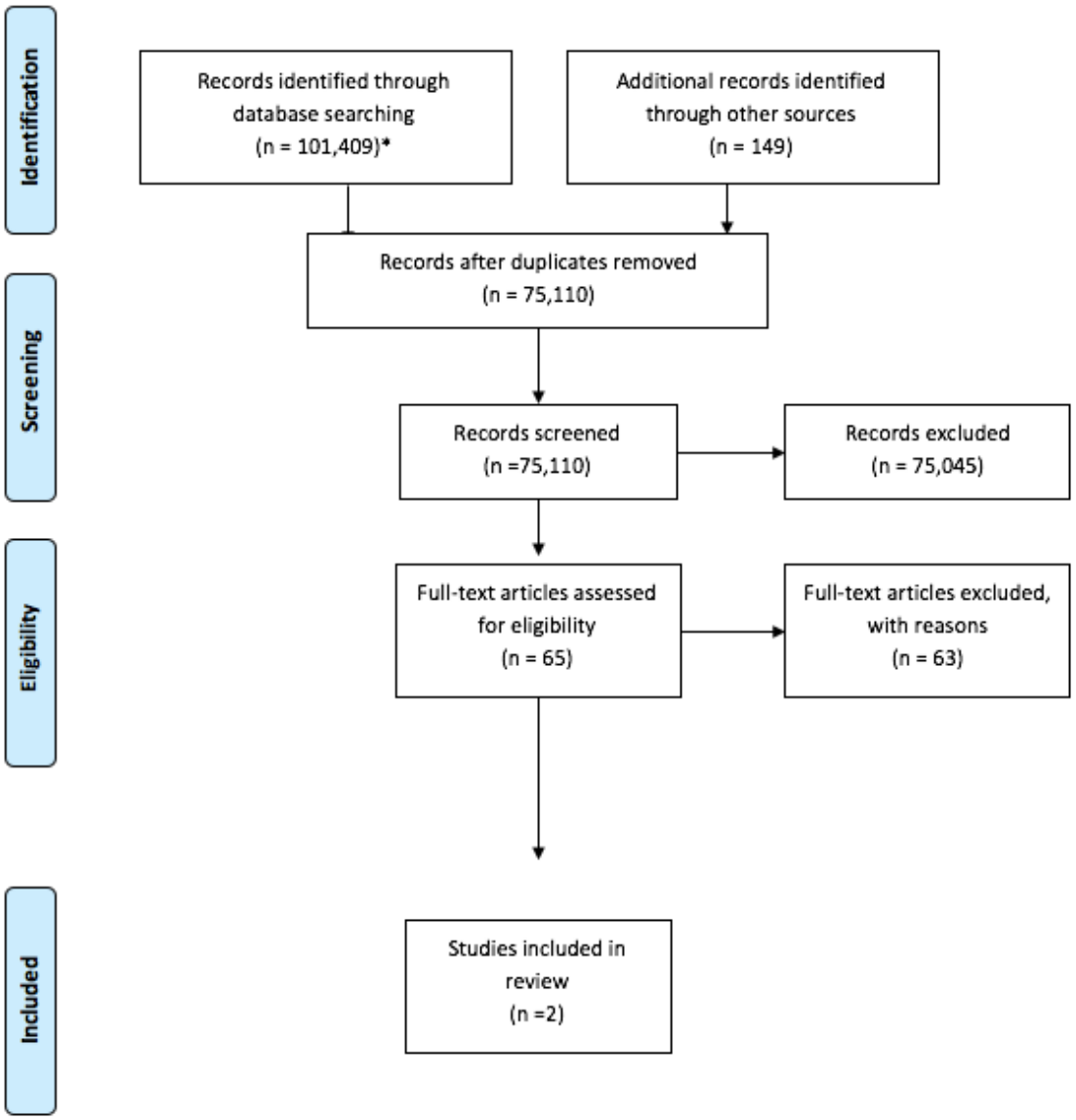


Figure 2.1 PRISMA flow diagram

2.5.1 Characteristics of included studies

Two studies met the inclusion criteria. Both studies had non-randomised designs with one [Andolsek et al. (33)] being a non-randomised, case controlled study and the other [Maguire et al. (34)] being an uncontrolled before and after study, described as a pilot study. These studies are detailed below, and summarised in table 2.1.

2.5.1.1 Aims of included studies

Aldolsek et al. (35) designed a case-control study aimed at assessing whether participation of health care professionals in CME modules which presented ‘complicated case scenarios’ resulted in decision-making which was evidence-based for patients with multimorbidity. Maguire et al. (36) aimed to equip GP trainees with the knowledge, skills and attitudes to enable them to effectively manage patients with multimorbidity.

2.5.1.2 Participants and settings of included studies

Andolsek et al. reported 1,479 participants in all: 487 workshop participants (307 of whom were doctors), and 992 controls (605 of whom were doctors) (37). The study was carried out in the USA, and participants were doctors, physician assistants, and nurse practitioners. 63% of workshop participants and 61% of controls were doctors.

Maguire et al. recruited twenty GP trainees in the northwest of Ireland for a pilot workshop (38).

Table 2.1: Characteristics of included studies

Study ID, setting, design	Participants	Intervention & comparison	Outcomes
Andolesk 2013 **USA** **nRCT**	1479 Participants: 487 Workshop participants and 992 controls Physicians and non-physicians (63% of workshop participants were doctors, 61% of controls were doctors)	*Intervention (workshop)* 1. Addressed 'complicated, realistic scenarios' 2. First: large group presentation, reviewing and discussing clinical evidence, current practice guidelines and available treatment algorithms 3. Second: small group discussion about challenging case studies, developing diagnostic and treatment plans *Controls* Completed online case studies of patients with chronic diseases, based on the workshop that was delivered	1. Immediate post-workshop satisfaction questionnaire 2. Thirty days after workshop: Self-reported knowledge, competence, confidence gains, and knowledge related to clinical cases 3. Controls completed knowledge- and competence-based assessment questions before and immediately after each case study
Maguire 2015 **Ireland** **Uncontrolled before & after study (pilot study)**	20 GP trainees from four years of training – some completing hospital jobs, some GP registrars	*Pilot multimorbidity workshop* 1. Presentation of literature review followed by large group discussion 2. Small group work facilitated by programme directors, discussing simulated multimorbidity cases No comparison group	Post-workshop knowledge questionnaire

2.5.1.3 Interventions in included studies

The cases in Andolsek's study completed an interactive workshop addressing complex patient case scenarios, while controls completed online case studies of patients with chronic diseases, based on the workshop that was delivered (39). The workshops comprised two parts: a large group presentation during which guidelines, algorithms and clinical evidence were summarised by primary care faculty; followed by small group discussions about developing plans for the diagnosis and management of a number of complex case scenarios. The clinical cases used in the workshop related to aspects of multimorbidity care that are recognised to be challenging; including patient factors such as self-care, lifestyle change and medication concordance; and health profession issues including care coordination. The control group in this study did not attend the live workshop, but completed a 'complex cases module' online which incorporated the content of the workshop and evidence-based strategies for management of patients with multimorbidity. The effectiveness of the online module was measured using the same questionnaire which evaluated the workshop, administered both before and immediately after each online case study.

The intervention in Maguire's uncontrolled before-after study (37) was described as a two-hour multimorbidity workshop. The workshop was facilitated by the directors of the GP training scheme, who assessed recall of prior knowledge via a questionnaire at the beginning of the workshop. The trainers then presented a multimorbidity literature review to the trainees, before facilitating small group discussion of 'simulated multimorbidity cases' (SMCs). These SMCs were developed by the facilitators and were based on clinical cases that they had encountered in practice. Each case involved information about a year of the patient's care, challenges for both the doctor and the patient, and the social history of the patient.

A plenary talk at the end of the small group work summarised the proceedings, and the workshop closed with a knowledge questionnaire and an evaluation by the trainees of the workshop content.

2.5.1.4 Intervention development in included studies

The clinical topics included in the intervention developed by Andolsek et al. were based on an 'independent educational needs assessment conducted by DukeCME and the accredited CME [continuing medical education] provider' (39). Andolsek suggests that realistic, occupationally-appropriate settings, with an opportunity to discuss the cases with colleagues, should be used to deliver novel clinical information, referencing a paper by Moore et al. (37). While this is not specific to multimorbidity, they suggest that presenting information in a discursive format, in an authentic work setting facilitates the implementation of new clinical information into practice.

Description of the theoretical basis of the development of the pilot workshop by Maguire et al. was not reported and they suggest that a needs assessment is necessary for future workshops: given that it is a pilot project, this may well follow when subsequent work is published (37). Facilitators of the workshop based the included cases on prior patient contacts, and trainees were given information about a patient's medical and social history, along with available relevant guidelines.

2.5.1.5 Outcome assessment in included studies

As outlined in table 3.2, Andolsek et al. evaluated their workshop with both an immediate satisfaction questionnaire and two non-validated, follow-up surveys which were completed at least thirty days after the workshop, and were developed by the author (39). Each follow-up survey included single-best-answer questions about three complex cases and was administered to each participant to assess clinical knowledge. Participants were also asked about their confidence in managing patients with multiple comorbidities as well as the

significance of barriers to treating these patients. The control participants completed a complex cases module online, and its effectiveness was measured by the same questions described above both before, and immediately after each case study contained in the online module.

In the other included study, GP trainees attending Maguire's pilot workshop completed a pre- and post-workshop knowledge questionnaire that was developed by the investigators, details of which are not included in the publication (37). As such, direct comparison of the two outcome measurement tools is not possible in the context of this review.

2.5.1.6 Effectiveness of educational interventions in included studies

Both studies reported non-validated measures of doctor knowledge and skill assessed on completion of the training. Andolsek reported that the majority of the intervention participants (physicians and non-physicians) described an increase in their knowledge (96%) and self-reported competence (89%) on immediate completion of the workshop (40). Thirty days following workshop completion, surveys were sent to 247 of the 307 physician participants and of these, 62 (25%) responded. Those who responded self-reported that knowledge had increased in some areas that were addressed at the workshop: two of eight specific areas reported were significantly improved when compared to non-participant controls (recognition of medications that contribute to overactive bladder, and appropriate referral of patients with rheumatoid arthritis to specialty care). There was no difference in self-reported confidence related to treatment decisions. The authors state that doctors who participated in the workshop reported that they were 27% more likely than non-participants to use available evidence and guidelines in practice: data to support this is not provided. Significant gains in knowledge were seen in almost all (17/18) assessment areas for the 992 clinicians who completed the online cases (survey response rates not provided). No long-term follow-up of the online case participants was

reported, so it is not possible to compare the online and workshop modalities at that point in follow-up.

GP trainees who attended Maguire's pilot workshop were found to have improved knowledge of the characteristics of multimorbidity (80% after workshop compared to 25% before the workshop) (39). All 20 trainees reported improved understanding and increased confidence in the management of patients with multimorbidity in the community. Neither study reported any of the secondary outcomes outlined in the review protocol, nor did they evaluate the long-term impact of the training which was provided.

2.5.2 Risk of bias in the included studies

The two included studies were assessed using the Cochrane Collaboration risk of bias in non-randomised studies assessment tool (ROBINS-I), and both were found to be at high risk of bias (37). Individual tables outlining the risk of bias assessment results are shown in tables 2.2 and 2.3, with a summary provided in table 2.4.

Confounding was a serious risk in both studies due to the study designs: Andolsek et al. used self-reported assessment of improvements in knowledge and competence, while Maguire et al.'s intervention was delivered by the trainees' own programme training director team, and participants had non-uniform prior exposure to general practice as they were first to fourth year GP trainees (39).

Selection of participants was also deemed to be at high risk of bias: Andolsek et al. did not describe the process of participant selection at all, while Maguire et al.'s participants were their own trainees on a usual training day, with no control group (37).

Missing data was not reported by Maguire. Risk of bias due to missing data was a serious risk in Aldolsek's study due to low response rates (20%) to questionnaires thirty days after the workshop (39). While it was encouraging that

medium-term follow-up was attempted, it was not clear how participants were selected for inclusion in the delayed postal survey one month after the workshop.

Both studies used non-validated, subjective outcomes. While this is disappointing and introduces detection bias to the studies, it is not unexpected, as there appears to be no available validated workshop evaluation in this area. While this is the case, there will remain significant bias in this element of our risk of bias assessment. Neither Aldolsek et al. nor Maguire et al. reported blinding of outcomes assessment. Since the outcomes were subjective, this is to be expected (36).

Future studies may address the validity, objectivity and blinding of outcome assessment, but the overall risk of bias in the two studies included in this review is high.

Table 2.2 Risk of bias assessment Andolsek 2013

(N/A = not applicable)

Risk of bias Andolsek 2013 (37, 39)		
Bias	**Authors' judgement**	**Support for judgement**
Confounding	High risk	Self-reported assessment of improvements in knowledge and competence
Selection of participants	High risk	No description of participant selection
Classification of interventions	N/A	N/A
Deviation from intended intervention	Unclear	Pragmatic approach
Missing data (attrition bias)	High risk	Not mentioned
Outcome measurement (detection bias)	High risk	Questionnaire not validated
Selective reporting (reporting bias)	Low risk	No indication of selection of subgroups for analysis

Table 2.3: Risk of bias assessment Maguire 2015

Risk of bias Maguire 2015 (37, 39)		
Bias	**Authors' judgement**	**Support for judgement**
Confounding	High risk	Non-uniform prior experience of attendees Workshop delivered by training programme directors
Selection of participants	High risk	No control group
Classification of interventions	N/A	No comparison group Literature well described
Deviation from intended intervention	Unclear	Not reported: pragmatic approach
Missing data (attrition bias)	Unclear	Not reported – group-based feedback
Outcome measurement (detection bias)	High risk	Outcomes measure may have been influenced by knowledge of the intervention, and outcome assessors were aware of (and delivered) the intervention received
Selective reporting (reporting bias)	Low risk	Only one outcome was pre-specified

Table 2.4 Risk of bias assessment summary

Bias	Andolsek *et al.* 2013 [30]	Maguire *et al.* 2015 [31]
Confounding	High risk	High risk
Selection of participants	High risk	High risk
Classification of interventions	N/A	N/A
Deviation from intended intervention	Unclear	Unclear
Missing data (attrition bias)	High risk	Unclear
Outcome measurement (detection bias)	High risk	High risk
Selective reporting (reporting bias)	Low risk	Low risk

2.6 Discussion

2.6.1 Summary of findings

This systematic review identified only two studies that developed and evaluated training programmes for doctors in managing patients with multimorbidity despite extensive searches. The evidence determining the effectiveness of multimorbidity educational interventions for doctors is very limited and the paucity of studies addressing this topic was surprising. The two included studies indicate that it is feasible to deliver workshop or online multimorbidity training to physicians over a short time. The effectiveness of these programmes has yet to be confirmed, but one of the studies was a pilot programme, and could be rolled out and subsequently evaluated (37, 39). The other programme appears to favour a workshop format over online case module, although a more robust evaluation of the two formats is required (37, 39).

2.6.2 Comparison with existing literature

This is a challenging area: patients with multimorbidity are a heterogeneous group. While some disease combinations are common, many permutations exist, each with individual requirements, therapeutic strategies and targets.

As to why there is so little published about training of doctors in this area, it may be that since the concept of multimorbidity is a relatively recent one, it is partly a function of time: the focus of investigators in the area in recent years has been on therapeutic strategies and guideline development. It inevitably takes time for the educational arm to emerge, particularly where there is still such uncertainty as to how to best manage patients with multimorbidity. While some research has been conducted in this area with respect to training undergraduates, we have been unable to identify any systematic reviews of the effectiveness of related postgraduate educational interventions such as training in the management of complexity in clinical practice (41). While the postgraduate curricula may have changed, we have not seen a corresponding increase in published literature regarding specific training in multimorbidity: perhaps the training is integrated into existing modules, or is indeed a 're-naming' of already delivered material, and as such, not considered novel to trainers (38).

2.6.3 Limitations of the review

This is the first study to systematically review the literature focusing on postgraduate training of medical doctors in multimorbidity. The search was broad and inclusive but the findings need to be interpreted in the context of some limitations.

The relatively recent introduction of the term 'multimorbidity', its lack of definition, and the current lack of a MeSH term for multimorbidity was a significant problem in this systematic search. Endeavouring to use multiple search strings to increase the yield of relevant papers found resulted in huge numbers of results to be screened (39). Despite the broad search terms, the number of results relevant to the topic of multimorbidity and education was very small. Some of the relevant articles / items were found by hand-searching reference lists, and this indeed provided the bulk of articles initially.

It is possible that there are relevant publications that were omitted, however multiple searches were conducted and international experts in multimorbidity were contacted in an effort to capture all relevant articles.

The inclusion of ‘multimorbidity’ or ‘multi-morbidity’ as a MeSH term would significantly improve the ease of research in this field, but it is clear that the terminology in this area also requires definition (37).

The final search at the end of January 2016 indicated that the trajectory of multimorbidity publications is upward, and as such there is likely to be continuing publication of hopefully significant literature in this growing area in the future.

The two included studies found were determined to be at risk of bias, and the data was insufficient to allow meta-analysis of the results. As such, a narrative approach was adopted, and this was deemed sufficient for publication.

While there was previously limited evidence to support clinical practice management of patients with multimorbidity, the findings of this systematic review can be considered along with the existing qualitative literature on doctors’ views and two recent clinical review papers providing guidance to doctors managing patients with multimorbidity (42). This and other literature highlight a range of areas which need to be addressed to enable doctors to confidently manage patients with multiple chronic conditions.

The researcher found that there were common themes in the published literature with respect to topics which would be useful in the management of patients with multimorbidity. These originated in the main from papers related to management of multimorbidity rather than related education, but the frequency with which the topics arose implied that these topics were important, useful, and necessary in the day-to-day dealings with these patients.

For this reason, the researcher compiled a proposed curriculum content (figure 2.2) which synthesised some of these topics suggested by the published literature.

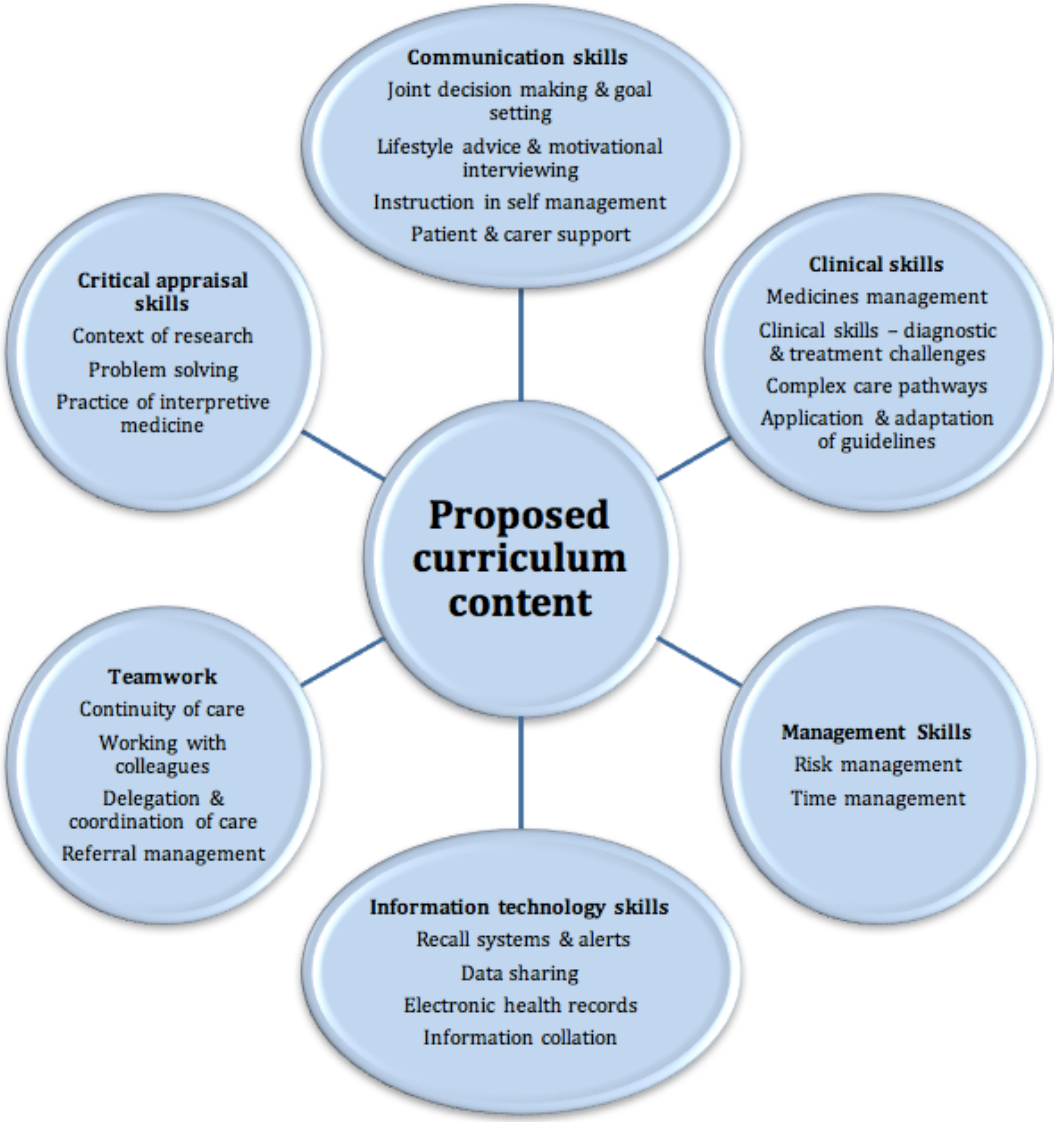


Figure 2.2: Proposed curriculum content for training of doctors in management of patients with multimorbidity

This proposed curriculum was included in the published systematic review, and contributed to the development of the intervention in this project. Further work may facilitate the inclusion of these topics within a more general curriculum of multimorbidity education (43, 44).

Since the publication of this systematic review in the Journal of Comorbidity, the National Institute for Health and Care Excellence (NICE) has published guidance on clinical assessment and management of multimorbidity (45). This provides a welcome structure to doctors tasked with the management of patients with multimorbidity, and would provide ample material for inclusion within a training module on the topic.

Optimal educational format is a significant issue which needs further research: while the two studies included in our review both implemented and evaluated workshops, they are clearly not the only format available to train doctors to manage patients with multimorbidity. Andolsek et al. did not find significant differences in outcomes when workshop training was compared to an online learning module completed by their control group (45).

Given the diversity of doctors to be trained, and the importance of training in this area to be an ongoing, realistic learning experience, updated over time in a CME scenario, it is unlikely that a single delivery format will suit all participants. This may present an opportunity to utilise distance learning or remote learning modules. However, the preferred format for doctors with regard to learning in this area has yet to be explored in the literature, and was subsequently the focus of a mixed methods needs assessment which follows. Given the demands on time and finances of doctors, any training on the management of multimorbidity in practice must be practical, needs-driven, stimulating, evidence-based, longitudinal and outcome-driven, to help change practice and ideally improve outcomes for complex patients.

2.7 Chapter summary

Much has been published about the challenges presented by patients with multimorbidity, but the issue of educating doctors to manage these problems has been previously poorly addressed. This systematic review included a thorough search of the literature and presents two studies which implemented and evaluated multimorbidity workshops.

While it remains to be proven that improving knowledge, skills and confidence of doctors results in improved care of this patient group, this systematic review highlighted existing literature that provides a platform for curriculum development for training in the management of patients with multimorbidity. Incorporation of emerging guidelines and research findings into multimorbidity training curricula for doctors with appropriate evaluation of effectiveness is needed, to facilitate changes in practice and enhance the competence and confidence of doctors in managing this challenging population of patients, with the ultimate aim of improving clinical outcomes.

The review provided a basis for the needs assessment and intervention development which are presented in subsequent chapters.

Chapter three

Literature review

Chapter three Literature review

3.1 Introduction

The aim of this literature review was to provide, in tandem with the systematic review, a theoretical grounding for this study, in order that the researcher could comprehensively address the published issues related to multimorbidity. While the systematic review focussed specifically on training and education, the literature review looked at the generality of multimorbidity, including definition, prevalence, impact and challenges presented in practice.

3.2 Search

Details of the search terms used in the systematic review are detailed in section 2.4.3. In carrying out the comprehensive systematic search regarding multimorbidity and education, 104 references were retrieved which were not suitable for inclusion in the systematic review, but provided relevant contextual information which is included in this literature review. Also contributing to the literature review are references which were subsequently discovered by hand-searching the reference lists of relevant papers, and papers which were found opportunistically through PubMed search updates.

A particular challenge in searching for relevant papers is the fact that multimorbidity is not a medical subject heading (MeSH) term. As a result, there is a risk that relevant papers may have been undiscovered: and equally, thousands of results which were returned by searches completed were utterly irrelevant to the field.

While definition of multimorbidity has been discussed in section 1.2.1, the literature review search also included comorbidity, given the significant overlap. Any physical and mental disease combination were included: however, articles which addressed the psychiatric concept of 'dual diagnosis' meaning addiction with a co-existing psychiatric illness were not included.

3.3 Prevalence of, and risk factors for multimorbidity

3.3.1 Prevalence of multimorbidity

The prevalence of multimorbidity in the community has been extensively quantified, and interest in the area has increased significantly since the mid-1980s (46-50). Prevalence levels have been found to be highly dependent on the methodology used and the setting of the research: anywhere between 13-95% of patients are reported as having multimorbidity: an Australian study suggests that 95% of patients over the age of 65 years have multimorbidity (48, 51-60). Closer to home, an Irish study estimates prevalence of multimorbidity at 66.2% (95% CI 64.5-67.8%) in patients over the age of 50 years (61, 62). However, van den Bussche and colleagues suggest that caution is used in interpreting conclusions of prevalence studies when single databases are used (41). In 2012 a systematic review was carried out by Fortin et al. which looked at 21 studies of prevalence of multimorbidity: they described significant differences between the results of included studies, and felt that this was due to methodological differences, particularly in the definition of multimorbidity (63).

From a global perspective, Afshar et al. found a positive relationship between the prevalence of multimorbidity and the gross domestic profit (GDP) of the country when they compared prevalence across low and middle-income countries (11, 56). Their 'all region analysis' also found that higher education was associated with a significant decreased risk of multimorbidity.

While this project primarily focused on primary care, prevalence of multimorbidity in medical inpatients has also been reported. For example, Schneider et al. looked at patients who had been admitted through the emergency department in a tertiary care teaching hospital in Zurich, Switzerland, and found that over 90% of these patients had multimorbidity when defined as two or more chronic conditions (15).

3.3.2 Risk factors for multimorbidity

3.3.2.1 Age

There is conflicting evidence about the influence of age on prevalence of multimorbidity: while Fortin et al.'s work described a significant increase in mean number of conditions with increasing age, Van den Bussche and colleagues disagreed, finding little difference in prevalence in older age groups (64). The latter group proposed that this might be because research investigating a small number of diseases might result in patients predominantly of a particular age group being included, unless there is a control group available to reduce this bias. However, the majority of the literature supports the idea that multimorbidity increases with age, both in the developed and developing world (31): a systematic review published in 2014 included 39 publications which included data on over 70 million patients in 12 countries, and concluded that there was a significant positive association between age and multimorbidity with an odds ratio ranging from 1.26-227.46 (65).

3.3.2.2 Gender

There is some debate about the influence of gender on multimorbidity: Barnett et al. found an association between female gender and multimorbidity (female: male = 26.2%:20.1%), while van den Bussche found that gender had almost no influence on prevalence (12, 64). The latter suggested that men might discuss disease less than women and that this contributed to their findings (64).

Fortin's systematic review of prevalence of multimorbidity suggested that reporting of gender in studies of prevalence would help with comparison and evaluation of the influence of gender on prevalence of multimorbidity: they were unable to draw conclusions regarding gender and multimorbidity in their review (31). Violan et al.'s systematic review found a definite association between female gender and multimorbidity, with an OR ranging from 1.12-1.50 in the studies included in their review (66).

3.3.2.3 Socioeconomic status

Multimorbidity has been associated with lower socioeconomic status by a number of research groups: lower socio-economic class patients are at increased risk of multimorbidity and shorter life expectancy than wealthier patients, and patients in the higher socio-economic classes are more likely to have no chronic diseases at all (12, 64). Patients living in the most deprived areas are also shown to have an age of onset of multimorbidity between 10-15 years earlier than those living in the most affluent areas (64). Recognition of this key factor in planning for the provision of education of doctors who will be managing patients with multimorbidity is critical. While inner city areas are well recognised as potential areas of deprivation, it must be also considered in rural, less obvious areas (11).

3.3.2.4 Literacy and education

Hudon et al. carried out a small study of just over 100 people, and found that although literacy and multimorbidity were associated in bivariate analysis, there was no association in a multivariate analysis which included age and family income (66). However, a Portugese study concludes that adults with low levels of education are significantly more likely to have multimorbidity (1, 8, 63).

3.4 Impact of multimorbidity on patients

The impact of multimorbidity on patients is considerable, particularly for those with a high number of conditions or what is referred to as ‘complex multimorbidity’ (8). Its consequences affect not just the physical and mental health and well-being of the patient, but also has implications for their occupation, economic situation and social life, and their families and carers.

3.4.1 Quality of life

Wang et al. recently published research looking at multimorbidity and health-related quality of life in an Australian cohort: using a survey of 8841 people, they found a relatively low prevalence of patients with two or more chronic conditions (26%), but found that multimorbidity was negatively associated with health-related quality of life (67). This supports the systematic review of Fortin et al. in 2004 which confirmed an inverse relationship between multimorbidity and quality of life, despite issues with definition and validity of measurements within a primary care setting (68).

3.4.2 Treatment burden

While developments in treatment of chronic and complex medical problems has reduced the mortality of many conditions, this progress comes at a cost: the burden of treatment which patients are asked to bear is often significant. With the shift of care to the community, the management of chronic conditions now takes place at home, at work, and at school, with the patient being their own primary carer (9). Clinicians are ‘just guides or coaches for management’ (69). Multiple medications, frequent appointments, and an expectation that patients will be concordant with treatment, all play a part in disrupting the daily life of patients with multimorbidity (23, 70). Well-intentioned increases in treatment burden can run the risk of patients being non-compliant with treatment, resources being wasted due to non-attendance at appointments and medication not being taken, and outcomes being potentially poorer. The consequences of treatment burden lead May et al. to suggest that ‘minimally disruptive medicine’

should be our aim: this paper clearly and practically outlines some clinical scenarios which are encountered on a frequent basis in practice, which illustrate the problem of treatment burden in real life:

> ‘In the US, a primary care doctor referred a man in his 50s with type 2 diabetes and a raised glycated haemoglobin concentration to an endocrinologist after noting insufficient glycaemic control with maximum doses of metformin and glipizide. The endocrinologist added pioglitazone and maximised the dose with no response. Similar failure accompanied the use of exenatide. A year after starting to see the endocrinologist the patient’s HbA1c concentration was even higher. When the endocrinologist offered glargine insulin instead, the patient complained that the drugs were too expensive. A review of his pharmacy records indicated that the patient had never collected the prescriptions for pioglitazone or exenatide because of their cost.’ (24)

They found that patients with congestive heart failure, diabetes, and/or chronic respiratory disease were at particular risk of functional decline, but suggested that recognition of this can hopefully allow proactive management by intervening where possible, particularly in primary care. Their initial conclusions were supported by Wallace et al. who found that older, community-based patients with three or more chronic conditions were at higher risk of functional problems (51).

3.4.3 Mental health problems

Fortin and colleagues evaluated the relationship between psychological distress and multimorbidity among patients in general practice: 238 French Canadian patients participated, and results showed that multimorbidity was significantly associated with psychological distress (51). The influence of multimorbidity on mental health is heightened in areas of deprivation, with significantly more psychosocial issues than those in more affluent areas (71).

3.4.4 Occupational impact

A prospective cohort study carried out in Denmark investigated the effect of multimorbidity on occupational status, including long term sick leave. They hypothesized that increasing numbers of chronic diseases was progressively associated with the risk of long term sick leave and the results of their study supported their hypothesis (71).

Clearly the ability to work with multimorbidity is at least partly related to the type of work involved in the patient's job: while indoor, sedentary work may be possible, an outdoor, physically demanding job may not be feasible. Taking these issues into consideration when addressing sick leave certification or discussing prognosis may enable the treating doctor to help in prolonging participation in the workforce.

3.5 Impact and challenges of multimorbidity on health services

3.5.1 Increased healthcare utilisation

Patients with multimorbidity are heavy users of the health service at all levels: primary, secondary and tertiary care, paramedical therapies and community nursing all contribute in the management of these patients (72). Glynn et al. found that the mean number of general practitioner (GP) consultations increased significantly proportional to the number of chronic conditions diagnosed in a given patient, and also found a lesser increase in number of hospital admissions and out-patient appointment visits with increasing multimorbidity (22). Glasby et al. found that intensive users of in-patient services in Wales have on average three chronic conditions (73). Emergency admissions are also more common in patients with multimorbidity when compared to patients without (74).

3.5.2 Demand and workforce planning

The increased utilisation of healthcare by this patient group poses challenges on a local and national level. Services which are located in areas of deprivation, which have already been shown to have an increased prevalence of multimorbidity, have increased demand when compared to affluent areas (70, 75). Within general practices in these areas, it has been recognised that longer appointment times should be given to affected patients, in order to facilitate appropriate and thorough management of their complex issues (76). This clearly comes at a price: with practices struggling to recruit doctors in the United Kingdom (UK) and Ireland, and a shortage of primary care physicians and general physicians in other parts of the world, workforce planning is needed to provide this extra time which is so essential for managing patients with multimorbidity (77).

Of course, not all care needs to be delivered by doctors if they are in short supply: patients with multimorbidity were found to be receptive to the idea of nurses delivering some care to patients in a primary care setting when they know that they can see a doctor if needed (78). Most patients in this qualitative descriptive clinical study expected nurses to work in traditional roles, supporting the doctor in their work, rather than the extended roles which are increasingly popular. While acute minor illness such as urinary tract infection or viral upper respiratory tract infection may be amenable to a short nurse practitioner consultation in some situations, chronic disease clinics and reviews led by nurses have tended to be focused on single systems. This could result in a patient with multimorbidity attending the diabetes nurse specialist for their diabetic review, the respiratory nurse specialist for their chronic obstructive pulmonary disease (COPD) review, the dressing clinic for review of their chronic ulcer, and the cardiology specialist nurse for review of their lipid management. Each of these specialist nurses will use their specific template for a review of the long term condition involved (8).

Rather than multiple single-disease reviews, the patient with multimorbidity should have a regular, thorough review which addresses all of their complex medical needs (79). Prioritisation of current quality of life rather than simply ticking boxes of disease control targets should be key. While some elements of the multimorbidity review can be delegated to other staff, a comprehensive medical review including screening for depression, must be carried out: treatment of depression has been shown to improve chronic disease control (80, 81). There is some evidence that nurses seeing patients with multimorbidity tend to overlook or 'block' patient cues, or fail to offer advice regarding issues which are not related to the presenting complaint (82). Delegation is not problem-free: Rushton described clearly the need for curriculum re-design in order for nurses to adapt to the 'changing landscape' of multimorbidity. (83)

While it is assumed that medication reviews improve concordance, there is little evidence to support this currently, although further robust research is needed (83). However, a meta-analysis by Bangalore et al. in 2007 demonstrated that fixed-dose drug combinations, for instance in hypertension, decrease the risk of non-compliance, and so should be considered in the management of patients with chronic conditions (84).

These multimorbidity reviews should be carried out by doctors and health care professionals who are appropriately trained: research addressing the educational needs of healthcare professionals in relation to multimorbid patients is urgently needed according to Drazen et al., in order to make delivery of care more efficient and effective (85): this is supported by the work of Kernick et al. who suggest that increasingly complex disease requires increased training and skills in order to deliver high quality care (57). Reeve et al. suggest that quality care for patients with multimorbidity requires generalist training, and expertise in both the principles and practice of 'interpretive practice', which involves the integration of information with interpretation of the patient experience (86, 87).

3.5.3 Quality of care

Increasing demand on primary and secondary care services, without increased resourcing and staffing of these facilities inevitably reduces the quality of care provided. The involvement of multiple care providers leads to challenges in communication and continuity: with multiple doctors involved, and potentially multiple sites of care, it is easy to understand how confusion can arise (88). In Ireland and the UK, care is usually coordinated by the GP, who acts as the first point of access of the patient, and a gatekeeper to secondary care (89).

The concept of the consultation is key, and continuity of care has a significant positive impact in the care of patients with multimorbidity (90). The Royal College of General Practitioners (RCGP) in the UK produced a 'Continuity of Care Toolkit', which aims to support GPs in improving their continuity of care of patients with multimorbidity (58). Haggerty, in a BMJ editorial on continuity of care in multimorbidity, suggested that healthcare professionals need informational continuity and management continuity in order to facilitate 'connectedness', or seamless care between services– which is what patients expect in communication between primary and secondary care (91). The RCGP suggest that continuity of care should be prioritised over rapid access to care, when possible, particularly for medication reviews and discussion of test results, to enable the doctor most familiar with the patient to make decisions regarding management (92). Gruneir et al. found that greater continuity of medical care reduced hospitalisations in multimorbid patients, which is unsurprising, as those most familiar with the patient can make decisions regarding treatment options. More recently in an article published in January 2017, Barker et al. found that increased continuity of care with a GP is associated with fewer admissions for conditions which were considered to be manageable in primary care: i.e. long term conditions such as asthma where good management can prevent exacerbations, acute conditions such as gangrene where early management can prevent development, and vaccine-preventable conditions such as influenza and pneumonia (25, 93). This evidence certainly supports the promotion of

continuity of care in General Practice, rather than necessarily speed of access to primary care, which has been prioritised in recent years in the UK.

Patients with multimorbidity in the UK National Health System (NHS) do not generally perceive their care to be deficient, and their carers rate the quality of care delivered to patients with chronic illnesses more highly than the patients themselves (93, 94). Padisson et al. looked at the patient-reported experience of general practice: however, quality of care was not addressed, the research instead focussing on access, communication and continuity (95). They found that the number of conditions a patient has is not the most important aspect when it comes to their experience of general practice: rather, it was the severity of disease, and the influence of specific diseases and combinations of diseases which had the biggest impact. For instance, patients with reduced hearing struggle to make appointments, and then struggle with communication within the consultation (94). This understandably has a negative impact on their perception of quality of care.

Quality of care in patients with multimorbidity in primary care has been assessed using measures which were developed for single disease states: as such, they are more suited to measure comorbidity, where an index disease exists in the presence of other diseases, than multimorbidity, where one condition is not significantly more prominent than another (96).

Quality measures such as the Quality Outcome Framework (QOF) in the UK are based on single system diseases, with ‘points’ and financial rewards given for successful achievement and recording of treatment targets (97, 98). Patients with multimorbidity do not fit the mould of these fixed quality targets, as they are based on evidence relating to single disease conditions, and do not reflect either the priorities of this patient group, nor the complexities of their management (99). Indeed, it has been proposed that ‘pay for performance’ schemes actually disadvantage patients with multimorbidity by setting unrealistic treatment goals for particular diseases which are inappropriately persued, to the detriment of other conditions which are not included in the quality targets (99). Novel care

strategies for these patients, such as those proposed in the 3D study (flagging patient patients with multimorbidity, and providing comprehensive assessments and care plans) and the Care Plus study (extending consultation time and providing training for healthcare workers), are currently being investigated, to ascertain whether they improve the care and outcomes of patients with multimorbidity (100).

3.6 Challenges of managing patients with multimorbidity

Healthcare workers involved in the management of patients with multimorbidity face numerous challenges which have been well documented, and which are summarised below.

3.6.1 Time and prioritisation

Scarcity of time is the most commonly presented challenge when dealing with multimorbidity, and this issue is highlighted in areas of deprivation, where efforts are being made to provide extra GP sessions to deal with these complex patients (101). Since these patients have multiple health issues, they often present with more than one problem at a time. In a system in which a fixed time is allocated per appointment, this is difficult, and poses problems for both the doctor and the patient (102-104). The challenge of addressing both the patient's agenda and that of the doctor, both within a set, short consultation time, is one which reduces the quality of care of these patients (102, 105). Clinicians 'routinely experience this tyranny of the urgent', where the urgent issue which is the priority of the patient is dealt with, and the chronic, ongoing multimorbidity management gets postponed to a subsequent visit due to time constraints (106, 107).

Discussing priorities of care with the patient, and changing from disease-oriented care to goal-oriented care, to increase the quality of life of the patient, have been suggested as useful methods of making good use of consultation time (48, 79). While this is not profitable in terms of pay-for-performance

schemes such as QOF, it is likely to be more successful in terms of satisfaction for both the patient and doctor.

3.6.2 Financial impact

The issue of resourcing of healthcare services for patients with multimorbidity has been mentioned above: strategies which have been suggested to deal with the increasing demands on services include the involvement of teams to support doctors and patients, the funding of extra GP sessions in areas of deprivation, and the provision of continuity of care (53).

The 'inverse care law', first described in 1971 by Hart et al. suggests that medical care is least available to those who have most need of it (108). Extensive work by the Deep End group in Scotland has highlighted the impact of economic deprivation on health and multimorbidity and aims to lobby for political change and support in the area in an attempt to decrease the inequality of healthcare provision for patients with multimorbidity living in deprived areas (109). An Irish group of GPs with similar interests has been founded and are similarly advocating for resourcing of primary care in deprived areas (10, 110).

Delegation to ensure that non-clinical work is done by managers or administrative staff ensures that clinical staff are able to use their expertise where it is most needed, but delegation is not without its challenges as training and protocols are required (111-113).

3.6.3 Evidence and guidelines

Multimorbidity is a relatively recent concept, and evidence-based clinical care is being investigated. Evidence-based medicine has been described as 'a poor fit for multimorbidity' however, given the heterogeneity of disease combinations which can exist in patients with multimorbidity (114). Greenhalgh discussed the difficulty of applying evidence based medicine to patients with multimorbidity: she suggests that, rather than trying to apply objective scores or guidelines which are based on single-disease situations, and using 'fictional vignettes', we should instead work with genuine clinical cases so that 'real' evidence-based

medicine (EBM) can be used: ‘what is the best course of action for this patient, in these circumstances, at this point in their illness or condition’ (79).

While there is qualitative data in the literature addressing problems which are faced by patients and health care workers, there is a lack of quantitative work. This is changing, and a number of studies are underway to evaluate interventions in the management of multimorbidity patients. The 3D study in Bristol is evaluating the impact of applying a ‘flagging’ system to highlight patients with multimorbidity, and to develop comprehensive assessments and care plans with increased continuity of care in this patient group (115). The Care-Plus study in Scotland is evaluating a complex intervention aimed at improving quality of life in multimorbid patients living in areas of deprivation: this intervention involves extended consultation length and training of healthcare workers (57, 60). Until the results of studies such as these are available, the lack of current, comprehensive evidence for multimorbidity management limits confidence with which changes which can be made in the day-to-day management of patients with multimorbidity (116).

At the start of this project, there were no appropriate guidelines for management of patients with multimorbidity in primary care (116). In the last year, the BMJ has published a clinical review of management of multimorbidity patients in primary care, and NICE has published guidance on the clinical assessment and management of patients with multimorbidity (106). While there is still significant room for further research and improvement of guidelines, these two publications in particular have changed current management of this patient cohort. Notable for its absence within the NICE guidance on multimorbidity is an educational arm: however, this can be developed to ensure that delivery of care takes account of the importance of multimorbidity and adapts to newly-proposed suggestions. While NICE acknowledges that implementation of guidelines can take time, it is suggested that some changes can be done quickly: for instance, changing prescribing practice to optimise medication management (117). It may be appropriate in such situations to provide brief educational interventions to

upskill relevant doctors and ensure that delay to implementation is minimised, particularly in the setting of General Practice as practice size often lends itself to a quick response to recommendations when compared with large organisations such as hospitals.

The vast majority of clinical guidelines and evidence-based management protocols relate to single system disease. Haslam et al. described it as: 'Focusing on a single condition is like having a few beautifully clear and focused pixels, without having the whole picture' (51, 118). Application of existing single-disease NICE guidelines to each condition in a patient with multimorbidity results in a considerable treatment burden, with frequent appointments and complex self-care regimes (19, 119, 120). Guidelines do not address uncertainty or outline the balance of potential benefits and harms of a given treatment in patients with concurrent chronic diseases: rather, they offer a single approach to management of a problem (18, 61). Application of guidelines to patients with multimorbidity requires training of clinicians in the appropriate adaptation of single-disease guidelines (61).

3.7 Education

For changing service requirements – such as management of an increasingly prevalent and demanding condition such as multimorbidity – comes a need for training of those involved in provision of that service (10). Primary health care professionals recognise the need for this training, and some of the skills required have been outlined in the literature (19). The format of this training has been less well researched, although the potential of networking continuing professional development (CPD) has been suggested (120). The recognition that management of patients with multimorbidity affects all specialties in medicine has also been addressed: while generalists and general practitioners are those most commonly managing the complexities of care, these patients fall under the care of most specialties and subspecialties at some point (121).

The current literature addressing the training of doctors in management of patients with multimorbidity have been explored in detail in the systematic review in chapter two.

3.8 Chapter summary

Multimorbidity is becoming increasingly prevalent, and its management is being investigated with recent guidelines issued by NICE highlighting the importance of this condition in practice.

The impact of multimorbidity on the lives of patients, on the health system which attempts to provide care for them, and on the doctors who ultimately encounter the patients to address their day to day healthcare needs, is substantial.

Multiple challenges in the management of patients with multimorbidity have been discussed in the literature, and include time pressure, prioritisation within the consultation, resourcing of healthcare services and the paucity of evidence and guidelines with respect to this heterogeneous patient group.

Chapter four

Training needs assessment: mixed methods

Chapter four Training needs assessment: mixed methods

4.1 Introduction

This chapter will address the quantitative and qualitative exploration of the training needs assessment of doctors in the management of patients with multimorbidity. While doctors in training were the primary focus of our needs assessment, the views of the trainers were also of interest. This quantitative needs assessment involved both doctors and other healthcare professionals involved in the training of postgraduate doctors.

The overarching aim was to determine whether there were unmet training needs of postgraduate doctors which could inform the development of a training intervention.

4.2 Background

Given the prevalence of multimorbidity, it is surprising that the training curricula in most specialties remain largely based on single system diseases: it is only recently that co-morbidity or multimorbidity has been included (89, 90). Management of patients with multiple chronic diseases presents clinical, communication, organisational and funding challenges, and as such could be a prime topic for interesting, engaging and stimulating training sessions, providing the opportunity for communication, ethics and clinical training in the context of case-based learning (51, 52, 58).

Trainees in all specialties encounter patients with multimorbidity within their patient cohort: whether it is an orthopaedic patient with osteoarthritis admitted for joint replacement who also has chronic obstructive pulmonary disease, diabetes and hypertension; or a renal patient with osteoporosis, skin cancer, and asthma. As such, it is vital that all doctors recognise the difficulties involved in managing these patients (20, 122).

While most training remains single-system focused, the ICGP and the RCPI now both include multimorbidity within their care of the elderly curricula. This focus on multimorbidity in elderly patients is insufficient: more than half of people with multimorbidity (and almost two-thirds of those with comorbid physical and mental health conditions) are under the age of 65 years (14, 58, 123). Guidelines remain based on single-system disease, and require doctors to be confident in their adaptation for implementation in patients with multiple chronic diseases (8).

4.2.1 Summary of literature and systematic reviews

The literature and systematic reviews in chapters two and three highlighted the lack of robust published research addressing the education and training of doctors in the management of patients with multimorbidity. While some publications have addressed components of care which are thought to be challenging, educational needs of the doctors involved have not been explored (1, 11).

4.2.2 Mixed methods research

In order to give a comprehensive picture of the training needs of doctors in managing patients with multimorbidity, a mixed methods approach was adopted. This allowed the quantitative evaluation of the training needs of doctors and their trainers using a questionnaire survey which comprised a combination of closed questions with free text comments. The deeper exploration of doctors' experiences and views were investigated using qualitative focus groups. Results from both were combined to present an overall needs assessment to facilitate development and piloting of an intervention which is described in chapter five.

4.3 Quantitative study

The quantitative element of this project included surveys of trainees in general practice and general medicine, and a separate survey of their respective trainers.

4.3.1 Aims

The aim was to investigate quantitatively the learning needs of doctors who are managing patients with multimorbidity, and the views and experiences of their current trainers.

4.3.2 Survey methods

4.3.2.1 Setting and participants

While it was recognised that multimorbidity should be a part of all specialty training, for the purposes of this study, two specific groups of trainees were selected for needs assessment: trainees in General Practice and trainees in General Medicine. This was a pragmatic selection: GPs and general physicians are expected to manage multimorbidity as a significant part of their working day. These patients are not unusual to them, so it was hoped that assessing their perceived learning needs would illustrate whether their current training was sufficient.

Training in general practice for doctors is overseen in Ireland by the Irish College of General Practitioners (ICGP). At the time of the study, this was led by a national director of GP training, and training schemes were located in different regions of the country. Individual training schemes were led by directors of training, who worked with assistant directors of training to deliver educational modules to trainees within their scheme (11, 63).

Training of physicians is coordinated by the Royal College of Physicians in Ireland (RCPI), and involves basic and higher specialist training delivered by National Specialty Directors (NSDs). Basic training takes two years of senior

house officer training positions, while higher specialist training takes a further 4-6 years of mostly hospital-based training.

GP trainees and physician trainees in the UK and Ireland follow specified curricula developed by their respective colleges: the Royal College of General Practitioners (RCGP), the Irish College of General Practitioners (ICGP), the Royal College of Physicians (RCP), and the Royal College of Physicians of Ireland. The curricula are freely accessible online (8). At the time of the needs assessment, multimorbidity was not specifically included in the curricula. However, management of complex patients was, in one form or another, addressed by the curricula, as one would expect.

4.3.2.2 Development of the survey

The first step was to conduct a survey of participants' multimorbidity training to date. The researcher was keen to investigate whether training was being delivered in key areas of patients' management, even if it was not 'labelled' multimorbidity: terminology in this area is complex and broad and as such it was hoped that the surveys would capture the clinical and organisational areas which are recognised to be involved in the management of this group of complex medical patients (10, 19, 119).

A survey was developed and was piloted amongst qualified GPs. The survey included questions which evaluated participants' experience in various aspects of management of patients with multimorbidity which have been recognised to be challenging in practice: for example, multisystem disease management, prescribing in patients on multiple, long-term medications and coordination of care and supporting self-management in these patients with multiple chronic diseases. Based on feedback from a small pilot group of academic GPs, some minor grammatical changes were made, and the survey was approved for use amongst the participating trainees.

The format of the survey was the next consideration, with the options of an electronic survey, a postal survey, or a survey distributed to trainees during their day-release meetings. In the interests of time, funding and convenience, an electronic survey was chosen. Electronic surveys present some well-documented difficulties in implementation: not least the issue of low response rates (48, 52).

4.3.2.2.1 Strategies implemented to enhance survey response rate

In order to maximise response rates to the electronic survey, a number of methods were engaged based on the findings of a Cochrane review by Edwards et al. published in 2011 (124).

Incentive

Participants were given the opportunity to be included in a prize draw for a gift voucher.

Questionnaire

The questionnaire developed was short, with just seven questions, as short questionnaires have been found to attract more complete responses than long questionnaires.

Results

Participants were offered the opportunity to be contacted subsequently with the results of the survey.

Formatting

A white background was used for the survey delivery as this was found by Edwards et al. to increase response rates.

Presentation

Response categories were represented textually rather than graphically.

Signatory

A female signatory was used on the email (odds of response 0.55 if male signatory).

Other strategies suggested by Edwards et al. were considered but not thought not to be practical for this survey, and are outlined below:

Personalised e-questionnaires

We used gatekeepers for this survey, so it was not possible to individualise questionnaires, as the contact details were known only to the gatekeeper.

Deadline given

No deadline was given in the email (or reminder) that was sent to the mailshot list. Conscious of demands on the time of trainees, and that some trainees may have separate, less frequently-checked email accounts for work or training correspondence, we did not provide or enforce deadlines.

Picture in email

While including a picture in the email might have been found to increase response rates, it was decided against, as the email was being sent by the two involved training colleges. Their corporate logo was included, as were the logos of the Royal College of Surgeons in Ireland (RCSI).

'Survey' included in the email subject line

This was beyond our control, as the gatekeepers sent the email on to their trainees.

The final surveys which were used are presented in appendix 5.

4.3.2.3 Identification of participants and recruitment

Representatives of the training departments of the RCPI and the ICGP, who oversee the training of physicians and GPs respectively, met with the researcher, and agreed to act as gatekeepers for the survey. They suggested the cohorts of trainees that should be contacted.

RCPI trainees contacted were involved in either the Basic Specialist Training (BST, n=314), or the Higher Specialist Training (HST, n=201) schemes. All BSTs in medicine were invited to participate in the survey. HSTs who were invited to participate were in either their first year (n=97) or their final year (n=104) of their training programme.

All GP trainees participating in an ICGP GP training scheme (n=623) were included in the recruitment mailshot, regardless of their stage of training. In Ireland, the first two years of GP training are usually hospital-based, with the doctor rotating between such specialties as paediatrics, emergency medicine, obstetrics and gynaecology, palliative medicine, medicine for the elderly, otorhinolaryngology/ophthalmology and psychiatry. Third and fourth year trainees are assigned to training general practices, and see GP patients independently as registrars, with supervision.

Directors and Assistant Directors of Training of GP training with the ICGP (n=70) and National Specialty Directors of the RCPI (n=39) were also invited to participate in a related survey, which aimed to investigate the preparedness of postgraduate training scheme tutors in the area of multimorbidity.

The final surveys were presented in SurveyMonkey format, and the link to the relevant survey included in a mailshot email to the trainees and trainers by their respective training college. A reminder email was sent two weeks after the initial mailshot. Consent was obtained from all participants at the beginning of the survey.

4.3.2.4 Analysis

Data was analysed and results collated using SurveyMonkey software (43, 44, 125, 126). As the numbers of participants are small, basic descriptive statistics were used with presentation of frequency distributions.

Free text comments were subjected to thematic analysis, which was limited by the small number of items. These will be discussed in section 4.3.3.1 and 4.3.3.2 below.

4.3.3 Survey results

4.3.3.1 Trainees

A total of 96 trainee physicians (n=515) and 86 GP trainees (n=623) responded to the survey, giving response rates of 18.6% and 13.8% respectively. This was disappointing but not unexpected, as the trainees are all working full time and potentially suffering from 'survey fatigue', being contacted by research groups on a regular basis regarding surveys (personal communication, RCPI). The gatekeepers reported that response rates greater than 10% for trainees were unusual, so within the populations being surveyed it was felt to be a reasonable response rate.

Characteristics of respondents are presented in table 4.1.

Table 4.1: Characteristics of respondents to survey

	RCPI	ICGP
N =	92	86
Year of graduation	1994-2012 Majority (85%) >/= post 2002	1999-2011 Majority (70.8%) 2005-2009 inc.
Year of scheme		
Year 1/2	48.9%	29%
Year 3/4	22.8%	69.8%
>/= Year 5	28.3%	1.2%

A total of 96 trainee physicians and 86 GP trainees responded to the survey, giving response rates of 18.6% and 13.8% respectively. Half of the physician group were in their first two years of specialist training, while almost 70% of the GP trainees were in their penultimate or ultimate year of training.

Almost 60% of the GP trainee respondents recalled no tutorials addressing the management of multimorbidity, compared with more than two thirds (68.8%) of the respondents in the physician group.

A total of 62 comments were submitted by trainees: 47 from physicians, and 15 from GPs. The predominant theme was the relevance of the trainees' specialty to their confidence in managing patients with multimorbidity: almost half of the comments related to this. The theme of current training also arose: this overlapped with the comments of the trainers, specifying the lack of formal training in multimorbidity in the current curriculum, with a dependence on self-training, experiential learning, or case-based learning being mentioned in 16 of 52 comments.

Another theme which arose was that of training needs: prescribing, polypharmacy, guidelines and care coordination were all specifically mentioned. Unsurprisingly, and again, overlapping with themes which arose in analysis of the trainers' comments, complexity was addressed. Finally, the theme of limitations to training was addressed, with time being the principal limitation, and funding or resources also meriting a mention. Some detailed examples of comments will be included in the results sections below.

Free text comments (listed in Appendices 6&7) about existing multimorbidity training suggested that while specific tutorials on multimorbidity were not delivered,

> *'the subject has arisen in tutorials to do with care of the elderly, pharmacy/therapeutics, and when discussing chronic diseases and resources',*

or when *'discussing certain clinical issues or cases'*. So while formal training in the area may not have been delivered (or was not recollected), there was an element of teaching when the subject arose during clinical case discussion or other topics.

Some respondents felt that their choice of specialty within medicine was particularly relevant:

> *'…Paeds and neonatology is full of multimorbidity…'*
>
> *'…this is core curriculum in geriatric medicine…'*
>
> *'Occupational Health SpR; we won't be managing these cohort of patients'*

Another (general internal medicine) trainee commented that there was:

> *'no dedicated teaching or tutorials on broader concepts of managing patients with medical co-morbidities'*.

When asked about whether they felt prepared to manage patients with multimorbidity, the majority of GP trainee respondents (83.7%) felt inadequately prepared, with none saying that they were completely prepared.

> '*I don't think I will ever feel adequately prepared for it, v(ery) daunting topic'*

wrote one trainee, reflecting the challenge the topic presents to them and their peers.

> *'I'm only starting off in my scheme and lots left to learn about multimorbidity'*

commented another trainee, displaying insight into their lack of experience. This sense of need for training was also mentioned by other participants:

> *'I would like some more tutorials and teaching in chronic disease, polypharmacy and management of patients with chronic disease needs'*
>
> *'Not enough training'*

'Any preparation I have in terms of management of multimorbidity has been self-directed'.

Although less trainees in general medicine said that they had been trained in management of multimorbidity than GP trainees, they felt more prepared to manage these patients than their GP trainee colleagues.

Some participants suggested clinical rotations which they felt would be helpful to GP trainees if incorporated within their training scheme:

'Did a rotation in Medicine for the Elderly – feel it was of great benefit in this regard'

'More medicine in GP training – 6 months far too little '

In contrast, the majority of physician trainees felt prepared to manage patients with multimorbidity: 63% felt adequately prepared or better, rating their confidence level >/= 5/10. Physicians felt that experience, rather than teaching, was where most of their training took place:

'Despite the lack of formal training, the prevalence of multimorbidity is such that we are exposed to it often, and therefore probably have developed skills in management of same'

'Everything is experience-based really. No formal training on issues of a general nature tend to be given'

'Rather than specific training you learn mostly by experience'

The challenges of therapeutics and organisational difficulties within the health service were also mentioned:

'On individual patient basis have acquired a lot of experience in general medicine and patients with multiple morbidities. Would be useful to have further training in prescribing with multiple medications, and in issues relating to managing within a health service which is not very well 'joined up'.'

Some trainees felt that further training would be desirable:

'I feel that there should be more teaching in the area'

'Topic has not been adequately addressed'

However, other trainees felt that further training was not needed:

'… Medicine is increasingly sub-specialised. It is facile to think that training physicians in multimorbidity has any use. Hence the need to divert training away from 'GIM' [General Internal Medicine] towards specialty training only. I am adequately trained in my specialty that deals with multisystem disease…'

'… (My) specialty is obs and gynae therefore little exposure to medically unwell patients or those with multiple morbidities…'.

GP trainees were more interested in attending multimorbidity training, at 86% vs 67% of physicians. The preferences for format of training were broadly the same, with workshops incorporated into their day-release training being the preferred option for both groups, and print material being the least popular format of those offered.

Table 4.2: Results of GP and physician trainees survey

	Physician trainees	GP trainees
On a rating scale of 1 (not prepared) to 10 (fully prepared), how prepared do you feel with regard to managing patients with multimorbidity?		
1-3 inc	15	18
4-6 inc	49	54
7-9 inc	25	14
10 (fully)	3	0
Total respondents	92	86
Which of the following subjects have been addressed during your Specialist Training? Please tick all that apply.		
Multisystem disease management	45.7%	24.4%
Prescribing in patients on multiple long term medications	41.3%	55.8%
Coordination of care in patients with multiple comorbidities / chronic diseases	32.6%	30.2%
Supporting self-management in patients with multi-morbidity	13.0	19.8%
None	41.5%	31.4%

Table 4.2: Results of GP and physician trainees survey (continued)

	Physician trainees	GP trainees
On a rating scale of 1 (not prepared) to 10 (fully prepared), how prepared do you feel with regard to managing patients with multimorbidity?		
1-3 inc	15	18
4-6 inc	49	54
7-9 inc	25	14
10 (fully)	3	0
Total respondents	92	86
Would you have an interest in participating in training in the area of multimorbidity in the future?		
Yes	65.2%	86%
No	12.0%	1.2%
Maybe	22.0%	12.8
What format would you like this further training in multimorbidity to take?		
First preference	Workshop	Workshop
Second preference	Online	Online
Third preference	Lecture	Lecture
Fourth preference	Other	Print
Fifth preference	Print	Other

Table 4.2: Results of GP and physician trainees survey (continued)

	Physician trainees	GP trainees
What would be your preferred time for training in multimorbidity?		
First preference	Normal working hours	Breakout session at usual day-release training
Second preference	Breakout session at usual day-release training day	Normal working hours
Third preference	Early morning	Own time
Fourth preference	Own time	Early morning
Fifth preference	Evening	Evening
	Weekend	Weekend
What would be your preferred venue for multimorbidity training, if you were to attend?		
First preference	Usual place of work	Breakout session at usual day-release training
Second preference	Breakout session at usual day-release training day	Usual place of work
Third preference	City centre	Online
Fourth preference	Online	City centre
Fifth preference	CME meeting	CME meeting
		GP practice

4.3.3.2 Summary of trainees' survey results

In summary, the survey demonstrated a need for training in management of patients with multimorbidity amongst most GP and physician trainees, but this varied according to the specialty choice in the RCPI. GP and RCPI trainees' preferences for training format and location reflect striking similarities, with both groups requesting a workshop format within their protected training days.

4.3.3.3 Trainers

A total of fifteen of a potential 70 directors or assistant directors of training in the ICGP responded to the survey, along with 16 RCPI National Specialist Directors of a potential (n=109). Results are shown in table 4.3. Just 14 free text comments were made by trainers.

The majority of GP trainers had more than five years of experience in the position, in contrast to the majority of RCPI trainers who were in more recently in their posts.

Almost half of GP trainers reported that they thought training in multimorbidity was delivered well or excellently, with only one GP trainer thinking that it was poorly delivered in contrast to RCPI trainers, half of whom felt that multimorbidity training was poor or non-existent in their courses. One GP trainer commented that they felt that multimorbidity training in GP training was done *'better than any other specialism'.*

As with the trainees, nomenclature was mentioned: some trainers suggested that issues of multimorbidity were addressed within their training but not labelled as such:

> *'I think we teach some of this without actually labelling it as above. Maybe we should have specific sessions on multimorbidity.' (GP trainer)*
>
> *‘Some of our complicated diabetes clinics include patients with (by definition) multimorbidity. We do not address any of the issues listed above in a specific way’ (Physician trainer)*
>
> *'It is a difficult area. We commonly talk about the problems without necessarily providing specific training, as there is relatively little to go on.' (GP trainer)*
>
> *'I think GPs have long been used to managing complicated patients, and coordinating their care. I think the evolution of multimorbidity as a named*

condition helps to frame training, and clinical practice, and ultimately hopefully leads to more coordinated care. ' (GP trainer)

Not all GP trainers are doctors: some felt that multimorbidity is not relevant to them, by virtue of their own basic training:

'I am a psychotherapist by training. Not relevant'.

Another trainer commented that

'others in the team would be better at delivering some aspects than I would'.

Overall, trainers were well aware of the large numbers of patients with multimorbidity presenting for management:

'The nature of being a practicing GP is the training ground for dealing with multiple morbidities. I roughly calculate that I have more patients with multiple comorbidities than those with single system diseases.' (GP trainer)

'Multiple comorbidity management forms a major part of my day to day work for the last 30 years in practice'. (GP trainer)

Trainers reported that their expertise in management of patients with multimorbidity was principally gained through experience rather than training. While a trainee in occupational health medicine suggested that multimorbidity was not relevant to their practice, an NSD in occupational medicine suggested otherwise:

'In occupational medicine we are certainly aware of the impact of multimorbidity on an employee's fitness for work. We see how even a relatively mild depression can impact on the management of other conditions such as diabetes mellitus, arthritis, obesity etc. Such multiple morbidities can impact on recovery rates following injury (including occupational injury) and can contribute to long term sickness absence. Our assessment of patients / employees aims to be holistic and to

consider how different conditions (particularly mental health) affect health and ability in general.'

Table 4.3: Trainers' survey (Feb-Mar 2013)

	RCPI	ICGP
N =	16	15
Numbers of years in post	<5y: 87.5% >/=5y: 12.5%	<5y: 13.3% >/=5y: 86.7%
In which of the following areas do you provide training to your trainees which specifically incorporates multimorbidity?		
Multisystem disease management	50%	46.7%
Prescribing in patients on multiple long term medications	50%	73.3%
Coordination of care in patients with multiple comorbidities / chronic diseases	56.3%	66.7%
Supporting self-management in patients with multi-morbidity	43.8%	33.3%
None of the above	25%	20%
Please rank below how well you feel that postgraduate training in your specialty prepares its trainees for managing patients with multimorbidity		
Not at all	6.25%	0%
Poorly	43.75%	6.7%
Adequately	18.75%	46.7%
Well	25%	33.3%
Excellently	6.25%	13.3%
Unsure	0%	0%

Table 4.3: Trainers' survey continued

In which of the following areas have YOU had specific training, either in the content itself or in teaching the topic?

ICGP Trainers (*One respondent did not answer this question)			
	Content	Teaching	Neither
Multisystem disease management	50%	28.6%	35.7%
Prescribing in patients on multiple long term medications	57.1%	35.7%	21.4%
Coordination of care in patients with multiple comorbidities / chronic diseases	42.9%	35.7%	35.7%
Supporting self-management in patients with multi-morbidity	42.9%	28.6%	35.7%
Other	28.6%	28.6%	28.6%
None of the above	7.1%	7.1%	0

RCPI trainers			
	Content	Teaching	Neither
Multisystem disease management	33.3%	26.6%	60%
Prescribing in patients on multiple long term medications	26.7%	40%	53.3%
Coordination of care in patients with multiple comorbidities / chronic diseases	40%	40%	46.7%
Supporting self-management in patients with multi-morbidity	42.9%	21.4%	50%
Other	16.7%	16.7%	83.3%
None of the above	0%	0%	0%

Table 4.3: Trainers' survey continued

	RCPI	ICGP
If specific training in multimorbidity was to be incorporated into the curriculum of your postgraduate training scheme, would you feel adequately prepared at present to deliver this training?		
Yes	18.5%	33.3%
No	50%	26.7%
Unsure	31.3%	40%

4.3.3.4 Summary of trainer's survey results

In summary, the trainers differed in their opinions on the relevance of multimorbidity to their practice. This appeared largely related to the specialty involved: while most felt it was a significant part of their practice, non-medical trainers felt that it was irrelevant to them. Skills in the area were gained by experience rather than formal training, and GPs were more positive about the quality of the multimorbidity training than their physician colleagues.

4.4 Qualitative Study

The mixed methods needs assessment incorporated a qualitative study to facilitate a deeper understanding of challenges and obstacles encountered by doctors in training.

4.4.1 Aims

The aim of the qualitative study was to explore the views and experience of doctors in postgraduate training who manage patients with multimorbidity in practice, with a view to gaining a deeper understanding of the content and format of a multimorbidity training intervention.

4.4.2 Methods

A qualitative research approach was chosen to explore the views and experience of participants. There are various approaches to data collection in qualitative research e.g. open-ended questionnaires, interviews and observation. For this study, focus groups were selected because it was felt that the group dynamic would encourage discussion and reveal valuable insight into doctors' experiences (2, 45).

4.4.2.1 Study sample and recruitment

A convenience sampling method was used to recruit our target population, which was postgraduate medical doctors who were managing patients with multimorbidity as a normal part of their daily clinical practice. As part of the training needs survey, participants were asked to indicate whether they would be interested in attending a focus group to discuss issues related to training doctors to manage patients with multimorbidity. The researcher planned to conduct two or three focus groups with physician trainees and GP trainees. This was based on pragmatic reasons rather than seeking saturation: the time constraints of the project and the anticipated difficulty recruiting influenced the decision regarding the number of focus groups planned.

Recruitment was challenging: Only one RCPI trainee replied positively regarding availability to attend a focus group, and while twenty ICGP trainees volunteered, they were scattered throughout the country with minimal overlapping availability which presented logistical issues which required that the initial plan was modified. Discussion of the issue with the training department of the RCPI revealed that their trainees had full timetables of training already scheduled for their day-release teaching, so it was decided that GP trainees would be the focus of further qualitative investigation. To overcome the issue of recruitment, GP training scheme directors were contacted and asked if it would be possible to recruit their trainees for focus groups about multimorbidity. Two schemes (of

fourteen contacted) responded positively: one scheme in an urban setting, and one rural scheme.

Information about the focus groups was provided in advance to the directors of training, and it was requested that the trainees were all made aware of the planned research in advance. The directors of the rural training scheme asked that a presentation about qualitative research be delivered to the trainees in return for accommodating the researcher (Appendix 8 focus group presentation). While this enabled the focus group session to be incorporated into their regular day of teaching, trainees were given the opportunity to leave the session after the presentation if they did not want to participate in the research. Those present were assured that their GP training directors would not be appraised about attendance at the focus group, or matters which were discussed.

4.4.2.2 Participants and settings

Three focus groups were conducted: two with five participants each (urban), and one with ten participants (rural). Doctors were all post-graduate GP trainees attending day release programmes as part of their GP training scheme, and all were in their third or fourth year of training, so currently based in GP clinical practice.

Focus groups took place in academic centres where the trainees attended on a weekly basis for GP training. It was hoped that having a mix of urban and rural groups would provide diversity in the sample of individuals and allow for exploration of training needs of doctors managing patients in different settings: inner city, suburban, and rural trainees were represented in the groups. Each focus group lasted approximately one hour.

4.4.2.3 Procedures

Prior to the focus group, an introduction was given by the researcher, outlining the purpose of the interview, and setting out some ground rules (Appendix 9 focus group procedure). Written, informed consent was obtained from all

participants at the start of each session, and the theme sheet was used as a guide throughout the session. Refreshments were provided by the researcher, but no other incentives were offered to participants.

The researcher facilitated each of the three focus groups. The researcher is a female GP working in both clinical practice and an undergraduate academic setting. Notes were taken during the interview to remind the researcher of items which arose, so that they could be addressed at a later stage in the group if they were not fully addressed.

A focus group guide (appendix 9) and a theme sheet that outlined the topics and issues to be explored (appendix 10) were developed. The theme sheet outlined a semi-structured questioning route which allowed for data to be gathered relating to current experience of training in management of patients with multimorbidity, but facilitating the exploration of interesting, unexpected issues should they arise.

4.4.2.4 Ethical considerations

Ethical approval was granted by the research ethics committee (REC) of the Royal College of Surgeons in Ireland medical school. Transcripts were pseudo-anonymised before being stored in a password protected electronic file. No significant ethical issues arose during this phase of the research.

4.4.2.5 Data analysis

Audiotape recordings of the focus group proceedings were transcribed verbatim. Analysis was completed by the researcher, with advice from experienced qualitative researchers (See acknowledgements for details). A six-step thematic analysis was used to identify, analyse, and report themes or categories (127). Group interaction data did not form part of the thematic analysis and is presented descriptively to facilitate interpretation of the findings.

1. Familiarisation

The transcript for each focus group was read repeatedly to familiarise the researcher with the data. Initial ideas and patterns were noted.

2. Generation of initial codes

Initial codes were highlighted on reading the transcript. As the focus of the research was to explore training needs so that these needs could be addressed in the future, codes relating to deficiencies in training and specific areas which could be included in training to improve the ability of doctors to manage patients with multimorbidity were included. This generation of initial codes allowed simplification of the data to more manageable quantities.

3. Searching for theme

Codes were then grouped into sub-themes, and these further developed into themes. While there was much discussion during the focus groups about GP training in general, and about problems in the organisation, structure and management of general practice on a local and national basis, the researcher, a GP and undergraduate educator herself, focused on the area of training in multimorbidity. As such, the themes reflect the reported training needs of the participants, and what they described as being important topics which need to be addressed in any training programme or module which would be developed.

4. Reviewing themes

Themes were then reviewed to revise the themes generated in step three: the iterative process of the thematic analysis was clear, particularly at this point, as the researcher became more familiar with the process. Sub-themes were amalgamated into coherent patterns which formed themes for discussion. Sub-themes which were related to multimorbidity or clinical practice in general, rather than related to educational needs and training preferences were eliminated at this stage in order to focus the exploration of data on the overall aim of the qualitative project.

5. Defining and naming themes

At this point, the themes were described in full, to capture the full meaning of the theme: they were prepared for the final report, and linked to the data transcribed.

6. Producing a final report

The final themes were compiled into a final findings report which follows – the coded dataset has been analysed to produce the themes which contribute to answering the primary research aim, which was to explore the views and experience of doctors who manage patients multimorbidity in practice, with a view to gaining a deeper understanding of the content and format of training which participants would envisage would enable them to become more confident and competent in their management of this patient group.

Quotations from the transcript were used as exemplars of key trends and agreements between participants or quotes were selected on the grounds of representativeness.

Member checking was considered, and a pragmatic decision was made not to invoke it, as there was a time interval between the focus group completion and full report completion, and some of the trainees at that stage had completed their training scheme and moved on.

4.4.3 Results

4.4.3.1 Demographics

The twenty doctors who participated in the three focus groups were all post-graduate GP trainees attending day release programmes as part of their GP training scheme, and all were in their third or fourth year of training.

4.4.3.2 Group dynamics

Participants in each focus group were familiar to one another: the researcher viewed the dynamic within the group in each instance as one of collegiality and friendliness with respect appearing to be given to all opinions.

The rural group was the largest: it was a mixed group of third and fourth year trainees. One member was particularly passionate about training and education, and was articulate, informed, and enthusiastic in discussion. However, this participant was also engaging and inclusive, rather than dominating, and other participants appeared sufficiently familiar and confident with that participant and each other to be able to respond, challenge, and engage in discussion to explore their individual and collective experiences of training in multimorbidity.

The two urban groups were slightly different. One comprised third years, and one fourth years. As such, all had completed at least two years of hospital medicine training, and while fourth years had been registrars in general practice for approximately eighteen months, third years had approximately six months experience of working in general practice. Again, in each group the participants were known to each other as they had a weekly training day together. The third-year group were somewhat less confident in the subject matter: this was to be expected, and was useful to the researcher: the group felt that even in their relatively early stage of training, the topic was of interest, and was worthy of inclusion in their curriculum. The fourth-year group were approaching the completion of their training within six months of the focus group: a number had completed their collegiate membership examinations, and two had completed significant postgraduate memberships of other colleges. This was reflected in an increased sense of confidence, but also highlighted that despite their significant training up to this point, they felt that there remained gaps in their knowledge and skills in managing of patients with multimorbidity.

Overall, the groups each worked well, with no significant challenges to the researcher. Dominant voices were easily guided and more reticent participants

were open to invitation to contribute: at the end of each focus group, the researcher felt that all participants, without exception, had contributed significantly and had been willing and enthusiastic in their engagement with the process.

4.4.3.3 Themes

From the dataset of the three focus groups, three overarching main themes emerged (figure 4.1 and appendix 11):

1. *Gaps in current training*
    a. Clinical skills (knowledge/therapeutics, guidelines, confidence)
    b. Patient factors (prioritisation/agenda-setting, communication with patients)
    c. System factors (time management, communication with colleagues, organisational tools i.e. coding)
2. *Potential barriers and facilitators to training*
3. *Future training content*
    a. Management of complexity and uncertainty
    b. Communication enabling efficiency, patient satisfaction, and job satisfaction
    c. Information organisation

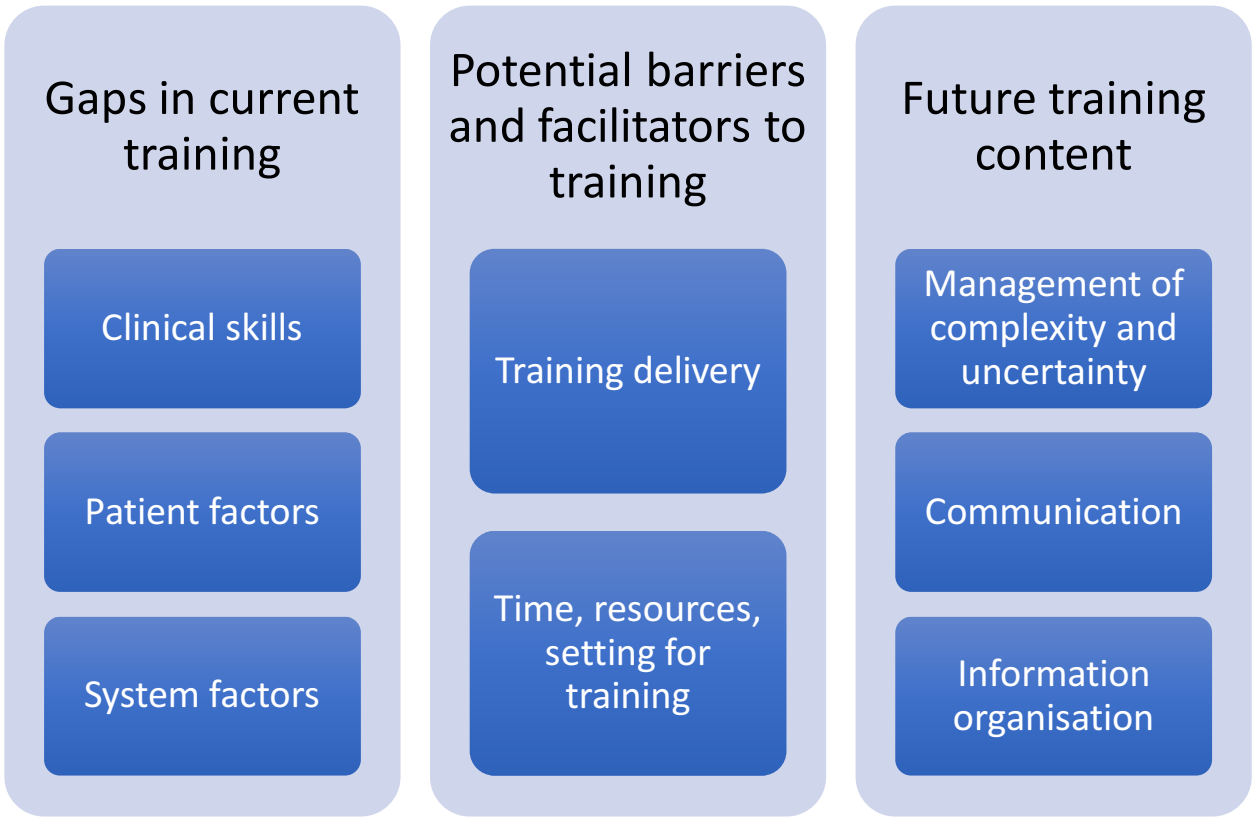


Figure 4.1 Thematic analysis

4.4.3.3.1 Theme 1: Gaps in current training

Multimorbidity was recognised as a significant issue in day-to-day practice for the majority of trainees:

> *'I think I see more people with multiple comorbidities than I do people with single diseases'* (D3)

However, trainees reported that there was no '*formal*' (M1) or '*dedicated*' (C8) training on multimorbidity within the current curriculum. Many trainees felt that although training in geriatrics or general medicine gave them exposure to some of the issues, this was insufficient as it was '*mainly acute medicine*' (C1). Specific training in multimorbidity would be preferable to some current GP training content:

'*It's an important topic, so giving a couple of sessions to [multimorbidity] I think would be really, really useful… we do a full or half day session on some other topics that you know.. this would trump it by miles'* (C7)

In the context of clinical case discussions or complex cases, trainees described cases of multimorbidity but reported that only one aspect of the patient's presentation, for example a medication review, would be addressed in a tutorial:

'We have done a lot of topics in isolation but not managing more than one at a time' (D4)

However, participants felt that there were many aspects of multimorbidity which are not addressed in current training and whose inclusion would enhance their practice as GPs. Gaps in training could be grouped into three sub-themes:

- Clinical challenges
- Patient factors: Conflicting agendas
- System factors: Time and resources.

Gaps in current training: Clinical challenges

Training to manage multimorbidity patients competently and confidently requires clinical knowledge in multiple areas:

'Staying up to date.. diabetic agents, hypertension guidelines, osteoporosis, Parkinson's… trying to stay abreast of guidelines.. (C3)'

Therapeutics was highlighted as a weak point for many participants:

'I think in terms of the teaching of managing multimorbidity… the nub of it will boil down to therapeutics.. It's very relevant to multimorbidity. ..that would really give me the tools to manage multimorbidity with greater confidence and it would be very teachable in a programme environment..'(M1)

Participants felt that there was plenty of scope for training in many aspects of multimorbidity, but recognised the value of experience when aligned with a good grounding in multimorbidity:

> *'So I think a good grounding in the basics on their own is very, very important and then I think the layers come with experience and a good structure. So I don't know necessarily, like I think dedicated teaching about things like polypharmacy and just kind of your options are good just to get you thinking about it. But I think learning how to deal with it is experience and I think the structure is very, very important and learning to use and implement a good structure. ' (D2)*

The problems of application of guidelines to patients with multimorbidity were recognised by participants:

> *'I think there are so many guidelines and they are changing so quickly that it's… keeping up to date is hard sometimes' (F2)*

Training in management of patients with multimorbidity may allow improvement in confidence managing these patients, which was recognised to be both lacking in participants, and also limiting the management of multimorbidity patients, demonstrated in the following conversation:

> *'You might be more inclined to under-treat somebody... if you aren't confident' (D9)*
> *'Fear of harm sort of overrides your ability to do good almost' (D3)*
> *'First do no harm, so do nothing' (D7).*

Specific decision support systems were also discussed:

> *'Training in the use of relevant tools and skills would help – STOPP/START criteria..'*

Gaps in current training: Patient factors: agendas, prioritisation, communication

Doctors participating in the focus groups recognised the often-conflicting agendae or priorities of the doctor and the patient:

> *'.. someone coming in and their priority being completely different. You know, whatever it is, the sore elbow or sore ear or whatever, when actually, you were worried about their diabetes and their COPD and their hypertension or whatever' (C2)*

Participants felt that it would be useful to learn '*how to negotiate those competing interests in the consultation' (M1),* as

> *'you don't necessarily have time to address their agenda and your agenda in one appointment' (D1)*.

Communication with patients was discussed in each focus group. An appreciation that this is a skill which can be learned was encouraging:

> *Sometimes, maybe communication skills might be amenable to module teaching perhaps. There is communication teaching and communication skills. Just to have it standardised and have the equipment to take on a consultation like that again in an efficient manner, where the patient feels listened to and you can attend to, whether it's your part or their part. Because, oh my God, multimorbidity, it's a complicated topic. So you need to be able to move around it swiftly and efficiently. So good communication skills would be critical.'(D2)*

Gaps in current training: System factors: Time and resources

Time management is an issue that arose in all the focus groups. One participant expressed the view that:

> *'I really think after just GP training, not to mind anything else you might have done before, I think we're well able to handle most [MM patients] reasonably, not the really complicated multimorbidity cases but most of them, I just think we need to be resourced and have time for it' (D3)*

Participants displayed good insight into the consequences of lack of consultation time:

> *'It would be nice if you had the time. You could do a lot more of it yourself.. We're referring them because of time constraints' (C7)*

This reflected other comments which suggested that time and resourcing were significant limiters of delivery of care.

4.4.3.3.2 Theme 2: Potential barriers and facilitators to training

Future training was unanimously agreed to be of interest to all three groups of GP trainees, and the data provided definite opinions regarding potential barriers and facilitators to training. Several sub-themes emerged including:

Potential barriers and facilitators to training: Training delivery

It was recognised that the experience levels and skills of GP trainers was varied, and that this would need to be considered if there were to be changes to include multimorbidity specifically in the curriculum. However, trainees were keen that specific training should be introduced into their GP training curricula. Considerable time was given to discussion within the focus groups about who was best placed to deliver training on management of patients with multimorbidity to GP trainees. There was general agreement that involvement of a GP was crucial:

> *'…you're teaching what's relevant…we need the reality…' (C3)*

Physicians or geriatricians were suggested as tutors, or as co-tutors in a session led by both a GP and general physician: however, participants were very clear that content needed to be relevant:

> *'… relate it to GP… how to manage it in a GP setting…' (D7)*

Existing directors and assistant directors of GP training were mentioned:

'I think it is perfectly reasonable to expect Programme Director teams and GP trainers to deliver these modules. I mean I think you can set, like if you have a multimorbidity curriculum, an accessible one, and you need to do say these four tutorials in a year in your practice and these two sessions during day release and you can get the ones you do in your practice signed off in your logbook, because we have to get everything signed off on anyway, and if you have e-learning modules you could do your own report.' (M1)

Other tutors within the ICGP were also mentioned:

'Let's not reinvent the wheel… You have a diploma in the college in therapeutics… There are already people who do therapeutics… I think you need to get hold of one of those and change it into a format that links everything together…' (M1)

Discussing others who might deliver training:

'I think it's better to have someone who has insight into what the GP role is about. I think if you went for somebody who is just a specialist in a particular field, we could end up going down the route of the old fashioned, didactic, single disease talk. Whereas, also if you have somebody there who has an insight into how little investigation tools we have at our hands at that moment when we are kind of making decisions, that it would help to, it cuts down, if he has that kind of insight, it cuts down more on par from where we're coming from. So at least then, I think it's a better basis to go from there' (C3)

Participants reflected on previous teachers to make suggestions about what they felt would contribute to effective training sessions:

'...the tutorials that we've had that have been fairly technical or medical based, that have been very good, were people who have a good idea of what we do when we sit down in the morning and patients come in to see us.... anytime anybody understands, we're all pretty hungry to hear what

they have to say. So long as they know what we do all day. Because they have to have a good grasp of that to know what we need to know. ' (D3)

<u>*Potential barriers & facilitators to training: Time, resources & setting for training*</u>

Obstacles to attending multimorbidity training included finance and time. Courses and continuing education were highlighted as a significant expense in terms of both time and money, and it was suggested that all courses and training should be included within their GP training scheme:

'You could nearly complete all your GP training by spending twenty grand buying diplomas. That should all be incorporated into our teaching'.

Trainees had no interest in 'didactic lectures' (C5) but rather wanted attendees to bring cases to training workshops:

'… if they're real, if they're something a colleague of yours is dealing with at the moment, it does stick with you a bit better..'

One group suggested that a patient with multimorbidity could attend the workshop, so that the lived experience of managing the complexity and uncertainty of multiple chronic diseases could be discussed. The comment:

'not an expert patient, a normal ordinary one' (C7)

was made, reflecting a sense that some expert patients gave a polished performance rather than an insight into real-life experience.

Rounding up the discussion, two groups discussed assessment, and whether they felt that they should be examined on the material covered:

'…I'm sorry to all trainees to come but I think we should have an exam'…'I find the exams do really make me study and they do make you learn…'(C3)

4.4.3.3.3 Theme 3: Future training content

The focus group participants identified potential content of future training. These included managing complex consultations; communication; organisation of information; and management of complexity and uncertainty.

Future training content: Training in managing complex consultations

Focus group participants recognised the challenge of developing a training intervention addressing management of multimorbidity, where heterogeneous combinations of disorders present in a single patient, and where multifactorial issues – medical, therapeutic, social, family – pose obstacles to optimal management:

> *'I'm trying to understand how you could train me to manage, like you have to be competent to manage say, heart failure, in the setting of renal failure, in the setting of COPD, in the setting of mild dementia and carer stress and every case is so individual that even if you knew an awful lot about heart failure, and if you knew an awful lot about dementia, and knew an awful lot about the resources available, it's still, you know each patient is so different you know? It's hard to be...I wonder what kind of a way you'd teach it. I don't know actually how you'd teach that. To be confident with all of them you know? ' (C2)*

The complexity of the patients' medical history presents challenges for the doctor both from a medical and time-management point of view:

> *'…if you see somebody coming in… for something very simple and what should be perceived as straight forward that day, if you look at their file and they have five or six other illnesses, you know that that consultation is going to very difficult to fit into the time frame that you are given and it's also, you have to bear in mind the patient. If you have to give them new instructions for whatever it is that day, it's them kind of going, does that effect the five other tablets that I'm taking?...it puts a time burden on you… what probably happens is that maybe instead of being able to give*

them one long consultation…is that you might see them a few times over a week so you do it in short bursts instead of one long sit down' (C1)

Participants felt that the doctor-patient consultation was often difficult in cases of multimorbidity but suggested related potential training needs:

'When it comes to multimorbidity, one thing that could be useful on two fronts: one would be from the point of view of the doctor and the patient, would be skills of how to negotiate those competing interests in the consultation' (M1)

Uncertainty surrounding applicability of guidelines, the effect of particular therapeutic options, and of optimal management outcomes was described as:

'It feels like a bit of witchcraft. We've one thing a little bit better today and the next day we might try something else'

Participants felt that training around some of the patient related-themes outlined in section 4.4.3.3.1 would be useful:

'Someone coming in and their priority being completely different. You know, whatever it is, the sore elbow or sore ear or whatever, when actually, you were worried about their diabetes and their COPD and their hypertension or whatever..' (F3)

'Provide a structure, or some system, or point out where it goes wrong in practice' (D2)

A prominent theme was the need for training in strategies to manage time effectively and to be able to balance the priorities of doctor and patient as efficiently as possible within the confines of short consultation times:

'It's unsatisfying I think like, I often finish a consult and I feel totally like, they haven't really gotten sorted and I don't feel like I've addressed their issues..' (C3)

While training is not necessarily helpful with respect to increasing resources in practice, the participants recognised that there is a place for time management

training and sign-posting to resources which can help with efficiencies in both the medical management and organisation of patients with multimorbidity.

Participants also suggested that:

> *'The other thing that might be helpful as well is to decide some sort of teaching on who to investigate further because … you find say an anaemia in a person with multiple comorbidities and what does the specialist think when they get the person referred in? Is it appropriate that they have an OGD and colonoscopy or not?' (C6),*

suggesting that they took account of the influence of time management and efficiency on the lives of their patients as well as themselves.

Future training content: Communication enabling efficiency, patient satisfaction, and job satisfaction

The theme of communication, both between patients and doctors, and within the medical community arose frequently:

> *'because, oh my god, multimorbidity, it's a complicated topic. So you need to be able to move around it swiftly and efficiently. So good communication skills would be critical. '*
>
> *'Colleagues don't communicate with colleagues' (C2)*

This highlights the need for training in communication skills but in the context of deficiencies in secondary care communication rather than recognising any need for training for primary care:

> *'The specialist for one thing might issue a plan that the specialist for another thing doesn't know and you're in the middle trying to.. engage two specialists.. working within the same hospital.. but it has to come out to you in the hospital to be reflected back in' (D 3)*

While this did not relate specifically to the focus of the study, the frequency with which communication issues arose within the data suggests that incorporating

communications training into the intervention may enable reduction in work-related stress for participants:

> *'And also feeling that you hadn't done them justice...you know you're kind of overwhelmed with letters from the hospital and you're doling out these scripts and really not enough time to kind of break it down and structure it…you're just kind of firefighting'. (D1)*

Training in managing communication may enable doctors to challenge the decisions of hospital specialists and act as patient advocates: One participant described a situation where a prescription was received from secondary care by a patient for a drug which was contraindicated by her multimorbidity:

> *'Normally you're just like the little gilly that puts it on to the GMS [General Medical Services] paper' (D3)*

Future training content: Organising information

Organisational chaos was a sub-theme which arose repeatedly, and which was felt to be of huge importance:

> *'I feel like in managing multimorbidity, like it's all about the information and the way it is presented to you. I would be so much more on top of multimorbidity if I had something flash up on the screen, five types of things that they had at the moment and then you click off it and then you're ready to go. '(F2)*

Training in the organisation of this information was recognised as helping in decision-making for patients with multimorbidity, not only for GP trainees but for hospital doctors too:

> *'Yeah, once everything is organised it's definitely a lot easier so if some poor SHO [senior house officer] puts in an hour in the day hospital figuring everything out, sending him for an xray the same day, doing bloods the same day and the CT [Computed tomography] brain, or whatever it might be. And getting everything there and then sort of*

*informing your decision on the basis of that, you can do it. But in GP, it's just this vacuum of chaos'. (*D4)

Training in use of computerised medical records and coding patient diseases within them was also highlighted as important by the GP trainees in the focus groups, and they also suggested that this was important for experienced GPs and could be incorporated into continuing medical education (CME).

4.4.3.3.4 Intertwining of themes

The researcher recognised significant interrelation between different themes – for instance:

> *'For example, someone with many different medical problems may have correspondence from many different consultants and those medical consultants may not be aware of decisions the other consultants are making and you are kind of in the middle of all this mess. And I suppose there is a lot more things to check every time you decide to put somebody on antibiotics, on warfarin, you have to check this and there is an awful lot more things to check, more steps before you can actually make that decision… I suppose there is an awful lot more uncertainty really as what's going to be the outcome of it… So time is definitely an issue and just getting the information all there and well organised is kind of difficult as well.' (D1)*

This single passage includes managing complex consultations, communication, improving knowledge and use of evidence, uncertainty, accessing resources, and organising information.

4.4.3.4 Summary of qualitative findings

The qualitative work utilised focus groups to explore in depth the experiences of GP trainees in managing patients with multimorbidity. The data obtained from the focus groups was subjected to thematic analysis, and provided a rich insight into the training experiences and requirements of this group of doctors. The analysis of the focus group data confirmed the importance and relevance of training in multimorbidity for GP trainees in their clinical training years, and suggested a perceived lack of multimorbidity content within the curriculum as it is currently delivered. Specifically, the trainees felt that there were deficiencies in training related to clinical challenges; patient factors such as conflicting agendas; and system factors such as time and resources.

Participants suggested that training in management of patients with multimorbidity should be delivered within their GP curriculum, preferably by GPs or by a GP in conjunction with a general physician or geriatrician, to ensure that the content is relevant and applicable to their daily clinical practice. It was suggested that cost and lack of time may present obstacles which would prevent doctors participating in training in multimorbidity. Other proposed obstacles were related to format of training: didactic lectures were not of interest.

Focus group participants suggested that training in the management of multimorbidity should include management of complex consultations; communication; organisation of information; and management of complexity and uncertainty. Inclusion of balancing the doctor's agenda and the patient's agenda, time pressures, communication with patients and with secondary care, organisational chaos, and the management of the inevitable complexity of patients with multimorbidity were felt to be important components of any training intervention being proposed. The complexity of multimorbidity was well-recognised, and seen to be a significant challenge to participants.

4.5 Integration of quantitative and qualitative findings

Mixed methods study requires integration of the quantitative and qualitative findings to achieve a 'whole greater than the sum of the parts' (127). In this study, triangulation was used to integrate findings from the individual studies (128). Lists of findings were compiled from both the qualitative and quantitative components of the study, and potential areas of convergence, complementarity, and dissonance were examined.

4.5.1 Integration of results: GP trainees

The integration of qualitative and quantitative results was challenging as the qualitative data related only to GP trainees: the analysis was adjusted to reflect this. Overall there was significant convergence between the surveys and focus groups related to the importance of multimorbidity in the daily practice of participants. Quantitative results illustrated a lack of multimorbidity content in the curriculum GP trainees: the overwhelming reports of experiential learning rather than formal multimorbidity teaching illustrates the impact of lack guidelines and formal curricula on the training of doctors in management of this complex patient group.

4.5.2 Integration of results: Physician trainees

Review of the RCPI trainee quantitative survey results and the thematic analysis of their free-text quotes suggested similar training needs to those of the GP participants, indicating a similar lack of formal training in the area. While there was no qualitative data, the results of the survey and comments could be used to support the development of training materials for physicians. The principal difference within the diverse general medical trainee group was the significance of the trainees' individual specialties on the perceived relevance of multimorbidity to their practice and to their training needs, and to their level of confidence in management of this patient group.

4.5.3 Integration of results: Trainers and trainees

Within the quantitative study, there were conflicting results between trainers and trainees: while trainees felt that their trainers were best suited to deliver multimorbidity content, the trainers' survey demonstrated a lack of confidence in the area, and a distinct lack of formal training. Despite this, more than half of trainers stated that they were already delivering training in multimorbidity. This dissonance suggests that it may be prudent to consider piloting a 'training the trainers' intervention in further work, to facilitate up-skilling of the experienced trainers in relation to multimorbidity.

4.5.4 Integration of mixed methods needs assessment summary

Overall, this assessment of learning needs illustrated a definite lack of training of doctors in management of patients with multimorbidity. With respect to options for training, participants indicated a preference for a workshop format, and both trainees and trainers indicated a willingness to participate in interventions aimed at upskilling them in this area.

4.6 Integration with literature and systematic review

The learning needs assessment supported the findings of the literature and systematic reviews which demonstrated a lack of validated or formal educational content on multimorbidity.

Comparison of this needs assessment with the existing literature which is detailed in the systematic review is encouraging: the two studies included provided training in the format of workshops or online modules, which were the preference of participants in this study. Just one of the included studies carried out a needs assessment: this study recognised that assessment of need provided a firm grounding on which to develop an intervention. While the studies included in the systematic review related only to family medicine or general practice this study broadened the knowledge base related to learning needs of

other doctors, demonstrating that multimorbidity is an important topic for physicians as well (107, 108).

While the literature addressing the management of multimorbidity is increasing, the educational aspects need further research and evaluation. As such, it was felt that the next stage of this project, development and piloting of an intervention, was appropriate and potentially useful.

4.7 Discussion

4.7.1 Summary

The mixed methods needs assessment used quantitative and qualitative methods to define and explore the training needs of doctors in management of patients with multimorbidity. The integrated results illustrated the relevance of multimorbidity in daily clinical practice amongst GPs and physicians (depending on individual specialty), and the lack of specific training in the area for both trainees and trainers involved in the study.

Exploration of limitations to the implementation of training highlighted the financial and time demands on doctors, but also demonstrated the willingness of doctors to attend training which is relevant, practical and accessible. Gaps in training were outlined, and demonstrated insight of participants into the complexity of, and challenges related to, management of this patient group. The need for guidelines and practical strategies to improve care of patients with multimorbidity in practice in both primary and secondary care was clearly demonstrated.

4.7.2 Strengths and weaknesses of the needs assessment

This mixed methods needs assessment gives a robust assessment of the learning needs of doctors in relation to management of patients with multimorbidity.

To our knowledge this is the first study of its kind to assess training needs prior to development of an intervention to train doctors in management of patients with multimorbidity. A study of Wilkinson et al. reported semi-structured interviews with family physicians who were caring for people with intellectual disability: while some of the needs which arose were specific to patients with intellectual disability (i.e. anxiety related to difficult behaviours), some of the issues were more generic and reflect issues which arose in the multimorbidity needs assessment, such as lack of guidelines, lack of experience, and a request for experiential rather than theoretical learning (129, 130).

To maximise the validity of the needs assessment in the context of a short project, mixed methods were used, and engagement with more than one postgraduate training group was attempted: this was successful for the quantitative portion of the work, but unfortunately there were insufficient volunteers from the physician trainees who were approached. The invitation to participate in the quantitative study was circulated to all GP trainees in Ireland, and to all physician trainees in their first two or last two years of training, to maximise the diversity of those participating. The disparate distribution of the GP trainees who volunteered led to a change in plan, resulting in GP training programmes being approached to participate, and the final focus groups being carried out in both urban and rural settings to increase generalisability and reduce bias. This provided rich data on which to base the analysis.

The reasons for recruitment difficulty are unknown: it may have been that those who participated in the quantitative survey did not see the need for focus groups: perhaps they felt that they had given sufficient information already. Response rates to surveys in general practice are low when compared to those of the general public, so the fact that the response rate in this survey was in line with those of the ICGP was reassuring (131).

4.8 Conclusion

The overarching conclusion which emerged from the needs assessment was that multimorbidity is a common, significant, challenging topic which requires further practical, relevant training at all stages of a GP's career, and which requires resources of both time and money to enable GPs to use their skills, in optimising treatment and care of this disparate patient group.

Specific training needs were identified including the need to address areas of clinical challenge, acknowledge patient factors and system factors to enable doctors to enhance their skills and competence in management of patients with multimorbidity. The preferred format for education was workshop training, ideally within the normal training time for postgraduate trainees. The findings provided a strong foundation for the development of the pilot intervention, which will be outlined in the following chapter.

Chapter five

Intervention development and feasibility testing

Chapter 5 Intervention development and feasibility testing

5.1 Introduction

This chapter describes the development of an intervention to support training of doctors to manage patients with multimorbidity. The Medical Research Council (MRC) Framework was used in the development, feasibility and evaluation of the pilot workshop (132). The development of the intervention, the intervention components, the pilot study, and results of evaluation will be presented, and a discussion will complete the chapter.

5.2 Aims

The aim was to develop and test the feasibility of a pilot multimorbidity training workshop for GPs.

5.3 Background to research design: The Medical Research Council (MRC) Framework

The MRC framework for development and evaluation of a complex intervention was initially proposed to address the methodological challenges posed by interventions which involve multiple components that interact with each other. While the initial MRC framework (see figure 5.1) proposed a linear progression through each of the four phases of development, feasibility & piloting, evaluation and implementation, subsequent work recognised that progression could be linear, cyclical, or neither of these, and that issues which arise can be addressed at any stage (133). While the guidance was updated in 2008 and 2015 (134), at the time of the development of the intervention, the 2006 guidance was in operation, and was used to clearly outline the steps which were taken in the development, piloting and evaluation of the intervention proposed (135, 136).

Figure 5.1: The MRC framework for developing complex intervention in healthcare

5.4 Phase one: Development of the intervention

The first step of phase one of the MRC framework involves identification of the current evidence base related to the topic, so that the intervention can be appropriately developed. The second step of phase one involves identifying or developing theory: i.e. investigating a theoretical understanding of how change

is likely to occur in the light of the intervention. The final step of phase one is the modelling of processes and outcomes: identifying the components of the intervention, its possible effects, and how the various components might relate to and interact with each other.

5.4.1 Current evidence

In order to develop a robust intervention in the context of this project, the existing evidence base was identified in the systematic review, outlined in chapter three.

The review identified two studies which had developed and implemented a training workshop for doctors (137). Both groups demonstrated that it is feasible to deliver workshop training or an online training module addressing multimorbidity over a short period to physicians. The effectiveness of the modules was not confirmed, and further research and evaluation of the area was required before definite benefit could be proven.

5.4.2 Identifying and developing theory for intervention and evaluation

Learning science suggests that understanding is actively constructed, requiring an engaged learner (138, 139). Learning is also additive, building on current understanding, and adding both theoretically and experientially to existing knowledge (137). Action learning methods involve solving real problems by taking action and reflecting on the results. This is thought to improve problem-solving approaches and enhance deep learning which is critical for doctors managing patients with multimorbidity (139). The qualitative results of this project indicate that action learning methods are the preference of doctors: this method promotes curiosity and the importance of reflection, and requires that theory is converted efficiently into actions which solve problems.

Small group learning or workshop best practice suggests that groups should comprise 8-10 people, with a physical set-up which allows participants to see each other (37, 39). Ideally, a workshop aims to engage all learners, and outline goals and expectations of the planned session (140). ‘Triggers’, such as clinical

problems, or videos can be used at the beginning of workshops, giving context and relevance to the content, and allowing participants to recall relevant cases for discussion. Social cognitive learning theory suggests that this improves learning by providing a social activity, and enables participants to learn by hearing of others' experiences, getting their feedback, and by observing others within the group learning situation (140).

5.4.3 Evaluation and outcome measurement theory

Selection of appropriate outcome measures is clearly of critical importance in the evaluation of any proposed intervention to determine the merit of the programme delivered. No appropriate validated measure was identified either during the systematic review, or subsequently when specific searches were carried out to locate relevant measures. Outcomes need to assess the usefulness, relevance, content and teaching methods of the workshop, and also to assess intent to change of participants after the workshop (141-143). This mirrors Kirkpatrick's model of four broad classes of intervention outcomes: reaction (satisfaction), learning (knowledge, skills and attitudes), behaviours, and results (effects on patients) (140).

5.4.4 Modelling processes and outcomes

The final part of phase one of the MRC framework for complex interventions involves the development of the intervention components, based on the evidence and theory described above and in preparation for feasibility and/or pilot studies.

The needs assessment identified a lack of validated training and evaluation, and a subjective need for training in the management of patients with multimorbidity. Participants were keen to participate in training, and their preference was for a workshop format of teaching incorporated into their regular training day. Participants were specific in suggesting that if non-GP trainers were delivering training, they would need to have an awareness of the limitations encountered in general practice, so that targeted, focused teaching could be facilitated.

The findings from the systematic review, mixed-methods needs assessment, and learning theory were used to structure an engaging workshop which would build on the clinical and theoretical experience of participants, and which would provide them with an opportunity to refine their knowledge and skills, and reflect on their attitudes to patients with multimorbidity. The intervention, a multimorbidity workshop, was developed, aimed specifically at qualified doctors in general practice. While the initial quantitative survey was administered to both physician and GP trainees and GP trainers, the qualitative work involved only GP trainees: so the workshop focussed just on GPs. The components of the intervention are outlined below in section 5.4.6.

5.4.5 Ethical considerations

This study was approved by the Research Ethics Committee of the Royal College of Surgeons in Ireland. Consent was obtained from all participants, and questionnaires were anonymised: participants were each given a numbered pre- and post-workshop questionnaire, so that their responses could be linked to each other and comparisons made. No key for association of the questionnaire number to participant demographics was made. No significant or unexpected ethical issues arose during the intervention.

5.4.6 Intervention (workshop)

The workshop development is summarised in figure 5.2 below, and described in detail thereafter.

Figure 5.2 Workshop development

The components of the intervention are as follows:

5.4.6.1 Learning outcomes

1. Describe the common problems which GPs encounter while managing patients with multimorbidity in the community
2. Enable understanding of the impact of multimorbidity on patient health outcomes and the healthcare system and the challenges they present
3. Outline a framework for use in approaching multimorbidity consultations, to streamline the workload of management of these patients
4. Use case studies to describe management of multimorbidity patients in the community.

5.4.6.2 Workshop format and content

A workshop was planned which would enable information sharing, interaction and facilitation of discussion, while engaging the participants in the content. The workshop was framed by a presentation which guided the facilitators and participants through the content.

As the systematic review indicated that there was little published literature addressing the training of doctors to manage patients with multimorbidity, the workshop started by clarifying what is meant by the term ‘multimorbidity’, and provided some basic epidemiological data about the prevalence of the condition in the community.

Participants were encouraged throughout to reflect on their own practice, and to contribute their experiences and clinical cases during the workshop. The presentation included the following topics:

a. Introduction to multimorbidity
b. Challenges in the management of patients with multimorbidity
c. Proposal for a ‘planned approach’ which could be used within an individual patient consultation, and this was discussed with the participants
d. Clinical case discussion

e. The final part of the workshop comprised an overview of findings of a systematic review addressing interventions for improving outcomes in patients with multimorbidity in primary care and community settings (144).

Full details of the workshop presentation are provided in Appendix 12.

5.4.6.3 Outcome measurement and evaluation

Outcomes focusing on the key challenges facing doctors managing multimorbdity were identified and measured using a pre- and post-workshop questionnaire (Appendix 13). These were developed as part of this project as there was no validated measure available in the public domain which could be used.

Outcomes included:

- Confidence managing patients with multimorbidity
- Subjective knowledge regarding management of multimorbidity
- Relevance of clinical guidelines to clinical practice
- Attitudes towards prioritisation of problems, coordination of care, and continuity of care
- Evaluation of interest in attending further training
- Understanding of challenges of multimorbidity management
- Resources used when information or further advice is needed

Likert item responses were used to allow a scaling response indicating the participants' level of agreement or disagreement with the statements given, capturing their intensity of feelings for a given item (144). These item responses provided ordinal data for analysis. Five response categories were included in each Likert item used, as this is within the optimal range of 5-7 options recommended (145). The researcher was aware of potential bias which could arise:

Table 5.1: Potential sources of bias in outcome measurement

Bias	Description
Central tendency bias	Avoidance of the use of extreme response categories
Acquiescence bias	Agreeing with statements as presented
Social desirability bias	Participants attempting to portray themselves in a more favorable light

It was hoped that the anonymous nature of the survey would help in reducing the tendency to these biases, and consideration of them was made in the analysis of data.

The questionnaires were piloted amongst a small group of academic and clinical GPs prior to use in the pilot workshops, and can be found in Appendix 13.

5.5 Phase two: Feasibility and piloting

A feasibility study can be defined as a study which assesses whether a future study, project or development can be done (146). While there are various definitions of pilot studies, for consistency the MRC framework definition was used in this project: that is, that a pilot study is not necessarily a 'scale model' of a planned intervention, but attempts instead to address the main uncertainties that arise in the development of the intervention. Since this project began, there have been further developments in feasibility and pilot study design highlighting the need for clear reporting of exact processes involved (33).

A feasibility study was planned to determine whether the workshop and its components were acceptable to an audience of GPs, and to see if an educational module addressing management of patients with multimorbidity was of interest to the target population. The main uncertainties which were anticipated surrounded the evaluation, as there was no validated questionnaire available.

5.5.1 Overall description

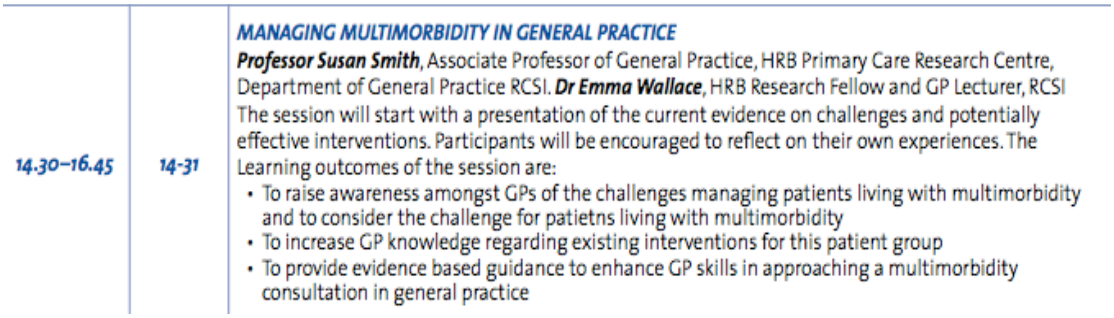
A single pilot workshop was completed. This was delivered to GPs attending the Irish College of General Practitioners' Summer School. The participants were informed of the nature of the study, and details and results are presented below.

5.5.2 Setting and participants

The ICGP Summer School is an annual meeting attended by approximately 300 of the 4,000 members of the college. It provides educational meetings and workshops in a relatively informal setting to GP members in Ireland.

The quantitative needs assessment was carried out amongst trainees and established GPs but the qualitative elements only involved trainees. The ICGP Summer School provided an opportunity to deliver the workshop to a mixed audience of experienced GPs and trainees, which was consistent with the overall aim of the workshop and the project, which included sharing common experiences and potential solutions based on clinical practice.

Attendees at the Summer School were sent a programme prior to the commencement of the meeting, which included the workshop as an optional attendance.



14.30–16.45	14-31	***MANAGING MULTIMORBIDITY IN GENERAL PRACTICE*** ***Professor Susan Smith***, Associate Professor of General Practice, HRB Primary Care Research Centre, Department of General Practice RCSI. ***Dr Emma Wallace***, HRB Research Fellow and GP Lecturer, RCSI The session will start with a presentation of the current evidence on challenges and potentially effective interventions. Participants will be encouraged to reflect on their own experiences. The Learning outcomes of the session are: • To raise awareness amongst GPs of the challenges managing patients living with multimorbidity and to consider the challenge for patietns living with multimorbidity • To increase GP knowledge regarding existing interventions for this patient group • To provide evidence based guidance to enhance GP skills in approaching a multimorbidity consultation in general practice

Figure 5.3: Summer school programme announcement of workshop

One pilot workshop was delivered, and was fully subscribed at fifteen participants.

5.5.3 Facilitators

The workshop was delivered by an associate professor of general practice (Susan Smith) and a research fellow/GP lecturer (Emma Wallace).

Both facilitators are practising GPs and have significant interest and research experience in multimorbidity. They were involved in the development of the workshop, as well as co-authors of the systematic review. It was felt that the validity of the study would be increased by delivery of the workshop by someone other than the author of this thesis, and it was hoped that participants would be able to honestly evaluate the session when the feedback was in written form, immediately after the session.

5.5.4 Format

The workshop was scheduled to run for two hours and fifteen minutes, and fifteen places were offered on a first come, first served basis to attendees of the Summer School. The limited numbers were to ensure that small group discussion was possible. An appropriate room was available so that the group could be facilitated comfortably, and participants were informed at the beginning of the workshop about the study and its purpose. They were informed that they were under no obligation to participate in the evaluation, and that they were not precluded from the workshop by non-participation in the study. On arrival at the workshop, participants were given a workshop pack containing four documents:

1. Pre-workshop questionnaire (Appendix 13)
2. Post-workshop questionnaire (Appendix 13)
3. Consent form (Appendix 14)
4. Demographics form (Appendix 15)

The workshop was delivered, and participants were asked to fill out the post-workshop questionnaire prior to leaving after the workshop.

5.5.5 Content: Workshop presentation overview

Details of the workshop content are provided in Appendix 12. Participants were encouraged to reflect on their own practice, and to share their experiences and clinical cases throughout the workshop.

5.6 Phase three: Evaluation

A before-after evaluation of the multimorbidity workshop was carried out using a questionnaire evaluating learning outcomes described in Appendix 13. Two of the questions were asked in the pre-workshop questionnaire only: these enquired about the current use of guidelines when managing patients with multimorbidity, and about ease in prioritising problems which arise in these consultations. Eight further questions were answered both before and after the workshop and results were compared to determine effect. Two final questions were asked only after the workshop: these related to the multimorbidity framework, which was presented, and to participant interest in attending further training.

5.6.1 Results

5.6.1.1 Participant characteristics

Fifteen participants attended the workshop. One arrived late, and did not complete the pre-workshop questionnaire. Another participant did not complete the post-workshop questionnaire, and no consent was signed by one participant. Twelve participants both provided consent and completed the pre- and post-workshop questionnaires, and these were used in the analysis. Demographic data was provided by only six participants (50%). Of the six who provided demographic data, five were qualified GPs and one was a trainee. Half of participants were male, and the majority were under the age of 46 years. Just one participant had graduated from medical school in the preceding ten years, and four had at least ten years of experience in general practice. Five of the six

of those who provided demographic data saw patients with multimorbidity most days or every day.

5.6.1.2 Questionnaire results and analysis

The results of the questionnaire are presented in this section and discussed individually, with a summary to follow.

5.6.1.2.0 Guidelines

Initial questions addressed the participants' views on the use of guidelines in management of patients with multimorbidity.

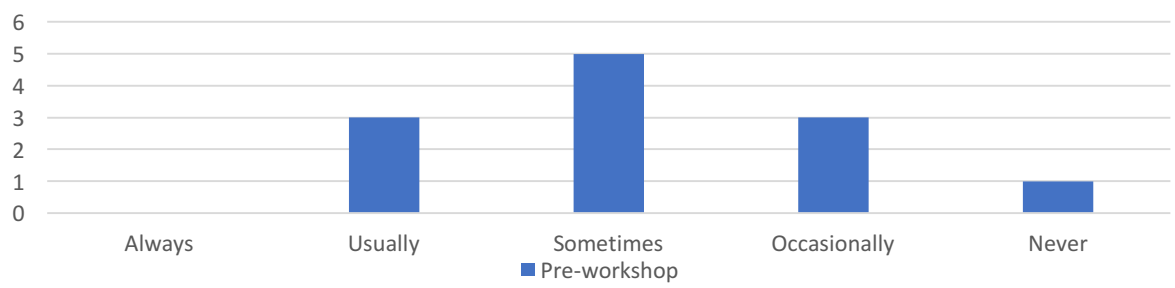


Figure 5.4 Question 1. How often do you use current available guidelines in your management of patients with multimorbidity?

66% (8/12) of participants reported that guidelines were sometimes or usually used in practice: no one reported that they always used them, which is not surprising given their frequent lack of applicability in the multimorbidity setting.

5.6.1.2.1 Prioritisation

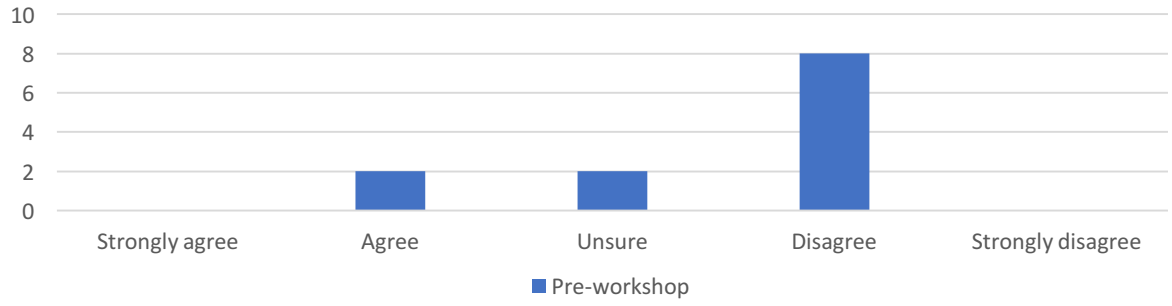


Figure 5.5 Question 2. I find it easy to prioritise problems arising in multimorbidity patients within my usual appointment times.

Prioritising the problems of patients with multimorbidity was not easy for most doctors: only two out of 12 participants felt it was easy.

5.6.1.2.2 Confidence

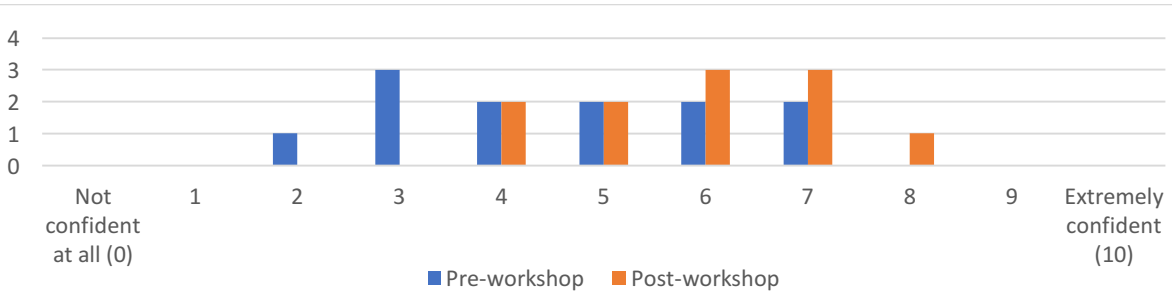


Figure 5.6 Question 3. How confident are you in managing patients with multimorbidity?

This was a general lack of confidence in managing these patients voiced in question but an overall trend towards an improvement in confidence after the workshop.

5.6.1.2.3 Knowledge

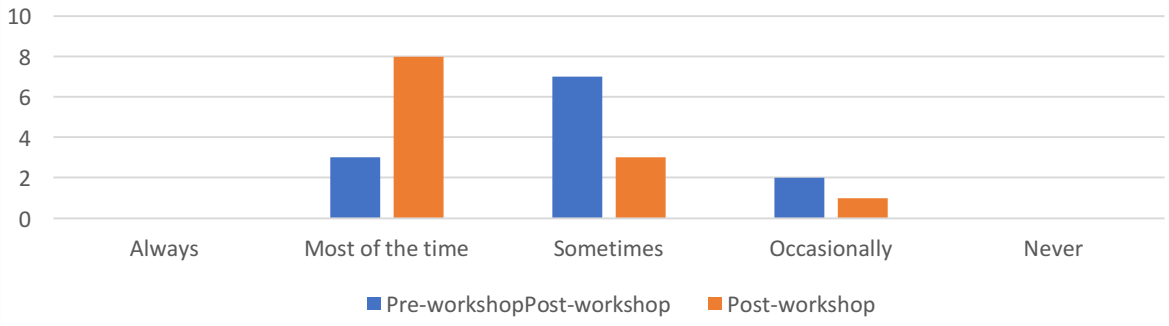


Figure 5.7 Question 4. I have adequate knowledge to manage patients with multimorbidity.

While specific knowledge about therapeutics or management was not a focus of the workshop, more participants felt that they had adequate knowledge to manage this patient group on completion of the workshop.

5.6.1.2.4 Coordination of care

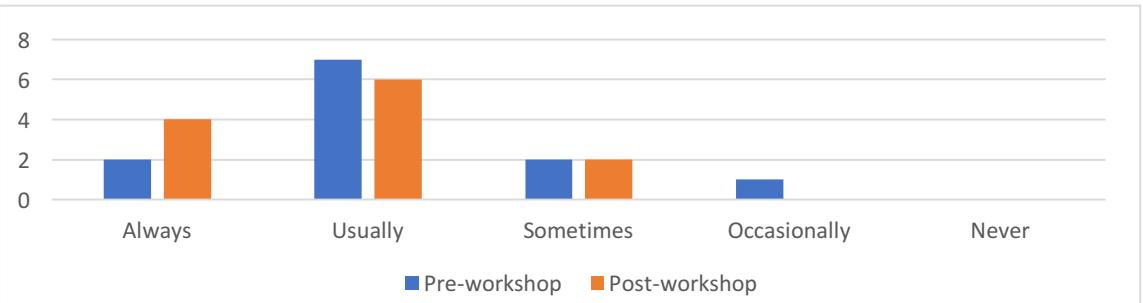


Figure 5.8 Question 5. Do you feel that coordination of care of multimorbidity patients is primarily the responsibility of the GP?

Most participants felt that coordination of care of multimorbidity patients was primarily the responsibility of the GP, and this remained generally unchanged before and after the workshop.

5.6.1.2.5 Named GP

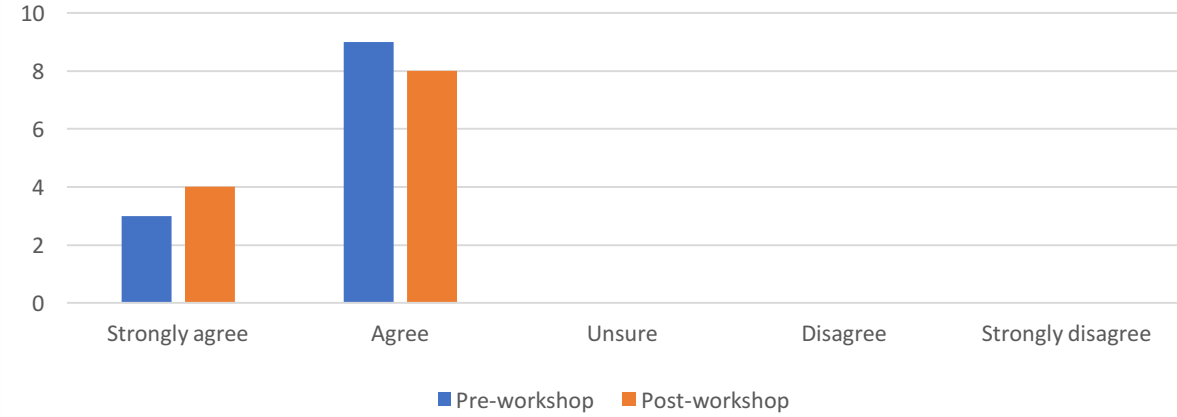


Figure 5.9 Question 6. I think that a named GP providing continuity of care for patients with multimorbidity improves outcomes.

Similarly, participant opinions regarding importance of a named GP providing continuity of care for improved outcomes was unchanged by the workshop.

5.6.1.2.6 Scope of multimorbidity

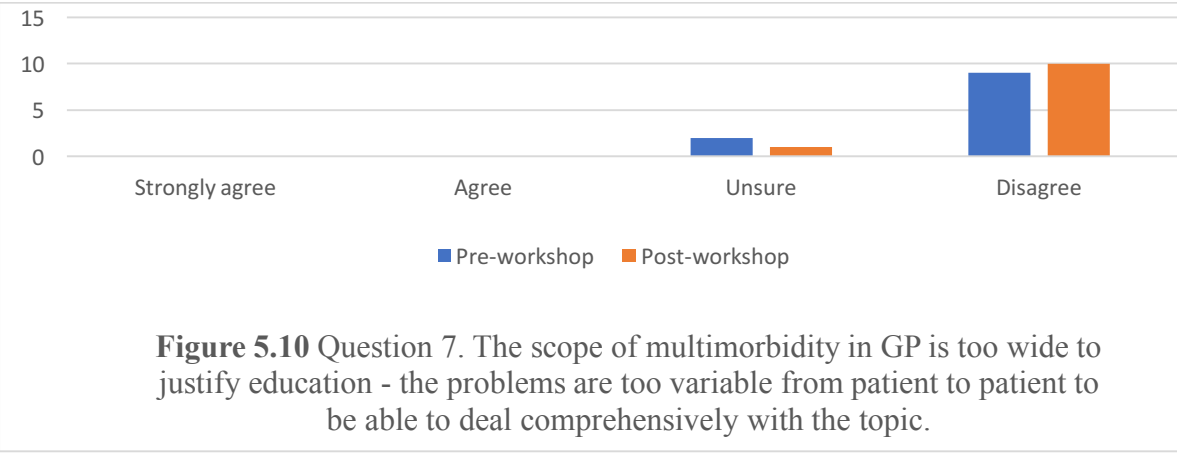


Figure 5.10 Question 7. The scope of multimorbidity in GP is too wide to justify education - the problems are too variable from patient to patient to be able to deal comprehensively with the topic.

Three quarters of participants disagreed with the statement that the scope of multimorbidity in GP is too wide to justify education, and there was little change in this in the post-workshop questionnaire. This is reassuring: it would suggest that participants felt that training could help, and that the problems are surmountable.

5.6.1.2.7 Problems associated with multimorbidity

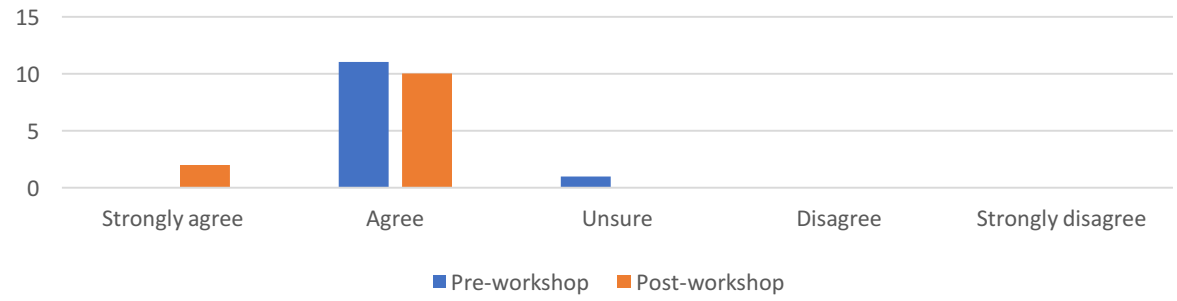


Figure 5.11 Question 8. I am confident that I can describe some of the common problems associated with managing patients with multimorbidity.

Almost all participants felt that they could describe problems associated with the management of patients with multimorbidity: this is not surprising, as the demographic information provided suggested that the large majority of participants encountered patients with multimorbidity most days.

5.6.1.2.8 Impact of multimorbidity

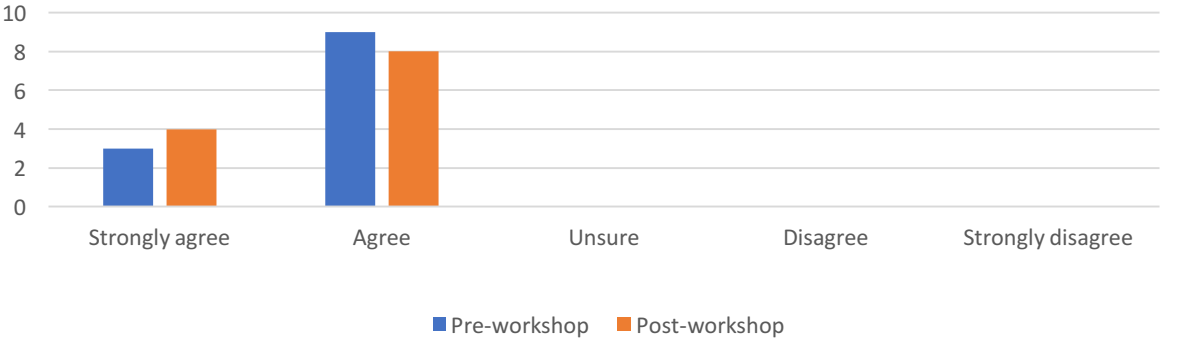


Figure 5.12 Question 9. I have a good understanding of the impact of multimorbidity on patient health outcomes and the healthcare system.

Doctors felt that they were aware of the impact of multimorbidity, and this was not significantly changed by participation in the workshop.

5.6.1.2.9 Resources

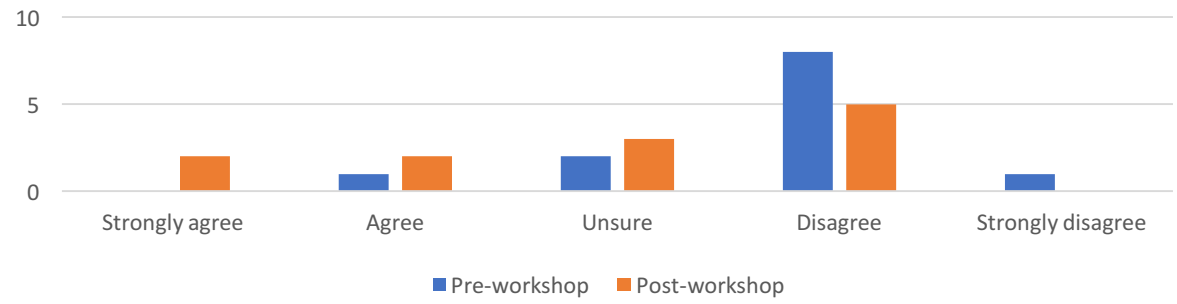


Figure 5.13 Question 10. I feel that I have adequate tools and resources to deal with patients with multimorbidity in my practice.

There was a slight shift in the level of confidence in the resources available to GPs after the workshop: GPs felt better equipped after the workshop than before. It may be that participants had not recognised that a lot of their competencies just need to be re-focussed rather than changed when caring for this patient group. One participant wrote: '[I] became aware that I have the knowledge and skills to deal with these patients but need to change my way of thinking' (Participant 4).

5.6.1.2.10 Multimorbidity consultation framework

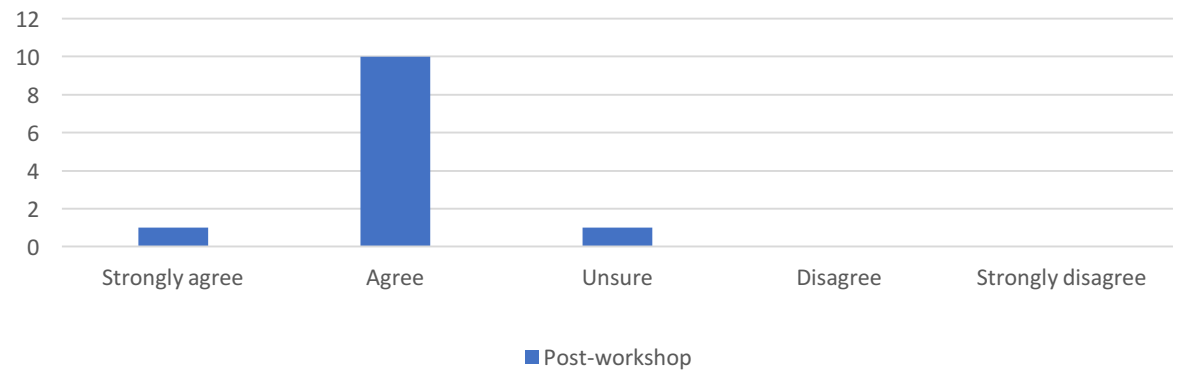


Figure 5.14 Question 11. I am confident that I can use the multimorbidity framework proposed in this workshop in my clinical practice.

Encouragingly, 92% of participants felt that they would be confident using the proposed framework for multimorbidity consultations within their clinical practice.

5.6.1.2.11 Further training

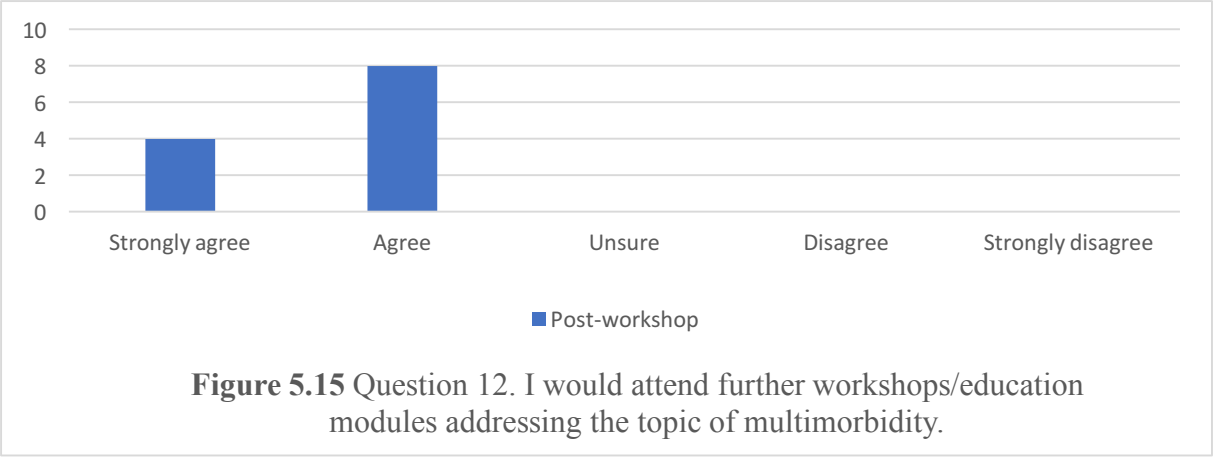


Figure 5.15 Question 12. I would attend further workshops/education modules addressing the topic of multimorbidity.

All participants said that they were willing to attend further training in managing patients with multimorbidity in the future.

5.6.1.2.12 Most challenging aspects of managing multimorbidity

Participants were also asked to rank which aspects of managing patients with multimorbidity they found most challenging from 1-4, with one being the subject they found most challenging, and four that which they found least challenging.

Table 5.2 How challenging do you find the following when managing patients with multimorbidity? Please rank the options below (1 = most challenging, 4 = least challenging)

Subject	Pre- or post-workshop	Preference of participant			
		1	2	3	4
Multisystem disease management	Pre	n=4	n=2	n=1	n=4
	Post	n=2	n=3	n=3	n=3
Prescribing in patients on multiple long term medications	Pre	n=3	n=2	n=6	n=0
	Post	n=1	n=3	n=5	n=1
Coordination of care in patients with multiple comorbidities / chronic diseases	Pre	n=2	n=7	n=3	n=
	Post	n=6	n=2	n=2	n=1
Supporting self-management in patients with multimorbidity	Pre	n=3	n=1	n=3	n=6
	Post	n=2	n=4	n=1	n=4
Other: please specify	Time management				

There was little agreement in response to this or the following question: this was a pilot workshop, and with just fifteen participants, and evaluations from three eliminated, it was difficult to draw robust conclusions. While the coordination of care in patients with multimorbidity was regarded as the most challenging aspect in both the pre- and post-workshop questionnaires, there was quite an equal distribution of responses, so further analysis is difficult.

5.6.1.2.13 Sources of information

Participants were also asked to indicate in order of preference where them most commonly seek information or advice.

Table 5.3 Where do you look for further information?

Please rank the options below: When you encounter a patient with multimorbidity and you are not sure what to do, where do you most commonly seek information or advice? Please rank the options below (1 = most commonly, 7 = least commonly)

Subject	Pre- or post-workshop	Preference of participant						
		1	**2**	**3**	**4**	**5**	**6**	**7**
		Number of participants						
Ask a GP colleague for help	Pre	5	2	3	1	0	0	0
	Post	2	5	1	0	0	0	0
Look for an answer to the question in a journal or textbook	Pre	0	4	0	4	5	0	1
	Post	0	2	4	1	0	1	3
I don't have time to look for an answer in a busy surgery, so I use my experience and find a practical solution	Pre	0	0	1	3	1	1	2
	Post	0	0	0	2	1	4	4
Ask a specialist / consultant colleague for help	Pre	0	0	2	2	5	2	1
	Post	1	0	2	5	2	2	0
Refer to secondary care (outpatient department or A&E)	Pre	0	0	0	1	1	4	3
	Post	1	0	1	1	4	2	3
Keep a note of the issue and ask at a CME meeting or conference	Pre	0	1	3	0	3	2	1
	Post	3	0	4	2	3	2	0
I use an online search engine and look for an answer there	Pre	6	2	3	1	1	0	0
	Post							

Only ten participants fully completed this question, and they indicated after the workshop that they would be most likely to refer to a GP colleague or an online search in situations where they need further information or advice about managing patients with multimorbidity.

5.6.1.3 Analysis of results

Just twelve participants provided consent and completed the pre-and post-test questionnaires. Consideration was given to how best to analyse these responses given the very small numbers involved. Bar graph presentation of Likert scales were chosen to allow easy visual interpretation of the limited data available. it was hoped that further pilot workshops could be delivered in other settings so that robust quantitative analysis of the results could be completed, but unfortunately there was insufficient time to allow more pilots prior to completion of this project.

5.6.1.4 Participant feedback

Three of the twelve participants provided additional written feedback at the end of the workshop: this was all positive: participants engaged well in discussion, and appeared interested and involved in the topic.

> *'Excellent session – great to see such practical research to manage such cases successfully in the community. General practice needs adequate resources and access to primary care teams and funding.' (Participant 12)*
>
> *'Excellent workshop – became aware that I have the knowledge and skills to deal with these patients but need to change my way of thinking' (Participant 4)*

5.6.1.5 Facilitator feedback

There were two facilitators of the workshop and they provided oral feedback about the workshop.

They felt that the workshop was well received, and that the content was appropriate to the audience involved. Interaction with participants was good, with sufficient time for discussion. The cases presented and discussed were thought to grounded in practice rather than theoretical, and that was welcomed.

It was suggested that the layout of the paperwork given to the participants, which included consent, a demographics sheet, and a pre- and post-workshop questionnaire be changed for future workshops, so that the demographics sheet is on a separate page, as it seemed that some participants did not take note of it.

5.7 Discussion

This part of the project involved the use of the MRC framework to develop, pilot, and evaluate a complex intervention aimed at training doctors to manage patients with multimorbidity. A workshop was developed using the preceding systematic review, mixed methods needs assessment and educational theory (24). A feasibility study of the intervention was delivered at the annual ICGP Summer School to a group of fifteen GPs, who evaluated the intervention at the end of the workshop. The feasibility study suggested that it was feasible to deliver the workshop which was well received by participating doctors. Although the numbers were small, feedback was encouraging. The multimorbidity framework which was proposed was welcomed.

Work on evaluation of the impact of the intervention is necessary: the very small numbers of completed before and after questionnaires made robust quantitative analysis of the data difficult, so Likert bar graphs were provided to facilitate visual interpretation of the limited results. From this limited data, there was little difference in responses elucidated between the pre- and post-workshop questionnaire, particularly for the topics relating to GP awareness of multimorbidity. There were trends showing an increase in confidence in managing multimorbidity patients, and a shift towards a preference for

consulting with colleagues over textbooks and participants needed advice. Evaluation of this type of intervention presents significant difficulties. There is no reliable, validated method of measuring participant response to a workshop of this type. Ultimately the aim is to change behaviour and attitudes with a view to improving outcomes for patients. The evaluation and impact analysis of a complex outcome involving behavioural change will be challenging, and will involve delayed evaluation and follow-up to assess the success of the intervention with respect to lasting change in clinical practice, and clinical impact on patients. Robust evaluation will be the key to assessing this change, and the lack of validated examples proved a problem in this case.

5.7.1 Comparison with the existing literature

Comparison with the existing literature which is detailed in the systematic review is encouraging. Similarities and differences exist with the two studies identified in the systematic review. Like this intervention, Andolsek's intervention targeted family doctors, whereas Maguire delivered their workshop to GP trainees only. While there are many similarities, the level of experience and the knowledge relating to local referral pathways plays a part in the management of these patients, and gives the experienced GP with better awareness of local systems an advantage over the trainee. This needs to be taken into consideration when appraising the results presented in these studies.

The content of Andolsek's workshop was developed based on a needs assessment carried out by an accredited CME provider (147). Maguire did not describe a theoretical basis for the development of their intervention, but instead the cases were developed by members of the programme directing team, based on patients seen in their clinical practice (148). The intervention piloted in the current study was developed using a mixed methods needs assessment.

None of the three studies used a validated outcome assessment, as none exist. Outcomes were measured using surveys in the Andolsek study, and using verbal and written feedback in the Maguire study (149). The outcomes of the

intervention in the current project were assessed using a before and after design with self-completed questionnaires.

5.7.2 Strengths and limitations of the study

A strength of this project was that the development of the intervention was based on educational theory, a systematic review of existing literature and a mixed methods needs assessment.

The format of the workshop was found to be acceptable to participants, who engaged well with the facilitators and gave positive feedback about the relevance and delivery of the intervention. The proposed multimorbidity consultation framework was positively received, and was subsequently developed further for a peer-reviewed Clinical Review in the British Medical Journal (149).

Limitations of the study relate primarily to the study population, and to evaluation. The study population was small – just one pilot workshop was planned, and fifteen participants attended. Ideally, further workshops would have been delivered and evaluated, but this was not possible in the timeframe permitted. Further work on the evaluation of the workshop is necessary: as it stands, there was little difference in responses elucidated between the pre- and post-workshop questionnaire for most outcomes, in the context of the small numbers of participants who attended the workshop. It will be challenging to develop a reliable, validated method of measuring participant response to a workshop of this type. Ultimately the aim is to change behaviour with a view to improving outcomes for patients. This is a complex outcome, and as such may not be amenable to robust evaluation on the day of the workshop.

5.7.3 Future research

Further development of the intervention and its evaluation is important. Initial reaction to the workshop was overwhelmingly positive. Some training needs which were highlighted in the qualitative and quantitative needs assessment were not included in this workshop, as they were not amenable to the format

which the workshop presented: for instance, information technology issues will require a different platform and skillset. Other issues which arose in the needs assessment, such as coding, payment, communication, critical appraisal skills and quality initiatives are not necessarily exclusive to multimorbidity, but certainly pose challenges to doctors involved in its management. Future research may allow incorporation of some of these other issues into training.

Given that the target audience for a training module in managing patients with multimorbidity includes doctors with a range of experience and interests, thought should be given to the possibility of enabling individualisation of material for the participants involved, to maximise the learning yield for doctors. It may be useful to allow participants identify content in advance of a training workshop to accommodate the individual learning needs and preferences of attendees. A facility such as an online voting platform or survey could be used to present potential attendees with topic options which can be delivered.

Future study designs need to consider the variety of experience of the target audience: should this be rolled out on a broader basis, there will be a need to refine the content to ensure efficient and productive use of participants' time. While the MRC framework is iterative in its nature, robust piloting is needed so that the intervention is fit for purpose prior to proceeding to full randomised controlled trial. Should the intervention be found at that stage to effect significant change, implementation on a larger scale can be considered.

5.7.4 Implications for policy and practice

This intervention study suggests that workshops in multimorbidity are acceptable to doctors, and are broadly welcomed by participants. While the outcome assessment needs further work, it suggests that there is a gap in the CME market for training in the management of patients with multimorbidity, and that that gap can be filled by an intervention in the form of a workshop.

Adding a robust, validated evaluation which looks at patient-relevant outcomes would be significantly more likely to influence change in policy and practice. As

patients with multimorbidity are now the norm in clinical practice, the challenges associated with their care need to be addressed, and their clinicians provided with the tools and skillsets to manage them appropriately, both in primary care and the community (37).

Chapter six:

Discussion

Chapter six Discussion

6.1 Introduction

This chapter will present a summary of the main findings of this project and discuss these findings in the context of the available existing literature. The strengths and limitations of the findings will be presented, along with the potential impact of the study. The chapter will conclude with recommendations for future research and implementation, and a reflection on the research process.

6.2 Summary of the main findings

This thesis summarises the current literature addressing management of multimorbidity, and presents a systematic review of educational interventions for multimorbidity. A mixed-method needs assessment involving trainees and trainers in general practice and general medicine showed a need for training in this area for both newly qualified and experienced doctors, and indicated a willingness of doctors to attend training, should it be made available to them. A workshop for GPs demonstrated an acceptable format of training which was well received, and which if proven effective, with some modifications, could be rolled-out on a larger basis to fill a gap in training.

Key findings:

1. A literature review regarding training in management of multimorbidity highlighted a number of key contextual points:
    - Difficulty relating to searching for evidence posed by conditions or concepts which are not included in the Medical Subject Heading (MeSH) thesaurus

- Challenges which are associated with the management of patients with multimorbidity
- Recent developments have included the publication of NICE guidelines on the identification and management of patients with multimorbidity, and a clinical review in the BMJ addressing clinical management of these patients
- Interventional studies underway: The 3D study and the Care-Plus study (39).

2. The systematic review looked at education and training formats which have been used to train postgraduate medical doctors in the management of patients with multimorbidity in primary and/or secondary care, and which have been shown to improve knowledge, skills, attitudes, and/or patient outcomes.

- Two studies with different study designs (one a non-randomised controlled trial and the other a pilot workshop) were included. They developed and evaluated training programmes for doctors in multimorbidity. The nRCT compared an interactive workshop with an online case study module, and the pilot workshop presented a review of current evidence followed by discussion of complex cases (37, 39).
- These studies demonstrated the feasibility of delivery of a workshop or an online training module to doctors, but the effectiveness of the training programmes (one of which was a pilot intervention), has yet to be robustly evaluated
- A proposed curriculum content (Figure 16) which synthesised some of these topics was developed.

3. The mixed methods needs assessment involved quantitative and qualitative exploration of the training needs of doctors in management of patients with multimorbidity, and a quantitative review of the training needs of some of their trainers.

Quantitative study

- The quantitative survey confirmed a need for training in management of patients with multimorbidity amongst the majority of trainee GPs and physicians
- The preference was for a workshop format for both groups
- The majority of trainers reported that they would not be adequately prepared to deliver multimorbidity training within their training scheme, despite more than half stating that they already did so.

Qualitative study

- The importance and relevance of training in management of patients with multimorbidity was confirmed, and participants highlighted a lack of curriculum content addressing this area for trainees in General Practice
- Challenges to implementation of training, and suggested content of an intervention were outlined.

Integration of qualitative and quantitative studies

- Triangulation showed convergence between the qualitative surveys and focus groups relating to relevance to daily practice, lack of training, and format of proposed training
- Trainers reported that they did not feel adequately prepared to deliver training in multimorbidity, despite more than half stating that they already did so: this dissonance demonstrates the importance of training the trainers to deliver any prospective programme in management of multimorbidity.

Integration of needs assessment with current evidence

- The mixed methods needs assessment supported the findings of the literature and systematic reviews, which demonstrated a lack of validated or formal educational content in multimorbidity

4. The proposed intervention was developed using the structure of the MRC Framework, informed by the existing evidence and the mixed methods needs assessment. It provided a platform for utilisation of the proposed curriculum in the delivery of training of doctors in the management of patients with multimorbidity.
    - The curriculum content proposed in appendix 16 is extensive and aspirational: some items such as critical appraisal skills, research context, and problem solving were excluded from the feasibility workshop
    - There are no validated measures of workshop success related to multimorbidity
    - The intervention developed comprised of a 90 minute, group-based workshop introducing multimorbidity and its challenges, proposing a framework for use in consultations with effected patients, and facilitating a multimorbidity clinical case discussion
    - A feasibility study found that the format and content was acceptable to an audience of GPs
    - Further work is needed on the evaluation of the intervention.

6.3 Comparison with existing literature

The two previously published studies which described interventions which were developed to provide training of doctors in management of patients with multimorbidity, and which are described in detail in the systematic review (Chapter 3) did not describe a needs assessment of potential attendees. This intervention was developed in response to a thorough review of the relevant

literature, and a qualitative and quantitative needs assessment. Neither this study nor the other two previously published used validated evaluations, as none are available. None of the three studies carried out long term follow-up to determine whether the intervention in question resulted in either a change in clinical practice or improved outcomes for patients with multimorbidity. All three studies indicate the interest of participants in the topic, their willingness to partake in training and the acceptability to doctors of both workshops and online case study formats.

6.4 Strengths and limitations

The strengths and limitations of the individual components of this research have been outlined in their respective chapters.

The systematic review was the first of its kind in the area, and was published in August 2016 in the Journal of Comorbidity (Appendix 1). The most significant limitation of the review of current evidence was the difficulty in developing a search strategy which captured the core material of interest. Searching the vast medical literature for a subject which is not included in the MeSH thesaurus was problematic and the possibility that relevant publications were omitted cannot be denied.

The two studies included in the systematic review were found to be at moderate to significant risk of bias, and the data was insufficient to allow meta-analysis of the results.

The mixed methods needs assessment provides the first study of its kind to our knowledge which robustly assesses the learning needs of doctors in the management of patients with multimorbidity. However, its applicability is limited due to difficulties recruiting a group of physicians for qualitative study, and by the homogeneity of the GP focus groups as they all comprised GP trainees. Integration of qualitative and quantitative findings was challenging as the relevant data related only to GP trainees: this resulted in a small dataset for

comparison, and limits the validity of the findings, particularly with respect to external applicability. However, it provides a foundation for future research, and allowed the development of a targeted intervention based on the requirements expressed by participants, and as such is worthy of inclusion.

One workshop was delivered, and attendance was capped at fifteen people to facilitate the desired interactive, discursive format which was the aim. However, data from three of the fifteen participants was unsuitable for analysis so the final sample size was just twelve. Of those twelve, just six provided demographic data, perhaps because of the layout of the information distributed to participants: this is a significant limitation of the study. The workshop itself was not delivered by the researcher, in an effort to increase the objectivity of both delivery and evaluation. This was, however, a feasibility study, and has provided some useful data and feedback which can be incorporated into future iterations for improvement of data yield.

6.5 Potential impact

Health research can have an impact on four main areas (18):

- Research-related impact
- Policy impact
- Service impact
- Society impact

This study can contribute to each of these fields, as detailed below.

6.5.1 Research impact

There is clearly scope for future research in this area: this study contributes to a sparse literature addressing the training of doctors in the management of multimorbidity. It provides a systematic review of the literature detailing two studies, both delivering case-based teaching, via either workshop or online training. While there was a disappointing absence of measurement of change in

patient outcomes or change in practice in the studies included in the systematic review, this is understandable when the duration of follow-up is considered. However, both doctor- and patient-related outcomes should be clearly defined and ideally blindly assessed in future research, in order to facilitate maximum extraction of gain from any multimorbidity training programme or module. The measurement of efficacy of such robustly designed and thoroughly evaluated interventions can contribute to the enhancement of clinical practice management of patients with multimorbidity through implementation on a larger and broader scale.

The study also describes a comprehensive mixed-methods needs assessment of both trainers and trainees who manage patients with multimorbidity.

It adds new knowledge to the area of training needs of doctors, and contributes to multimorbidity curriculum development which can provide a framework for future research.

The systematic review included in this study filled a significant gap in the literature, and has been both published in the Journal of Comorbidity and disseminated to the International Research Community on Multimorbidity (8).

6.5.2 Policy impact

At both local and national levels, this body of work can contribute significantly to the future training of doctors in the management of patients with multimorbidity.

Although there is broad recognition that patients with multimorbidity require care to be delivered by trained generalists rather than single system specialists there remains a shortage of generalists in many countries (106, 117). Providing more training positions in General Practice, General Internal Medicine and Geriatric Medicine may improve the ability of the health system to manage these complex patients in appropriate settings both within the community and on an in-patient basis if needed. Provision of more generalists alone will not suffice, and the available qualitative literature suggests that GPs feel underprepared to manage these patients (37, 39).

The proposed curriculum content (Appendix 16) derived from the extensive literature search can be used as a basis for development of a formal multimorbidity training curriculum in the future. This curriculum allows for modification depending on the target audience, and facilitates the provision of training by people with different skillsets – IT, clinicians, paramedics, pharmacists and others. However, further development and evaluation is needed before this can be implemented.

The findings of the project will be disseminated to participants who requested a summary of findings, and to those who were involved as gate-keepers to the participants: the educational departments of both the ICGP and the RCPI, which coordinate national training programmes in General Practice and Medicine respectively. It is hoped that further research will involve the implementation of a modified workshop, and allow robust evaluation of the effect of training in different scenarios. After successful further modification, workshops could potentially be rolled out on a larger scale, to include postgraduate CME groups, national meetings, undergraduate medical students and diverse specialist training schemes, to ensure that all doctors are trained in the management of patients with multimorbidity. Ultimately, this training could also be implemented for non-medical groups, such as nurses, pharmacists and other allied health professionals.

6.5.3 Service impact

Improving the training of doctors in management of patients with multimorbidity may impact services in a number of ways.

- Improving service provision to patients by highlighting multimorbidity in patients attending services. This will allow time for preparation, appropriate referral, communication and team management of patients with high levels of service need, with multidisciplinary and multispecialty clinics when appropriate.

- Improving the knowledge, skills and attitudes of doctors, and making available to them resources and guidelines to assist them in decision-making.
- Potential improvement in quality of care delivered to patients, by highlighting the importance of resourcing this underfunded area.
- Optimisation of time management for consultations involving patients with multiple chronic diseases, thus improving the patient experience of services and increasing job satisfaction for doctors.
- Minimisation of treatment burden for patients by planning clinic appointments strategically, and reducing inappropriate or duplicate investigations and treatment.
- Reduction of inconvenience to other service users by providing extra time for patients with multimorbidity rather than prolonged appointments delaying others, and planning regular reviews rather than 'fire-fighting' acute issues.

6.5.4 Society impact

The impact of this study on society may be considered on a financial or a quality-of-life basis. Training GPs to more comprehensively manage patients with multimorbidity, and resourcing this care, may reduce pressure on services by increasing care in the community and leaving secondary care to manage only those with more complex problems. This clearly requires funding: it is inappropriate to simply transfer this care to primary care, without funding following the patient. Given that the vast majority of patients prefer care in the community to care in hospital, it is reasonable to endeavour to provide trained medical staff in that location: particularly when the costs associated with management of patients in primary care are lower than in secondary care (150). If these patients can be managed proactively with regular, planned reviews, then one would hope that outcomes and quality of life would improve, crisis admissions and in-patient stays would decrease, and waiting lists for elective procedures may reduce accordingly.

6.6 Recommendations for future research and implementation

There is clearly huge scope for future research in the area of training of doctors in the management of multimorbidity: the prevalence, impact, challenges and importance of multimorbidity in clinical practice outlined in this project suggest that this area merits attention. While interventional studies are ongoing, this project would suggest that a training programme for doctors managing patients with multimorbidity both in the community and in secondary care is needed. The needs assessment suggests that doctors are willing to engage with training when it is targeted, efficient, and evidence-based, and that continuing education in this area is of relevance to daily practice for doctors.

6.6.1 Populations to target

Future researchers should be cognisant of the diversity of their target group: doctors are as heterogeneous a group as patients with multimorbidity, with those attending CME events ranging from recent graduates to doctors approaching retirement. It would be anticipated that the content of any proposed intervention would need to be adapted to the participants, dependent on their specialty and level of training. In the case of a mixed-experience group, early-career doctors could draw on the experience of doctors who are familiar with clinical cases over years, and perhaps bring new guidelines or resources to the table, so providing a mutually beneficial experience to all attendees.

6.6.2 Format of educational intervention

It is unlikely that a ‘one size fits all’ educational format will accommodate all preferences when it comes to multimorbidity training (30, 35). Learning styles differ and will change over time, so this will need to be considered in the development and implementation of training. Doctors in Ireland have considerable experience in learning: they have attended primary education for eight years, second level education for six years, and will have completed, at the very least, four years of medical school and their intern year. Several

participants in our needs assessment had significant clinical experience, and some will have completed other membership examinations. Thus, our needs assessment participants were aware of what educational formats they prefer. Postgraduate training in any form requires that the attendees be engaged, interested and enthused by the material presented and in the format used. With demands on the time, money, and energy of doctors, it is important to take into consideration their preferences when it comes to learning formats. With this in mind, a variety of educational modalities may be needed in the continuing medical education (CME) scenario, covering identical multimorbidity content but either online, in a workshop, in print or other modalities. The needs assessment indicated a desire to attend workshops in a series rather than just a single session: as such, future multimorbidity workshops can focus on completion of the curriculum on a phased basis.

6.6.3 Content of intervention

Increasing literature regarding evidence and guidelines will guide the content of educational interventions in multimorbidity management. Recent NICE guidance provides principles of an approach to care that takes account of multimorbidity, and suggests medication reviews, use of screening tools to identify potential inappropriate medication management, and involvement of the patient in development of an individualised management plan. This published work, along with the results of this project, can provide a solid basis on which to build a curriculum for multimorbidity training, to provide guidance for doctors managing the heterogeneous population of patients effected.

6.6.4 Outcome development

To deliver maximum benefit from any multimorbidity training programme or module, it is important that it is robustly designed and thoroughly evaluated to enhance participants' clinical practice and to provide value for the time which doctors commit for training. Development of a validated complex intervention

workshop evaluation tool will be an important component of future research, to improve the ability to reliably evaluate the impact of training.

However, ultimately the aim is to change doctors' clinical behaviour with a view to improving outcomes for patients. A complex outcome such as this may not be amenable to evaluation on the day of the intervention, and it may be more useful to undertake a delayed evaluation to assess the impact, if any, of the multimorbidity workshop proposed.

6.7 Implementation

Given the prevalence of multimorbidity in practice, and the interplay between multimorbidity, health, lifestyle factors, social influences, occupational status and healthcare services, the need for doctors to be equipped with the ability and confidence to manage these patients is critical. Unfortunately, the timescale of this project did not allow for full implementation of the intervention proposed. Implementation will require resources of both time and money, and a commitment to ongoing learning: the breadth of the proposed curriculum is wide, and this may be best addressed by delivering training on a phased basis, as was suggested in the qualitative analysis of this research. Certain aspects of training could be delivered by non-medical trainers – pharmacists, IT and communication experts, and our colleagues in different spheres of healthcare all have skills which are relevant to aspects of the proposed curriculum. This will allow implementation of interesting, expert and comprehensive training of doctors in the management of patients with multimorbidity, and will provide a platform for the development of robust evaluation of training with a view to improving the competence and confidence of doctors in their delivery of care to this challenging cohort of patients.

6.8 Research reflection

This project was a challenge: my research and organisational skills have improved significantly since starting out. Research methods with which I was entirely unfamiliar have been experienced. In retrospect, the search strategy was too cumbersome and was far too onerous for the size of the project: two periods of leave also resulted in searching over a prolonged period of time, in a field with increasing numbers of publications, so previously run searches were rapidly outdated.

The difficulty of engagement with survey participants for subsequent focus groups was challenging, but those groups which were eventually convened yielded valuable information, and I am extremely grateful for participants' time, openness, and willingness to engage in the different components of this project.

If I was to have more time, I would certainly run more pilot workshops to increase the validity of that part of the project: the numbers included are such that robust conclusions are not possible. However, for the time available, what was possible was completed, and the experience and skills that I gained in completing the project mean that future research projects can be more efficient and can build on the work I have done for this thesis.

Chapter seven:

Conclusion

Chapter seven Conclusion

Multimorbidity is a significant clinical, organisational, and educational issue which has been under-researched to date. This piece of research has investigated the current literature, presented a mixed methods needs assessment of doctors, and proposed a curriculum and training methodology for doctors managing patients with multimorbidity.

The lack of published work in support of training in doctors in multimorbidity was reflected in the mixed-methods needs assessment which was completed in this project. Although the relevance of multimorbidity to GPs and physicians was clear in both the qualitative and quantitative assessments, there was a widespread lack of specific training in the area. Participant doctors indicated an enthusiasm for, and willingness to engage in, relevant, practical, and accessible training, and showed an appreciation of the complexity of the area.

The curriculum which was developed as a result of the systematic review was used to form the basis of the pilot workshop, which provided encouraging results with respect to the acceptability of the training format proposed.

The prevalence of multimorbidity in clinical practice behoves upon the medical community to ensure that funding and time for training is provided, in an effort to improve outcomes for this vulnerable and demanding patient group. Further research is required to deliver and implement training on a broad scale and to develop robust evaluation tools to ensure that training is relevant, efficient and, most of all, effective in improving outcomes in patients with multimorbidity.

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Appendices

List of appendices

Appendix 1: Systematic review Journal of Comorbidity

JOURNAL OF COMORBIDITY

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Original article

Training doctors to manage patients with multimorbidity: a systematic review

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Abstract

Background: Patients with multimorbidity (two or more chronic conditions) are now the norm in clinical practice, and place an increasing burden on the healthcare system. Management of these patients is challenging, and requires doctors who are skilled in the complexity of multiple chronic diseases. **Objective:** To perform a systematic review of the literature to ascertain whether there are education and training formats which have been used to train postgraduate medical doctors in the management of patients with multimorbidity in primary and/or secondary care, and which have been shown to improve knowledge, skills, attitudes, and/or patient outcomes. **Methods:** Overall, 75,110 citations were screened, of which 65 full-text articles were then independently assessed for eligibility by two reviewers, and two studies met the inclusion criteria for the review. **Results:** The two included studies implemented and evaluated multimorbidity workshops, and highlight the need for further research addressing the learning needs of doctors tasked with managing patients with multimorbidity in their daily practice. **Conclusion:** While much has been published about the challenges presented to medical staff by patients with multimorbidity, published research regarding education of doctors to manage these problems is lacking. Further research is required to determine whether there is a need for, or benefit from, specific training for doctors to manage patients with multimorbidity.

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Keywords: multimorbidity, postgraduate training, patient management, postgraduate education

Introduction

Multimorbidity can be defined as the co-existence of two or more chronic conditions in an individual [1] where one of these conditions is not necessarily more central than the other(s) [2]. Patients with multimorbidity are now the norm in clinical practice, with prevalence ranging from 13 to 72%, depending on the methodology used and the setting [3]. Factors such as social deprivation, psychiatric illness, and coexisting intellectual disability are associated with an increased prevalence of multimorbidity [4,5].

While much attention has been directed at the management of chronic disease, it is the multiplicity of disease rather than the chronicity that increases demands on healthcare systems [6]. As the prevalence of multimorbidity increases, its impact on both the healthcare system and the people using that system depends, in part, on the competence of doctors who

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treat patients with multiple illnesses [7]. Management of patients with multimorbidity has been the focus of a recent British Medical Journal Clinical Review [8], and the National Institute for Health and Care Excellence (NICE) has published draft guidance on this topic in April 2016 with full guidance due later in Autumn 2016 [9]. These developments address the limitations of current clinical guidelines which are predominantly based on single-disease–focused research and present recommendations that may be inappropriate when applied to patients with multimorbidity [10–12].

Critical in the appropriate management of patients with multimorbidity is the doctor–patient consultation, which must take into account the need for extensive information-gathering and record-keeping, the changing priorities over time, and the need for high-quality communication to coordinate care with other services and healthcare providers [13]. The increasing complexity of disease combinations presenting to medical professionals requires additional skills and training so that clinicians caring for patients with multimorbidity can competently and confidently manage the multiple chronic diseases presented, and implement a personal, patient-centred approach to care, involving shared decision-making, patient and carer education, and self-management [14–16]. The management of older patients with multimorbidity and frailty is embedded in higher specialist training in Geriatric Medicine in Ireland and the UK [17,18]. The growing ageing population, limited numbers of trained geriatricians, and increasing numbers of patients with multimorbidity is a challenge, and should generate increased training of 'generalists', ideally within family practice, with a view to facilitating the maintenance of these patients in the community as much possible [19]. Management of polypharmacy, lack of guidelines and decision-making tools, and the difficulty of trying to manage multiple problems in a single, fixed-time consultation are just some of the challenges described by doctors in the qualitative literature examining doctors' views on multimorbidity [20–23]. As doctors feel inadequately trained in these and other compentencies which are critical to the management of patients with multimorbidity, sufficient, comprehensive and validated training must be provided to optimize patient outcomes in people with this increasingly 'normal' presentation [24].

This systematic review aimed to ascertain whether there are education and training formats which have been used to train postgraduate medical doctors in the management of patients with multimorbidity in primary and/or secondary care, and which have been shown to improve knowledge, skills, attitudes, and/or patient outcomes.

Methods

Study design

A systematic review of the literature was performed and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standardized reporting guidelines [25].

Criteria for considering studies for this review

As no previous reviews had been conducted in this area, we aimed to identify all published evidence relating to this topic, and included articles of any type which addressed postgraduate medical education and training in the management of patients with multimorbidity in primary or secondary care.

Studies were eligible for inclusion if they recruited graduate medical doctors who had participated in a training programme addressing management of patients with multimorbidity in primary or secondary care. All educational and training formats were included, and both observational and experimental study designs were eligible. Studies were excluded if they addressed only clinical management or organizational interventions for patients with multimorbidity, or if they related only to either undergraduate training or training for health professionals other than doctors.

Outcomes

Primary outcomes were any measure of doctor knowledge, attitude, or skills that related to the content of the training programme. Secondary outcomes included any patient outcomes reported in a study that examined an intervention designed to train doctors to manage multimorbidity including patient-reported outcome measures, for example, health-related quality of life and health-service utilization in patients with multimorbidity.

Search strategy

Initial scoping searches in late 2012 suggested that there was very little published literature regarding multimorbidity and education, so our search was widened to include editorials, news pieces, and commentaries in an effort to maximize yield of relevant papers. The principal challenge of this search was the fact that there is currently no Medical Subject Heading (MeSH) term for multimorbidity. A search string was initially developed using keywords to capture the concept of multimorbidity, based on previous published searches [26,27].

Systematic literature searches were initially conducted in April 2013 and updated regularly up to January 2016.

Table 1 Risk of bias assessment.

Bias	Andolsek *et al.* 2013 [30]	Maguire *et al.* 2015 [31]
Confounding	High risk	High risk
Selection of participants	High risk	High risk
Classification of interventions	N/A	N/A
Deviation from intended intervention	Unclear	Unclear
Missing data (attrition bias)	High risk	Unclear
Outcome measurement (detection bias)	High risk	High risk
Selective reporting (reporting bias)	Low risk	Low risk

Risk of bias assessment was performed using the ROBINS-I tool [29]. N/A, Not applicable.

We searched databases from 1996 onwards, as the concept of multimorbidity was first defined in 1998 by Van den Akker *et al.* [1]. The search databases and search strategy are provided in the Supplementary Methods. We also hand-searched the reference lists of included articles and other articles of interest. We contacted authors involved in the field, those who had published related or pilot work, and searched the International Research Community on Multimorbidity archive [28]. We did not exclude papers on the basis of language.

Data collection and analysis

Study selection

One author (C.L.) screened the titles and abstracts, and full-text copies of potentially relevant papers were obtained for further evaluation. These were independently assessed for eligibility by at least two reviewers (C.L. and either S.S. or E.W.) and the final included studies were confirmed as eligible by three authors (C.L., S.S., E.W.).

Data extraction and management

Two review authors independently extracted data from each included paper, using a data extraction form specifically designed for this study. Data extracted included study design, setting and definition of multimorbidity, intervention, characteristics of participating providers of intervention, characteristics of participating doctors (being trained), quality criteria, source of funding, ethical approval, outcome measures, and length of post-intervention follow-up period.

Disagreements were resolved by discussion and consensus.

Assessment of risk of bias in included studies

Risk of bias of the included studies was assessed using the Cochrane Collaboration Risk Of Bias In Non-randomized Studies of Interventions (ROBINS-I) assessment tool [29]. The domains assessed are presented in Table 1.

Data analysis

We anticipated that meta-analysis would not be possible and planned to conduct a narrative synthesis of included studies.

Results

Search results

Overall, 75,110 citations were screened, of which 65 full texts were deemed to be potentially relevant. These 65 articles were formally independently assessed for eligibility by two reviewers. Two studies met the inclusion criteria for the review, as outlined in the flow diagram (see Figure 1). Excluded studies and reasons for exclusion can be found in Supplementary Table 1.

Characteristics of included studies

Two studies met the inclusion criteria and are summarized in Table 2. Both studies had non-randomized controlled trial designs with one (Andolsek *et al.* [30]) being a non-randomized controlled study and the other (Maguire *et al.* [31]) being an uncontrolled before and after study, described as a pilot study.

As summarized in Table 2, Andolsek *et al.* reported on a half-day workshop for family physicians and internal medicine physicians, physician assistants, and nurse practitioners, which addressed complex clinical scenarios [30]. While multimorbidity is not defined in this paper, the cases described had multiple, co-existing chronic conditions.

Andolsek *et al.*'s workshops comprised two parts: a large group presentation during which guidelines, algorithms, and clinical evidence were summarized by primary care faculty; followed by small group discussions about developing plans for the diagnosis and management of a number of complex case scenarios [30]. Their intervention group of 487 practitioners contained 307 doctors, while their control group comprised

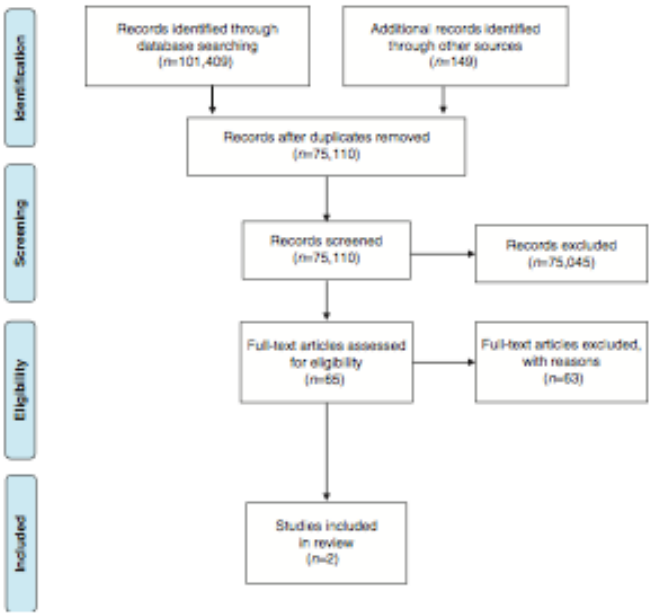

Figure 1 PRISMA flow diagram.

992 participants, 605 of whom were doctors. The clinical cases used in the workshop related to aspects of multimorbidity care that are recognized to be challenging; including patient factors such as self-care, lifestyle change, and medication concordance; and health profession issues, including care coordination. The control group in this study did not attend the live workshop, but completed a complex cases module online which incorporated the content of the workshop and evidence-based strategies for management of patients with multimorbidity. The effectiveness of the online module was measured using the same questionnaire that evaluated the workshop, administered both before and immediately after each online case study [30].

The intervention in Maguire *et al.*'s uncontrolled before–after study [31] was described as a 2-hr multimorbidity workshop for 20 postgraduate trainees in General Practice, in the northwest of Ireland. The workshop was facilitated by the directors of the general practitioner (GP) training scheme, who assessed recall of prior knowledge via a questionnaire at the beginning of the workshop. The trainers then presented a multimorbidity literature review to the trainees, before facilitating small group discussion of 'simulated multimorbidity cases'. These simulated multimorbidity cases were developed by the facilitators and were based on clinical cases that they had encountered in practice. Each case involved information about a year of the patient's care, challenges for both the doctor and the patient, and the social history of the patient. A plenary talk at the end of the small group work summarized the proceedings, and the workshop closed with a knowledge questionnaire and an evaluation by the trainees of the workshop content [31].

Intervention development

The clinical topics included in the intervention developed by Andolsek *et al.* were based on an 'independent educational needs assessment conducted by DukeCME and the accredited continuing medical education (CME) provider' [30]. Andolsek *et al.* suggest that realistic, occupationally appropriate settings, with an opportunity to discuss the cases with colleagues, should be used to deliver novel clinical information, referencing a paper by Moore *et al.* [32]. While this is not specific to multimorbidity, they suggest that presenting information in a discursive format, in an authentic work setting, facilitates the implementation of new clinical information into practice [32].

Description of the theoretical basis of the development of the pilot workshop by Maguire *et al.* was not reported

Table 2 Characteristics of included studies.

Study Country Design	Participants	Intervention and comparison	Outcomes
Andolsek *et al.* 2013 [30] USA Non-randomized, controlled trial	1479 Participants: 487 workshop participants and 992 controls Physicians and non-physicians (63% of workshop participants were doctors, 61% of controls were doctors)	*Intervention (workshop)* 1. Large group presentation, reviewing and discussing clinical evidence, current practice guidelines, and available treatment algorithms 2. Small group discussion about challenging case studies, developing diagnostic, and treatment plans *Control* Completed online case studies of patients with chronic diseases, based on the workshop that was delivered	1. Immediate post-workshop satisfaction questionnaire 2. Thirty days after workshop: self-reported knowledge, competence, confidence gains, and knowledge related to clinical cases 3. Controls completed knowledge- and competence-based assessment questions before and immediately after each case study
Maguire *et al.* 2015 [31] Ireland Uncontrolled before and after study (pilot study)	20 GP trainees from 4 years of training – some completing hospital jobs, some GP registrars	*Pilot multimorbidity workshop* 1. Presentation of literature review followed by large group discussion 2. Small group work facilitated by programme directors, discussing simulated multimorbidity cases *No comparison group*	Post-workshop knowledge questionnaire

GP, General practitioner.

and they suggest that a needs assessment is necessary for future workshops: given that it is a pilot project, this may follow when subsequent work is published. Facilitators of the workshop based the included cases on prior patient contacts, and trainees were given information about a patient's medical and social history, along with available relevant guidelines [31].

Outcome assessment

As outlined in Table 2, Andolsek *et al.* evaluated their workshop with both an immediate satisfaction questionnaire and two non-validated, follow-up surveys which were completed at least 30 days after the workshop, and were developed by the authors [30]. Each follow-up survey included single-best-answer questions about three complex cases, and was administered to each participant to assess clinical knowledge. Participants were also asked about their confidence in managing patients with multiple comorbidities as well as the significance of barriers to treating these patients. The control participants completed a complex cases module online, and its effectiveness was measured by the same questions described above both before, and immediately after each case study contained in the online module [30].

In the other included study, GP trainees attending Maguire *et al.*'s pilot workshop completed a pre- and post-workshop knowledge questionnaire that was developed by the investigators, details of which are not included in the publication [31]. As such, direct comparison of the two outcome measurement tools is not possible in the context of this review.

Effectiveness of educational interventions

Both studies reported non-validated measures of doctor knowledge and skill assessed on completion of the training [30,31]. Andolsek *et al.* reported that the majority of the intervention participants (physicians and non-physicians) described an increase in their knowledge (96%) and self-reported competence (89%) on immediate completion of the workshop [30]. Thirty days following workshop completion, surveys were sent to 247 of the 307 physician participants and of these, 62 (25%) responded. Those who responded self-reported that knowledge had increased in a number of areas that were addressed at the workshop: two of eight specific areas reported were significantly improved when compared with non-participant controls (recognition of medications that contribute to an overactive bladder, and appropriate referral of patients with rheumatoid arthritis to specialty care). There was no difference in self-reported confidence related to treatment decisions. The authors state that doctors who participated in the

workshop reported that they were 27% more likely than non-participants to use available evidence and guidelines in practice: data to support this are not provided. Significant gains in knowledge were seen in almost all (17/18) assessment areas for the 992 clinicians who completed the online cases (survey response rates are not provided). No long-term follow-up of the online case participants was reported, so it is not possible to compare the online and workshop modalities at that point in follow-up [30].

GP trainees who attended Maguire *et al.*'s pilot workshop were found to have improved knowledge of the characteristics of multimorbidity (80% after the workshop compared with 25% before the workshop) [31]. All 20 trainees reported improved understanding and increased confidence in the management of patients with multimorbidity in the community. Neither study reported any of the secondary outcomes outlined in the review protocol, nor did they evaluate the long-term impact of the training which was provided [30,31].

Risk of bias in included studies

The two included studies were assessed using the ROBINS-I tool, and both were found to be at high risk of bias [29–31] (Table 1). Confounding was a serious risk in both studies due to the study designs, and selection of participants was also deemed to be at high risk of bias. Missing data are not reported by Maguire *et al.* [31], but there was a serious risk of bias in Andolsek *et al.*'s study due to low response rates (20%) to questionnaires 30 days after the workshop [30]. Both studies used non-validated, subjective outcomes, and neither reported blinding of outcomes assessment [30,31]. As such, the overall risk of bias in the two studies included in this review is high.

Discussion

Summary of findings

This systematic review identified only two studies that developed and evaluated training programmes for doctors in managing patients with multimorbidity [30,31], despite an extensive search over several years. The evidence determining the effectiveness of multimorbidity educational interventions for doctors is very limited, and the paucity of studies addressing this topic was surprising. The two included studies indicate that it is feasible to deliver workshop or online training over a short period of time to physicians on this topic. The effectiveness of these programmes has yet to be confirmed, but the study by Maguire *et al.* was a pilot programme, and could be rolled out and subsequently evaluated [31]. The programme by Andolesk *et al.* appears to favour a workshop format over online case module [30], although a more robust evaluation of the two formats is required.

Comparison with existing literature

This is a challenging area: patients with multimorbidity are a heterogeneous group. While some disease combinations are common, many permutations exist, each with individual requirements, therapeutic strategies, and targets. As to why there is so little published about training of doctors in this area, it is likely that since the concept of multimorbidity is a relatively recent one, it is partly a function of time: the focus of investigators in the area in recent years has been on therapeutic strategies and guideline development. It inevitably takes time for the educational arm to emerge, particularly where there is still such uncertainty as to how best to manage patients with multimorbidity. While some research has been conducted in this area with respect to training of undergraduates, we have been unable to identify any systematic reviews of the effectiveness of related postgraduate educational interventions, such as training in the management of complexity in clinical practice [33]. While the postgraduate curricula may have changed, we have not seen a corresponding increase in published literature regarding specific training in multimorbidity: perhaps the training is integrated into existing modules, or is indeed a 're-naming' of already delivered material, and as such, not considered novel to the trainers.

Strengths and weaknesses of the review

To our knowledge, this is the first study to systematically review the literature focusing on postgraduate training of medical doctors in the area of multimorbidity. The search was broad and inclusive, but the findings need to be interpreted in the context of some limitations.

The relatively recent introduction of the term 'multimorbidity', its lack of definition, and the current absence of a MeSH term proved a significant challenge when developing the search string, giving a large number of search results to be screened [34]. It is possible that there are relevant publications that were omitted as a result; however, multiple searches were conducted and international experts in multimorbidity were contacted.

Implications for future research

There is clearly huge scope for future research in this area. Initial assessment of learning needs is vital to enable educators to provide doctors with relevant and practical training to address the clinical challenges presented by patients with multimorbidity. Just as with treatment of patients, medical training tends to focus on individual diseases: further

research is required to delineate deficiencies in the current curricula, so that focused training can be provided.

The studies included in this review examine case-based interventions using workshop and on-line formats [30,31]. However, learning styles differ, and it is unlikely that a 'one size fits all' educational format will accommodate all preferences [35]; rather, several educational modalities will be needed in the CME scenario, covering the same material, but either online, in a workshop, in print, or other modality. Further research should be directed at determining the preference of doctors with regard to various formats of delivery and the differential effectiveness of each format. Outcomes (both doctor- and patient-related) should be clearly defined and ideally blindly assessed: there was a disappointing absence of measurement of change in patient outcomes or change in practice. In order to extract maximum gain from any multimorbidity training programme or module, it is important that it is robustly designed and thoroughly evaluated to enhance participants' clinical practice.

Implications for policy and practice

Although there is broad recognition that patients with multimorbidity require care to be delivered by trained generalists rather than single-system specialists [36,37], there remains a shortage of generalists in many countries. Providing more training positions in General Practice, General Internal Medicine and Geriatric Medicine should improve the ability of the health system to manage these complex patients in appropriate settings, both within the community and on an in-patient basis, if needed. Provision of more generalists alone will not suffice, and the available qualitative literature suggests that GPs feel underprepared to manage these patients [20,22].

While there is limited evidence to support clinical practice management of patients with multimorbidity, the findings from this review can be considered along with the existing qualitative literature on doctors' views, two recent clinical review papers providing guidance to doctors managing patients with multimorbidity and the recently published draft NICE Clinical Guidelines on Multimorbidity [8,9,21–23,38]. This and other literature highlight a range of areas that need to be addressed to enable doctors to confidently manage patients with multiple chronic conditions. Figure 2 synthesizes some of the topics suggested by the published literature, and might provide a basis for curriculum development for multimorbidity education [7,20–22,39–45].

Postgraduate medical educators need to consider who is best suited to training doctors who manage patients with multimorbidity. Management of these patients is complex, and the two studies included in this review used case-based approaches delivered by medical doctors. This is supported by both Knowles's adult learning theory [46] and Kolb's model of experiential learning [47], in which concrete experience is followed by reflection, abstract conceptualization, and subsequent active experimentation. However, there is also a role for other healthcare professionals in training: the proposed curriculum components outlined in Figure 2 suggest that a range of other disciplines, such as communication specialists, simulated patients, and other healthcare workers, may have a role to play in training doctors: for example, pharmacists may have a key role in supporting training in medicines management.

Additional consideration needs to be given to when doctors should be trained. Given the prevalence of multimorbidity in the community, some educators suggest that training in its management should begin at the undergraduate level [48]. Training should certainly be integrated into postgraduate medical training, ideally for doctors of all specialties, to enable competent basic management of multimorbidity by doctors of all medical and surgical specialties. For doctors who have completed their specialist or generalist training, updates could be incorporated into CME training, with regulatory authorities advising on frequency of training and updates.

Optimal educational format is a significant issue which needs further research: while the two studies included in our review both implemented and evaluated workshops, they are clearly not the only format available to train doctors to manage patients with multimorbidity. Andolsek *et al.* did not find significant differences in outcomes when workshop training was compared with an online learning module completed by their control group [30]. Given the diversity of doctors to be trained, and the importance of training in this area to be an ongoing, realistic learning experience, updated over time in a CME scenario, it is unlikely that a single-delivery format will suit all participants. This may present an opportunity to utilize distance learning or remote learning modules. However, the preferred format for doctors with regard to learning in this area has yet to be determined, and needs to be explored prior to development and implementation of training. Given the demands on time and finances of doctors, we suggest that any training on the management of multimorbidity in practice must be practical, needs-driven, stimulating, evidence-based, longitudinal, and outcome-oriented, in order to change practice and ideally improve clinical outcomes for complex patients.

Conclusion

Much has been published about the challenges presented by patients with multimorbidity, but the issue of

Figure 2 Proposed curriculum content for training of doctors in management of patients with multimorbidity [7,20–22,39–45].

educating doctors to manage these problems has been poorly addressed. The two studies presented in this review implemented and evaluated multimorbidity workshops, and provide a basis for further research. It remains to be determined whether there is a specific need for training of doctors to manage patients with multimorbidity, and if so, how that need can best be met. It also remains to be proven that improving knowledge, skills, and confidence of doctors results in improved care of this patient group. We have identified existing literature that provides both a platform for training [30,31], and a basis for curriculum development for training doctors in the management of patients with multimorbidity [7,20–22,39–45]. Incorporation of emerging guidelines and research findings into multimorbidity training curricula for doctors with appropriate evaluation of its effectiveness is needed, to change practice and enhance the competence and confidence of doctors in managing this challenging population of patients, with the ultimate aim of improving clinical outcomes.

Conflicts of interest

Cliona Lewis has received grants from Health Services Executive Ireland; Susan M. Smith is a Co-Editor-in-Chief of the *Journal of Comorbidity*; Walter Cullen has received grants from Health Research Board of Ireland, Gilead, and the European Union (Third Health Programme).

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Appendix 2: Prospero registration

UNIVERSITY of York
Centre for Reviews and Dissemination

NHS
National Institute for Health Research

PROSPERO International prospective register of systematic reviews

Training postgraduate doctors to manage patients with multimorbidity: a systematic review

Cliona Lewis, Emma Wallace, Lorraine Kyne, Walter Cullen, Susan Smith

Citation
Cliona Lewis, Emma Wallace, Lorraine Kyne, Walter Cullen, Susan Smith. Training postgraduate doctors to manage patients with multimorbidity: a systematic review. PROSPERO 2013:CRD42013004010 Available from http://www.crd.york.ac.uk/PROSPERO_REBRANDING/display_record.asp?ID=CRD42013004010

Review question(s)
Are there education and training formats which can be used to train postgraduate medical doctors in the management of patients with multimorbidity in primary and/or secondary care, and which can be shown to increase knowledge, skills or attitudes related to the content of the training material?

If these education and training methods have been developed, have they been shown to be effective in studies with experimental designs with a comparison or control group?

Searches
Electronic searches:

We will search for relevant trials in the following electronic, bibliographic databases:

• The Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library, latest issue)

• MEDLINE (1950 to present) via Pubmed interface (Appendix 1)

• EMBASE (1980 to present)

• CINAHL (1982 to present)

• AMED (Allied and Complementary Medicine Database) (1985 to present)

• The Cochrane Database of Systematic Reviews (The Cochrane Library, latest issue)

• Database of Abstracts of Reviews of Effects (DARE) (The Cochrane Library, latest issue)

• Electronic dissertation/theses databases: ProQuest Dissertations & Theses Database (PQDT)

• ClinicalTrials.gov (http://clinicaltrials.gov/)

• Current Controlled Trials (www.controlled-trials.com)

• Trials Central (www.trialscentral.org)

• UK Clinical Research Network Portfolio database (http://public.ukcrn.org.uk/search/)

• BEME (Best Evidence Medical and Health Professional Education) (http://www.bemecollaboration.org)

Searching other resources

To identify further published, unpublished and ongoing trials, we will:

• Hand-search the reference lists of included articles

• Contact experts active in this field (including authors of included articles and excluded studies that have been identified as possible preliminary or pilot work).

We will search the databases from 1990 onwards as the concept of multimorbidity was only defined in 1996. Searches will not be limited by language, and we will arrange translation of papers published in languages other than English.

Given that the definition of multimorbidity is recent, and that there is currently no MeSH term for multimorbidity, the search string will be developed using words to capture 'multimorbidity', 'co-morbidity', 'geriatrics' and 'medicine for the elderly'. The search string will also include 'post-graduate', 'training' and 'education'.

Link to search strategy
Pending

Types of study to be included
All article types including: editorials, expert reviews and any primary experimental studies examining training and education modules with a stated objective to address management of patients with multimorbidity.

Condition or domain being studied
Multimorbidity can be defined as the co-existence of two or more chronic conditions in an individual, and further limited to the situation where one of these conditions is not necessarily more central than others.

Provision of appropriate care to patients with multimorbidity is dependent on the education and training of doctors. They must be provided with expert skill-sets in order to care for patients with more than one illness. This training should ideally start at an undergraduate level, and continue during postgraduate training, so that new developments and current best evidence can be incorporated into the care of this group of patients. Ultimately, this training should form a core aspect of the efficient, safe and effective delivery of competent care to these patients.

Participants/ population
Inclusion criteria

1. Any articles addressing postgraduate education and training in the area of multimorbidity

2. All article types including: editorials, expert reviews and any primary experimental studies examining training and education modules with a stated objective to address management of patients with multimorbidity.

3. Articles relating to primary and secondary care.

4. All educational formats, including (but not exclusively): print material, workshops, lectures, on-line resources, training courses.

Exclusion criteria

1. Studies directly addressing clinical management or organization interventions for patients with multimorbidity.

2. Studies related to undergraduate medical training.

3. Studies related to individual specialties or disease processes.

4. Studies examining training for health professionals other than doctors.

Only studies with an appropriate experimental design will be included in the analysis determining the effectiveness of any training programmes identified. These study designs will include randomised controlled trials, controlled before and after studies and interrupted time series, as recommended in the Cochrane Handbook.

When we have answered our first research question ('Are there education and training formats which can be used to train postgraduate medical doctors in the management of patients with multimorbidity in primary and/or secondary care, and which can be shown to increase knowledge, skills or attitudes related to the content of the training material?'), we will then look only at studies with experimental designs with a comparison or control group which assessed the effectiveness of their training methods to answer our second question ('If these education and training methods have been developed, have they been shown to be effective in studies with experimental designs with a comparison or control group?').

Intervention(s), exposure(s)
All education and training formats used in the field of multimorbidity. These may include workshops, taught modules, online resources, print materials and lectures/tutorials.

Comparator(s)/ control
Usual training programmes used in the field of multimorbidity.

Context
Multimorbidity can be defined as the co-existence of two or more chronic conditions in an individual, and further limited to the situation where one of these conditions is not necessarily more central than others. Patients with multimorbidity are becoming the norm in clinical practice, in part because of a strong link between aging and the presence of multiple chronic conditions.

However, in absolute terms the majority of people with multimorbidity are less than 65 years of age, so it is a problem which affects patients across the age spectrum, many of whom will be cared for in primary care.

The responsibility to deliver evidence-based primary and specialist care, while at the same time addressing the outcomes that are important to patients, presents a significant challenge to those who deliver medical care to patients affected by multimorbidity. Current clinical guidelines have limited applicability to complex patients, and primary care doctors need guidelines focusing on multimorbidity in order to support their care of these patients.

Provision of appropriate care to patients with multimorbidity is dependent on the education and training of doctors. They must be provided with expert skill-sets in order to care for patients with more than one illness. This training should ideally start at an undergraduate level, and continue during postgraduate training, so that new developments and current best evidence can be incorporated into the care of this group of patients. Ultimately, this training should form a core aspect of the efficient, safe and effective delivery of competent care to these patients.

As multimorbidity is a relatively new concept, there may be a lack of structure to its teaching.

As no previous systematic reviews have been conducted in this area we plan to identify all published evidence relating to this topic. Tighter inclusion criteria will apply for study designs in relation to the secondary aim which is to determine the effectiveness of education or training programmes in this area on patient care.

Outcome(s)
Primary outcomes
Any measure of knowledge, attitude or skills that relate to the content of the training programme. Ideally these will be validated measures.

Secondary outcomes
1. Increased physician confidence and competence in managing patients with multimorbidity.

2. Patient-reported outcomes - QoL etc

3. Reduced hospital admissions in multimorbidity patients

4. Reduced mortality of patients with multimorbidity

Data extraction, (selection and coding)

Titles and abstracts will be examined to remove obviously irrelevant reports, and the full text of all potentially relevant reports will be retrieved. Authors will be contacted to clarify study eligibility if needed, and any articles complying with the inclusion and exclusion criteria will be included in the systematic review.

The following data will be extracted from the included articles:

• Study design

• Level of training of doctors involved in the study

• Setting of education programme

• Number of doctors included in training programmes

• Format of education modules/ material delivered

• Content of educational material delivered

• Delivery of education - by whom

• Duration of education modules

• Evaluation of educational module(s) delivered

• Exclusion criteria

Types of outcome measures

Outcome measures will include:

1. Primary outcomes

2. Any validated measure of knowledge, attitude or skills that relate to the content of the training programme

Secondary outcomes will include:

1. Patient-reported outcomes – HRQoL, patient satisfaction

2. Increased physician confidence or self-efficacy in managing patients with multimorbidity

3. Health service measures including measures of the process of care, utilization of services or measures of the coordination of care

Only outcomes measured using validated scores will be included.

The risk of bias of all included studies will be assessed independently by two reviewers using the guideline appropriate to the study design. If no consensus is achieved studies will be evaluated by a third independent reviewer.

Risk of bias (quality) assessment

The risk of bias of all included studies will be assessed independently by two reviewers using the guideline appropriate to the study design. If no consensus is achieved studies will be evaluated by a third independent reviewer.

Strategy for data synthesis

Depending on the number of studies meeting the inclusion criteria, the results of this review will be reported using meta-analysis (e.g. minimum four studies using similar methodologies) or using a narrative review (e.g. if less than four studies or if all studies use a wide variety of methodologies).

A preliminary review of the literature indicates that a narrative review is more likely.

Analysis of subgroups or subsets
None planned

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Details of any existing review of the same topic by the same authors
None

Anticipated or actual start date
13 November 2012

Anticipated completion date
06 August 2013

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Conflicts of interest
None known

Language
English

Country
Ireland

Subject index terms status
Subject indexing assigned by CRD

Subject index terms
Education, Medical; Humans; Morbidity

Stage of review
Ongoing

Date of registration in PROSPERO
11 March 2013

Date of publication of this revision
11 March 2013

DOI
10.15124/CRD42013004010

Stage of review at time of this submission	Started	Completed
Preliminary searches	Yes	No
Piloting of the study selection process	No	No
Formal screening of search results against eligibility criteria	No	No
Data extraction	No	No
Risk of bias (quality) assessment	No	No
Data analysis	No	No

The Risk Of Bias In Non-randomized Studies – of Interventions (ROBINS-I) assessment tool

(version for cohort-type studies)

Developed by: Jonathan AC Sterne, Miguel A Hernán, Barnaby C Reeves, Jelena Savović, Nancy D Berkman, Meera Viswanathan, David Henry, Douglas G Altman, Mohammed T Ansari, Isabelle Boutron, James Carpenter, An-Wen Chan, Rachel Churchill, Asbjørn Hróbjartsson, Jamie Kirkham, Peter Jüni, Yoon Loke, Terri Pigott, Craig Ramsay, Deborah Regidor, Hannah Rothstein, Lakhbir Sandhu, Pasqualina Santaguida, Holger J Schünemann, Beverly Shea, Ian Shrier, Peter Tugwell, Lucy Turner, Jeffrey C Valentine, Hugh Waddington, Elizabeth Waters, Penny Whiting and Julian PT Higgins

Version 1 August 2016

ROBINS-I tool (Stage I): At protocol stage

Specify the review question

Participants	
Experimental intervention	
Comparator	
Outcomes	

List the confounding domains relevant to all or most studies

List co-interventions that could be different between intervention groups and that could impact on outcomes

ROBINS-I tool (Stage II): For each study

Specify a target randomized trial specific to the study

Design	Individually randomized / Cluster randomized / Matched (e.g. cross-over)
Participants	
Experimental intervention	
Comparator	

Is your aim for this study…?

- ☐ to assess the effect of *assignment to* intervention
- ☐ to assess the effect of *starting and adhering to* intervention

Specify the outcome

Specify which outcome is being assessed for risk of bias (typically from among those earmarked for the Summary of Findings table). Specify whether this is a proposed benefit or harm of intervention.

Specify the numerical result being assessed

In case of multiple alternative analyses being presented, specify the numeric result (e.g. RR = 1.52 (95% CI 0.83 to 2.77) and/or a reference (e.g. to a table, figure or paragraph) that uniquely defines the result being assessed.

Preliminary consideration of confounders

Complete a row for each important confounding domain (i) listed in the review protocol; and (ii) relevant to the setting of this particular study, or which the study authors identified as potentially important.

"Important" confounding domains are those for which, in the context of this study, adjustment is expected to lead to a clinically important change in the estimated effect of the intervention. "Validity" refers to whether the confounding variable or variables fully measure the domain, while "reliability" refers to the precision of the measurement (more measurement error means less reliability).

(i) Confounding domains listed in the review protocol				
Confounding domain	Measured variable(s)	Is there evidence that controlling for this variable was unnecessary?*	Is the confounding domain measured validly and reliably by this variable (or these variables)?	OPTIONAL: Is failure to adjust for this variable (alone) expected to favour the experimental intervention or the comparator?
			Yes / No / No information	Favour experimental / Favour comparator / No information

(ii) Additional confounding domains relevant to the setting of this particular study, or which the study authors identified as important				
Confounding domain	Measured variable(s)	Is there evidence that controlling for this variable was unnecessary?*	Is the confounding domain measured validly and reliably by this variable (or these variables)?	OPTIONAL: Is failure to adjust for this variable (alone) expected to favour the experimental intervention or the comparator?
			Yes / No / No information	Favour experimental / Favour comparator / No information

* In the context of a particular study, variables can be demonstrated not to be confounders and so not included in the analysis: (a) if they are not predictive of the outcome; (b) if they are not predictive of intervention; or (c) because adjustment makes no or minimal difference to the estimated effect of the primary parameter. Note that "no statistically significant association" is not the same as "not predictive".

Preliminary consideration of co-interventions

Complete a row for each important co-intervention (i) listed in the review protocol; and (ii) relevant to the setting of this particular study, or which the study authors identified as important.

"Important" co-interventions are those for which, in the context of this study, adjustment is expected to lead to a clinically important change in the estimated effect of the intervention.

(i) Co-interventions listed in the review protocol		
Co-intervention	Is there evidence that controlling for this co-intervention was unnecessary (e.g. because it was not administered)?	Is presence of this co-intervention likely to favour outcomes in the experimental intervention or the comparator
		Favour experimental / Favour comparator / No information
		Favour experimental / Favour comparator / No information
		Favour experimental / Favour comparator / No information

(ii) Additional co-interventions relevant to the setting of this particular study, or which the study authors identified as important		
Co-intervention	Is there evidence that controlling for this co-intervention was unnecessary (e.g. because it was not administered)?	Is presence of this co-intervention likely to favour outcomes in the experimental intervention or the comparator
		Favour experimental / Favour comparator / No information
		Favour experimental / Favour comparator / No information
		Favour experimental / Favour comparator / No information

Risk of bias assessment (cohort-type studies)

Responses underlined in green are potential markers for low risk of bias, and responses in red are potential markers for a risk of bias. Where questions relate only to sign posts to other questions, no formatting is used.

Bias domain	Signalling questions	Elaboration	Response options
Bias due to confounding	1.1 Is there potential for confounding of the effect of intervention in this study? **If N/PN to 1.1:** the study can be considered to be at low risk of bias due to confounding and no further signalling questions need be considered	In rare situations, such as when studying harms that are very unlikely to be related to factors that influence treatment decisions, no confounding is expected and the study can be considered to be at low risk of bias due to confounding, equivalent to a fully randomized trial. There is no NI (No information) option for this signalling question.	Y / PY / PN / N
	If Y/PY to 1.1: determine whether there is a need to assess time-varying confounding:		
	1.2. Was the analysis based on splitting participants' follow up time according to intervention received? **If N/PN**, answer questions relating to baseline confounding (1.4 to 1.6) **If Y/PY**, proceed to question 1.3.	If participants could switch between intervention groups then associations between intervention and outcome may be biased by time-varying confounding. This occurs when prognostic factors influence switches between intended interventions.	NA / Y / PY / PN / N / NI
	1.3. Were intervention discontinuations or switches likely to be related to factors that are prognostic for the outcome? **If N/PN**, answer questions relating to baseline confounding (1.4 to 1.6) **If Y/PY**, answer questions relating to both baseline and time-varying confounding (1.7 and 1.8)	If intervention switches are unrelated to the outcome, for example when the outcome is an unexpected harm, then time-varying confounding will not be present and only control for baseline confounding is required.	NA / Y / PY / PN / N / NI
	Questions relating to baseline confounding only		
	1.4. Did the authors use an appropriate analysis method that controlled for all the important confounding domains?	Appropriate methods to control for measured confounders include stratification, regression, matching, standardization, and inverse probability weighting. They may control for individual variables or for the estimated propensity score. Inverse probability weighting is based on a function of the propensity score. Each method depends on the assumption that there is no unmeasured or residual confounding.	NA / Y / PY / PN / N / NI

COT

	1.5. **If Y/PY to 1.4**: Were confounding domains that were controlled for measured validly and reliably by the variables available in this study?	Appropriate control of confounding requires that the variables adjusted for are valid and reliable measures of the confounding domains. For some topics, a list of valid and reliable measures of confounding domains will be specified in the review protocol but for others such a list may not be available. Study authors may cite references to support the use of a particular measure. If authors control for confounding variables with no indication of their validity or reliability pay attention to the subjectivity of the measure. Subjective measures (e.g. based on self-report) may have lower validity and reliability than objective measures such as lab findings.	NA / Y / PY / PN / N / NI
	1.6. Did the authors control for any post-intervention variables that could have been affected by the intervention?	Controlling for post-intervention variables that are affected by intervention is not appropriate. Controlling for mediating variables estimates the direct effect of intervention and may introduce bias. Controlling for common effects of intervention and outcome introduces bias.	NA / Y / PY / PN / N / NI
	Questions relating to baseline and time-varying confounding		
	1.7. Did the authors use an appropriate analysis method that adjusted for all the important confounding domains and for time-varying confounding?	Adjustment for time-varying confounding is necessary to estimate the effect of starting and adhering to intervention, in both randomized trials and NRSI. Appropriate methods include those based on inverse probability weighting. Standard regression models that include time-updated confounders may be problematic if time-varying confounding is present.	NA / Y / PY / PN / N / NI
	1.8. **If Y/PY to 1.7**: Were confounding domains that were adjusted for measured validly and reliably by the variables available in this study?	See 1.5 above.	NA / Y / PY / PN / N / NI
	Risk of bias judgement	See Table 1.	Low / Moderate / Serious / Critical / NI
	Optional: What is the predicted direction of bias due to confounding?	Can the true effect estimate be predicted to be greater or less than the estimated effect in the study because one or more of the important confounding domains was not controlled for? Answering this question will be based on expert knowledge and results in other studies and therefore can only be completed after all of the studies in the body of evidence have been reviewed. Consider the potential effect of each of the unmeasured domains and whether all important confounding domains not controlled for in the analysis would be likely to change the estimate in the same direction, or if one important confounding domain that was not controlled for in the analysis is likely to have a dominant impact.	Favours experimental / Favours comparator / Unpredictable

Bias in selection of participants into the study	2.1. Was selection of participants into the study (or into the analysis) based on participant characteristics observed after the start of intervention? **If N/PN to 2.1:** go to 2.4	This domain is concerned only with selection into the study based on participant characteristics observed *after* the start of intervention. Selection based on characteristics observed *before* the start of intervention can be addressed by controlling for imbalances between experimental intervention and comparator groups in baseline characteristics that are prognostic for the outcome (baseline confounding). Selection bias occurs when selection is related to an effect of either intervention or a cause of intervention **and** an effect of either the outcome or a cause of the outcome. Therefore, the result is at risk of selection bias if selection into the study is related to both the intervention and the outcome.	Y / PY / PN / N / NI
	2.2. **If Y/PY to 2.1**: Were the post-intervention variables that influenced selection likely to be associated with intervention?		NA / Y / PY / PN / N / NI
	2.3 **If Y/PY to 2.2**: Were the post-intervention variables that influenced selection likely to be influenced by the outcome or a cause of the outcome?		NA / Y / PY / PN / N / NI
	2.4. Do start of follow-up and start of intervention coincide for most participants?	If participants are not followed from the start of the intervention then a period of follow up has been excluded, and individuals who experienced the outcome soon after intervention will be missing from analyses. This problem may occur when prevalent, rather than new (incident), users of the intervention are included in analyses.	Y / PY / PN / N / NI
	2.5. **If Y/PY to 2.2 and 2.3, or N/PN to 2.4**: Were adjustment techniques used that are likely to correct for the presence of selection biases?	It is in principle possible to correct for selection biases, for example by using inverse probability weights to create a pseudo-population in which the selection bias has been removed, or by modelling the distributions of the missing participants or follow up times and outcome events and including them using missing data methodology. However such methods are rarely used and the answer to this question will usually be "No".	NA / Y / PY / PN / N / NI
	Risk of bias judgement	See Table 1.	Low / Moderate / Serious / Critical / NI
	Optional: What is the predicted direction of bias due to selection of participants into the study?	If the likely direction of bias can be predicted, it is helpful to state this. The direction might be characterized either as being towards (or away from) the null, or as being in favour of one of the interventions.	Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Bias in classification of interventions	3.1 Were intervention groups clearly defined?	A pre-requisite for an appropriate comparison of interventions is that the interventions are well defined. Ambiguity in the definition may lead to bias in the classification of participants. For individual-level interventions, criteria for considering individuals to have received each intervention should be clear and explicit, covering issues such as type, setting, dose, frequency, intensity and/or timing of intervention. For population-level interventions (e.g. measures to control air pollution), the question relates to whether the population is clearly defined, and the answer is likely to be 'Yes'.	Y / PY / PN / N / NI
	3.2 Was the information used to define intervention groups recorded at the start of the intervention?	In general, if information about interventions received is available from sources that could not have been affected by subsequent outcomes, then differential misclassification of intervention status is unlikely. Collection of the information at the time of the intervention makes it easier to avoid such misclassification. For population-level interventions (e.g. measures to control air pollution), the answer to this question is likely to be 'Yes'.	Y / PY / PN / N / NI
	3.3 Could classification of intervention status have been affected by knowledge of the outcome or risk of the outcome?	Collection of the information at the time of the intervention may not be sufficient to avoid bias. The way in which the data are collected for the purposes of the NRSI should also avoid misclassification.	Y / PY / PN / N / NI
	Risk of bias judgement	See Table 1.	Low / Moderate / Serious / Critical / NI
	Optional: What is the predicted direction of bias due to measurement of outcomes or interventions?	If the likely direction of bias can be predicted, it is helpful to state this. The direction might be characterized either as being towards (or away from) the null, or as being in favour of one of the interventions.	Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Bias due to deviations from intended interventions	**If your aim for this study is to assess the effect of assignment to intervention, answer questions 4.1 and 4.2**		
	4.1. Were there deviations from the intended intervention beyond what would be expected in usual practice?	Deviations that happen in usual practice following the intervention (for example, cessation of a drug intervention because of acute toxicity) are part of the intended intervention and therefore do not lead to bias in the effect of assignment to intervention. Deviations may arise due to expectations of a difference between intervention and comparator (for example because participants feel unlucky to have been assigned to the comparator group and therefore seek the active intervention, or components of it, or other interventions). Such deviations are not part of usual practice, so may lead to biased effect estimates. However these are not expected in observational studies of individuals in routine care.	Y / PY / PN / N / NI
	4.2. **If Y/PY to 4.1**: Were these deviations from intended intervention unbalanced between groups *and* likely to have affected the outcome?	Deviations from intended interventions that do not reflect usual practice will be important if they affect the outcome, but not otherwise. Furthermore, bias will arise only if there is imbalance in the deviations across the two groups.	NA / Y / PY / PN / N / NI
	If your aim for this study is to assess the effect of starting and adhering to intervention, answer questions 4.3 to 4.6		
	4.3. Were important co-interventions balanced across intervention groups?	Risk of bias will be higher if unplanned co-interventions were implemented in a way that would bias the estimated effect of intervention. Co-interventions will be important if they affect the outcome, but not otherwise. Bias will arise only if there is imbalance in such co-interventions between the intervention groups. Consider the co-interventions, including any pre-specified co-interventions, that are likely to affect the outcome and to have been administered in this study. Consider whether these co-interventions are balanced between intervention groups.	Y / PY / PN / N / NI
	4.4. Was the intervention implemented successfully for most participants?	Risk of bias will be higher if the intervention was not implemented as intended by, for example, the health care professionals delivering care during the trial. Consider whether implementation of the intervention was successful for most participants.	Y / PY / PN / N / NI
	4.5. Did study participants adhere to the assigned intervention regimen?	Risk of bias will be higher if participants did not adhere to the intervention as intended. Lack of adherence includes imperfect compliance, cessation of intervention, crossovers to the comparator intervention and switches to another active intervention. Consider available information on the proportion of study participants who continued with their assigned	Y / PY / PN / N / NI

		intervention throughout follow up, and answer 'No' or 'Probably No' if this proportion is high enough to raise concerns. Answer 'Yes' for studies of interventions that are administered once, so that imperfect adherence is not possible. We distinguish between analyses where follow-up time after interventions switches (including cessation of intervention) is assigned to (1) the new intervention or (2) the original intervention. (1) is addressed under time-varying confounding, and should not be considered further here.	
	4.6. **If N/PN to 4.3, 4.4 or 4.5**: Was an appropriate analysis used to estimate the effect of starting and adhering to the intervention?	It is possible to conduct an analysis that corrects for some types of deviation from the intended intervention. Examples of appropriate analysis strategies include inverse probability weighting or instrumental variable estimation. It is possible that a paper reports such an analysis without reporting information on the deviations from intended intervention, but it would be hard to judge such an analysis to be appropriate in the absence of such information. Specialist advice may be needed to assess studies that used these approaches. If everyone in one group received a co-intervention, adjustments cannot be made to overcome this.	NA / Y / PY / PN / N / NI
	Risk of bias judgement	See Table 2	
	Optional: What is the predicted direction of bias due to deviations from the intended interventions?	If the likely direction of bias can be predicted, it is helpful to state this. The direction might be characterized either as being towards (or away from) the null, or as being in favour of one of the interventions.	

Bias due to missing data	5.1 Were outcome data available for all, or nearly all, participants?	"Nearly all" should be interpreted as "enough to be confident of the findings", and a suitable proportion depends on the context. In some situations, availability of data from 95% (or possibly 90%) of the participants may be sufficient, providing that events of interest are reasonably common in both intervention groups. One aspect of this is that review authors would ideally try and locate an analysis plan for the study.	Y / PY / PN / N / NI
	5.2 Were participants excluded due to missing data on intervention status?	Missing intervention status may be a problem. This requires that the *intended* study sample is clear, which it may not be in practice.	Y / PY / PN / N / NI
	5.3 Were participants excluded due to missing data on other variables needed for the analysis?	This question relates particularly to participants excluded from the analysis because of missing information on confounders that were controlled for in the analysis.	Y / PY / PN / N / NI
	5.4 **If PN/N to 5.1, or Y/PY to 5.2 or 5.3**: Are the proportion of participants and reasons for missing data similar across interventions?	This aims to elicit whether either (i) differential proportion of missing observations or (ii) differences in reasons for missing observations could substantially impact on our ability to answer the question being addressed. "Similar" includes some minor degree of discrepancy across intervention groups as expected by chance.	NA / Y / PY / PN / N / NI
	5.5 **If PN/N to 5.1, or Y/PY to 5.2 or 5.3**: Is there evidence that results were robust to the presence of missing data?	Evidence for robustness may come from how missing data were handled in the analysis and whether sensitivity analyses were performed by the investigators, or occasionally from additional analyses performed by the systematic reviewers. It is important to assess whether assumptions employed in analyses are clear and plausible. Both content knowledge and statistical expertise will often be required for this. For instance, use of a statistical method such as multiple imputation does not guarantee an appropriate answer. Review authors should seek naïve (complete-case) analyses for comparison, and clear differences between complete-case and multiple imputation-based findings should lead to careful assessment of the validity of the methods used.	NA / Y / PY / PN / N / NI
	Risk of bias judgement	See Table 2	Low / Moderate / Serious / Critical / NI
	Optional: What is the predicted direction of bias due to missing data?	If the likely direction of bias can be predicted, it is helpful to state this. The direction might be characterized either as being towards (or away from) the null, or as being in favour of one of the interventions.	Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Bias in measurement of outcomes	6.1 Could the outcome measure have been influenced by knowledge of the intervention received?	Some outcome measures involve negligible assessor judgment, e.g. all-cause mortality or non-repeatable automated laboratory assessments. Risk of bias due to measurement of these outcomes would be expected to be low.	Y / PY / PN / N / NI
	6.2 Were outcome assessors aware of the intervention received by study participants?	If outcome assessors were blinded to intervention status, the answer to this question would be 'No'. In other situations, outcome assessors may be unaware of the interventions being received by participants despite there being no active blinding by the study investigators; the answer this question would then also be 'No'. In studies where participants report their outcomes themselves, for example in a questionnaire, the outcome assessor is the study participant. In an observational study, the answer to this question will usually be 'Yes' when the participants report their outcomes themselves.	Y / PY / PN / N / NI
	6.3 Were the methods of outcome assessment comparable across intervention groups?	Comparable assessment methods (i.e. data collection) would involve the same outcome detection methods and thresholds, same time point, same definition, and same measurements.	Y / PY / PN / N / NI
	6.4 Were any systematic errors in measurement of the outcome related to intervention received?	This question refers to differential misclassification of outcomes. Systematic errors in measuring the outcome, if present, could cause bias if they are related to intervention or to a confounder of the intervention-outcome relationship. This will usually be due either to outcome assessors being aware of the intervention received or to non-comparability of outcome assessment methods, but there are examples of differential misclassification arising despite these controls being in place.	Y / PY / PN / N / NI
	Risk of bias judgement	See Table 2	Low / Moderate / Serious / Critical / NI
	Optional: What is the predicted direction of bias due to measurement of outcomes?	If the likely direction of bias can be predicted, it is helpful to state this. The direction might be characterized either as being towards (or away from) the null, or as being in favour of one of the interventions.	Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Bias in selection of the reported result	Is the reported effect estimate likely to be selected, on the basis of the results, from... 7.1. ... multiple outcome *measurements* within the outcome domain?	For a specified outcome domain, it is possible to generate multiple effect estimates for different measurements. If multiple measurements were made, but only one or a subset is reported, there is a risk of selective reporting on the basis of results.	Y / PY / PN / N / NI
	7.2 ... multiple *analyses* of the intervention-outcome relationship?	Because of the limitations of using data from non-randomized studies for analyses of effectiveness (need to control confounding, substantial missing data, etc), analysts may implement different analytic methods to address these limitations. Examples include unadjusted and adjusted models; use of final value vs change from baseline vs analysis of covariance; different transformations of variables; a continuously scaled outcome converted to categorical data with different cut-points; different sets of covariates used for adjustment; and different analytic strategies for dealing with missing data. Application of such methods generates multiple estimates of the effect of the intervention versus the comparator on the outcome. If the analyst does not pre-specify the methods to be applied, and multiple estimates are generated but only one or a subset is reported, there is a risk of selective reporting on the basis of results.	Y / PY / PN / N / NI
	7.3 ... different *subgroups*?	Particularly with large cohorts often available from routine data sources, it is possible to generate multiple effect estimates for different subgroups or simply to omit varying proportions of the original cohort. If multiple estimates are generated but only one or a subset is reported, there is a risk of selective reporting on the basis of results.	Y / PY / PN / N / NI
	Risk of bias judgement	See Table 2	Low / Moderate / Serious / Critical / NI
	Optional: What is the predicted direction of bias due to selection of the reported result?	If the likely direction of bias can be predicted, it is helpful to state this. The direction might be characterized either as being towards (or away from) the null, or as being in favour of one of the interventions.	Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Overall bias	**Risk of bias judgement**	See Table 3.	Low / Moderate / Serious / Critical / NI
	Optional: What is the overall predicted direction of bias for this outcome?		Favours experimental / Favours comparator / Towards null /Away from null / Unpredictable

Appendix 4: Excluded studies and reasons for exclusion

	Study	Abbreviated reference	Reason for exclusion
1	AHRQ updates on primary care research	Ann Fam Med 2014;79. doi: 10.1370/afm.1611	Notification of webinar - not relevant
2	Banerjee 2015	Lancet. 2015 Jun 6;385(9984):2252-3. doi: 10.1016/S0140-6736(15)61062-5	Undergraduate training only - clarified by direct communication with author
3	Barnett 2012	Lancet 2012; 380: 37–43	Comments on need for more training
4	Bayliss 2012	Ann Fam Med 2012;10:3-5. doi:10.1370/afm.1352	Editorial about patient (rather than doctor) interventions
5	Bayliss 2008	Family Practice 2008; 25: 287–293	Participants are patients, not doctors
6	Bodenheimer 2002	N Engl J Med 365;1: 5-8	Not specific to multimorbidity
7	Bogetz 2015	Acad Med. XXXX;XX:00–00.doi: 10.1097/ACM.0000000000000773	Focus is on chronic disease rather than multimorbidity
8	Bohmer 2010	Health Aff (Millwood). **2010** May;29(5):1010-4. doi: 10.1377/hlthaff.**2010**.0197	Not specific to multimorbidity, discusses some of the skills needed
9	Bonney 2015	Primary Health Care Research & Development, page 1 of 11 doi:10.1017/S1463423614000589	Geriatric focus rather than multimorbidity
10	Bonney 2012	Educ Prim Care. 2012 May;23(3):186-95.	Geriatric focus rather than multimorbidity
11	Boult 2010 (1)	Health Aff (Millwood). 2010 May;29(5):811-8. doi: 10.1377/hlthaff.2010.0095	Geriatric focus rather than multimorbidity
12	Boult 2010 (2)	JAMA. 2010;304(17):1936-1943	Geriatric focus rather than multimorbidity
13	Bower 2014	Journal of Health Services Research &Policy 18(Suppl. 2) 29–37	Commentary on the Ariadne principles, but nothing specifically about education
14	Boyd 2005	JAMA, August 10, 2005—Vol 294, No. 6	No educational focus
15	Chang 2014	J Gen Intern Med 29(6):940–6	Outlines an assessment tool
16	Clark 2011	Health Education & Behavior 38(3) 219– 221	No comment on effectiveness
17	Cottrell 2015	Chronic Illness 2015, Vol. 11(4) 279–303	Not effectiveness
18	Darer 2004	Academic Medicine 79(6)	Not specific to multimorbidity

	Study	Abbreviated reference	Reason for exclusion
19	Drazen 2014	Eur Respir J 2014; 44: 557 | DOI: 10.1183/09031936.00120814	Editorial discusses need for research on how best to train doctors
20	Durso 2006	JAMA, April 26, 2006 Vol 295, No. 16	No evaluation
21	Fortin 2007	Health and Quality of Life Outcomes 2007, 5:52 doi:10.1186/1477-7525-5-52	No educational focus
22	Gilbert 2011	Australasian Journal on Ageing, Vol 30 Supplement 2, October 2011, 32–37	Qualitative study
23	Guthrie 2008	BMJ 2008;337:a867	Continuing care, not education
24	Guthrie 2012	BMJ. **2012** Oct 4;345:e6341. doi: 10.1136/bmj.e6341	Analysis piece - adapting guidelines to suit patients with multimorbidity
25	Haggerty 2012	BMJ. **2012** Sep 7;345:e5915. doi: 10.1136/bmj.e5915	Discusses skills required but no education focus
26	Hawkes 2012	BMJ 2012;344:e3336	Comments on need for more training
27	Hays 2011	MJA 2011; 194: S63–S66	Review of GP training -mentions multimorbidity but not specific to it
28	Honey 2014	Internal Medicine Journal 44;6:619 doi:10.1111/imj.12452	Discusses who is responsible for management of multimorbid patients - no education focus
29	Jackal 2014	Internal Medicine Journal 44 (2014)	Not relevant - analysis of general medical training programme
30	Junius-Walker 2009	European Journal of General Practice, 2010;16:51-54	No education focus
31	Kadam 2012	BMJ 2012;345:e6202 doi: 10.1136/bmj.e6202	Discusses system changes which are needed - no education focus
32	Kernick 2012	British Journal of General Practice, September 2012 e659	Discusses theoretical framework - clinical, service delivery, governance - not education
33	Koch 2015	West J Nurs Res. 2015 Apr;37(4):498-516. doi: 10.1177/0193945914549058	Systematic review of barriers and faciltators to multimorbidity management from patient perspective
34	Langan 2013	BJP 2013, 202:391-393	Editorial on multimorbidity and psychiatry
35	Luijks 2012	Br JGenPract 2012;DOI: 10.3399/bjgp12X652373	Barriers to delivery of care to multimorbidity patients, but nothing about training needs

	Study	Abbreviated reference	Reason for exclusion
36	Magin 2014	BMC Medical Education 2014, 14:260	Focus is on chronic disease rather than multimorbidity
37	Marshall 2004	Drug and Alcohol Review (December 2004), 23, 455 – 462	Dual diagnosis (alcohol and mental health) rather than multimorbidity
38	Mercer 2012	BMJ 2012;345:e5559 doi: 10.1136/bmj.e5559	No education focus
39	Mitchell 2014	Eur Respir J 2014; 44: 578–584 | DOI: 10.1183/09031936.00109314	Respiratory focus rather than multimorbidity
40	Muth 2014	European Journal of General Practice, 2014; 20: 139–147	Discusses research challenges for multimorbidity but no education focus
41	Nieman 2011	Medical Teacher, 33:6, e340-e348	Chronic illness rather than multimorbidity
42	Nieuwenhuijzen Kruseman 2007	The Netherlands Journal of Medicine 2007;65(10):363-365	Opinion piece on training needs rather than education specifically
43	Nuño-Solinís 2014	Aten Primaria. 2014;46(Supl 3):3-9	Review article about management of multimorbidity
44	O'Regan 2013	Aten Primaria. 2014;46(Supl 3):3-9	Not specific to multimorbidity
45	Renner 2004	Biological Psychiatry 2004;56(10):810-816	Dual diagnosis (alcohol and mental health) rather than multimorbidity
46	Roland 2013	BMJ 2013;346:f2510 doi: 10.1136/bmj.f2510	Identifies skills needed to manage patients with multimorbidity, no education focus
47	Rudland 2013	BMJ 2013;346:f3555 doi: 10.1136/bmj.f3555	No education focus
48	Salisbury 2013	British Journal of General Practice, February 2013 DOI: 10.3399/bjgp13X661020	Focuses on research and clinical challenges of multimorbidity
49	Shipengrover 1999	Med Educ. 1999 Nov;33(11):846-53	Theoretical medical education paper
50	Shipway 2015	Journal of Surgical Education Volume 72/Number4 _ July/August 2015 http://dx.doi.org/10.1016/j.jsurg.2015.01.019	Geriatric focus rather than multimorbidity
51	Sinnott 2013	BMJ Open 2013;3:e003610. doi:10.1136/bmjopen-2013-003610	Training needs rather than education
52	Smith 2010	Br J Gen Pract 2010; DOI: 10.3399/bjgp10X514756.	Qualitative study addressing needs
53	Soubhi 2010	Ann Fam Med 2010;8:170-177. doi:10.1370/afm.1056.	Organisational paper

	Study	Abbreviated reference	Reason for exclusion
54	Stange 2012	Ann Fam Med 2012;10:2-3. doi:10.1370/afm.1354.	No multimorbidity focus
55	Starfield 2011	Primary Health Care Research & Development 2011; 12: 1–2 doi:10.1017/S1463423610000484	Challenges of multimorbidity, no education focus
56	Thom 2006	BMC Med Educ. 2006 Jul 26;6:38	No multimorbidity focus
57	Tinetti 2012	JAMA, June 20, 2012—Vol 307, No. 23	Opinion piece on how care for patients with multimorbidity should be delivered
58	Van der Zwet 2010	Medical Teacher, 32:7, e294-e299	Undergraduate training only
59	Van Iersal 2013	JAGS 2013–Vol. 61, NO. 4 p661	Discusses how patients with multimorbidity should be presented in ward rounds
60	Walsh 2014	Pan African Medical Journal. 2014; 19:333 doi:10.11604/pamj.2014.19.333.5555	Not specific to multimorbidity
61	Wong 2015	AGS AGM 2015	Undergraduate training only
62	Wrede 2013	Patient Education and Counseling 90 (2013) 54–60	Geriatric focus rather than multimorbidity
63	Yardley 2015	BMC Family Practice (2015) 16:23 DOI 10.1186/s12875-015-0234-9	Organisational and theoretical discussion

Appendix 5 Surveys of trainees and trainers

Training Doctors in Multimorbidity: Survey of Trainees

***1. In what year did you graduate from medical school?**

***2. What year of specialist training/ GP training are you currently in?**

- 1
- 2
- 3
- 4
- >/=5

***3. Multimorbidity is very common in clinical practice and will often arise during case-based discussions. However, when we refer to specific training in multimorbidity we are interested in training or educational sessions that explicitly deal with the broader concepts and management of patients with multimorbidity.**

In your specialist training, have you had any tutorials addressing the management of patients with multimorbidity?

- Yes
- No
- Unsure

***4. Which of the following subjects have been addressed during your specialist training? Please tick all that apply.**

- Multisystem disease management
- Prescribing in patients on multiple long term medications
- Coordination of care in patients with multiple comorbidities / chronic diseases
- Supporting self-management in patients with multimorbidity
- None of the above

Comment

***5. On the rating scale below, how prepared do you feel with regard to managing patients with multimorbidity?**

1 Not prepared	2	3	4	5 Adequately prepared	6	7	8

Why / why not?

***6. Would you have an interest in participating in training in the area of multimorbidity in the future?**

- Yes
- No

7. If you are interested in further training in multimorbidity, what format would you like this training in multimorbidity to take?

- [ ] Workshop
- [ ] Lecture
- [ ] On-line module
- [ ] Print material
- [ ] I am not interested in further training
- [ ] I do not need further training as I have had previous adequate training
- [ ] Other (please specify)

8. If you would like to participate in multimorbidity training, what would be your preferred time?

- [ ] I do not want to participate in multimorbidity training
- [ ] Normal working hours
- [ ] Early morning
- [ ] Evening
- [ ] Weekend
- [ ] Break-out session at usual day release teaching
- [ ] In your own time (ie online or printed material)
- [ ] Other (please specify)

9. What would be your preferred venue for multimorbidity training, if you were to attend?

- [ ] Usual place of work
- [ ] City centre
- [ ] Breakout session at usual day-release training
- [ ] Online
- [ ] CME meeting
- [ ] GP practice
- [ ] Other (please specify)

Survey of National Specialty Directors / Directors and Assistant Directors of GP training

***1. For how long have you been a National Specialty Director?**

- ☐ Less than five years
- ☐ Five years or more
- ☐ Other (please specify)

***2. Multimorbidity is very common in clinical practice and will often arise during case-based discussions. However, when we refer to specific training in multimorbidity we are interested in training or educational sessions that explicitly deal with the broader concepts and management of patients with multimorbidity.**

In which of the following areas do you provide training to your trainees which specifically incorporates multimorbidity? (Please tick all that apply)

- ☐ Multisystem disease management
- ☐ Prescribing in patients on multiple long-term medications
- ☐ Coordination of care in patients with multiple comorbidities / chronic diseases
- ☐ Supporting self-management for patients with multimorbidity
- ☐ Other
- ☐ None of the above

Comment

***3. Please rank below how well you feel that postgraduate training in your specialty prepares its trainees for managing patients with multimorbidity?**

Not at all | Poorly | Adequately | Well | Excellently | Unsure

Comment

***4. In which of the following areas have YOU had specific training, either in the content itself or in teaching the topic? (Please tick all that apply)**

	Content	Teaching	Neither
Multisystem disease management	☐	☐	☐
Prescribing in patients on multiple long-term medications	☐	☐	☐
Coordination of care in patients with multiple comorbidities / chronic diseases	☐	☐	☐
Supporting self-management for patients with multimorbidity	☐	☐	☐
Other	☐	☐	☐
None of the above	☐	☐	☐

Comment

***5. If specific training in multimorbidity was to be incorporated into the curriculum of your postgraduate training scheme, would you feel adequately prepared at present to deliver this training?**

- ○ Yes
- ○ No
- ○ Unsure

Comment

Appendix 6: Free text comments: trainees' survey

Which of the following subjects have been addressed during your Specialist Training?

RCPI trainee

'No dedicated teaching or tutorials on broader concepts of managing patients with medical co-morbidities' Lack of formal training

'Paeds and neonatology is full of multimorbidity' Relevance of specialty

'Would be useful to have further training in prescribing with multiple medications and in issues relating to managing patients in a health service which is not very well joined up'

'The prevalence of multimorbidity is such that we are exposed to it often and therefore probably have developed skills in management of same' Experiential/case-based learning

'I feel that there should be more teaching in the area' Lack of formal training

'Everything is experience-based really. No formal training on issues of a general nature tend to be given' Lack of formal training, experiential/case-based learning

'Topic has not been adequately addressed' Lack of formal training

'Rather than specific training you learn mostly through experience' Experiential/case-based learning

'I am an oncology trainee where multimorbidity is a significant issue, but which is not addressed formally in training' Lack of formal training

‘Medicine is increasingly sub-specialised. It is facile to think the training physicians in multimorbidity has any use. Hence the need to divert training away from “GIM” towards specialty-training only. I am adequately trained in my specialty that deals with multisystem disease’ Relevance of specialty

‘This is part of Geriatrics SpR training’ Relevance of specialty

‘As said above these issues are discussed on individual patient case basis but not as a topic in its own right. There is a very grey area when dealing with these patients in specialist clinics, in my UK experience there appeared to be a much clearer referral path back through the GP for referrals, prescribing etc but there was a clearer one-to-one relationship/responsibility (present to some extent here with GMS patients) and much more timely communication with GPs which is difficult here because of overstretched secretarial services. Most patients also assume that we have access to lists of their current medications in their charts (paper based, frequently multi-volume and falling apart) and take poor responsibility for knowing what they are taking & for bringing copies of their medication lists. An example of the difficulties: recent patient I brought back for fasting bloods after several high random cholesterol readings over a couple of years with a strong family history of heart disease - should I be managing his statin titration at a sub-specialist viral hepatitis clinic which is over-booked with a massive waiting list? Probably not appropriate but I can't trust 'the system' to follow him up based on his previous interactions with it over the past number of years. An integrated electronic system for results, medication records & communication with GPs and other healthcare professionals is badly lacking.’ Communication, resources

‘I’m a histopathology trainee’ Relevance of specialty

‘This question is vague. Surely e.g. diabetes, geriatrics sessions involve multiple comorbidities. No sessions were specifically labelled with these terms.’

‘Without being provocative - I have received next to no formal training/ teaching to even be able to answer these questions’ Lack of formal training

‘Histopathology trainee’ Relevance of specialty

‘Areas quite specific to my specialty: hepatorenal syndrome, Cardiorenal syndrome. Co-morbidity addressed in so far as these conditions overlap more than one organ system/specialty. However no dedicated teaching or tutorials on broader concepts of managing patients w medical comorbidities.’ Lack of formal training, experiential/case-based learning, relevance of specialty

‘Working in occupational medicine - limited focus on medication requirements for patients or on disease management’ Relevance of specialty

‘This is core curriculum in Geriatric Medicine’ Relevance of specialty

‘The concept of multimorbidity is so nebulous as to be impossible to accurately answer many of the questions raised. How many of us see people with diabetes, hypertension and hypercholesterolaemia on a weekly basis?’ Experiential/self-directed learning

‘Paediatrics and neonatology is full of multimorbidity. General paediatricians are excellent all-encompassing physicians who provide excellent care in comparison to "adult" general physicians in my opinion.’ Relevance of specialty

ICGP Trainees

‘The subject has arisen in tutorials to do with care of the elderly, pharmacy/therapeutics and when discussing chronic diseases and resources’ Experiential/case-based learning

‘Never do specific tutorials on management of multimorbidity’ Lack of formal training

‘Has come up in discussing certain clinical issues or cases’ Experiential/case-based learning

On a rating scale of 1 (not prepared) to 10 (fully prepared), how prepared do you feel with regard to managing patients with multimorbidity?

ICGP Trainees

'Little consideration (and little research) is given to addressing multiple biological problems in the same patient' Lack of formal training and guidelines

'I'm only starting off in my scheme and lots left to learn about multimorbidity' Stage in training

'I feel reasonably prepared but my main difficulty would be applying guidelines and EBM to this cohort of patients who may differ a lot from the types of patients in clinical trials' Guidelines

'I have many patient with multimorbidity. I find their care challenging as it can be difficult to decipher which condition in causing their symptoms. Also, medi (sic) for one condition may exacerbate the other. It is also difficult getting a consultant opinion who takes their whole medical issues into account.'

'I would like some more tutorials and teaching in chronic disease, polypharmacy and management of patients with chronic disease needs' Training needs

'Not enough training' Lack of formal training

'Limiting multimorbidity consulting times is difficult. It's not the medical issues it's how to deal with it in a short consult' Resources

'Lack of experience with the drugs involved' Training needs

'Any preparation I have in terms of management of multimorbidity has been self-directed' Lack of formal training

'Did a rotation in Medicine for the Elderly - feel it was of great benefit in this regard'. Experiential/case-based learning, relevance of specialty

'More medicine in GP training - 6 months far too little' Relevance of specialty

RCPI Trainees

'Despite the lack of formal training, the prevalence of multimorbidity is such that we are exposed to it often and therefore probably have developed skills in management of same.' Lack of formal training, experiential/case-based learning

'Very complex. Requires an MDT approach.'

'It's very common in clinical practice, so I feel I have a lot of exposure to patients with multimorbidity over my training to date.' Experiential/case-based learning

'There is always room for improvement & I feel that there should be more training in this area.' Training needs

'Need more exposure' Experiential/case-based learning

'General experience' Experiential/case-based learning

'Occupational Health SPR; we won't be managing this cohort of patients' Relevance of specialty

'I think it would be very useful to have formal teaching in this area as in our day to day work and on call we frequently deal with such patients. It would however be necessary to make it compulsory as it can be very difficult to get time away from a busy service to attend almost any extracurricular activities.' Experiential/case-based learning

'Very frequent presentation in the GIM patient' Experiential/case-based learning, relevance of specialty

'Lack of clear guidelines.' Guidelines

'Everything is experienced based really. No formal training on issues of a general nature tend to be given. My experience tells me that I'm used to dealing with multimorbidity and therefore adequately prepared.' Lack of formal training, experiential/case-based learning

‘Not applicable within my specialty.’ Relevance of specialty

‘Topic has not been addressed adequately’ Lack of formal training

‘Because we haven’t been given formal training on how to manage such patients, although we are dealing with such patients almost daily but don’t feel confident in managing these patients because of lack of appropriate training.’ Lack of formal training, experiential/case-based learning

‘No training. Only heard if multimorbidity for the first time due to this survey’ Lack of formal training

‘I’m a histopathology trainee’ Relevance of specialty

‘I am a histopathology trainee so the topic is probably not as relevant for me as for other specialities.’ Relevance of specialty

‘Still a junior,’ Relevance of stage of training

‘I receive very little formal training, teaching but many patients do have multimorbidity so by default I have become used to considering all of this before coming to a decision in treatment management’ Lack of formal training, experiential/case-based learning

‘I feel that in paediatrics in Galway, a lot of our patients with multimorbidity/ complex biopsychosocial problems are already involved with the appropriate services (e.g. Enable Ireland, Early Intervention Services) and so this makes the job of the acute medical Dr much easier.’

‘Rather than specific training you learn mostly through experience.’ Experiential/case-based learning

‘Speciality is obs and gynae therefore little exposure to medically unwell patients or those with multiple morbidities’ Relevance of specialty

‘We are involved with the diagnostic process more than intervention/ management.’ Relevance of specialty

‘Although our teaching doesn't address this area, real life in the hospital consists of considerable exposure to patients with co-morbid conditions, so as you progress in experience, you accrue considerable management skills with this. It would be nice to have some formal teaching in the area especially with regard to service planning and provision for this patient population.’ Lack of formal training, experiential/case-based learning

‘I am an oncology trainee where multimorbidity is a significant issue but

which is not addressed formally in training - more on an individual case basis.’ Lack of formal training, relevance of specialty

‘Within the context of the service provided’

‘Very minimal input in acute medicine with regards multiple comorbidities. Focus placed solely on the acute presentation’

‘Geriatric Medicine is all about manging complex multimorbidity’ Relevance of specialty

‘However the resources for "complex" patients in paediatrics as in many areas are unfortunately limited by HSE spending and planning.’ Resourcing

‘I feel quite comfortable to manage patients with multimorbidity as it is a daily practice, but if I'm stuck will always refer to senior/consultant.’ Experiential/case-based learning

‘I am a geriatric medicine trainee so most of our patients have multiple medical co-morbidities’ Relevance of specialty

‘While there is little formal/directed training in managing patients with multimorbidity, by rotating through multiple specialities e.g. Med el, renal, cardiology and doing general on call one becomes familiar with general medical patients with multimorbidity, real life patients rarely fit into one speciality.’ Lack of formal training, experiential/case-based learning, relevance of specialty

‘This is not as big an issue in Paediatrics’ Relevance of specialty

‘Medicine is increasingly sub-specialised. It is facile to think that training physicians in multimorbidity has any use. Hence the need to divert training away from "GIM" towards speciality-driven training only. I am adequately trained in my specialty that deals with multisystems disease.’ Relevance of specialty

‘Teaching is very much specialty directed, very little done on multiple co morbidities except on an individual case basis at bedside’ Lack of formal training, experiential/case-based learning

Appendix 7: Initial analysis of free text comments: trainers' survey

Q 1 **In which of the following areas do you provide training to your trainees which specifically incorporates multimorbidity?**

RCPI NSDs

'In occupational medicine we are certainly aware of the impact of multimorbidity on an employee's fitness for work. We see how even a relatively mild depression can impact on the management of other conditions such as DM, arthritis, obesity etc. Such multiple morbidities can impact on recovery rates following injury (including occupational injury) and can contribute to long term sickness absence. Our assessment of patients / employees aims to be holistic and to consider how different conditions (particularly mental health) affect health and ability in general' Relevance to specialty

'From a rehabilitation perspective patients with complex impairments and morbidity represent a challange e. g. SCI and cancer, obesity, COPD, CVS, Stroke etc' Relevance to specialty

'Some of our "Complicated Diabetes" clinics include patients with (by definition) multimorbidity. We do not address any of the issues listed above in a specific way' Lack of formal training

Q 3 **Please rank below how well you feel that postgraduate training in your specialty prepares its trainees for managing patients with multimorbidity? Comments**

RCPI NSDs

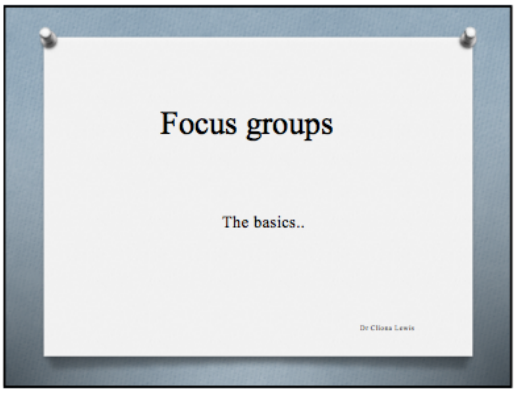
‘We focus on functional ability which of necessity involves some consideration of multimorbidity particularly when mental health and physical health issues exist’

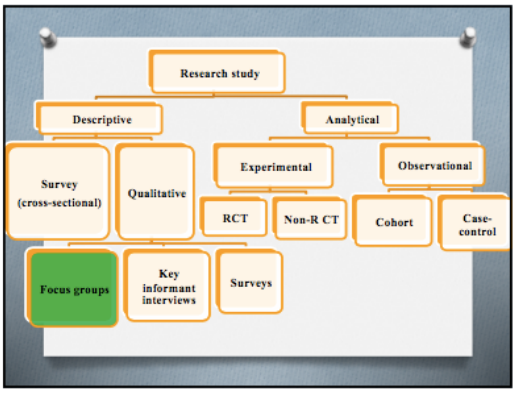
‘Perhaps my judgment is a bit harsh here. We do emphasise in training the importance of full assessment. Since “risk assessment” is a key component of our training, this is also brought in to the individual assessment of patients. However, I was unfamiliar with the term multimorbidity until now so perhaps what we need is to evaluate our training and adjust it in light of this 'new' concept’ Nomenclature

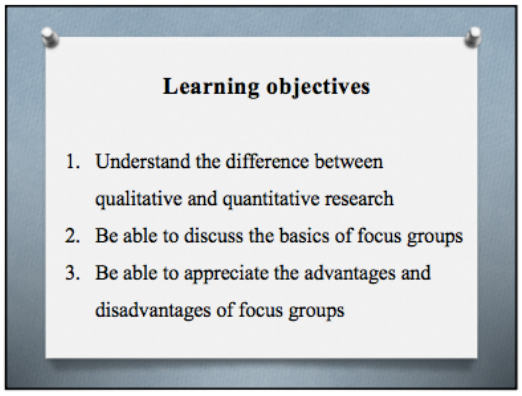
‘Need to expand issues around polypharmacy & drug interaction’ Specific training needs

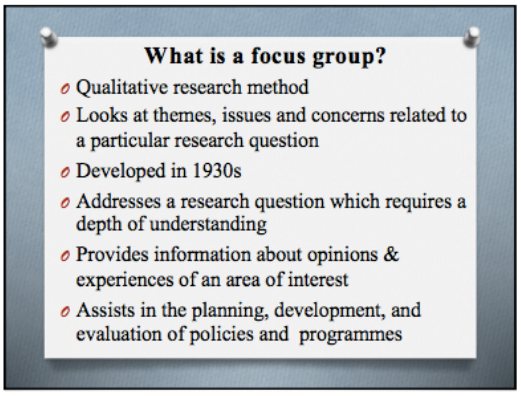
‘Management of complex impairments’

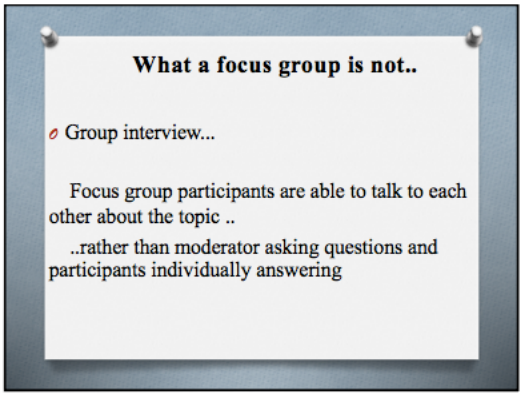
Appendix 8: Focus group presentation for GP trainees

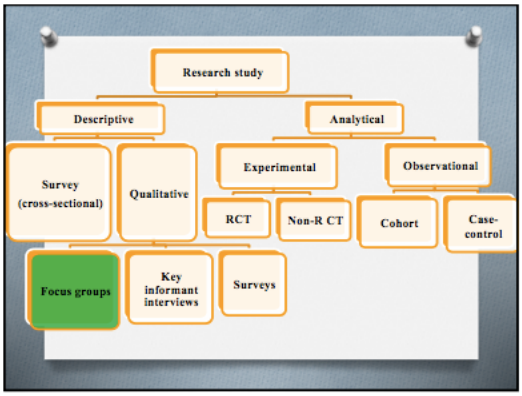












Learning objectives

1. Understand the difference between qualitative and quantitative research
2. Be able to discuss the basics of focus groups
3. Be able to appreciate the advantages and disadvantages of focus groups

Qualitative vs quantitative

- Analysis of words / pictures / objects
- Complete, detailed description
- Subjective - individuals interpretation of events is important
- Uses participant observation, in-depth interviews
- Data is 'rich', time consuming, and less able to be generalized
- Analysis of numerical data
- Classify items, count them
- Objective – measures and analyses measurement target concepts,
- Statistical models
- Researcher knows clearly in advance what information they are looking for

Learning objectives

1. Understand the difference between qualitative and quantitative research
2. Be able to discuss the basics of focus groups
3. Be able to appreciate the advantages and disadvantages of focus groups

Why use focus groups?

- Collect qualitative data
- In-depth information related to the topic of interest
- Participants are influenced by interaction with others
  - Opinions can be clarified during the group
  - Insights trigger sharing of others' experiences
- Stimulate new ideas
- Generate new hypotheses
- Can help with interpretation of quantitative results
- Good for looking at human needs and behaviours

When is a focus group used?

- Can be used as:
  - An independent investigation
  - Part of a multi-method study (qualitative and quantitative methods)
  - A supplement to a quantitative study, giving in-depth interpretation of the quantitative data

Planning a focus group

1. Planned discussion:
   - Themes
   - Probes ('tell me more about that')
   - Clarifying questions
2. Conducted by a moderator / facilitator
3. Relaxed environment:
   - Encourages expression of different points of view
   - No pressure for consensus

Who takes part in a focus group?

- Ideally 7-10 people
- Common characteristics / interests
- If possible
  - participants unfamiliar with each other to encourage diversity
- Minimum three focus groups in a study
  - identify patterns and trends until 'data saturation' – no new themes emerge from subsequent focus groups

Practicalities…

- Convenience
- Comfortable
- Time
- Quiet
- Verbal/ written consent
- Audio recorder
- Themes and probes

Data collection

- Voice recorder
- Note taking during group
- Immediately after group
- Transcription of audio recording
- Analysis of series of focus groups
- Preparation of final report

Data analysis

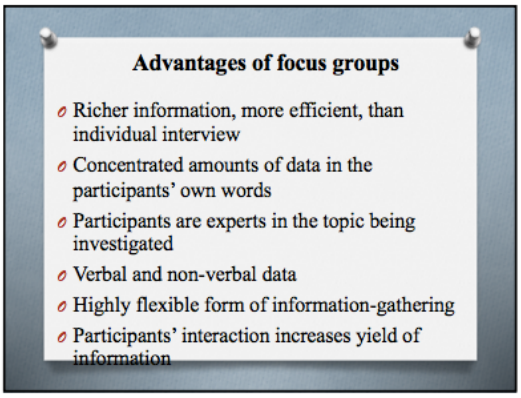
- Look at:
  - Words
  - Context
  - Internal consistency
- Comments:
  - Frequency
  - Intensity
- Find the 'big ideas'

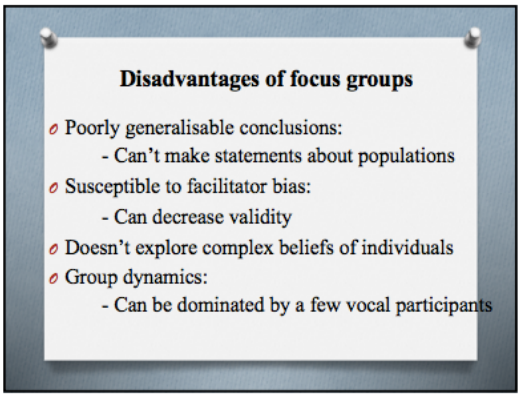
Steps in data analysis

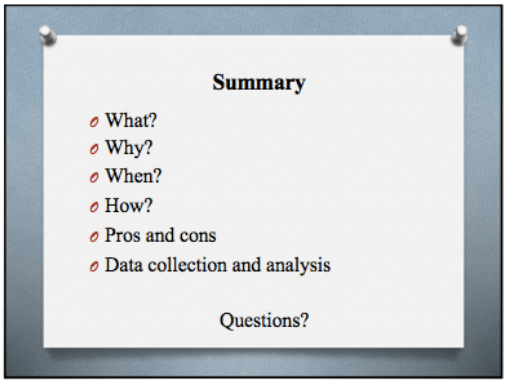
1. Mechanical:
   - Organising and sub-dividing topics
2. Interpretation:
   - Code mapping:
     - Developing subdivisions
     - Searching for patterns
     - Drawing meaningful conclusions
3. Reliability:
   - Repeated review of data
   - Independent analysis by two / more analysts

Learning objectives

1. Understand the difference between qualitative and quantitative research
2. Be able to discuss the basics of focus groups
3. Be able to appreciate the advantages and disadvantages of focus groups


Advantages of focus groups
Richer information, more efficient, than individual interview
Concentrated amounts of data in the participants' own words
Participants are experts in the topic being investigated
Verbal and non-verbal data
Highly flexible form of information-gathering
Participants' interaction increases yield of information


Disadvantages of focus groups
Poorly generalisable conclusions:
- Can't make statements about populations
Susceptible to facilitator bias:
- Can decrease validity
Doesn't explore complex beliefs of individuals
Group dynamics:
- Can be dominated by a few vocal participants


Summary
What?
Why?
When?
How?
Pros and cons
Data collection and analysis
Questions?

Appendix 9: Focus group procedure

1	Introduction by facilitator ▪ Qualitative research, specifically focus groups
2	Consent ▪ Option to leave if not interested in participating ▪ Programme training directors will not be informed re attendance / non-attendance
3	Ground rules ▪ One person talking at a time ▪ Confidentiality assured ▪ No right / wrong answers – all ideas, views, experiences, and opinions – positive and negative - are valuable ▪ Discussion is informal ▪ Everyone is expected to participate ▪ Facilitator is entirely independent of the training scheme ▪ Any other ground rules suggested by participants?
4	**Facilitator:** ▪ Use focus group guide as prepared ▪ Facilitating rather than guiding direction of discussion ▪ If incomplete / irrelevant answers: o Pause for the answer o Repeat the question o Repeat the reply o Ask when/ what / where / which / how questions o Use neutral comments 'anything else?' ▪ Address questions to individuals who are reluctant to talk ▪ Give non-verbal cues ▪ Intervene, summarise the point, re-focus the discussion 'We have had an interesting discussion – let's explore other ideas / points of view. Has anyone had a different experience that they would like to share?'

	▪ Ideally record with tape recorder and hand-written notes. – facial expression, group dynamics. ▪ Dominant participants: o 'I really appreciate your comments, I'm very interested to hear how other people feel about the issue' ▪ If no one responds: o Rephrase the question o Is it a politically sensitive question – are they afraid to answer honestly? o Are they tired talking about the topic? ▪ 'Is there anything else you would like to share? If not, we can move on to our next question' o Are they feeling uncomfortable about talking? ▪ Wandering from topic: o 'For the purposes of exploring the specific topics that are the focus of this discussion, I'd like to move onto another item if that's ok?' Winding up: Thank you Further contact re training workshops / modules ▪ CME – qualifies for either Internal CME (Other), or Research/Training CME (Other). ▪ Lists for further contact re training & CME email

Appendix 10: Focus group theme sheet

Theme 1: Understanding of multimorbidity

What is your understanding of multimorbidity?

What is the impact of multimorbidity on your daily practice?

Are there challenges to managing patients with multimorbidity in general practice?

Theme 2: Current curriculum

What (if any) training have you had in your postgraduate education which addressed multimorbidity?

What was covered in this training?

Is there sufficient MM material already included in training so far?

Do you feel that you have had sufficient exposure to MM – MedEl / Gen Med etc?

Have you covered MM but under a different name? (case discussion/ medication management etc)

Theme 3: Training needs

Do you think that training specific to multimorbidity is needed? Why/Why not?

If yes - What should be covered in MM training?

Theme 4: Future training

Would you be interested in attending training in multimorbidity if it was made available? If yes:

What? (format)

Who? (delivered by):

MedEl	Pharmacist	Physician	GP	Academic
Therapeutics	Others	Physician / GP/ Combined?		

When?

Workshop at ICGP summer school? / Workshop at usual training day?

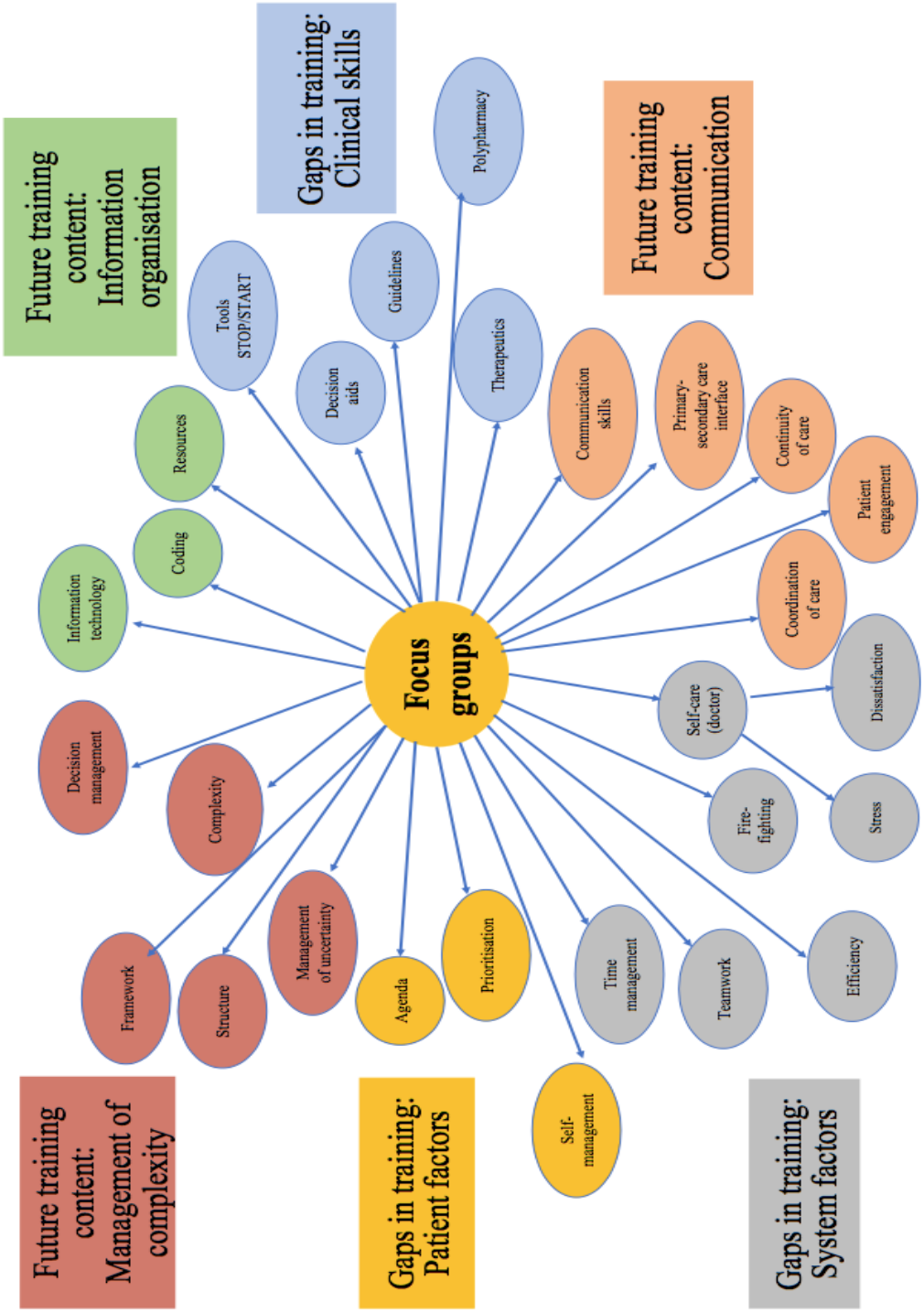
Theme 5: Obstacles

Do you see any obstacles to introducing a MM module to training, if you feel that it's necessary?

Theme 6: Other

Are there any other comments which you would like to make re: MM training for graduates?

Appendix 11: Thematic analysis of focus group data



Appendix 12: Workshop presentation summary

Part one: Introduction to multimorbidity

A brief introduction to multimorbidity and its definition was followed by a video made by the Agency for Healthcare Research and Quality (AHRQ) (77, 151). This video demonstrated some of the impact of multiple chronic conditions on the daily life of a patient, and proposes the introduction of a system which offers care of the whole person, communication between specialties, coordination of appointments and empowering of the patient within the experience which is their life and illnesses. Prevalence of multimorbidity, its association with deprivation and mental illness, and the impact of multimorbidity on both the patient and the health system were addressed, completing the introduction.

Part two: Challenges in the management of patients with multimorbidity

The workshop then looked at a variety of topics which had been highlighted as relevant to management of patients with multimorbidity in the systematic review of the literature:

1. Consultation skills, including prioritisation and shared decision making
2. Clinical skills with discussion of the limited use of guidelines in the management of these patients
3. Management skills including safety netting, planned review (risk management) and consultation preparation (time management)
4. Information technology skills including technical continuity, electronic health record updating; and
5. Teamwork, including coordinating and communicating with the multidisciplinary team.

Proposal for a 'planned approach'

The next part of the workshop proposed a 'planned approach' which could be used within an individual patient consultation to enable structuring of multimorbidity consultations, to improve the efficiency and completeness of complex multimorbidity management.

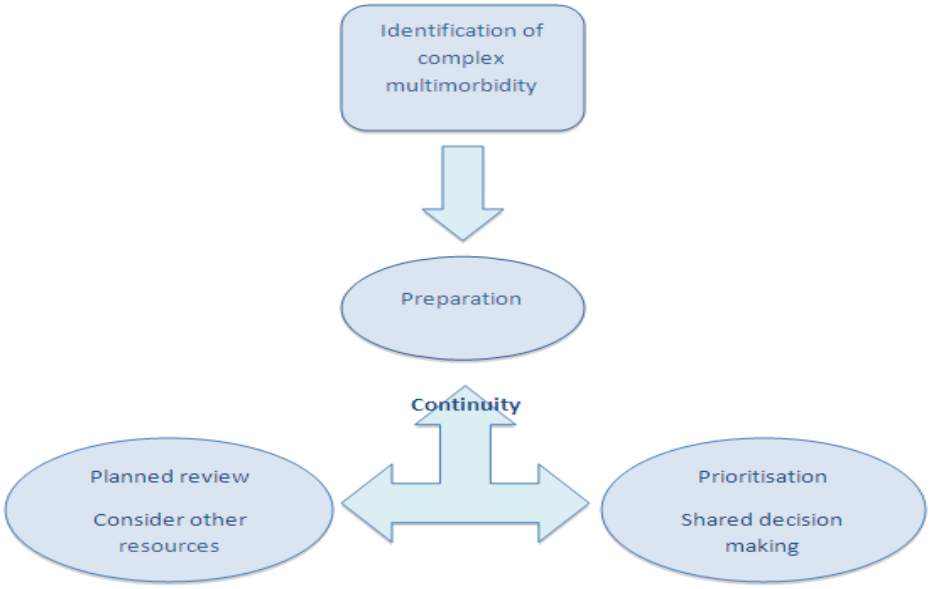


Figure A.1: Multimorbidity consultation framework

The planned approach had several domains:

1. **Identification** of the patient with complex multimorbidity
2. **Preparation** for the consultation
3. **Continuity of care**
4. **Prioritisation and shared decision making**
5. **Planned review**
6. **Consider other resources**

Given the time pressures on GPs and dwindling numbers within the profession, delegation of tasks and input of other health professionals is vital. Public health and practice nurses, occupational health and other health care workers can contribute hugely to the care of patients with multimorbidity.

Part three: Clinical case discussion

The next part of the workshop took the format of a clinical case discussion: two cases were presented and were discussed by the group under the domains outlined above in the planned approach.

The cases were as follows:

A 63 year old ex-smoker with hypertension, ischaemic heart disease (IHD), previous transient ischaemic attack (TIA), chronic kidney disease (CKD), chronic obstructive pulmonary disease (COPD), obesity, osteoarthritis and chronic pain, attends her GP.

Current prescribed medications

1. Acetylsalicylic acid 75mgs od po
2. Bisoprolol 1.25mg od po
3. Ramipril 5mg od po
4. Atorvastatin 10mg od
5. Amlodipine 5mg od po
6. Paracetamol 1g qds po
7. Salmeterol 50mcg/Fluticasone 100mcg twice daily inhaled
8. Salbutamol 100mcg 2 puffs prn inhaled
9. Amitriptyline 10mg nocte po

A 36 year old woman with a history of hypertension, asthma and epilepsy, attends her GP practice.

Current prescribed medications

1. Beclomethasone 200mcg twice daily inhaled
2. Salbutamol 100mcg 2 puffs prn inhaled
3. Ramipril 5mg od po
4. Carbamazepine 400mg bd po

These cases were then approached looking at what can be achieved in the following domains:

a) **Pre-consultation**

   Identify that the patient has multimorbidity, so that you can be prepared for the consultation – a quick check of the chart indicates both the number of prescribed medications, and any previous medication intolerances. Patient engagement with other services (i.e. asthma nurse, epilepsy services) can be clarified, latest communication can be quickly reviewed, and an attempt at prioritising issues can be made prior to collecting the patient from the waiting room. Ideally aim for continuity of care, to help increase satisfaction (47, 152) and decrease duplication of investigations as a result of lack of familiarity with the case.

b) **In consultation**

   The presenting complaint(s) can be addressed, while also taking other ongoing issues into consideration.

c) **Prioritisation and shared decision-making**

   Functional optimisation should be addressed – using motivational interviewing, prescribing, and appropriate onward referral for the acute problem, and doing a medication review in case any changes are appropriate. Discussing the multiple conditions, treatments, and priorities with the patient can enable some degree of control to be given back to them.

d) **Planned review**

   Review of disease-specific parameters can be arranged with the practice nurse at an appropriate interval, increase the ratio of planned to ‘crisis’/ ‘fire-fighting appointments’ and enable optimal long term management of chronic diseases.

e) Consideration of other resources

Specialist nurses in secondary care can be involved in the care of patients with multimorbidity, and may be able to aid patients helping in both overall management, crisis planning, and shared care with the GP.

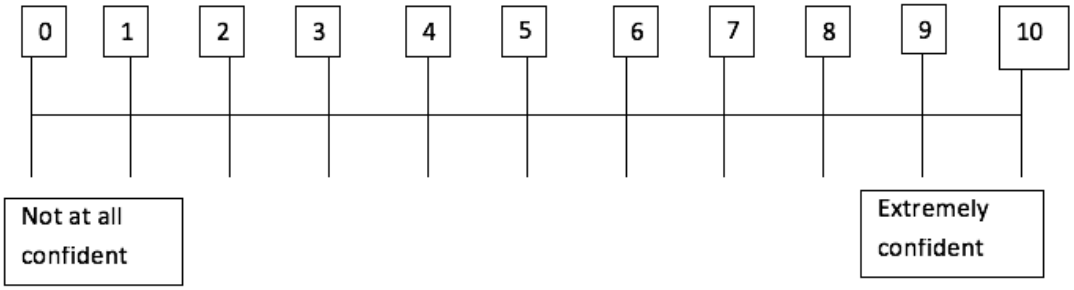
Part four: Interventions overview

The final part of the workshop comprised an overview by Professor Susan Smith of findings of a systematic review addressing interventions for improving outcomes in patients with multimorbidity in primary care and community settings (153).

Appendix 13 Pre- and post-workshop questionnaire

1. How confident are you in managing patients with multimorbidity?

Please tick the scale below:



For each of the statements below, please circle the phrase which most appropriately indicates your CURRENT opinion

2. I have adequate knowledge to manage patients with multimorbidity.

Always	Most of the time	Sometimes	Occasionally	Never

3. How often do you find current available guidelines relevant in your management of patients with multimorbidity?

Always	Usually	Sometimes	Occasionally	Never

4. I find it easy to prioritise problems arising in multimorbidity patients within my usual appointment times.

Strongly agree	Agree	Unsure	Disagree	Strongly disagree

5. Do you feel that coordination of care of multimorbidity patients is primarily the responsibility of the GP?

Always	Usually	Sometimes	Occasionally	Never

6. I am usually confident managing multimorbidity patients in my daily practice.

Always	Usually	Sometimes	Occasionally	Never

7. I think that a named GP providing continuity of care for patients with multimorbidity improves health outcomes.

Strongly agree	Agree	Unsure	Disagree	Strongly disagree

8. The scope of multimorbidity in General Practice is too wide to justify education – the problems are too variable from patient to patient to be able to deal comprehensively with the topic.

Strongly agree	Agree	Unsure	Disagree	Strongly disagree

9. I would attend further workshops / education modules addressing the topic of multimorbidity.

Strongly agree	Agree	Unsure	Disagree	Strongly disagree

10. Which of the following domains do you find most challenging when managing patients with multimorbidity?

Please rank the options below (1 = most challenging, 4/5 = least challenging):

Multisystem disease management	
Prescribing in patients on multiple long term medications	
Coordination of care in patients with multiple comorbidities / chronic diseases	
Supporting self-management in patients with multimorbidity	
Other: (please specify)	

11. When you encounter a patient with multimorbidity and you are not sure what to do, where do you most commonly seek information or advice?

Please rank the options below (1 = most commonly, 6/7 = least commonly):

Ask a GP colleague for help	
Look for an answer to the question in a journal or textbook	
I don't have time to look for an answer in a busy surgery, so I use my experience and find a practical solution	
Ask a specialist / consultant colleague for help	
Keep a note of the issue and ask at a CME meeting / conference	

I use an online search engine and look for an answer there	
Other: (please specify)	

Comments

Many thanks for completing this questionnaire

Appendix 14: Workshop consent

Many thanks for completing this questionnaire. It will help us evaluate the workshop today, which is part of a study addressing training doctors to manage patients with multimorbidity. We would appreciate it if you could fill in section one (PINK) at the beginning of the workshop, and section two (GREEN) at the end of the workshop. If you would be happy to receive a phone call for further (confidential) discussion about the workshop, please leave your contact details below: this will be detached from your questionnaire, and will not be linked to your answers.

Please circle the appropriate answer

I understand that my completion of this questionnaire is entirely **voluntary** and that I may withdraw at any time, without giving reason

Yes **No**

I understand that a copy of this consent form will be kept on file in a secure location at RCSI.

Yes **No**

I give my approval that unidentifiable data concerning my person may be stored or electronically processed for the purpose of this study.

Yes **No**

Participant signature: _____

Participant name (printed): _____

Phone number / email address: _____

Date: _____

Many thanks

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Appendix 15 Workshop demographics form

Demographics

Please circle the most appropriate response:

I am a:

GP	GP trainee	Other (please specify)

Please circle the most appropriate response:

Gender:

Male	Female

Age:

</= 25	26-35	36-45	46-55	>55

Time since graduation from medical school:

< 10 years	10 years or more

Years of experience in General Practice:

< 10 years	10 years or more

Clinical practice

Please circle the most appropriate response:

I see patients with multimorbidity:

Every day	Most days	Some days	Rarely	Never

Appendix 16: Proposed curriculum content

Proposed curriculum content for training of doctors in management of patients with multimorbidity