

**Patient Request for Imaging and the Desire for ‘Proof of Wellness’:
The Influence of Online Health Information on Imaging Practices**

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degree of Doctor of Philosophy

Faculty of Medicine and Health

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Statement of Originality

I, **Lizzie De Silva**, declare that the work in this thesis is my own and has not been submitted to any other university or institution as part or a whole requirement for any higher degree.

I, **Lizzie De Silva**, declare that I was the principal researcher of all work in this thesis, including work published with multiple authors.

I, **Lizzie De Silva**, certify that the intellectual content of this thesis is the product of my own work, and with guidance from my supervisory team, designed the studies, obtained ethics approvals, collected, managed and analysed the data, interpreted the results, drafted and revised the manuscripts for submission to peer-reviewed journals and wrote and compiled this thesis. All assistance received in preparing this thesis and all sources have been acknowledged.

Lizzie De Silva

Signature:

As the lead supervisor for the candidature upon which this thesis is based, I can confirm the work presented in this thesis has been carried out by the PhD candidate under the primary supervision of myself, Associate Professor Jillian Clarke, Discipline of Medical Imaging Science, Sydney School of Health Sciences, Faculty of Medicine and Health, The University of Sydney, with co-supervision by Professor Melissa Baysari, Faculty of Medicine and Health, Susan Wakil School of Nursing and Midwifery, Sydney School of Nursing, The University of Sydney, Associate Professor Melanie Keep, Sydney School of Health Sciences, Faculty of Medicine and Health, University of Sydney and Professor Peter Kench, Discipline of Medical Imaging Science, Sydney School of Health Sciences, Faculty of Medicine and Health, The University of Sydney.

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Third-party editing services used in this thesis were provided by Dr. Arlene Harvey, who conducted copy-editing and proofreading. These covered grammar and syntax rules, improving language clarity, and ensuring logical flow between sentences, paragraphs, and sections of the thesis. She provided advice on avoiding ambiguity, rephrasing (including adding and removing words), reducing repetition, and eliminating verbosity. To note, the editor is not a subject matter expert in the thesis topic and only offered services related to proofreading and copy editing.

Dr Bronte Somerset, Thesis Proofreading and Formatting, formatted this thesis for submission according to the University of Sydney's specifications.

Author Attribution Statement

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As supervisor for the candidature upon which this thesis is based, I can confirm that the authorship attribution statements above are correct.

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Date 14th September 2025

Generative AI Acknowledgement

During the preparation of this thesis, Grammarly (2025, Version 9.880, <https://www.grammarly.com>) was utilised for the purpose of text enhancement. The employment of this generative AI tool included spelling corrections, minor sentence restructuring, and clarity improvement. The author affirms that, where text was modified by generative AI, it was reviewed for potential errors, inaccuracies, and bias. The author assumes full responsibility for the submitted thesis, affirms the work is original, and confirms that the use of generative AI complies with university guidelines and policies.

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Dedication

I dedicate this thesis to all the healthcare workers who continue to strive for excellence in patient care and who, through the COVID-19 pandemic, selflessly and compassionately cared for their patients with resilience, determination, and strength. I want to honour your hard work and the passion that drives you to pursue the practice of medicine.

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Terms and Abbreviations

Glossary of Terms	Ascribed meaning in this thesis
Cyberchondria	This term refers to individuals who experience excessive distress or anxiety about their health and engage in repeated health-related searches on the internet
Continuity of care	Continuity of care is characterised by the patient’s experience of a ‘continuous caring relationship’ with an identified healthcare professional, such as a GP
Defensive medicine	Medical practitioners sometimes deviate from established practices to protect themselves against potential litigation. When faced with the threat of a malpractice lawsuit, a healthcare professional may choose to perform treatments or procedures that are not the norm as a proactive measure for their own protection
Patient decision aids	These are tools designed to assist individuals in making informed healthcare choices. They provide information about various options and help users identify what might be best for their specific situations. These aids can be utilised both in-person and online, and they can take the form of written materials or videos
Disconfirmation paradigm	This model explains how customer satisfaction or dissatisfaction is determined by comparing a customer’s expectations with their perceptions of a service
GP gatekeeping	This system requires patients to obtain approval from a GP to access specialty care (like radiology). GPs serve as gatekeepers to manage healthcare costs and utilisation, thereby controlling unnecessary visits to specialists

Glossary of Terms	Ascribed meaning in this thesis
Holistic care/whole person care	This healthcare approach considers the patient's well-being rather than treating specific symptoms or diseases. It emphasises the importance of the doctor-patient relationship and involves multiple clinicians collaborating to achieve optimal health outcomes
Incentivised care	This refers to payments to GPs made by organisations for providing quick and efficient care to patients for financial profits, which might include referrals to specialised facilities
Impressive labels	A term derived from the empirical research given to an individual where prior imaging reports describe their condition in complex medical jargon. Due to a lack of comprehension by the individual, such terms intrigue individuals as being significant and requiring follow up treatment plans
Non-indicated scan/imaging	This refers to the use of medical imaging when there is no clear clinical indication for it
Online health information (OHI)	This refers to the availability of information about health and medicine online which patients are able to access outside the traditional patient-GP consultation
Over-diagnosis/over-detection	This involves reference to the diagnosis of a medical condition that would not have caused any symptoms or problems
Patient-centered care	This healthcare model actively involves patients in their treatment decisions and considers their individual needs and preferences
Patient autonomy	This refers to the right of patients to make informed decisions about their medical care without interference from healthcare

Glossary of Terms	Ascribed meaning in this thesis
	providers. It is a key principle in medical ethics and a foundation of patient-centered care
Primary care	This refers to the healthcare services that individuals seek first in their community, such as those provided by GPs, pharmacies, and allied health professionals
Proof of wellness	This term is derived from the empirical research coined to describe patients looking for evidence of wellbeing through the use of medical imaging to be reassured of one's health status or the absence of pathology
Screening	The purpose of a screening examination is to detect potential abnormalities or diseases early, enabling more effective treatment. It may also reassure patients of the absence of abnormalities.
Therapeutic relationship/interaction	This term refers to the connection between a patient and a healthcare professional that is based on an emotional connection of trust and mutual respect
Therapeutic scan	This term is derived from the empirical research referring to a scan fulfilled by a GP to help alleviate a patient's anxiety about their health
Value-based care	This approach focuses on using available resources fairly, sustainably, and transparently to achieve improved health outcomes for patients
Watch and wait strategy	This approach involves monitoring a patient's condition without immediate intervention and the implementation of a follow up plan should symptoms remain unresolved

Abbreviations used in this thesis

AIHW	Australian Institute of Health and Welfare
AMA	Australian Medical Association
ANM	Andersen–Newman Model of healthcare utilisation
eHEALS	eHealth Literacy Scale
ESR	European Society of Radiology
ESR-PAG	The European Society of Radiology Patient Advisory Group
GP	general practitioner
HIC	high-income country
ICT	information and communication technologies
LMIC	low- and medium-income country
MBS	Medicare Benefits Scheme
MHR	My Health Records
MRI	magnetic resonance imaging
NEHTA	National E-Health Transition Authority
NHS	National Health Service
OHI	online health information
PBS	Pharmaceutical Benefits Scheme
PCEHR	Personally Controlled Electronic Health Record
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PRISMA Sc-R	PRISMA extension for scoping reviews
RANZCR	Royal Australian and New Zealand College of Radiologists

RACGP	Royal Australian College of General Practitioners
WHO	World Health Organisation
UK	United Kingdom
US	United States of America

Publications and Presentations

Publications

Parts of the work presented in this thesis have been published.

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Presentations

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Abstract

Background

Traditionally, general practitioners (GPs) have served as gatekeepers who determine the necessity of medical tests and procedures and hold the authority to request them on their patients' behalf. However, the growing availability of medical information on the internet has provided individuals with access to knowledge that was once primarily the domain of medically trained professionals such as GPs. As individuals become more aware of medical information, many are choosing to take a more proactive approach to their health and well-being, and one indication of this is the number of patients in primary care settings who are now actively requesting diagnostic imaging. Anecdotal evidence shows that it is now more common for patients to arrive at medical imaging facilities with a letter from their GP stating that 'the patient requested study X'. In Australia, where only qualified healthcare providers, predominantly GPs, can authorise referrals for radiological imaging and interventions, these patient-initiated requests raise pertinent concerns and questions surrounding the need for the requested imaging.

The influence of online health information (OHI) on patient behaviour in recent years has been significant. Many patients now arrive at consultations with their healthcare providers with preconceived ideas and expectations, and often request imaging studies based on their own self-diagnosis derived from online health searches. By accessing medical knowledge outside of the patient-GP relationship, many patients consider themselves to be 'empowered', which can lead to potential misunderstandings about imaging studies. In some instances, individuals who are not medically trained can develop the wrong impression about the capabilities of imaging modalities, that is, their merits and limitations. This often results in an increased demand for imaging that GPs believe to be neither clinically necessary nor

evidence-based, which poses a key challenge for healthcare professionals. Patients' anxiety about their health has also increased their perceived need for imaging, and some individuals seek out physical evidence of their well-being or 'proof of wellness' through imaging studies. The rationale behind these requests is that imaging facilitates the visualisation of internal organs, thereby enabling the identification of underlying pathologies. Public health campaigns and social media also encourage some individuals to screen for possible pathologies, especially those with a family history of particular diseases, which can cause them to become even more proactive about their health. Factors such as these are explored in this thesis and emerge as the key drivers behind patient-initiated imaging requests, whereby individuals seek 'proof of wellness' to be reassured of their well-being.

Aims and Objectives

This thesis explores the trend toward patient-initiated requests for radiological imaging, driven by increasing patient autonomy, digital literacy, and access to OHI. It seeks to understand the challenges of patient autonomy and digital literacy in addressing patients' requests for diagnostic testing based on information gathered from OHI, while further gaining the perspectives of patients, GPs, and radiologists on this trend. Insights from GPs and radiologists were sought to evaluate how often patients request diagnostic tests and how these requests impact clinical workflow. The consequences for radiologists when GPs comply with patient demands for imaging were also examined. The thesis provides recommendations to improve value-based care for Australian health professionals (GPs and radiologists) and offers suggestions to professional bodies (RANZCR and RACGP) as well as patients and consumer groups. As existing research on this topic is limited (including in the Australian context), the aim was to bridge this knowledge gap in the literature by exploring the perspectives of a range of key stakeholders, Australian health professionals and patients, and

to ensure that the voices of these key stakeholders were heard in this research. The thesis investigates anecdotal evidence in the Australian context that patients are increasingly soliciting diagnostic imaging from their GPs. Surveys and interviews were conducted with these key stakeholders in four research phases, and a systematic scoping review supplemented these empirical studies. The systematic review aimed to provide a global perspective and to investigate the challenges faced by GPs regarding clinically non-indicated patient imaging requests. It also sought to identify recommended strategies for mitigating unwarranted requests. Given the scarcity of literature on patients' requests for diagnostic imaging in Australian primary healthcare facilities, the systematic scoping review drew upon the empirical findings from the first two phases of the research. The review confirmed the global nature of this issue and informed the empirical studies in the third and fourth research phases, which explored healthcare providers' perspectives within the Australian context. Findings from these final two phases of the research contributed to the literature from the Australian perspective as GPs and radiologists from primary healthcare systems reported similar challenges to those reported globally. The thesis concludes by recommending robust strategies to support health providers, professional bodies, and consumer groups in managing patients' expectations and to ensure the judicious use of diagnostic imaging, thereby fostering a balance between patient empowerment and clinical efficacy. The Australian findings were thus both informed by and confirmed by findings found globally and have led to the development of practical guidelines and recommendations for use within both Australian and global contexts.

Mixed methods approach

The research used both quantitative and qualitative methods in a mixed methods approach to comprehensively investigate the research problem. This approach recognises that different

data sources can offer complementary strengths to address complex health research questions. The thesis presents four phases of research, with Phases 1 and 2 informing the systematic scoping review, and Phases 3 and 4 corroborating the review's findings and enhancing the available knowledge in the literature.

The following sections outline each phase of the research (an outline of the thesis chapters is presented at the end of Chapter 1).

Phase 1

The first phase in this research project investigated the relationship between patients who use OHI and their propensity to request radiological services. Specifically, the study in this phase used surveys to understand patients' reasons for consulting OHI and the types of websites and information they accessed. The study also explored the impact of digital literacy on patients' comfort levels in making requests for radiological services, whether they successfully obtained referrals from their GPs, and whether they achieved their desired outcomes. To examine the connection between OHI and patient-initiated requests for radiological referrals, the study employed Qualtrics, an online marketing research platform. This platform selected participants from across Australia, focusing on individuals who had undergone a radiological procedure in the five years prior to the administration of the survey. Individuals were invited to participate in a 20-minute anonymous online survey that could be accessed via various digital channels, including email, SMS, and in-app notifications. Data collection took place between September and October, 2020.

Phase 2

Building on the first phase, Phase 2 employed the Andersen-Newman model of healthcare utilisation (ANM) to examine the factors that drive patients to request radiological imaging.

This model assists in identifying the predisposing factors (such as anxiety), enabling factors (such as access to OHI), and perceived needs (such as symptoms experienced by patients) that influence patient requests. The study in Phase 2 sought to address the current gap in the literature with respect to the motivations behind patient-initiated requests for radiological services and the dynamics in patient-GP interactions in the context of these requests.

In this phase, a mixed methods approach was utilised to gather both quantitative and qualitative participant data. Participants were recruited through Qualtrics, the same online market research platform used in Phase 1, with the target individuals having requested diagnostic imaging from their GPs in the five years preceding the survey. Data collection took place between January and February in 2022, beginning with the survey and followed by interviews with willing participants via Zoom or a phone call.

Systematic scoping review

Informed by the findings from the first two phases of empirical research (Phase 1 and 2, as above), a systematic scoping review was conducted to explore global perspectives on patient-initiated imaging requests. The objective was to identify barriers to and facilitators of GPs' responses to patient-initiated requests, and to assess how the challenges encountered by GPs affect adherence (compliance or non-compliance) to imaging guidelines. The systematic scoping review also explored strategies employed by GPs to balance patient satisfaction with responsible use of diagnostic resources. The review was conducted using the databases Embase, Medline, Scopus, CINAHL, and Web of Science, and focused on studies conducted between 2010-2023 that discussed GPs' experiences with patient-initiated image requests in primary care settings. Findings from the scoping review informed the empirical studies in Phases 3 and 4 of the research.

Phase 3

Informed by the studies in the first two research phases as well as the findings from the systematic scoping review, the objective of Phase 3 was to explore the perspectives of GPs in Australia. This third phase employed semi-structured interviews to gather insights from 10 GPs working at five private medical centres in the northwestern suburbs of Sydney, Australia. These GPs were recruited through advertisements posted on their medical centres' intranet. Potential participants expressed their willingness to volunteer for the research project by informing the head receptionist of their medical centres, who then communicated the GPs' interest to the research team. Interviews were conducted face-to-face or via Zoom between August and September in 2022, and the option to Zoom was provided to accommodate these GPs' busy schedules.

During the interviews, the GPs were prompted to reflect on their strategies for managing non-clinically indicated imaging requests and to identify any challenges they faced with aggressive or overbearing patients. The interviews were audio-recorded and transcribed verbatim by the first author. The transcripts were then analysed using thematic analysis, with the initial coding carried out by the lead researcher. A second reviewer analysed the results to ensure reliability and consistency in the data analysis process, and the research team subsequently agreed upon all final themes. Key themes and sub-themes were identified and organised using NVivo software, to comprehensively examine these GPs' perspectives on non-indicated imaging requests.

Phase 4

The final phase involved radiologists, who are specialists that are typically not directly engaged with patients. Radiologists work as part of a healthcare team and have a crucial role to play in managing patient care. As one of their key responsibilities is to interpret imaging

studies requested by GPs, imaging requests initiated by patients indirectly impact radiologists' work and can lead to an increased workload due to the need to provide reports on non-indicated imaging requests. The study in Phase 4, therefore, aimed to explore the impact of patient-initiated imaging on radiologists, focusing on how such requests affect their workload and the broader healthcare system. It also sought radiologists' perspectives on the appropriateness of these requests and how the challenges associated with unnecessary imaging requests might be mitigated.

The cross-sectional survey used in Phase 4 was designed to capture the perspectives of radiologists working in private medical centres across Australia. Radiologists working in the same large private healthcare imaging company as in Phase 3 but across a number of medical centres were invited to participate in the study through the company's intranet system. The survey was conducted between November 2023 and February 2024.

The recruitment process was facilitated by an educational coordinator working within the healthcare imaging company, who distributed the survey link. The use of an educational coordinator for recruitment purposes helped maintain the researchers' distance from the participants. The survey was sent to all 100 full-time radiologists working for this company across sites within Australia (including Queensland, New South Wales, Victoria, South Australia, and Western Australia). These radiologists were provided with an information sheet outlining the aims of the study and were given the option to participate. The survey incorporated a mixture of structured questions and included open-ended and scaled response items. The questions concerned radiologists' awareness of patient-initiated imaging, the impact of such requests on their workload, their perception of patients' expectations within a patient-centered care environment, their explanations as to why GPs comply with these requests, and mitigation strategies.

The quantitative data were analysed using IBM SPSS descriptive statistics to summarise the frequency and distribution of responses. Cross-tabulation was employed to explore relationships between key variables.

Overview of findings

As outlined above, four empirical studies (phases) were conducted to examine the perspectives of patients, GPs, and radiologists on patient-initiated imaging requests in the Australian context. The findings from these studies shed light on the intricate dynamics of patient-initiated imaging and highlight factors such as patient empowerment, digital literacy, health anxiety, and the decision-making processes of healthcare providers. With respect to patient empowerment, it was found that individuals who are increasingly dependent on OHI to inform their healthcare decisions express greater comfort in requesting imaging from GPs, and this is especially the case for individuals with elevated eHealth Literacy Scale (eHEALS) scores. The eHEALS instrument measures an individual's ability to evaluate their combined knowledge, comfort, and perceived skills at finding, evaluating, and applying electronic health information to health problems (Norman & Skinner, 2006).

Nonetheless, even the high-scoring individuals usually lacked the capacity to critically evaluate the quality of the information they encountered. The findings demonstrate that although the patient participants in Phase 2 indicated that they sought out reputable sites for health information, and many had requested imaging services for reassurance and 'proof of wellness', they were still often misinformed due to their poor understanding of the content they sourced from these sites.

This trend has placed GPs in a difficult position as they need to balance the clinical appropriateness of imaging requests with the satisfaction of their patients. Many GPs who participated in the study in Phase 3 reported feeling pressured to comply with patients'

requests, particularly by individuals who were anxious or enamoured of ‘disease labelling’ based on vague and insignificant symptoms. Some GPs indicated that they feared litigation if they were to decline such requests, and some were concerned about the potential for breakdowns in the patient-GP relationship as unmet patient expectations can result in mistrust. They admitted that it was easier, given the demands of their busy clinical schedules, to grant these patient requests rather than to spend time explaining to patients why the requested imaging might not be necessary.

As radiologists are involved in the specialised care of patients, they also expressed concerns about GPs’ fulfilment of patients’ imaging requests and suggested that patients might not be aware of the merits and limitations of the requested imaging. They stressed that fulfilling patient-initiated imaging requests meant that they often had to expedite reports to appease GPs and their patients, which led to an increase in their workload as radiologists.

The systematic scoping review highlighted the challenges faced by GPs and radiologists worldwide, and reinforced the need for strategies to balance patient satisfaction with clinically appropriate care. It identified several barriers to guideline compliance for GPs attempting to respond to patient requests: patient-centered care, fear of litigation, economic incentives, patients’ health literacy, and patients’ anxiety. Facilitators to guideline adherence included guideline dissemination, interdisciplinary communications, and the use of patient decision aids.

Overall, this research highlights the need for improved patient education regarding the limitations of diagnostic imaging. It proposes a collaborative approach between patients, GPs, and radiologists to ensure the appropriate use of healthcare resources. Recommendations for implementing structured decision-making frameworks, such as patient decision aids and evidence-based communication strategies, are provided. The study contributes to the broader

discourse on patient-centered care by offering insights into how digital literacy and patient autonomy shape healthcare delivery. It underscores the importance of guiding patients in making informed decisions, particularly regarding the responsible use of diagnostic imaging.

Chapter 1 : Overview

1.1 Introduction

This introductory chapter provides an overview of the significant shift from a traditional paternalistic model of healthcare where GPs hold authority over medical decision-making towards a more patient-centric approach that emphasises autonomy and shared decision-making. It examines the rise of online health information (OHI) that promotes patient empowerment through increased digital literacy, enabling patients to take a more active role in their care, such as requesting diagnostic imaging as part of their healthcare management. The chapter discusses the technologically advanced digital imaging now available to patients and examines the growing tensions between patient expectations and clinical appropriateness of the imaging requested, highlighting the challenges faced by healthcare providers as they attempt to balance patient demands with evidence-based medicine. It also addresses the impact of public health campaigns and their implications for the use and potential overuse of imaging services.

There are several important consequences of the shift away from the traditional paternalistic relationship between patients and general practitioners (GPs) towards a more patient-centric approach that prioritises patient autonomy (Epstein et al., 2005; Timmermans, 2020). In the past, patients had limited access to medical information, and GPs adopted an authoritative and paternalistic communication style in their clinical interactions (Beisecker & Beisecker, 1993). Moreover, GPs were responsible for acting on behalf of their patients and for their benefit (Walton & Kerridge, 2014), and this unequal relationship was considered to be crucial for the purposes of medical diagnosis, treatment, and prognosis and for promoting patients' well-being (Heritage & Maynard, 2006). In other words, GPs (and other medical

professionals) practiced a paternalistic type of care that depended on the passive involvement of patients, who asked few questions. As GPs operated under the assumption that patients would not comprehend detailed medical information, the advice they offered their patients tended to be limited (Topol, 2015). Over recent decades, however, there has been a slow but steady transition towards a more patient-centric approach to healthcare in which patient autonomy and shared decision-making is emphasised (Lumbreras et al., 2017).

One factor responsible for this transition has been the general public's access to online health information (OHI), which has empowered patients to make more informed decisions.

Accessibility to OHI has shaped patient behaviours and their expectations about how their health can (and should) be managed in primary care facilities (Timmermans, 2020). The influence of OHI can be seen in many medical fields, including pharmaceuticals, with patients requesting medications (Breivold, 2021), pathology, specialist care (Jerant, 2017), and individuals' growing tendency to request diagnostic imaging services based on information acquired through their online searches (Gransj en et al., 2018; Griffith et al., 2015; Walderhaug et al., 2022). In this changing healthcare landscape, individuals feel more empowered by the accessibility of medical information and have started to see themselves as informed decision-makers who can make requests of their medical practitioners, such as GPs (Singh et al., 2018).

An important aspect of individuals' OHI-seeking behaviour is their 'eHealth', more broadly known as digital literacy. Digital literacy enhances individuals' capacity to engage with and understand OHI through critical analysis, thus influencing their healthcare decisions (de Oliveira Collet et al., 2024). Digital literacy "incorporates the ability to search and navigate, create, communicate and collaborate, think critically, analyse information, and address safety

and wellbeing using a variety of digital technologies. These skills are essential for individuals to participate effectively in today's society" (UNESCO, 2018).

Individuals' access to OHI through digital literacy has also allowed them to become more informed about medical advancements and their significant benefits (Hussain et al., 2022). Recent advancements in medical technology, for instance, have significantly expanded the array of diagnostic and therapeutic options available to patients, particularly in the area of imaging capabilities. Enhanced diagnostic accuracy has led to an increased reliance on imaging modalities and this has been driven by GPs as well as patients (Flick, 2014). The integration of GPs' clinical competencies and radiologists' technical expertise in interpreting and reporting imaging results has become vital within multidisciplinary healthcare teams (Gransj en et al., 2018). This collaboration has been fundamental to delivering effective patient care and enhanced health outcomes. When a patient's requests for imaging are not aligned with clinical indications, GPs, radiologists, and patients must all attempt to balance the apparent benefits of diagnostic imaging and the tangible benefits to the patient (Lu et al., 2024).

Yet, refusing patient requests, even unreasonable ones, can have serious consequences for GPs, such as ending long-term patient-GP relationships or even the threat of litigation (Nilsen & Malterud, 2017). This introductory chapter explores the literature dealing with patients' expectations around requests for medical services and the role of GPs as gatekeepers within the healthcare system. It examines how the critical role of GPs as primary care providers has become increasingly challenging in the current healthcare landscape. As gatekeepers, GPs have traditionally been primarily responsible for issuing referrals to specialised services, including diagnostic imaging. This chapter examines the conflicts that can arise when GPs attempt to balance the appropriate use of healthcare resources, guided by their clinical

expertise and established guidelines, with the demands of their patients. It also considers how GPs can ensure that the care provided is both appropriate and effective (Durand et al., 2015; Sripa et al., 2019).

The chapter also discusses how public awareness campaigns designed to facilitate medical screening (and the appropriate implementation of this screening) can cause undue alarm for some patients, who over-request imaging as a result (Sharma et al., 2021). It recommends ways in which information can be disseminated as part of these campaigns in a more transparent and objective way to allow individuals to make more appropriate decisions (Loos, 2013). Indeed, there have been calls for government-sponsored advertising for screening to shift away from the use of persuasive strategies towards a more balanced communication approach (Huisman et al., 2020). As such, the chapter highlights how decision aids can be used as a tool for communicating evidence-based information about the benefits and harms of various screening options (Carrié et al., 2022). The chapter concludes with a description of the aims of the thesis and its objectives, which is to investigate the impact of patient-initiated imaging requests on patients, GPs, and radiologists within the Australian context, and to provide recommendations for managing patient-driven requests.

1.2 A Paternalistic Bond

While the patient-GP relationship has long been foundational to primary care practice (Cherryman, 2006), over the past several decades this relationship has undergone a shift (Fang et al., 2011; Timmermans, 2020). The Hippocratic tradition of medicine was initially founded on a paternalistic model with an important guiding moral principle: the duty of the doctor is ‘to do good’ for their patients (Walton & Kerridge, 2014). A more modern set of principles—also founded on the Hippocratic tradition—has been provided by Beauchamp and Childress (1979) who introduced four principles of medical ethics for healthcare providers:

respect for autonomy, beneficence, non-maleficence, and justice. Autonomy refers to the ability of individuals to make informed decisions; beneficence means to do good to others, non-maleficence means to do no harm (*primum non-nocere*), and justice refers to the equal distribution of limited resources within the healthcare system (Beauchamp & Childress, 2019).

Autonomy in medical settings can be seen in the shift away from more paternalistic care towards empowering patients, with those in favour of this move arguing that paternalism disregards the rights of individuals and inhibits patients' health choices (Beauchamp & Childress, 2019). According to Beauchamp and Childress (2019), a major criticism of the paternalistic approach is the amount of power it gives to healthcare providers. In healthcare decision-making, the paternalistic model allows providers to override their patients' right to self-determination and to justify actions as being for their patients' benefit (Beauchamp & Childress, 2019). While healthcare providers may possess esoteric knowledge, often referred to as medical 'expertise', they can nonetheless lack a comprehensive understanding of their patients' values, expectations, and past experiences, that is, the more profound, broader, and holistic aspects of the patient (Swan, 2009; Thomas, 2020).

In contrast, today's patients are more informed and view themselves as autonomous individuals who are engaged in equal partnerships in their healthcare journey (Hagg et al., 2018). This has changed how healthcare is delivered, and there is now a stronger emphasis on patient-centred care. In other words, the traditional paternalistic model of care has witnessed a paradigmatic shift (Walton & Kerridge, 2014) and concepts such as shared decision-making (Kanzaria et al., 2015), patient empowerment (Vitzthum von Eckstaedt et al., 2020), patient activation (Lee et al., 2015), and patient autonomy (Borracci et al., 2012) have become

commonplace, reflecting this movement away from the traditional patriarchal model and towards patient-centered healthcare delivery.

1.2.1 Health System Funding

In Australia, individuals have access to a universal tax-funded health insurance system—the Medicare Benefit Scheme (MBS)—which entitles them to receive care with no additional costs. Under Medicare, Australians can access free treatment in public hospitals, subsidised out-of-hospital health services, and prescription medicine at discounted prices. However, to access subsidised specialist care (including pathology and radiology investigations) and to receive subsidised medications through the Pharmaceutical Benefits Scheme (PBS), patients require a referral from a healthcare provider (such as a GP). GPs are typically remunerated by patients, who pay for these services and are then either fully or partially reimbursed by the MBS (AIHW, 2024).

The Australian healthcare system is characterised by a complex interplay of funding mechanisms and service provisions between the public and private sectors. Both the Commonwealth and state/territory governments contribute around two-thirds of this expenditure, while the private sector also contributes significantly to overall spending (AIHW, 2024). The contribution by individual Australians from their own pocket is about 20% of total expenditure (Duckett, 2018).

1.2.2 Public versus Private

The MBS, which is set by the Australian Government, allows patients to receive fixed rebates from Medicare if the GP agrees to accept the Medicare rebate as the service fee, with no gap payment (excess fee above the rebateable amount) required from the patient. This practice is known as ‘bulk billing’. In private medical consultations, professionals provide primary care and specialist services using a fee-for-service model which allows GPs to set their fees

independently (Johan et al., 2017). In these cases, patients incur an out-of-pocket expense for services received as most GPs charge more than the Medicare rebate for their services.

1.2.3 Primary care and gatekeeping

Medicare aims to ensure affordable healthcare for Australians by providing equal services for everyone, and general practice serves as the cornerstone of Australia's primary healthcare system, with GPs typically being the first point of contact for most individuals. Moreover, the requirement for a referral to access specialised services places GPs at the heart of ordering practices within the health system. This referral requirement for specialised services means there is an expectation of gatekeeping throughout the system, and GPs are often seen as the gatekeepers of the Australian health system where their gatekeeping role positions them centrally in the coordination of patient care within primary care. This coordination is believed to help contain healthcare costs through the efficient allocation of resources (Sripa et al., 2019).

The past few decades have seen an increase in the accessibility and availability of OHI through social media platforms (Esen et al., 2018), public health awareness campaigns (Sharma et al., 2021), software apps (Topol, 2015), and various other forms of communication about health (e.g., family, friends, and community groups) (Tempini, 2017; Wong & Cheung, 2019). This shift has encouraged patients to increasingly view themselves as medically well-informed; for instance, they can input their symptoms into online sites and, based on the information provided, generate different diagnoses for themselves (Au, 2019). Based on the information they acquire through their online searches, individuals may then request diagnostic services from their GPs (Griffith et al., 2015; Ottenheim et al., 2014). This shift in patients' behaviour has also changed how healthcare is delivered as patients now have strong expectations that their GPs will fulfil their requests based on their online searches

(Walderhaug et al., 2022). In his paper, ‘Why physician guidance matters: A night of neuralgia, meningitis, and WebMD’, Au (2019) discusses this changing healthcare landscape and issues related to individuals consulting online platforms for health advice. He argues:

Patients need control and input into the final decision but with proactive guidance through testing and treatment options from physicians who know them; they need the agency to draw their lines, but with a steadying hand laid over their own, particularly on the Internet when the veracity of information is made tenuous by its sheer volume and lack of quality control and as people increasingly turn to and trust online websites as credible sources of knowledge. (Au, 2019, p. 463)

1.3 The Gatekeeper

The patient-GP relationship at the primary care level can be considered to be the starting point for a patient’s trajectory through the health ecosystem (Epstein et al., 2005). As the cost of health services continues to increase with an estimated \$241.3 billion spent in 2021–22 (Australian Institute of Health and Welfare, 2023, p. 2) and the general public becoming more involved in their health, GPs have started to face more challenges in balancing patient-centric care with resourceful medical use. In recent years, the idea of controlling healthcare expenses through efficient gatekeeping has gained popularity as decision-makers aim to lower costs by limiting the use of unsuitable and costly medical treatment. The rising cost of medical services has also prompted governments and policymakers to become more involved in gatekeeping by deciding the most appropriate care for patients through a rigorous exploration of the types of tests and services that are requested by patients (Halm et al., 1997). As noted above, GPs are the gatekeepers to other medical services and often are the health professionals who encounter patients at the start of their healthcare journey (Sripa et al., 2019). They are typically viewed as playing a crucial role in allowing health systems to

pursue cost-effectiveness (Sripa et al., 2019). For example, the UK's National Health Service (NHS) has long been credited with controlling costs, a success that has been attributed to its well-established gatekeeping system (Hawkes, 2014).

GPs are consistently identified in the academic literature as the key gatekeepers in healthcare systems because they decide on and direct patients towards the most appropriate course of action and provide authorisation for them to access specialised care. This role is not only significant but indispensable for healthcare ecosystems (Allard et al., 2011; Biro, 2013; Godager et al., 2015; Gonzalez, 2010). Therefore, as gatekeepers, GPs within the Australian healthcare system are well-positioned to promote the value of general practice in healthcare. Tabenkin and Gross (2000) provide perhaps the most detailed description of gatekeeping:

the authority to decide upon referrals to specialists, to implement the diagnostic work-up and patient management in the primary care clinics, to consider finances when deciding about medical care, and to coordinate the actions of other caregivers, thus guaranteeing continuity of care. (Tabenkin & Gross, 2000, p. 75)

Gatekeeping has long been associated with primary care provision, most likely since the Declaration of Alma-Ata in 1978 (World Health Organisation, 1978). This declaration, which has been reaffirmed by the World Health Organisation (WHO), identified primary health care as the key to achieving health for all through “practical, scientifically sound and socially acceptable methods” (World Health Organisation, 1978, Section VI of the Alma-Ata Declaration).

According to the Australian Institute of Health and Welfare report for 2022-2023 (Australian Institute of Health and Welfare [AIHW], 2024), most people who consulted a GP reported a positive experience. For instance, 71% reported that their GPs listened carefully to them and spent enough time with them while around 80% reported that their GPs always showed them

respect ([AIHW, 2024](#)). The Australian Medical Association (AMA) reported that 79% of individuals have a usual or preferred GP, and 75% of these individuals always manage to see their preferred GP when needed; furthermore, 87% of older Australians (those 45 years and above) reported visiting a regular GP (Australian Medical Association, 2022). The patient-GP relationship involves both professional and therapeutic interactions, and GPs who have long-term relationships with their patients typically gain more in-depth knowledge and understanding of them, which is considered to be crucial for effective patient care (Janssen et al., 2000; Murphy & Salisbury, 2020).

One of the critical roles of a GP is to understand patients and to address their health concerns. The increased knowledge about, and understanding of patients that accompanies the long-term patient-GP relationship enables more effective communication, especially as external factors such as history, values, and norms can be taken into account (Thomas et al., 2020).

For example, a patient who visits their GP may seem anxious because they have a family history of cancer, which has prompted them to be more proactive in managing their health. A GP who is familiar with this patient's family history would be more likely to understand their anxiety and address this in their discussion. Getting to know a patient holistically, especially over a longer time period, can extend the relationship beyond the confines of a medical therapeutic consultation (Walderhaug et al., 2022). In a qualitative study by Thomas et al. (2020), GPs were given the opportunity to reflect on the long-term continuity of their relationships with their patients, some of which they thought of as resembling friendships. It was found that patients were comfortable with GPs with whom they had a long term relationship that was based on encouragement, affirmation, and unconditional acceptance. These patients had been on a long journey with their GPs and were familiar to one another, and they felt that they were seen as a whole person. One participant in their study noted that

“acknowledging them as people ... warts and all ... caring about them more than just their illness ... being interested in their life” (Thomas et al., 2020 p. 141).

For this reason, a patient who consults medical information outside of the established patient-GP relationship has the potential to create tension in the relationship. An informed patient, for instance, may consider going beyond or even overriding their GPs’ expertise and advice in the belief that they are exercising their patient autonomy by relying on knowledge that they have acquired through their online searches (Huisman et al., 2020; Ruhnke et al., 2000).

However, this rise in patient autonomy has become inevitable as the internet has become a popular option for accessing health information, due to its ubiquitous presence (Hodyl et al., 2020). Sites such as WebMD (WebMD, n.d.) and Healthline (Healthline. n.d.) can provide patients with instantaneous and copious amounts of information about diseases, diagnoses, medical explanations, and treatment options.

While some GPs accept patients’ active OHI-seeking, others see these patients as devaluing their extensive training and authority as they are not only seeking out information independently, but, more importantly, they are acting on the results of their online searches. In addressing the move towards patient-centered care, Gusmano et al. (2019) defend the critical role played by GPs:

Medical professionalism requires independent, discretionary judgment. Professionals do not simply do as they are told or requested [by their patients] but must act on the basis of knowledge, skill, and fiduciary obligations to patients’ well-being (Gusmano et al., 2019, p. 372).

At the same time, when patients gather information about health matters, it can empower them to make better decisions about their health. In fact, it has been suggested that actively seeking information allows individuals to manage their overall health and well-being more

effectively (Wong & Cheung, 2019) and the WHO advocates for the greater involvement of health service users in decision-making processes, which further underscores the significance of patient-centered care (World Health Care, 2016).

Nonetheless, this OHI-driven evolution in patient behaviour has redefined how patients view their roles in the patient-GP relationship. Breivold et al. (2021), for instance, investigated challenges encountered by GPs who are faced with unreasonable OHI-based requests from their patients. Their study used a focus group with 17 Norwegian GPs to understand the role of patient education regarding these requests. They found that in the face of patients' requests, GPs tended to make minor compromises rather than delivering outright refusals. Moreover, many expressed feelings of isolation and reported a lack of professional support in the face of patients' access to OHI and their expectations for a patient-centered healthcare approach. These GPs called for more campaigns and professional guidelines to help them legitimise their refusals of unreasonable requests and to establish realistic patient expectations (Breivold et al., 2021).

Another important aspect of the patient-GP relationship is that, rather than viewing GPs as central figures in their healthcare journey, some patients have started to perceive them as secondary sources in their quest to satisfy their healthcare needs (Fang et al., 2011; Timmermans, 2020). Timmerman (2020), for instance, observed that patients who feel empowered, engaged, and less intimidated by GPs tend to demonstrate more assertiveness in researching their symptoms online, expressing their preferences to their GPs, and suggesting potential diagnoses. Healthcare providers have accordingly started to anticipate and manage these challenges, either by leveraging them to their advantage or investing their scarce and valuable time in addressing patients' concerns and providing reassurance (Timmermans, 2020).

1.4 The Patient-GP Dyad

Within the traditional paternalistic care model, the patient tends to play a very passive role (Beisecker & Beisecker, 1993). Yet, one key advantage of this paternalistic model is its protective nature in that it relieves patients from decision-making responsibilities when they are sick, and this extends to family members and caretakers who may feel burdened by having to make clinical decisions on behalf of the sick person (Hofmann & Lysdahl, 2008). In this model, the patient is assigned a 'sick role', a social role described by Parsons (1975) as being characterised by three criteria, the first criterion of which is that being sick is not considered to be the fault of the individual but is due to external forces beyond their control. The second is that those who are in the state of being 'sick' are absolved from ordinary societal expectations and obligations, with the proviso that the conditions of their illness are perceived to be severe enough to warrant this release. In this case, the third criterion asserts that the individual needs to seek the services of an institutionalised health service system to provide care and facilitate recovery (Bissell et al., 2002; Parsons, 1975).

Two contrastive types of healthcare providers in the healthcare system are often presented in the literature: the paternalistic healthcare provider, who makes decisions on behalf of the patient, and the empowering healthcare provider, who encourages the patient to make their own decisions, thereby enabling patient autonomy (Agarwal et al., 2019; Beisecker & Beisecker, 1993; Hughes et al., 2008). As the emotional weight of making decisions can feel overwhelming for some patients, they may choose to entrust their care to the expertise of a GP with a more paternalistic approach, thereby relinquishing control over the medical decision-making process. Sherlock et al. (2019) conducted a discourse analysis of GPs who actively encouraged patient autonomy and found that some of their patients still believe that 'the doctor knows best', which can lead to tensions if the GP is attempting to foster

independence in their patients and involve them in decision-making. This tension can be especially evident in emotionally charged and high-stakes situations, such as cancer treatment, where decisions have significant consequences for the patient and their family. Similarly, in interviews and observations at a Canadian cancer clinic, Sinding (2010) found that while many patients appreciated the opportunity to make their own choices, others felt overwhelmed by this responsibility. Patients who did not wish to make decisions were often seen as being unable to participate meaningfully in the decision-making process (Sinding et al., 2010). The above studies highlight how some patients in high-stress situations prefer the authoritative hand of a GP who will make decisions on their behalf.

1.5 The Digital Health Age

The accessibility of OHI (initially referred to as ‘electronic health’ or ‘eHealth’) has emerged as a critical factor in advancing population health and healthcare services. Eysenbach (2001) refined the definition originally articulated by Mitchell (1999) to capture aspects of the contemporary landscape. He characterises eHealth as the delivery or enhancement of health services and information facilitated through the internet and related technologies (Eysenbach, 2001; Mitchell, 1999). Meanwhile, the WHO has expanded their definition of eHealth to include a broader range of services and use the term ‘digital health’. The WHO’s vision for health as outlined in their 2022 global strategy is:

to improve health outcomes for everyone, everywhere, by (i) accelerating the development and adoption of appropriate, accessible, affordable, scalable and sustainable person-centric digital health solutions to prevent, detect and respond to epidemics and pandemics, and (ii) developing infrastructure and applications that enable countries to use health data to promote health and well-being. (WHO, August 1, 2022, p. 5)

Digital health encompasses systems, tools, and services based on information and communication technologies (ICT) that can be used as interventions to treat patients effectively and as a way to collect and disseminate patient health information. Digital health also includes strategies for patient self-management as well as measures to prevent future health concerns. Examples include mobile health applications (such as messaging), wellness apps, My Health app, and Medicare Online. Digital health solutions include electronic prescribing, medication charts, electronic health records (My Health Record), telehealth, and telemedicine. Also falling within the scope of digital health are fitness trackers, monitors, artificial intelligence, and access to medical data (Australian Institute of Health and Welfare, 2022).

1.5.1 Digital Literacy

Digital health literacy plays a crucial role in the digital solutions outlined by the WHO, as noted above, in terms of uptake and effectiveness. Digital health literacy encompasses diverse skills that empower individuals to navigate, evaluate, and apply digital solutions and information for the purposes of decision-making and problem-solving. Ideally, individuals will possess the capacity to seek out relevant information, critically evaluate its credibility, integrate it with existing knowledge, and use it to address their health concerns. In other words, this multifaceted skill set involves both technical proficiency in using digital tools and the ability to think critically about the information accessed (Norman & Skinner, 2006). Yet, the 2011–2012 Programme for the International Assessment of Adult Competencies indicated that 44% of Australians have low literacy skills (www.abs.gov.au/ausstats/abs@.nsf/lookup/4228), which suggests that health information needs to be presented at a readability level that can accommodate the wide range of literacy skills among the general population (Cheng & Dunn, 2015). However, due to the scarcity of literacy tools, assessing an individual's capacity to effectively engage with OHI can be

challenging. Addressing this gap is important as it would ensure that the Australian public can harness the full benefits of online health resources. As the digital landscape continues to evolve, efforts made to enhance digital health literacy (eHealth) will be fundamental in ensuring patients are kept informed, particularly in the realm of tests and procedures given that the individual's potential to effectively engage varies (Kemp et al., 2021).

1.5.2 Information and Understanding

The connection between accessibility to OHI and digital literacy has been addressed in the academic literature (Kemp et al., 2021; Prochaska et al., 2017), and various studies have found that the more an individual uses technology, the more likely they will be to become proficient in using technology as a tool. For instance, Borzekowski and Rickert (2001) measured digital literacy among adolescents based on the assumption that their use of technology and the internet from a young age would mean that they would have a higher digital literacy than older demographics. However, it was found that despite their familiarity with technology and navigating internet platforms, many adolescents were unable to derive the full benefits of OHI and experienced difficulties engaging in and understanding OHI (Borzekowski & Rickert, 2001). More than a decade later, Lee et al. (2015) confirmed that half of the adult consumers seeking web-based health information in their study required assistance in finding the desired information (Lee et al., 2015). Their study suggested that despite age playing a role in the participants' use of technology, all of the participants required some form of help in comprehending the online health material. More recently, de Oliveira Collet et al. (2024) found that individuals' frequency of OHI-seeking on the internet and social media platforms has increased markedly and that social media has emerged as a significant source of information, promoting health and positive lifestyle behaviours. Their study's findings showed that individuals with higher scores on the eHealth literacy scale (eHEALS) often engaged in research about their health status. At the same time, they were

more critical of online content and did not disregard their healthcare providers' advice in favour of this OHI (de Oliveira Collet et al., 2024). Irrespective of the demographic being studied, the ability to effectively navigate the internet for health-related information is becoming increasingly important in the ongoing transformation in how health information is shared. Public health communication, for example, has evolved significantly, to the extent that individuals without medical training are now providing unsolicited advice on social media platforms, which raises concerns about the accuracy and reliability of information. For this reason, individuals who use online platforms and other media sources to request imaging studies based on low-quality, misleading, or falsely informed sites should be encouraged to assess the authoritativeness and accuracy of this information (Afrin & Prybutok, 2022).

1.6 Cyberchondria

'Cyberchondria' is a term used to refer to excessive and repetitive searching for health-related information online. This behaviour can lead patients to develop an undue fixation on self-diagnosis, which may result in inaccurate conclusions and delays in seeking timely and appropriate medical intervention (Loos, 2013)—seeking advice from medically trained providers is typically a more efficient way to address health concerns (Afrin & Prybutok, 2022). For instance, Starcevic et al. (2021) explored cyberchondria during the COVID-19 pandemic and found that this behaviour was influenced by several factors, such as an increased perception of threat and fear of a newly identified and poorly understood disease (COVID-19), difficulty in coping with the uncertainty associated with the pandemic, a lack of authoritative and trustworthy sources of relevant health information, difficulty in managing the constantly updated, unverified, and copious amounts of information available, and the inability to find reassurance despite excessive online health information-seeking (Starcevic et al., 2021).

1.7 Digital Tools

The COVID-19 pandemic led to an increase in digital health implementation globally, which was designed to help primary care providers protect the vulnerable and enable healthcare workers to maintain high-quality care but from a safe distance (Ahmad et al., 2022).

However, the same types of digital applications that were used to overcome pandemic-related operational challenges continued to be utilised post-crisis. Before the pandemic, telehealth consultations were restricted to rural and remote communities and there was no significant wider adoption of this model of health service. During the pandemic, however, many healthcare providers started to use telehealth for the first time with a view to limiting patient and staff exposure to the virus. During telehealth consultations (conducted via telephone or video), patients are required to self-report their symptoms without physical contact or GP examinations, but with a view to maintaining high-quality consultations despite these limitations (Sturgiss, 2022). A recent study in the US by Patel et al. (2021) that investigated variations in total outpatient visits and telehealth use across different patient demographics, specialties, and conditions, found a higher use of telehealth consultations than in-person consultations, including for specialties such as psychiatry, endocrinology, and neurology. During the COVID-19 pandemic, around 30% of all patient visits were conducted via telehealth, and the weekly number of visits increased 23-fold compared to the pre-pandemic period (Patel et al., 2021). Sturgiss (2022) found that over 90% of individuals in Australia who use the telephone for consultations do so for greater convenience, to not waste time, and to reduce the complexities created by the government imposed restrictions during the pandemic. Yet, this lack of in-person contact with healthcare providers requires patients to be able to effectively communicate their symptoms and/or provide detailed clinical explanations of their ailments (Sturgiss et al., 2022), which has led to more patients consulting OHI.

1.7.1 Digital Health Journey

In the early 1990s, all seven Australian states and territories revised their poisons regulations to permit computer-generated prescriptions. As a result of this change, medical records became more explicit and comprehensive, which led to a significant reduction in prescribing, dispensing, and administration errors (Charatan, 2000). Burgess et al. (2005) described the serious implications of siloed health information and reported the notable rise in hospitalisations due to adverse drug reactions during the period 1991–2002 (Burgess et al., 2005). In response to these alarming findings, the state and territory governments initiated the MediConnect program in 2000 and the HealthConnect program in 2004 to facilitate the electronic communication of health data and to enhance safety and quality in the healthcare system (Department of Health and Ageing, 2009). In 2005, the National E-Health Transition Authority (NEHTA) was established to introduce electronic health information systems across Australia while in 2012, NEHTA launched the Personally Controlled Electronic Health Record (PCEHR) (later renamed My Health Record) with a view to fully engaging patients and their carers in the digital health journey (Australian Digital Health Agency, 2015).

My Health Records (MHR) is a national electronic health records system that allows individuals to access their health information, such as medical history, medication, allergies, and diagnostic results. MHR was initially introduced in 2012 via an opt-in model for all Australians to have their health information available via an electronic health record. As this opt-in approach failed to achieve widespread adoption, an opt-out approach was put in place a few years later (Hoffman, 2023). This transition was completed in 2018 and resulted in 90% of Australians having a My Health Record (Digital Health Agency, 2018).

1.7.2 Patient Portal

Patient portals are organisation-specific systems that allow individuals to access health information, including studies they have received from organisations either before or during their visits to the GP. To take one example, the Hunter New England Imaging online portal allows patients access to their imaging, enables the sharing of exams with GPs or other referrers, and helps patients manage their images using a range of familiar, user-friendly browser-enabled devices (hnehealth.nsw.gov.au). Patient portals are secure online platforms that provide patients with access to their health information anywhere and anytime. The advantages of these portals include improved patients' understanding of their health, shared decision-making around health matters, enhanced patient-GP communication, and better health outcomes (such as ongoing patient management and preventative care promotion) (Woolen et al., 2019). Yet, the use of patient portals can also have negative consequences, such as confusion and anxiety due to patients' lack of understanding of their study results (Lu & Zhang, 2019). A focus group study evaluating GPs' views on direct patient access to radiologic test results found that many of these GPs were not only concerned that their patients would not be able to understand the imaging (Gimson, 2022) but that this lack of understanding could cause patients significant anxiety, which could in turn lead to increased demands on the referring GPs' time to clarify patients' misunderstandings. Patients' could experience further anxiety as most are ill-equipped to understand the full implications of image findings, which may be particularly detrimental in the case of patient-sensitive results such as new cancer diagnoses (Gimson et al., 2022).

1.7.3 Imaging Modalities

It is widely acknowledged that digital data and technology has transformed the field of imaging. The use of electronic image acquisition, interpretation, transmission, and storage of

image data has not only increased patient access but has benefited referring providers (Hussain et al., 2022). Imaging interpretations are now more readily available, with instantaneous access to these on digital platforms such as patient portals, as mentioned above (Halaska et al., 2019). Table 1-1 presents the imaging modalities referred to in this thesis, along with a brief historical background of their development, and their main clinical uses.

Table 1-1:

Imaging modalities–historical perspectives and clinical use.

Modality	Background	Clinical Use
Ultrasound	<p>In 1794, Lazzaro Spallanzani, an Italian physicist, studied how bats navigate in total darkness and theorised that these nocturnal creatures rely on sound for navigation (Genc et al., 2016).</p> <p>Many years later, in 1880, Pierre and Jacques Curie discovered the piezoelectric effect, that is, the application of electrical currents to quartz crystals to produce sound, specifically ultrasonic waves. This resulted in the development of diagnostic medical ultrasound (Genc et al., 2016).</p>	<p>One significant advantage of ultrasound is that it does not use ionising radiation; another is that it allows imaging of anatomy in real-time.</p> <p>Technological advances such as microbubble contrast agents and Doppler technologies have enabled the direct visualisation of blood vessels and permitted tissue characterisation in solid organs (Christensen-Jeffries et al., 2017).</p> <p>Elastography has enhanced ultrasound’s diagnostic capabilities in detecting tumours. Elastography has been used to determine tissue stiffness as tumour-infiltrating tissues tend to be stiffer than the surrounding normal tissues. As such, elastography can assist in detecting tumours in breast, thyroid, and liver imaging (Tapper et al., 2016).</p>

Modality	Background	Clinical Use
X-rays	<p>Wilhelm Conrad Roentgen discovered the X-ray in 1895.</p> <p>During World War 1, Marie Curie contributed to the development of appropriate and efficient ambulatory diagnostic imaging. The medical applications of Xray technology after its discovery in 1895 was forged ahead by Madame Curie who mobilised Xrays by creating Xray stations - developing and equipping mobile radiography used to diagnose injuries in wounded souldiers.</p> <p>X-rays enable visual images of the inside of a patient’s body (Hashimi et al., 2020).</p>	<p>Chest X-rays are the most common and widely available diagnostic imaging for pneumonia, and as such, they play a crucial role in clinical care (Fawole et al., 2020).</p> <p>Pneumonia is an acute respiratory infection where the air sacs fill with pus and other liquids (Andronikou et al. 2017).</p> <p>Pneumonia is ranked 8th in the list of top 10 causes of death in the US. Worldwide, it is the single largest cause of death in children, particularly under the age of five (Fawole et al., 2020).</p>
Computer Tomography (CT)	<p>Sir Godfrey Hounsfield invented the first CT scanner in 1971. Offering unparalleled diagnostic accuracy through detailed soft tissue imaging. The use of computed tomography (CT) has become revolutionary in its diagnostic capability. Such technology has enabled better surgical results and treatment of various pathologies and trauma including major cardiac conditions. CT can be performed within minutes allowing health providers immediate results in most instances (Moloney et al., 2016).</p>	<p>For patients experiencing acute coronary syndrome, which is characterised by reduced blood flow to the heart, the triple-rule-out (TRO), CT angiography provides an innovative approach. This technique offers a cost-effective method to evaluate not only the coronary arteries but also the aorta, pulmonary arteries, and nearby intrathoracic structures (Hussein et al., 2022).</p>

Modality	Background	Clinical Use
	<p>CT technology has advanced significantly, with thinner slices providing better precision and reduced radiation doses due to its fast scanning capabilities (Hussain et al., 2022).</p>	<p>CT perfusion for detecting and quantifying cerebral stroke perfusion allows treatment to be initiated more quickly after the onset of symptoms. This offers many patients the opportunity for effective embolectomy (clot removal) (deVries et al., 2023).</p>
<p>Magnetic Resonance Imaging (MRI)</p>	<p>In 1972, Dr. Raymond Damadian filed the first patent for MRI technology. After his patent was approved in 1974, he designed and built a full-body MRI machine. MRI provides exceptional contrast of soft tissues and detailed anatomical images, making it essential in the fields of cardiology and oncology.</p>	<p>MRI enables detailed morphological and functional assessment of cardiac valves, aiding the diagnosis and risk stratification of various conditions, including acute coronary syndrome (Pathik et al., 2016).</p> <p>MRI also plays an integral role in the workup of chest pain to assess for further events such as reinfarction or heart failure (Pathik et al., 2016).</p> <p>MRI is also helpful to rule out other causes of acute chest pain, including myocarditis, aortic dissection, aortic stenosis, and Takotsubo cardiomyopathy (Saremi, 2017).</p>
<p>Interventional procedures</p>	<p>Image-guided biopsies and minimally invasive procedures such as abscess drainage and tissue ablation have become standard practice. These techniques are applicable to various organs,</p>	<p>Current management of osteoarthritis (OA) is primarily focused on symptom control. Intra-articular corticosteroid</p>

Modality	Background	Clinical Use
	<p>including thyroid, lung, liver, breast, and bone, and underscore the role of imaging in therapeutic interventions.</p>	<p>injections are often used to manage hip and knee pain (Chen, 2016).</p> <p>Rotator cuff pathology in shoulders, as well as acromioclavicular and glenohumeral joint disorders, constitute the most common cause of shoulder pain, which is often therapeutically managed using diagnostic imaging modalities with pharmaceutical interventions (Kuratani, 2022).</p> <p>For the management of inflammatory conditions, intra-articular steroid injections using image-guided CT or ultrasound have become the cornerstone of pain management (Kuratani, 2022).</p>

1.8 Unintended consequences

The GP's relationship with their patients can become problematic when patients with increasing autonomy and a patient-centric outlook challenge the GP's professional integrity, especially if the GP considers tests and/or procedures requested by the patient to be either unnecessary or inappropriate to the patient's needs. In such cases, GPs who are merely trying to act in the best interest of patients can experience significant frustration and conflict (Breivold et al., 2021; Hardavella et al., 2017).

1.9 Imaging Overuse

1.9.1 'Choosing Wisely'

When patients are granted the autonomy to make their own decisions, they can potentially request an indefinite amount of imaging that they may deem necessary but which their broader healthcare team might consider to be futile. This can impact healthcare resource allocation if the overuse of imaging or unnecessary testing starts to deplete healthcare resources (Durand et al., 2015; Pike et al., 2022). In fact, the use of diagnostic imaging services is increasing worldwide, and the reasons for this are multifactorial, including an ageing population, improved patient access to imaging services, and the reliance on advanced imaging and treatment options for diagnosis. Such increased use means that GPs are more reliant on diagnostic imaging services and are expanding their indications for more radiological studies to be conducted on patients (Lu et al., 2024; Smith-Bindman et al., 2008). While the various terms used to refer to this phenomenon can be ambiguous, Chassin and Galvin defines 'overuse' as "the provision of medical services for which the potential for harm exceeds the potential for benefit" (Chassin & Galvin, 1998). 'Choosing Wisely' is an international movement that began in the US and has since become an international collaboration with the Commonwealth Fund. Founded by Anna Harkness, the

Commonwealth Fund supports independent research on health care issues and provides grants to improve health care practice and policy (Commonwealth Fund, n.d.). The objective of the ‘Choosing Wisely’ movement, which started with six countries and has now grown to include around 20 countries, is to disseminate jointly devised strategies and best practices to reduce unwarranted imaging. Although the overuse of imaging has mostly been documented in high-income countries, there is evidence that it also exists in low- and middle-income countries (choosingwisely.org.au).

1.9.2 Diagnostic Imaging Reform Package

The total number of imaging services provided within Australia has been growing over the past two decades. P. Lu et al. (2024) extracted data from the Australian Medicare Benefits Schedule (MBS) between 2000 and 2021 and found that over 400 million imaging studies were performed during that period. They also found that these services accounted for between 5.5% and 6.5% of total Medicare services annually. One reason for this increase may have been the ‘The Diagnostic Imaging Reform’ package, which allocated A\$104.4 million every financial year during the period 2012–2016 to increase the number of MRI machines available to perform Medicare subsidised services. An additional A\$375 million was assigned in the 2019–2020 federal budget to continue this expansion of MRI machines (Department of Health, n.d.). In this same federal budget, A\$198.6 million was allocated to Medicare rebates, breaking a 22-year freeze by indexing X-rays and ultrasound to reduce out-of-pocket expenses for diagnostic imaging patients and to improve access to these services (AIHW, 2018).

A study by Lumbreras (2017) that investigated patients’ values and what constitutes value-based care recommended a two-step approach for addressing overuse in medical imaging. Breivold et al. (2021), found that the challenge for GPs in the patient-centric decision-making

process is how to avoid imposing their preferences on patients while also declining patient requests that seem medically unjustifiable. A Norwegian study by Walderhaug et al. (2022) identified a variety of strategies used by GPs to avoid unnecessary diagnostic imaging when encountering patients with medically inappropriate expectations around imaging. They found that GPs who empathised with their patients and articulated their diagnostic reasoning before denying requests had a better response from patients. Factors such as a long-term patient-GP relationship and patients' trust in the GP also played a significant role, particularly when the GP had extensive knowledge about the patient, such as access to their comprehensive medical history (including family history) and a general understanding of their personality (Walderhaug et al., 2022). Yet, they also found that increased demand for scans strained radiological services, resulting in longer waiting times and higher costs for healthcare systems. Furthermore, the increased time spent educating patients about the futility of specific requests (often derived from OHI searches) was found to be a potential source of GP burnout (Breivold et al., 2021; Nilsen & Malterud, 2017a).

1.10 Rise in Clinically Non-Indicated Imaging

1.10.1 Defensive Medicine

Perhaps even more significant than GPs having to negotiate with patients' inappropriate requests is the societal trend towards reduced tolerance of uncertainty, which is reflected in the defensive approach to healthcare. 'Defensive medicine' refers to medical care provided by GPs that does not necessarily increase the benefits to the patient but whose primary purpose is to reduce risks to GPs, and this can include ordering unnecessary tests out of fear of litigation (Kakemam et al., 2022). A study by Pike et al. (2022) of GPs in Canada who ordered imaging for low back pain found that over a third of their sample had previous negative experiences associated with possibly missing an underlying pathology. Some of

these GPs reported the use of imaging as a ‘fail-safe’ method for diagnosing serious ailments (Pike et al., 2022). However, Griffith et al. (2014) found that half of the GPs interviewed for their study had ordered inappropriate imaging to avoid complaints and legal ramifications. This type of fear puts GPs under immense pressure to order tests even when they are diagnostically inappropriate (Embrett & Randall, 2018).

It is clear that diagnostic tests can be overused, particularly in contexts where there are limited benefits, for example, testing for cancer when there is a low likelihood of occurrence. For this reason, GPs must carefully evaluate the need for ordering studies for patients who request screening imaging without clinical indications. This is because requests often lead to more tests due to incidental and inconsequential findings that can encourage further testing.

1.10.2 Screening Tests

As noted above, in addition to high levels of unnecessary imaging requests, high rates of inappropriate screening tests have also been documented, particularly in the US, where there is widespread public support for cancer screening, such as cervical cancer screening for women who are actually at very low risk for this disease (Schwartz et al., 2004). Other studies have identified the overuse of mammography screening for women with a limited life expectancy; that is, a cancer diagnosis and treatment would not be clinically relevant for women at an advanced age as the cancer diagnosis would have only a limited impact on their quality of life (Tan et al., 2014). South Korea’s aggressive use of thyroid ultrasound has led to a 15-fold increase in the detection of thyroid papillary carcinoma even though the death rate from this cancer has remained unchanged even with this increased screening. In the absence of a change in mortality rates in the South Korean case, increased detection merely means that more patients are subjected to thyroidectomy with its associated risks of hypoparathyroidism and vocal cord paralysis (Ahn et al., 2014).

1.10.3 Time Pressure

A survey of GPs, patients, and policymakers in Canada found that patient demand was the most frequently cited reason for unnecessary care provided over and above health providers' decisions (CIHI, 2017). Pike et al. (2022) reported that GPs found that explaining the merits and limitations of requested studies consumed far more time than was typically available during a busy clinic day (Pike et al., 2022). Furthermore, a systematic review conducted by Hall et al. (2019) found that GPs lacked the time to converse openly with patients about diagnoses or to explain why particular scans were unnecessary. The review found that recommending alternatives to imaging, such as physiotherapy or pain management clinics, could also be problematic as access to these services was not always readily available due to scheduling delays (Hall et al., 2019).

1.11 Summary

In applying the ethical framework within which medicine is practiced, that is, *primum non-nocere* ('first do no harm'), the current challenge for healthcare providers is to do what is right for patients while also respecting patients' rights and their desire to be autonomous in their health management (Walton & Kerridge, 2014). Access to advanced imaging now allows GPs to quickly and accurately diagnose a wide range of conditions, and the introduction of technologies such as patient portals also enables individuals to more easily access their imaging studies (Halaska et al., 2019). Moreover, the proliferation of online medical information allows patients to be better informed through their online searches and able to refer to differential diagnoses when requesting studies (Flick, 2014b). Encountering patients' demands or requests for imaging, however, can be problematic for GPs when such requests conflict with evidence-based medicine or even risk harm to the patient (Breivold et al., 2021). All too often, patients do not have the ability to understand the merits and

limitations of various examinations due to their low health literacy and low digital health literacy, which limits their ability to be critical of the online information they have sourced. Patients' inability to critically evaluate OHI can have both direct and indirect effects, including physical and psychological burdens, and can also strain the patient-GP relationship and deplete resources within the healthcare system (Griffith et al., 2014).

1.12 Current Research

Patient requests for imaging can pose challenges for GPs, radiologists, and other allied healthcare workers. To address the influence of OHI on patients' diagnostic imaging requests and the challenges for GPs and radiologists in particular, this thesis seeks to determine why patients make such requests.

The thesis provides an Australian perspective on patient-initiated diagnostic imaging in primary healthcare, and the main focus is on the paradigmatic shift in the roles of patients, GPs, and radiologists. These roles have been changing over the years due to the shift away from the traditional healthcare delivery model towards a patient-centric one, where patients, empowered through the accessibility of OHI, are more likely to request tests and procedures based on their understanding of OHI. The thesis also explores the challenges for healthcare providers in fulfilling/ declining patient-initiated needs while promoting value-based care.

1.12.1 Scope and Objectives

This research aims to understand the relationship between the accessibility of OHI and its influence on individuals seeking diagnostic imaging from health providers. It addresses the consequences for healthcare providers associated with meeting such patient demands and discusses key issues for them. Considering that only qualified healthcare providers, primarily GPs can authorise referrals for radiological imaging and interventions in Australia, patient-initiated requests can create several problems within the patient-GP dyad, which can extend

to radiologists as they are specialised care providers. To address the existing knowledge gap in Australia, we undertook surveys and interviews with members of the Australian public. In addition, we gathered targeted insights from healthcare professionals, i.e., GPs and radiologists, to assess how common these patient requests are and their effects on clinical workflow. This process validated the recurring anecdotal evidence that patients often solicit diagnostic imaging from their GPs. Our collaborative approach ensured that the perspectives of all stakeholders, including patients, GPs, and radiologists, were acknowledged in this research.

This thesis explores the difficulties GPs encounter when responding to patients' demands for diagnostic testing. It investigates GPs' approaches to managing patients' increasing awareness of medical imaging through OHI and their wish to seek reassurance through imaging, which they see as a way of visualising their internal health to provide 'proof of wellness'. The thesis examines the implications for radiologists when GPs acquiesce to patients requests for imaging, and offers recommendations and guidelines for GPs and patients to promote value-based care.

The thesis does not assume that patient requests are unreasonable nor that healthcare providers' decisions are inherently correct; rather, it examines patients' behaviour in a meaningful and contextually grounded manner rather than dismissing patients as being misinformed or misguided. It investigates how the behaviours, motivations, and constraints of each stakeholder interact within the system, with the goal of understanding how these interdependent responses shape imaging utilisation and identifies sustainable, patient-centred strategies to support value-based diagnostic care.

Hensher & Zywert (2020) argue modern healthcare systems face several challenges as they are deeply embedded in economic growth models that rely on increasing resource use; they

offer options to scale back. They see opportunities for cultural transformation within the healthcare system in reducing overuse by cultivating a belief among health providers in sufficient rather than maximising use. This thesis examines a health system problem involving primarily the tripartite stakeholders; the patient, the GP, and the radiologist. Positioned within the broader context of the health system, the objective of the research is to analyse how OHI, patient autonomy, and digital literacy influence patient-initiated requests for imaging, and to understand how these key health system stakeholders behave and interact within this evolving modern environment and address some of the concerns in resource usage. It further explores GPs' gatekeeping behaviours shaped by clinical guidelines, patient-centred care expectations, time-constrained consultations, medico-legal concerns, and the doctor-patient relationship. Such concerns intersect with radiologists' workflow management, which is impacted by non-indicated imaging requests prompted by patients' influence on GPs.

This research study was segmented into several phases, each of which addresses questions pertinent to the overarching research aim. Each phase has been categorised according to the perspectives of patients, GPs, and radiologists, respectively.

1.12.2 *Research Questions*

Research Phase 1: Patients' Perspectives

1. Does a relationship exist between the accessibility of online health-related information (OHI) and online health literacy?
2. Is there a relationship between patient health literacy and requesting referrals from GPs for imaging or interventional procedures?

3. Do patients perceive GPs as pivotal to patient care when guiding them for studies conducted in imaging clinics?

Research Phase 2: Patients' Perspectives

For Phase 2, the Andersen–Newman model of healthcare utilisation (ANM) was employed to explore predisposing, enabling, and need elements of patients' requests for radiological referrals, their self-reported experiences, and the outcomes of such requests. The ANM investigates patients' behaviours to understand the motivations behind their requests for imaging. It would be beneficial to expand the scope for GPs and radiologists in private practice to examine the intersecting behaviours of all three stakeholders. The ANM does not consider financial incentives, organisational constraints, or economic drivers. Hensher et al. (2020) emphasise the risks associated with healthcare utilisation based on the assumption of unlimited resource expansion and offer a systemic explanation for provider behaviours where increase in healthcare utilisation is independent of environmental degradation. They highlight that, for current healthcare growth to occur in providing patients with optimal care, there is a reliance on increasing resource utilisation. Future systems should prioritise reducing energy and material consumption in medicine, technology, and infrastructure, and aim to develop simpler systems that do not require tiers of specialised care. Emphasising reduction in overdiagnosis, overtreatment, and low-value care, Hensher et al., (2020) promote a professional shift towards an ethic of sufficiency that highlights values and outcomes. Using theories, models, and frameworks, Sun et al. (2024) established that complex health interventions are increasingly used to address disease burden. However, there is limited focus on the interconnected dimensions of adaptability (tailoring interventions to the local context to ascertain feasibility), scalability (expanding interventions once proven effective and essential to the process), and sustainability (maintaining impact over time through successful

long-term adaptation), all of which are linked sequentially. This is often observed in high income countries and less so in low to middle countries. Several influencing factors comprise what is termed the outer context, including socio-political environments, inter-organisational arrangements, and funding structures. The inner context involves organisational readiness, culture, and resource allocation. Intervention characteristics range from simple to complex solutions, with outcome evaluations adapted accordingly. Bridging factors such as workforce motivation, skills, and professional adaptability also influence the process. Sun et al. (2024) highlight that many existing frameworks have been developed in high income countries and face limitations when applied to different contexts, such those found in low to middle income countries in being consistent with the foregoing, where resource, training, and capacity constraints are present. Together, Hensher et al. (2020) and Sun et al. (2024) provide a broader system-level and contextual perspective needed to explain GP and radiologists' behaviour, thereby complementing the ANM and enabling a more comprehensive understanding of the triadic interactions at the centre of the thesis.

The research questions for this phase were:

4. What themes emerge as patients' predisposing, enabling, and need factors specific to requesting radiological referrals?
5. What are the main drivers of patient requests for radiological studies ?
6. What are patient-reported outcomes of such requests?

Scoping review and Phase 3: General Practitioners' Perspectives

In addressing GPs' perspectives, a scoping review and interviews were conducted to understand the challenges experienced by health providers in meeting patients' expectations.

The scoping review provided a global perspective while the GPs' interviews were focused on the Australian population. The questions addressed in the scoping review were:

7. What challenges faced by GPs in responding to patient requests pose barriers to complying with established guidelines on appropriate imaging?
8. What strategies using evidence-based medicine have been identified by GPs in addressing patient requests?
9. What support or help do GPs receive in implementing guidelines and managing patient requests for imaging?

The questions explored in the interviews were:

10. Do GPs feel obliged or pressured to acknowledge and validate patients' requests?
11. Is there a relationship between patient characteristics and requests fulfilled by GPs?
12. What are the consequences of declining a referral as self-reported by GPs?

Phase 4: Radiologists' Perspectives

Lastly, Phase 4 explored the perspectives of radiologists, who often do not deal directly with patients' requests but report on the imaging requested by these individuals. As part of a specialised field, radiology is impacted by imaging requests and the following questions addresses this.

13. Are radiologists aware of patient-initiated requests for radiological imaging studies?
14. What do radiologists believe are the facilitators for requesting irrelevant studies?

15. Do radiologists think patients are aware of the merits and limitations of various radiological studies?

16. Have requests for irrelevant studies impacted radiologists' workloads?

1.12.3 Thesis Overview

The thesis comprises nine chapters, covering the four phases of empirical research work (Chapters 3, 4, 6, and 7) and a systematic scoping review (Chapter 5). The work presented in Chapters 3, 4, 6 and 7 has been published; the manuscript in Chapter 5 is under review. Gaps in the literature are discussed in each of the empirical chapters.

This chapter has provided the background and rationale for the research with questions for each of the research phases and the scoping review. The next chapter, Chapter 2, describes the methodology, which involves quantitative and qualitative inquiries into patients, GPs, and radiologists' perspectives. Chapter 2 provides the rationale for using the mixed method approach, which is framed within the pragmatic paradigm. It also justifies the use of the eHEALS scale (Norman & Skinner, 2006) and the Andersen–Newman model of healthcare utilisation (ANM) (Andersen & Newman, 1973). The results of the data analysis are embedded within a grounded theoretical framework (Glaser, 1999).

Chapters 3 and 4 present the findings from the first two phases of the research, which both investigate patients' perspectives: Phase 1 employed a quantitative methodology while Phase 2 used a mixed methods approach. Chapter 3 reports on patient survey respondents' perspectives while Chapter 4 presents findings from a follow-up survey and interviews with a sample of patients who had previously requested imaging studies from their GPs, using the same criteria as Phase 1. The data revealed several key drivers of patient requests for imaging from their GPs.

The systematic scoping review presented in Chapter 5 discusses worldwide challenges stemming from increasing patient demand for imaging. This review reports on the barriers and facilitators to patient requests with respect to imaging guidelines and highlights the strategies implemented by GPs to manage patient requests. Chapters 6 and 7, which are informed by the systematic scoping review, present empirical research conducted with healthcare providers in Australia. Chapter 6 presents the findings from the GP interviews, which were designed to explore their perspectives on imaging requests. It reports on the challenges faced by GPs and suggests strategies for addressing patient requests. Chapter 7 reports on radiologists' perceptions of patient demand for their services. Chapter 8 presents the discussion of the thesis, and Chapter 9 presents the conclusion of the study and makes recommendations for health practitioners, professional bodies and consumers. It acknowledges the research limitations and presents the implications of the findings for future research.

The next chapter discusses the philosophical underpinnings of the methods used for data collection, the research design, and the specifics of the quantitative and qualitative (mixed methods) data collection methods.

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Chapter 2 : Methodology

Whether we are aware of it or not, we always bring certain beliefs and philosophical assumptions to our research. (Creswell & Poth, 2018, p. 15)

2.1 Introduction

This chapter focuses on the research methods used to explore diagnostic imaging requests initiated by patients in Australia from the experiences and perspectives of the patients themselves, GPs and radiologists. It outlines the epistemological underpinnings of the methodological approach taken in this thesis and provides an overview of the methods of data collection and analysis used to investigate the research questions. It introduces the key tools and frameworks that informed the study design, including a validated eHealth measurement instrument used in phase 1 and a conceptual model that support a comprehensive exploration of participants' experiences utilised in phase 2. These frameworks were applied across the 1st and 2nd phase of the research to guide the interpretation of healthcare utilisation from a patient perspective. The results of both informed the structure of the systematic scoping review component. The 3rd and 4th phases were interviews and surveys respectively to gain an understanding of the health providers' perspectives.

Researchers who view the world as a natural phenomenon, perceiving it to be hard, real, and external to the individual, will adopt a quantitative, objective, or positivist methodology. Conversely, those who view the world as a social construct interpret it as personal, and humanly created, and these researchers will typically adopt a qualitative, subjective, or social constructivist methodology (Chandra & Hareendran, 2018). However, those who interpret the world as a social reality, are interested in the subjective experiences of individuals in the creation of this reality, but view the social world as relativistic rather than absolute, will

usually adopt a mixed methods approach, combining both quantitative and qualitative methodologies (Burrell, 2017). It is this last, mixed methods approach that was employed in this thesis.

The various ways in which ‘reality’ can be understood, in terms of ontology and epistemology, influence the methodology selected for the research: quantitative, qualitative, or mixed methods. These will be discussed in the following sections.

2.2 Ontology

Ontology can be defined as the study of the nature of reality, in which the researcher makes assumptions about what they believe makes sense (Creswell & Poth, 2018). Reality is seen as being contextually bound, and continuously recreated based on an individual’s understanding of it. In the process of data collection, for instance, the ontological view of the individual is crucial as it influences the meaning assigned to the collected data. It also determines how the research questions are developed, which aspects of the data are seen as significant, and the approach used to conduct the analysis (Yilmaz, 2013).

There are several possible views to ontology and a positivistic quantitative approach was used for Phases 1, 2, and 4 of this research. The utilisation of surveys allow for an objective truth to be sought through mathematical data and interpretation. Ontologically speaking, the quantitative approach not only assumes that a single, tangible, albeit fragmented reality can be discovered (Needleman & Needleman, 1996) but that there is only a single truth (Noblit & Hare, 1999). On the other hand, the qualitative approaches used in Phases 2 and 3 are founded on a constructivist viewpoint that assumes realities are multiple, socially constructed, and holistic (Creswell & Poth, 2018). This approach involved interviews with the research participants, whose reality was seen to be contextually bound and recreated by their experiences based on their individual understandings (Slevitch, 2011). Being informed

on the ontological stance of research studies, therefore, means understanding how researchers make meaning from data collection as well from a broader context, its analysis and interpretation.

2.3 Epistemology

Epistemology deals with the nature and extent of knowledge, focusing on how individuals acquire such knowledge and verify what constitutes the truth (Chandra & Hareendran, 2018). In the research context, Creswell and Poth (2018) discuss the relationship between researchers and that which is being researched, including the research subjects. These authors emphasise the need to understand the dynamic interaction that takes place between researcher and subject, as this relationship can significantly impact the interpretation of the data and the research outcomes. Such philosophical assumptions reflect the researcher's worldview and, within scientific research specifically, the conceptual set of beliefs and practices that guide particular fields. Such beliefs are typically referred to as a 'paradigm' (Morgan, 2007).

Denzin and Lincoln (1998) identified four fundamental influences on the design of a research study:

- a. The paradigm or worldview that will guide the research design
- b. The subject or topic of the research design
- c. The research strategy employed
- d. The research methods or tools used to collect and analyse data

2.3.1 A Pragmatic Paradigm

The studies in this thesis were designed using what has been referred to as the ‘pragmatic’ paradigm. In this type of paradigm, researchers choose what they see as the best methods to investigate the real-world problems they are interested in and this paradigm allows for the use of multiple data sources and knowledge to answer the research questions (Allemang, 2022). Pragmatism is considered to be the ‘philosophical partner’ of the mixed methods approach (Denscombe, 2008) as it provides a practical method of inquiry. Pragmatism, which is also considered to provide an action-oriented framework, suggests that experience is needed to ascribe meaning to an event and its main goal is to use human experience as the primary means to build knowledge (Feilzer, 2010). In the research context, pragmatism does not privilege one type of knowledge or research method over another but instead calls on researchers to critically analyse “which interests are served in a particular situation by the application of a particular kind of knowledge” (Cornish & Gillespie, 2009, p. 800). That is, no one method is seen as holding an upper hand in the analysis of data; instead, what is considered to be most important and integral to the research design is recognising the validity of different perspectives and accepting different ways of knowing (Cornish & Gillespie, 2009).

The pragmatic approach, therefore, eschews the so-called dichotomy between quantitative and qualitative methods (Needleman & Needleman, 1996) and supports different methods of enquiry to address different problems (Denscombe, 2008). This allows for combinations of different data sources as well as mixed and multimethod research designs (Feilzer, 2010).

While this thesis employs a pragmatic approach emphasising practical understanding of real-world problems, it is important to recognise that pragmatism does not eliminate the risk of favouring one stakeholder's viewpoint (Feilzer, 2010). As a clinical sonographer with 20

years of experience and long-term employment with a major imaging provider, I am inherently more aligned with radiologists than GPs or patients. This professional identity may subconsciously bias my perspective towards the concerns and priorities of radiologists and sonographers. Although this identity offers valuable contextual insight, it can also lead to an unconscious bias toward the concerns, norms, and culture (Creswell and Poth, 2018) typical of radiologists.

To address potential bias, I approached the topic as a complex issue with overlapping perspectives, rather than a problem exclusive to one group. Using both quantitative and qualitative methods allowed me to understand stakeholder interactions instead of prioritising any single group's interests. Consequently, my analysis focused on a shared problem space involving patients, GPs, and radiologists. This approach enabled me, as a researcher, to explore the issue more broadly, emphasising patient agency, GP decision-making, and the delivery of clinically justified radiological services. This perspective guided the design and analysis of all three studies, ensuring the pragmatic paradigm was applied in a balanced and coherent manner.

According to Curry et al. (2015), the mixed methods approach is well-suited to health services research as it can take into account multiple perspectives on complex research questions. As each method has its own strengths, a combination of methods can be seen to be complementary, offering a broader and more in-depth analysis (Curry & Nunez-Smith, 2015). By definition, the mixed methods approach involves a procedure for collecting, analysing, and integrating ('mixing') both quantitative and qualitative data for the purpose of gaining a better understanding of a research problem (Tashakkori & Teddlie, 2010). Given that this thesis explores the perspectives of patients, GPs, and radiologists, such a choice seems ideal as each of these stakeholders brings a breadth and depth of experience, anecdotes, and

perspectives to the study (Creswell, 2018). The rationale for employing both quantitative and qualitative methods in this research project is grounded in the belief that utilising both approaches provides greater rigour in comprehending the details and trends of the situation being explored and studied. In summary, when used in combination, quantitative and qualitative methods can be complementary and can allow for a more robust analysis, taking advantage of the strengths of each type of method (Greene et al., 1989; Miles & Huberman, 1994; Tashakkori & Teddlie, 2010).

2.4 Data Collection Context

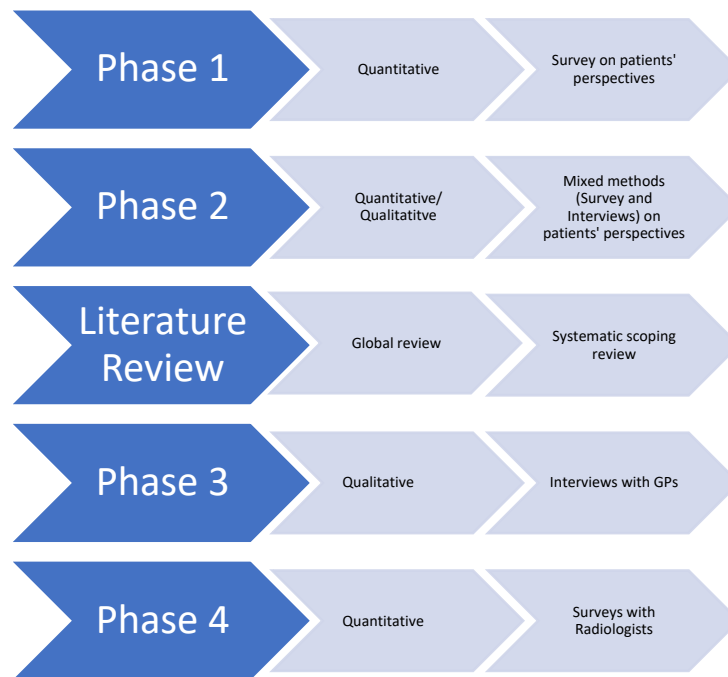
The original plan for the surveys and interviews conducted in this research was to be in-person, however with government imposed restriction due to the pandemic, this method of data collection was no longer feasible. In response to the COVID-19 pandemic, the Australian federal government introduced a temporary telehealth scheme on March 30, 2020, the aim of which was to enable subsidised access to healthcare services provided via telephone or videoconferencing (<https://www.health.gov.au/>). In a telehealth consultation, patients are required to self-report their symptoms, without physical contact with or examination by a GP. A study by Isautier et al. (2020) found that over half of the respondents who shared their telehealth experiences reported that this mode was as effective as traditional in-person consultations. As noted in Chapter 1, in Australia before the pandemic, telehealth consultations were restricted to rural and remote Australian communities. The rampant spread of the COVID-19 virus, however, encouraged individuals worldwide to acquire and apply health information and adapt their behaviours (Zadnik et al., 2020). This adaptation is seen in the data collection procedure followed in Phases 1 and 2 of this research, as it was facilitated through an online platform that used an external market research group, Qualtrics, that recruited volunteers who fulfilled the research criteria for this research. A web-based platform for participant recruitment was used as it provided a secure, safe way for

participants to indicate their interest and contribute their responses. Recruitment methods were limited due to COVID-19 restrictions, and Qualtrics provided an external market research panel that allowed for recruitment and data collection in a safe and efficient manner using a digital interface. The use of Qualtrics for this purpose aligns with established practices in studies exploring online health information seeking, such as investigations into consumers' use of 'Dr Google', which also required a flexible digital interface (Lee, 2015).

The research followed a structured sequence of steps. While the initial step involved determining the research design to be employed to investigate the topic, and this was influenced by the selected research paradigm, the research design in turn informed the techniques used for data collection, analysis, and interpretation of findings (Creswell & Poth, 2018). Several tools were employed in the data collection and is described in more detail in this chapter, such as the eHealth measurement tool, eHEALS (Norman & Skinner, 2006), the conceptual frameworks of the Andersen Newman model of healthcare utilisation (ANM) (Andersen, 1995) and PRISMA Sc-R (Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Reviews). Such tools utilised to analyse the data are described here to explore patients' and GPs' perspectives in depth. While the ANM was used to understand patients' use of healthcare resources in Phase 2 (Andersen, 1995), the PRISMA Sc-R guidelines were used to frame the systematic scoping review conducted between Phases 1 and 2 and Phases 3 and 4 of the research and considered GPs' perspectives. The following flow chart 2-1 describes the sequence of steps for the research.

Flow Chart 2-1:

An overview of the research process steps and methods used for each study



2.4.1 Quantitative Research Designs

The quantitative approach taken in Phases 1 and 4 of this research relies on an ‘etic’ view of positivism within the objectivist epistemology, in which researchers act as outsiders (Needleman & Needleman, 1996). In this view, there is an objective, rationally organised reality that is independent of the perceptions of both the researcher and those who participate in the research study (Needleman & Needleman, 1996). In other words, neither the researcher nor the participants can influence or be influenced by what is being investigated and the aim is to discover an objectively measured truth. In quantitative research, a phenomenon is investigated through the testing of a hypothesis (or set of hypotheses) in which measurable variables determine whether the hypothesis is supported or not (Needleman & Needleman, 1996). Quantitative approaches to data collection and analysis were used in Phases 1 and 4 of this research. The next section describes the research methods used in Phase 1 and the research questions they sought to answer. It provides context for the data collection, which includes the Australian federal and state government lockdowns in response to the COVID-19 pandemic in 2020–2021, which limited the options available for engaging participants.

2.4.2 Phase 1: Patients' Perspectives

In Phase 1 of this research, a quantitative approach, specifically, a cross-sectional survey research design, was used to explore patients' perspectives. This involved an Australia-wide survey that aimed to provide a snapshot of the Australian landscape as to why people request imaging as part of managing their individual health journeys and if OHI was an essential influencing component. The representative sample consisted of individuals who had initiated a radiological study five years before the survey. A pilot survey was first launched nationwide, the results of which informed the development of questions for the larger survey group.

A general search of the literature revealed that individuals are increasingly consulting OHI to inform themselves about the various tests and treatment options available to them (Epstein et al., 2005; Griffith et al., 2015; Hogue et al., 2012; Huisman et al., 2020; Hungerford, 2009; Johnson et al., 2010; Le et al., 2018; Lee et al., 2015; Singh et al., 2018; Wong & Cheung, 2019). Increased accessibility to OHI means that more individuals are initiating care on their own terms based on information derived from various websites. Earlier literature from Hogue et al. (2012) explored the impact of media and health-related advertising on patients who requested medications and/or services from their GPs (Hogue et al., 2012). Lee et al., 2015, investigated difficulties reported by patients in sourcing desired health information. Griffith et al., 2015 explored GPs' reports of feeling pressured by patients who had consulted OHI and were demanding medical imaging services based on the results of their online searches. More recently, Wong & Cheung, (2019) investigated predictors of online health information-seeking behaviours in Hong Kong to understand the association between OHI-seeking and electronic health (eHealth) literacy.

The process of assessing patient literacy and patient requests takes place within a complex context. For instance, as described in Chapter 1, the availability of OHI allows patients to not only receive medical data, but to generate their own data through online platforms and software apps (Topol, 2015) and patient portals (Halaska et al., 2019). Yet, patients can be confronted with quite complex information in conversations about OHI with their GPs (Bass III et al., 2002; Kindig et al., 2004), that is information that may be beyond their understanding in the absence of formal medical training. Therefore, utilising tools to understand participants' knowledge of OHI use, and as healthcare providers receiving requests based on such OHI seeking, were essential for data collection. The pragmatic approach, therefore, avoids the so-called dichotomy between quantitative and qualitative methods and supports various methods of enquiry to address different problems.

2.4.3 Health Literacy Scales and eHEALS

The Institute of Medicine, an independent, nonprofit organisation that works outside of government to provide unbiased and authoritative advice to decision-makers and the public in the US, defines health literacy as “the degree to which individuals can obtain, process, and understand the basic health information and services they need to make appropriate health decisions” (Institute of Medicine, 2013). However, literacy skills are content- and context-specific, and it is not only patients with low literacy levels who may have difficulty comprehending health information but also patients with otherwise high literacy skills or more advanced levels of education (Institute of Medicine, 2013).

For our first two research phases, an external market research panel was used because face-to-face interaction was limited during the COVID-19 pandemic, and administering paper-based surveys was not feasible. The initial planning was to conduct paper based surveys which were made available in the waiting room for patients to participate. However, with

COVID-19 and the restrictions imposed, it was necessary to pivot to an online platform for survey participation for Phases 1, 2, and 4 of this research. Using an e-health literacy scale, eHEALS, in the study in Phase 1 allowed us to capture various dimensions of literacy. eHEALS was designed by Norman and Skinner (2006) to measure the skills and comfort levels required by consumers to engage with healthcare-related information technology. One of the critical strengths of eHEALS lies in its universality: it assesses skills, such as the ability to evaluate and apply knowledge acquired through eHealth resources, and also collects diverse demographic information, such as age, gender, and cultural background (Norman & Skinner, 2006). Statistically, the scale has been psychometrically tested and validated, and for our study, there was a high internal consistency, with a Cronbach alpha of 0.94. (Norman & Skinner, 2006). It is to be noted that the extended eHEALS (Petrič & Atanasova, 2024) offers more items and potentially richer measurements. However, the systematic review by Lee et al. (2021) found that it still operates under the original conceptual definition of eHealth literacy used. Furthermore, additional questions can be exhausting for participants, which can lead to response burden and consequently a low response rate. Given these limitations, the original eHEALS was used for the survey in phase 1.

Given the specific circumstances of the pandemic, the eHEALS scale seemed to be an ideal solution for independently measuring patients' health literacy levels as it is simple, user-friendly, and easy to administer (Wong & Cheung, 2019). In addition to being able to be directly administered to patients, eHEALS can also be administered by GPs to their patients, and it offers a valuable opportunity for GPs to gain insight into patients' abilities to engage with online health information. By understanding their patients' eHealth literacy levels, GPs can more effectively tailor interventions and provide solutions to health problems (Lee et al., 2015). This personalised approach is crucial, particularly in this digital age, as it enables individuals to navigate the complex landscape of online healthcare information successfully.

More information about the application and impact of eHEALS can be found in the publication presented in Chapter 3 of this thesis: 'Patient requests for radiological services: An Australian survey study of patient agency and impact of online health information'. The overall aim of Phase 1 of this research project, therefore, was to explore the relationship between a patient's accessing OHI and their eHealth literacy. By conducting an Australia-wide survey using Qualtrics as our external market research panel, we were able to assess the general nationwide healthcare landscape.

2.4.4 Phase 4: Radiologists' Perspectives

A quantitative methodology was also used to understand the radiologists' perspectives in Phase 4 of this research. Informed by the studies in the previous phases, it became clear that those patients who were more health literate and reported higher eHEALS scores were also more likely to request diagnostic imaging from their GPs (some of whom had their requests fulfilled, as described in Chapter 5). Unlike GPs, radiologists have traditionally not been asked for imaging by patients. Instead, much like laboratory or other specialised services, radiologists constitute one arm of a multi-tiered service within the healthcare system (Brady, 2021). To date, there has been limited research exploring radiologists' perspectives on patients requesting diagnostic imaging. Therefore, in Phase 4 of this research, radiologists' views were sought to understand how patient-initiated requests impacted their workload.

The quantitative approach used in Phase 4 consisted of a cross-sectional survey of radiologists working in private medical facilities across Australia, all operating within the same company. As a sonographer myself, I may have had an influence on the research design of the project, the construction of the survey, and the subsequent data analysis as I am close to the subject matter at hand. Because I also have anecdotal evidence of patients requesting diagnostic imaging within my own workplace, it seemed appropriate to take an 'etic' view as

a researcher. Methodology refers to the philosophical framework guiding data collection and the subsequent application of methods. Therefore, using statistically measurable instruments appeared more suitable for pursuing a generalisable explanation concerning the phenomena under investigation (Yilmaz, 2013). In seeking consistency and accuracy in measurement, the aim was that the research results would not be influenced or biased by external factors (Needleman & Needleman, 1996; Yilmaz, 2013). Furthermore, recruiting radiologists for an interview was challenging due to their busy work schedules. Consequently, a survey appeared to be a more feasible and pragmatic approach.

2.5 Qualitative Research Design

In Phases 2 and 3 of this research, qualitative methods were used for data collection and analysis. This section overviews the research methods used in these two phases and the research questions they sought to address. Phase 2 (like Phase 1), centered on patients' perspectives through a smaller sample derived from Qualtrics, and semi-structured interviews were used to explore participants' responses in more detail. In Phase 3, interviews were used to understand GPs' perspectives on patient requests for imaging.

2.5.1 Phases 2 and 3: Patients' and GPs' Perspectives

As described above, qualitative research is based on interpretivism and constructivism and assumes that realities are multiple, socially constructed, and holistic (Creswell & Poth, 2018; Yilmaz, 2013). In Phase 2 of this research, a convergent parallel design allowed for the quantitative component to inform the qualitative aspect. Whereas the quantitative data and analyses provided a general understanding of the research problem, the qualitative data and analyses refined and explained these statistical results by exploring participants' views in more depth through interviews, adding richer data (Tashakkori, 2010 ;Creswell, 2018; Taherdoost, 2022) .

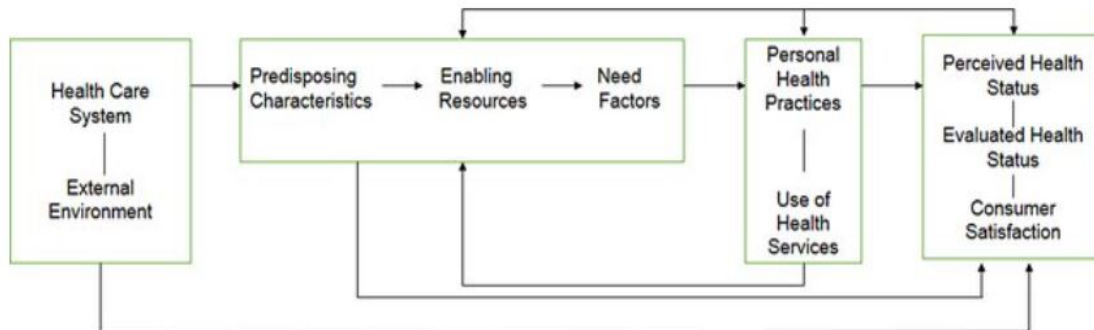
Unlike the quantitative components of the research, the qualitative components took an ‘emic’ view with respect to the epistemology driving the research, whereby interactions between the researchers and participants were considered necessary to gain an in-depth understanding of the research topic (Creswell & Poth, 2018). The study in Phase 2 of our inquiry was conducted to gather richer data on patients' perspectives, following the administration of the survey in Phase 1. This phase involved a mixed-method approach using the same market research panel, Qualtrics, used in Phase 1. Following the survey, participants were asked if they would volunteer for individual interviews, and several agreed. (See Appendix E and F for the survey and interview guide for the studies in Phases 1 and 2 on patient perspectives). Of the ten interviewed, saturation was reached after 8 participants. The overarching aim of Phase 2 was to explore the predisposing, enabling and need elements of patients' requests for diagnostic imaging; their self-reported experiences; and the outcomes of such requests, all structured within the framework of the ANM (Andersen, 1995).

2.6 Anderson–Newman Model of Healthcare Utilisation

The Andersen–Newman model of healthcare utilisation (ANM) provides a conceptual framework for recognising the antecedents for healthcare use through understanding human behaviour. This model, therefore, was employed in Phase 2, which investigated patients' perspectives (Andersen & Newman, 1973). Theoretical models such as the ANM allow researchers to explain and justify their study findings within the broader literature. Developed by the American professor of Public Health Ronald M Andersen, in 1968, the initial model accentuated, at population level, the predisposing, enabling, and need factors that influence the utilisation of healthcare. The ANM has since evolved to better understand access to care by individuals, with the most current model incorporating feedback loops within four domains: environment, population characteristics, health behaviour, and outcomes (Andersen & Newman, 1973; Andersen, 1995; Petrovic & Blank, 2015).

Flow Chart 2-2:

Andersen–Newman model of healthcare utilisation (ANM)



Adapted from [Andersen R. M. (1995), p. 2 Fig. 2.2]

The ANM originally focused on the family as the unit of analysis because the medical care an individual receives is typically a function of the family's demographic, social, and economic characteristics as a unit. However, Andersen later modified this to include the individual as the unit of analysis due to the heterogeneity among family members, and because it was not efficient to develop measures of analysis for all family members (Andersen, 1995). The ANM is useful as it identifies antecedents on human behaviour.

In Phase 2 of this research, we employed the modified version of the ANM initially used by Kravitz et al. (2003) in his observational study on the antecedents to patient requests within general practice. Our research design in this phase incorporated two distinct stages. In the first stage, the data were gathered through the use of surveys and interviews, while in the second phase these collected data were analysed based on the modified ANM (Flynn & Uttley 2021; Gunther et al., 2022). In this analysis, patients' preexisting conditions and health status were considered to be predisposing characteristics while the logistics of accessing medical imaging services were considered to be the enabling factors influencing patients'

ability to navigate the healthcare system and obtain necessary information on radiological studies. Lastly, the study explored patients' perceptions of care, in particular, the motivations and perceptions that drove them to seek medical care, especially within the context of their requests for radiological studies. In providing such a multifaceted view, the intention was to provide valuable insights for healthcare professionals and policymakers to enhance and optimise patient experience in care delivery (Kravitz et al., 2003).

2.7 Using Grounded Theory to Understand Emergent Themes

In 1967, the American sociologists Barney Glaser and Anselm Strauss developed the qualitative methodology that they labelled 'grounded theory' to provide an inductive approach to research in which theories are generated from the collected data (ref). By systematically collecting and analysing data to generate theory, studies using this methodology seek to investigate patterns of human behaviour within social contexts; that is, grounded theory is used to enhance our understanding of social phenomena (Glaser, 1999). Glaser (1999) used grounded theory to engage in empirical inquiry, that is, to explore social phenomena by looking at what people experience. Grounded theory has been useful here because this thesis has not been heavily informed *a priori* with respect to patients' requests for diagnostic imaging or GPs' experiences around these requests. In other words, there were no predetermined ideas regarding what would be discovered. In fact, grounded theory was specifically used to avoid making assumptions and to allow for a more neutral view of human actions within this particular social context to emerge.

Moreover, as grounded theory as a research methodology is not entirely predetermined by any particular research paradigm, a researcher can choose the data collection method (or methods) that best addresses the research question (ref). Over time, Glaser and Strauss themselves adopted divergent approaches and positions with respect to the theory they had

developed (Glaser, 1999). From an ontological perspective, our influences can be seen to stem from our different histories and cultural contexts, which shape our view of the world. The assumptions we make as researchers are based on our different world-views, which we often taken for granted and/or unconsciously carry into our research studies (Slevitch, 2011). Charmez (2006) developed a constructivist approach to grounded theory that emphasises the subjective interrelationship between the researcher and participants (and their co-construction of meaning) (Denzin & Lincoln, 2018) and rejects the idea of an ‘objective’ reality (Charmaz, 2006). This constructivist grounded theory approach was applied in two phases of this research project: Phase 2 (interviews with patients) and Phase 3 (interviews with GPs). From a constructivist epistemological standpoint, in my role as researcher, I can be seen to be a part of the research endeavour rather than as a distant observer of the phenomena under investigation. In this way, constructivism allows the researcher to give meaning to reality through ‘lived’ experience (Denzin, 2012). By undertaking research in a natural setting, this thesis has sought to understand and interpret the phenomenon under investigation through an in-depth description of the phenomenon from the perspective of both researcher and participants (Lincoln et al., 1985; Slevitch, 2011; Yilmaz, 2013).

2.8 Systematic Scoping Review

The primary purpose of a systematic review is to identify, evaluate, and integrate ideas from a body of pre-existing literature to attempt to answer specific research questions based on this literature (Maggio et al., 2018). Yet, it is essential to understand how knowledge within any given review is synthesised according to the reviewers’ epistemological positioning (Crotty & Preissle, 2000). For instance, we conducted a systematic scoping review for this project, a method increasingly being used in the health research area as a means of synthesising information to understand the scope and depth of the research on a topic. In contrast to systematic reviews, which are more appropriate for synthesising larger, more established

bodies of literature (Arksey & O'Malley, 2005; O'Brien et al., 2016; Tricco et al., 2011), systematic scoping reviews seek to map the available knowledge on a given topic in emerging research areas. To inform and guide our systematic scoping review of GPs' noncompliance with guidelines in fulfilling patient requests for imaging, we employed the PRISMA Sc-R guidelines. Crotty (1998) argued that researchers construct their research questions based on particular epistemologies, which provide the foundation for deciding what types of knowledge are possible, appropriate, and legitimised using the data from a heterogeneous body of literature. For example, our review team needed to come to a consensus on the types of articles that would inform our study. In this process, we needed to answer the following questions: What types of data are legitimate and meaningful? What types of data can be considered trustworthy? Is objectively measured quantifiable data more legitimate than subjectively influenced, qualitatively constructed data? (Crotty & Preissle, 2000).

While systematic scoping reviews are typically exploratory and involve searching for, collecting, and charting data, they do not strive to produce a single, objectively true answer (Arksey & O'Malley, 2005). Moreover, systematic scoping reviews do not usually seek to restrict the scope of the literature to be included and synthesised; instead, they incorporate a broad range of literature, such as peer-reviewed journal articles, opinion pieces and commentaries, and so-called 'grey' literature (Hagg et al., 2018; Williams et al., 2017). Grey literature refers to various types of documents produced across all levels of government, academia, business, and industry, available in both print and electronic formats. Intellectual property rights protect these documents and are of sufficient quality to be collected and preserved by library holdings or institutional repositories. However, they are not controlled by commercial publishers, meaning that publishing is not the primary activity of the producing body (Vaska, 2010). Our intention was to focus on the research questions, and to

allow this question to guide our understanding of GPs' non-compliance with imaging guidelines within primary care. In other words, we sought out data that would allow us to explore GPs' experiences of patient requests for imaging in primary care settings; this meant that the review team needed to develop inclusion and exclusion criteria. As stated by Arksey and O'Malley (2005), the review process "is not linear but interactive, requiring researchers to engage with each [scoping review] stage in a reflexive way and, where necessary, repeat steps to ensure that the literature is covered comprehensively" (Arksey & O'Malley, 2005, p 22). In synthesising the literature, which can be quite extensive, the researcher actively constructs interpretations that are shaped by their personal experiences, expertise, and knowledge (Arksey & O'Malley, 2005; Lincoln et al., 1985), which leads to findings that are legitimate and appropriate to the aim of the study. More details about the systematic scoping review are provided in Chapter 5 of this thesis.

To ensure methodological rigour across the included qualitative and mixed methods studies, we relied on Creswell & Poth's (2018) essential guidance on qualitative research design and trustworthiness. These principles guided our assessment of study transparency, reflexivity, and coherence (Creswell & Poth, 2018). The established COREQ framework was used to guide reporting completeness and rigour in the qualitative section (Tong et al., 2007), while the quantitative component followed guidance from Artino et al. (2018), using a checklist of reporting standards for survey-based studies.

The scoping review was conducted and reported following the Joanna Briggs Institute (JBI) guidelines, which provided procedural direction, with the PRISMA-ScR framework informing our reporting. Two structured tools underpinned the appraisal standards applied across all included studies: the Critical Appraisal Skills Programme (CASP) checklist (CASP,

2018) for qualitative studies, and Hoy et al.'s (2012) Risk of Bias Tool for Prevalence Studies for survey-based quantitative research.

2.9 Ethics

All participants received information about the research prior to the surveys and interviews. Ethics approval was obtained for all four phases of the research. There were no personally identifiable components from the returned surveys other than a number generated on the Qualtrics platform for phases 1 and the survey component of phase 2. For the 4th phase all identifying data was removed by the education coordinator upon returning the survey to the candidate. For individuals taking part in phases 1, the survey of phase 2 and 4, if they wished to exit the survey they clicked exit on the browser which would take them out of the survey platform. Consent for the survey was obtained upon participants submitting their completed surveys in accordance with the National Statement on Ethical Conduct in Human Research which states a range of strategies being appropriate for obtaining consent (nhmrc.gov.au, 2023). Once the data was analysed, all survey data stored in electronic devices -was transferred to the Research Data Storage (RDS) at University of Sydney and then destroyed..

The 2nd and 3rd phase required face-to-face interviews for which consent was obtained. Phase 2 consent was obtained through Qualtrics, and for phase 3, consent was obtained verbally online. They were informed that the interview would be recorded and the researcher proceeded once the consent was verbalised by participants. If participants were not willing to continue the interview, as per ethics approval they were able to exit, and any data collected up to that point was deleted. All audio and video recordings of these interviews were permanently deleted upon transcription. Once transcribed, the data was transferred to the RDS and then permanently deleted from all electronic devices following ethics approval. Qualtrics does not retain any data, and information collected during the project term is

permanently deleted once the data is transferred to the researcher as per ethics approval and under Qualtrics' conditions of appropriate data collection and storage.

All data collected will be stored at the University of Sydney RDS for 5 years in compliance with relevant legislation, State Records Authority of NSW. Once transferred to the RDS, any hard copy or data stored within the student's password-protected computer was permanently destroyed. Participants were offered a one-page summary of the study results through the student's University of Sydney email address.

2.10 Conclusion

In conclusion, this chapter has outlined how a researcher's ontological view dictates the epistemological stance taken in their research, which in turn determines the methodology and methods used to inform the research study (Slevitch, 2011). Using a quantitative methodology allows for an objective view whereby hypotheses can be tested and results obtained with little to no influence from the researcher. In contrast, a qualitative methodology provides a rich depth of information and allows a researcher to ascertain participants' views of the issues under investigation in natural settings. One limitation of a qualitative methodology, however, is that researchers' biases and personal subjectivities may influence the findings (Denzin & Lincoln, 2018). While many research studies tend to employ either one or the other of these two methodologies, this thesis has relied on a combination of both to better understand complex issues and real-world problems. Each methodology makes a contribution based on its strengths and complements the other, resulting in a more robust analysis.

Systematic scoping reviews take into consideration varying epistemological positionings when mapping a large body of literature. Being part of a review team for this research project has meant that it was necessary to be mindful of how our different perspectives and personal

subjectivities could influence, enrich, and broaden the findings derived from the systematic scoping review. That is, purposeful engagement with different perspectives was designed to strengthen the review process, and our differences allowed for a more nuanced understanding of why and how foundational philosophies have influenced the conclusions drawn from our studies, resulting in enriched, comprehensive findings.

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Chapter 3 : Introduction. Patient requests for radiological services: An Australian survey of patient agency and the impact of online health information

De Silva, L., Baysari, M., Keep, M., Kench, P., & Clarke, J. (2023). Patient requests for radiological services: An Australian study of patient agency and the impact of online health information. *Health Promotion Journal of Australia*, 34(2), 437–442.

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3.1 Phase 1: Patients' Perspectives

The publication presented in this chapter describes a study that investigates patients' perspectives on patient-initiated requests for radiological imaging. As explained in the previous chapters, with the advancement of technology and the increasing accessibility of OHI in recent years, patients have become more empowered as individuals. That is, accessibility to information through different media and online platforms has allowed individuals to become better informed about their health conditions, diagnostic options, and the various treatments available to them. An illustrative quote describes such a transition of a passive patient to one actively managing their health "Every patient is an expert in their own chosen field, namely themselves and their own life." Hill, E (2014), p. 140–141. In Australia, this growing trend of accessing OHI is reflected in the fact that nearly 86% of households have internet access, and 82-85% use the internet for health-related reasons, depending on their age (Australian Institute of Health and Welfare. (2023). *Digital health*.

<https://www.aihw.gov.au/reports/australias-health/digital-health>

As a sonographer working at a private imaging site, I myself have observed a significant shift in the dynamics of patient-GP relationships. Patients are now often presenting to our private


imaging clinic with referrals from their GPs stating, ‘patient requests study X’, which marks a significant departure from the traditional practice whereby referrals were initiated by GPs based on clinical examinations and necessity. GPs are now finding themselves in a more consultative role, which includes responding to patient requests (Breivold et al., 2021), and the publication included in this chapter sheds light on this trend.

This first phase of the research (Phase 1) was designed to explore the relationship between patients using OHI and their likelihood of requesting radiological services. It sought to understand the reasons why patients consult OHI and the types of websites they consult. It also explored how digital literacy influences patients’ comfort levels in making these requests, whether patients successfully obtained referrals from their GPs based on their requests, and whether the requests led to desired outcomes. The research questions specifically addressed if a relationship exists between accessibility of online health-related information and online health literacy, if there is a relationship between patient health literacy and requesting referrals from GPs for imaging or interventional procedures and if patients perceive GPs as being pivotal to patient care when guiding them for studies conducted in imaging clinics.

To investigate the relationship between OHI and patient-initiated requests for radiological referrals, this study utilised an online marketing research platform, Qualtrics. This platform allowed for the random selection of participants across Australia, focusing on individuals who had undergone a radiological procedure in the past five years. Respondents were invited to complete a 20-minute anonymous survey through various digital channels, including email, SMS, and in-app notifications. Ethics approval was obtained for this study from the University of Sydney (220/432).

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Patient requests for radiological services: An Australian study of patient agency and the impact of online health information

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Abstract

Issue Addressed: The Internet has been instrumental in patients' knowledge about health and medicine through increasing consultation of online sources that advocate self-management. For example, those patients who request referrals from their doctors for tests and procedures in radiology. Such patient-initiated referral requests can devolutionise the traditional model of health care. This study aimed to understand individuals who sought online health information (OHI) and whether requests for radiological referrals were the result of OHI seeking.

Methods: The individuals targeted were those who have had a radiological procedure in the past 5 years.

Using an online survey tool, individuals completed a 20-min anonymous survey. Included in the survey was a validated digital health literacy measurement scale, eHEALS.

Results: Those who scored higher on the eHEALS measure were likely to be under 55 years of age and were more inclined to request radiological referrals. Though they were not concerned with the credibility of sourced websites, most secured the desired outcome from their requests.

Conclusion: Overall, this study indicates that patients are consulting online sites for health information, and individuals with higher digital literacy scores are asking doctors for referrals for radiological tests and procedures. These findings confirm our anecdotal experience in radiology departments. So what?: In conducting this study, we hope to better inform radiology and other health practitioners of the way OHI is impacting clinical practice.

KEYWORDS

doctor-patient relationship, eHealth, empowerment, health-seeking, Internet, online health, patient requested studies, radiology

1 | CLINICAL RELEVANCE

Though prior research provides valuable insight into how patients use OHI, most are centred on patients' discussions of internet

information with their doctors.¹ Studies have been focused on patients with multi-morbidity and the influence of media on prescription requests,²⁻⁴ patients seeking online sites and experiencing navigational challenges,⁵ exploration of varying dynamics of the

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doctor-patient relations with request for referrals^{3,6-9} and patients' perceived digital health literacy scores.¹⁰

However, a gap remains in research regarding the use of OHI by patients in requesting their own radiological investigations.

2 | INTRODUCTION

The rapid development of the Internet has significantly changed the way people obtain health-related information.¹¹ In making health decisions, the availability of online health information (OHI) has transformed the way people manage their health care needs.¹² It has been shown that the number of individuals searching for OHI – ranging from health advice, medications, and treatment choices to disease presentations – continues to grow.¹³ Patients are now more informed than ever and have a perceived increase in medical knowledge.²

Currently, close to 86% of Australian households have Internet access, and 78% refer to the Internet for health-related activities.¹⁴ Such accessibility may change how patients interact with or participate in formal consultations with their doctor.¹⁵ Websites such as Wikipedia or more trusted sites such as Mayo Clinic or¹⁶ may have validated and reliable information. Concerningly, however, sites are more often chosen based on convenience rather than accuracy or authoritativeness, and are often the result of an individual's previous searches, based on prior history and online algorithmic calculations.¹⁷

Funded under Medicare and private cover, health professionals perform tests requested by the patient's doctor, using a referral letter, that is, a written request to undertake tests or procedures for diagnosing or treating various health concerns. Tests can range across modalities in a radiology department such as X-rays, computer tomography (CT) or ultrasound examinations.

Rather than being referred on the doctors' initiative, a number of patients have begun requesting referrals for radiology imaging and image-guided treatments from their doctors.^{7,18-20} Anecdotally, doctors have responded by writing referrals notated "patient requested." One possibility for such requested studies may be due to the accessibility of OHI. Such radiological referral pattern needs to be explored to see if, indeed, the availability of OHI has influenced patients to assume a proactive role.

With improved self-management and increasing demands on the doctor's time,²¹ the influence of OHI can create positive doctor-patient relationships. Patients are optimising the limited window of availability during consultations by being more informed²² and in return, doctors are willing to fulfil patients' requests, as an integral component of preserving a positive and satisfactory patient-doctor relationship.^{23,24} We acknowledge that it is beyond the scope of this paper to do justice to the wider ethical implications of radiation exposure for potentially nonclinically indicated imaging,¹⁸ and appreciate the need for guidelines in managing such requests during clinical encounters for both doctors and patients.²⁵

In adhering to guidelines, some clinicians may disagree declining patients' requests for clinically nonindicated imaging, espousing the view of guided patient autonomy.²⁶ This view takes into

consideration that patients are already inundated with a plethora of information.²⁷ Particularly, information from social media influencers and celebrities, who endorse screening imaging as a way of prevention and awareness.²⁶ If patients perceive they have sufficient information to make their own decisions, and are already aware of the radiation risks involved in imaging studies, adhering to strict clinical guidelines and denying patient requests can be difficult for doctors.^{25,20} Notably, when patients desire autonomy in making an informed decision.²⁷

As government-funded health services become increasingly stretched, however, advocating self-management²⁸ through patient-initiated examinations can result in costly and unnecessary referrals. One major concern raised by doctors is the poor quality of patient-sourced online information, contradicting their advice, which may negatively impact the doctor-patient relationship.²² Doctors may also find engaging in lengthy discussions with patients impossible. However, dismissal of patient's involvement may lead to feelings of dissatisfaction with the doctor.²⁹ Therefore, by acquiescing to patients' requests for studies such as radiological imaging and image-guided procedures in patient agency, doctors are seeking ways to bring greater patient satisfaction⁷ in time-punctuated clinical consultations.³⁰

The overall aim of this study is to explore the relationship between accessing OHI (using a validated measure eHEALS) and patients securing their requests for radiological referrals from doctors.

3 | MATERIALS AND METHODS

This study employed an online survey using a market research company called Qualtrics (www.Qualtrics.com). Respondents were randomly selected throughout Australia. Qualtrics members were sent an invitation via email or by in-app and SMS notification, asking if they would be interested in participating in a 20-min anonymous survey. Respondents were incentivised through a program of small rewards. Participants were eligible to complete the survey if they were over the age of 18 years, had searched online for health-related information, were residing in Australia and have had a radiological procedure in the past 5 years. They were required to read a participant information statement, and consent was implied when participants submitted the completed questionnaire. Institutional ethics approval was granted (2020/432). The survey was conducted from September 2020 to October 2020.

In a recent survey by Jerant et al,⁷ 11% of respondents requested a radiological referral. Further, using the Australian national data collection Bettering the Evaluation and Care of Health (BEACH) study, Britt et al. addressed patient-doctor clinical interactions and found with the ever changing needs of consumeristic patients, GPs encountered 10% of their patients requesting imaging referrals.³¹ Based on these figures, we calculated an appropriate sample size using an online sample size calculator³² and the required sample size for detecting 10% prevalence at 95% confidence was 139. The final sample consisted of 415 participants, thus our study had sufficient power.

Questions were drawn from prior studies of individuals' OHI searches and digital literacy.^{5,17} We also used the 5-point Likert eHEALS scale to assess digital health literacy.¹⁰ The questionnaire was initially piloted with a convenience sample of 30 participants to ensure face validity and acceptability.

The questionnaire initially addressed demographics. The second component investigated participants' website choices. Participants were asked what types of information they looked for online and their reasons for seeking OHI. The next section assessed the level of comfort participants had in asking for radiology referrals, what they requested, how confident they felt that their doctor would accommodate their requests and whether they had the outcome they expected. A further shared decision-making section explored the doctor-patient relationship and asked if participants were comfortable making their own health-related decisions, and if they felt the Internet was useful in helping them make health-related decisions.

The last section of the survey incorporated the eHEALS scale, an 8-item measure of electronic health literacy. The 5-point Likert scale measures how participants' combined knowledge, comfort, and perceived skills are in finding, evaluating, and applying electronic health to their health problems.¹⁰

In this study, Cronbach's alpha for the eHEALS showed high internal consistency ($\alpha = .94$). The eHEALS final scores were calculated using the compute variable option on SPSS (version 26), where the individual eHEALS responses were added together to yield possible total scores ranging from 8 to 40.

Descriptive statistics were used to explore the demographics of those who used OHI, their reasons for health-related searches and the specific types of information sought. Chi-Square cross-tabulation analyses were computed to assess the demographics (age, gender and education levels) of participants who visited specific websites for health information (eg, "any site," hospital sites, government sites, social media, etc.). Some cells were collapsed to meet the Chi-square assumption where the number of responses was less than 5 in each cell. A three-way ANOVA test was conducted to assess the association between eHEALS scores and age. An independent samples *t* test was run to determine if there were differences between male and female eHEALS scores. We conducted two one-way ANOVAs to determine participants' perception of their comfort level in asking for a referral. Using eHEALS scores, we calculated whether those who have high digital health literacy scores were more inclined to feel comfortable requesting referrals and to secure the expected outcomes based on these requests. Statistical significance was established at $P < .05$ for all tests.

4 | RESULTS

We obtained responses from 532 individuals, of which 415 were used in analyses based on a completion time ≥ 2 min. About 53% (220) of respondents were female. The age range was 18-75 years. Men made up 60% of those aged above 55 years and over and those in the

TABLE 1 Types of information sought online and the reasons for seeking (n = 415)

^a Types of information sought	n (%)
Symptoms	163 (40)
Treatment and procedures	86 (21)
Medication	66 (16)
Disease condition	31 (8)
Tests and investigations	19 (5)
Other	46 (11)
^b Reasons for seeking information	
More information	267 (64)
Noticed new symptoms	75 (18)
Heard on News, social media, etc	36 (9)

^aMore than one answer was permitted in these responses.

25-34 years age group were mostly female (77%). Most respondents held a tertiary qualification (n = 276, 66.5%).

Most sought information online about symptoms, followed by treatment and procedures and then medications. In considering the reasons for seeking information, most participants indicated that they wanted more information as shown in Table 1 below.

In the multiple response items, participants were asked to indicate all the websites they used to obtain health information. The most common response was "Any Website" (67%, n = 238), a term to indicate a nonspecific search using their web browser's default search engine, for example, Google or Bing. Other responses included "Trusted Health Sites" such as the Mayo Clinic (n = 169, 41%), PubMed articles' (n = 167, 40%), and "Blogs" (n = 149, 36%). The least used were "News" (n = 124, 30%), "Facebook" (n = 112, 27.0%) and "government sites" such as the Better Health Channel (n = 69, 17%).

Overall, most people under 55 years of age, particularly in the 25-34 years age group, used the Internet for health information. Females were more inclined to seek information from "Any Website" $\chi^2(2, N = 151) = 9.7, P = .001$. There were no significant differences between participants of different education levels on self-reported websites visited (Table 2).

Gender ($P = .96$) and education ($P = .118$) were not significantly associated with "Any website," however a Chi-square test of independence showed a significant association between age category and individuals choosing "Any website" $\chi^2(15, N = 415) = 43.2, P \leq .001$. A three-way ANOVA test revealed significant differences between age groups. On average, the eHEALS scores, after controlling for gender and education levels $F(5,369) = 3.20, P = .008$ showed a small to medium effect with partial $\eta^2 = .04$. Those aged 55-64 years ($M = 27.29, SD = .72$) and 65-74 years ($M = 26.88, SD = .78$) had statistically significantly lower eHEALS scores than 25-34 years ($M = 30.76, SD = .92$), $P = .033$ and $P = .022$, respectively. An independent samples *t* test indicated that males ($M = 27.69, SD = 7.39$) reported lower eHEALS scores than females ($M = 29.88, SD = 6.59$;

TABLE 2 Number of participants by websites and demographics

n = 415	"Any" site	Trusted health sites	PubMed or WebMD	"Facebook"	"Blogs"	"News"	Government sites
Demographics							
Age							
18-24	24	20	15	11	21	13	2
25-34	51	40	42	31	35	21	10
35-44	52	30	32	23	30	21	7
45-54	33	24	24	18	23	25	7
55-64	55	29	27	17	22	23	5
65-74	51	26	27	12	18	21	4
Gender							
Male	113	60	64	38	64	62	13
Female	151	108	103	73	84	62	22
Education							
Primary	4	0	0	1	3	2	1
Secondary	74	43	39	29	43	35	46
Tertiary	188	126	128	82	103	87	27

Note: ^aMore than one answer was permitted in these responses.

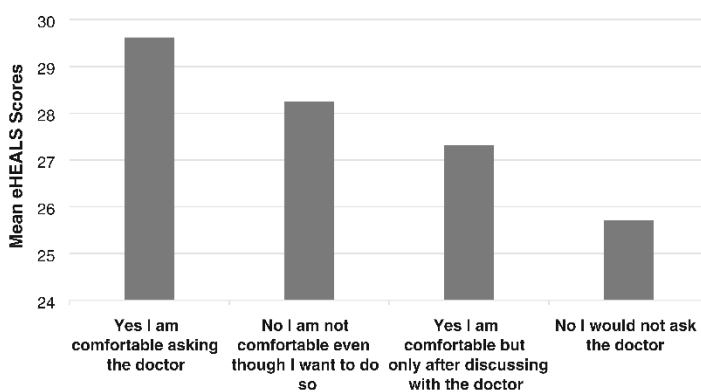


FIGURE 1 Mean eHEALS scores and patient comfort in asking for referrals

-2.19, 95% confidence interval [CI] -3.56 to -0.81; $t(404) = -3.144, P = .002$.

Over two thirds of the participants felt comfortable ($n = 279, 67.2\%$) and confident ($n = 277, 66.7\%$) requesting referrals from their doctors and indicated that their doctors responded positively to their requests. Figure 1 shows that those with higher digital health literacy eHEALS scores were the most comfortable asking for referrals ($M = 29.62, SD = 7.09$). While those who chose the option, "I did not feel comfortable asking though I wanted to" were the next highest group ($M = 28.24, SD = 5.34$) and the lowest scores ($M = 25.71, SD = 11.35$) were those who never asked for referrals. Participants with positive outcomes from their referral requests ($M = 29.85, SD 6.76$) also had higher overall eHEALS scores.

5 | CONCLUSION

This survey of 415 Australian health care consumers revealed that most participants indicated feeling confident asking for referrals from their doctors for radiological tests suggested by their online health searches. Participants with higher overall digital health literacy are also most likely to request referrals and secure the outcome expected from their requests.

Most participants were not concerned about the types of websites they visited, and our data confirmed it is appropriate for doctors to raise concerns over the veracity of information individuals are exposed to online.^{17,22,33} Such concerns should be qualified by our study and those done previously by Lee et al.,³⁴ since information

from search engine algorithms are based on individuals' browsing history, and are not necessarily evidence-based medicine.³⁵

Our study indicated that participants who sought OHI were more likely to ask for referrals from their doctors. By responding positively to patient-initiated requests, doctors may acknowledge their patient's information and earn patient satisfaction. Such patterns of referral requests are likely to continue with increasing accessibility of OHI. There is a strong indication, patients are confident in participating in their own care.

Our findings were inconsistent with the study by McMullan,²⁹ who reported that doctors responded negatively or even defensively to patients' OHI seeking. Potentially, such response is because McMullan's research occurred nearly 15 years ago. The Internet is now more prevalent and accessible, and doctors may be more accepting of patients consulting OHI.

One potential limitation is that this study examined patients' experiences only, and future studies could also include doctors' perspectives on patients' requests for referrals. Another limitation of this study was the use of an online market research company. Using such an online platform facilitated by market research panels, means our participants are purposively selected for the study and are incentivised. The pre-selection process means individuals have had a radiological study in the past and are provided with background information and reasons for the study in the participant information sheet. Such a process may introduce a selection bias leading to a skewed response and may not represent the broader Australian population. Further studies could expand on the benefits of patient requests to their overall outcome. Finally, the study relied on self-report, and we did not collect data on actual requests for referrals from practices and clinics. Despite these limitations, this study is the first to consider the impact of OHI on radiology referrals, and its strengths include large sample size and the use of a validated measure of digital health literacy.

Our study showed that participants with increased digital literacy were not necessarily judicious with the types of websites consulted; however, doctors often acquiesced to their patients' requests.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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3.2 Chapter 3 Summary: Patient requests for radiological services: An Australian survey of patient agency and the impact of online health information

This study explored the evolving landscape of patient engagement with their health (Timmermans, 2020). It focused on how individuals leveraged OHI to influence clinical decision-making. Drawing on survey data from 415 Australian adults who had undergone radiological procedures, the research revealed that those with higher digital literacy, measured using the validated eHEALS scale (Norman & Skinner, 2006), were more likely to request imaging referrals from their GPs. These individuals, as patients, often reported an anticipated outcome from their requests, despite showing little concern for the credibility of the websites they consulted.

The findings highlight the broader shift in the healthcare paradigm: from the traditional paternalistic model (Hofmann, 2008) to one where patients assert greater agency, catalysed by widespread access to digital health information (Breivold, 2022). This self-directed behaviour, while empowering, presents challenges for health providers, ranging from the need to navigate potentially misguided requests (Fenton et al., 2021; Linn et al., 2020) to managing limited consultation time (Huisman et al., 2020; Walderhaug et al., 2022). It also raises questions about resource use and the health providers' role in moderating information retrieved through non-expert channels.

These insights serve as a critical foundation for the next chapter, "Patient-initiated Radiology Requests: Proof of Wellness Through Imaging", a continuation of the first phase seen in the previous chapter. The following chapter presents a mixed-methods study exploring this emergent phenomenon in the Australian context. The study applies the Andersen Newman Model (Petrovic & Blank, 2015) to examine the factors driving patients' proactive requests for radiological imaging.

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Chapter 4 : Patient-initiated radiology requests: Proof of wellness through images.

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4.1 Phase 2: Patients' Perspectives

The survey study Chapter 3 (Phase 1 of this research) found that patients are indeed requesting radiological studies from their GPs based on their own research and knowledge sourced from various online and media platforms. It was also found that participants were not cautious about seeking out OHI but were generally oblivious to the quality of the content on the sites they visited (De Silva et al., 2023). This chapter presents Phase 2 of the study which aims to expand on these findings by incorporating a mixed-methods study design. The shift away from traditional methods of healthcare delivery, where GPs are seen as gatekeepers to medical interventions (Breivold et al., 2021), towards more patient-centric care has seen more GPs accommodating patients' requests, and with minimal resistance (Fenton et al., 2015; Nilsen & Malterud, 2017). Moreover, this pattern of behaviour has seen the erosion of GPs' traditional gatekeeping role (Paterniti et al., 2010; Sripa et al., 2019).

GPs in Australia are considered primary health providers qualified to write referrals for imaging/radiological studies; yet, patients have become more proactive in this process by requesting imaging studies on their own initiative during clinical consultations as seen in Chapter 3. These requests are often driven by either anxiety or the desire for a visual confirmation of their own wellness or that of their loved ones (De Silva et al., 2023).

Phase 2 of this research applies the Andersen–Newman model of healthcare utilisation (ANM) to explore the factors that drive patients to request radiological imaging (Andersen & Newman, 1973). This model helps to identify the predisposing factors (such as anxiety), enabling factors (such as access to OHI), and perceived needs (such as symptoms experienced by patients) that contribute to such requests (Petrovic & Blank, 2015). This phase of the research sought to fill the gap in our understanding of the drivers of patient-initiated radiological requests and the dynamics involved in patient-GP transactions in the context of these requests. The research questions specific for this phase were: What themes emerge as patients' predisposing, enabling and need factors specific to requesting radiological referrals?; what are the main drivers of radiological studies requests?; and what are patient-reported outcomes of such requests?

The study conducted in this phase employs a mixed methods approach to collect both quantitative and qualitative data from participants. The data were gathered in January and February, 2022, initially via a survey and then through follow-up interviews with volunteer participants via Zoom or phone call. As with Phase 1, the participants were again recruited using the online market research platform Qualtrics, and the target group were those individuals who had requested referrals for diagnostic imaging services from their GPs in the five years prior to the administration of the survey. Ethics approval was obtained for this study (2020/432).

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Patient initiated radiology requests: proof of wellness through images

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ABSTRACT

Background. Traditionally, general practitioners (GPs) have initiated the need for, and ordered, radiological tests. With the emergence of consumer-centred care, patients have started to request scans from doctors on their own initiative. Consumeristic health care has shifted the patient–doctor dyadic relationship, with GPs trending towards accommodating patients’ requests. **Methods.** A mixed method analysis was conducted using a survey instrument with open ended questions and concurrent interviews to explore participants’ responses from their requests for radiological studies from GPs. Themes emerging from both qualitative and quantitative methodologies were mapped onto the Andersen Newman Model (ANM). **Results.** Data were analysed for ‘predisposing,’ ‘need’ and ‘enabling’ elements of the ANM model and were correspondingly mapped to patient’s requests for radiological referrals according to the elements of the ANM. Participants expressed anxiety about their health, were confident in the types of radiological scans they desired and typically indicated the need for evidence of good health. Their desire for such requested scans was often enabled through prior exposure to health information and the experience of specific symptoms. Requests came with the expectation of validation, and if these requests were denied, participants indicated that they would seek another doctor who would oblige. **Conclusions.** In our modest study of Australian patients, participants were well informed about their health. Exposure to information seems to create a sense of anxiousness prior to visiting the doctor. Individuals sought visual proof of wellness through imaging, and doctors in return often accommodated patient requests for radiological studies to appease patients’ needs and to maintain workflow.

Keywords: diagnostic imaging, empowerment, health consumer, health outcome, internet, mixed methods, patient–doctor communication, patient preference, patient request, radiological requests.

Introduction

Traditionally, GPs have been central in patient care (Palanica *et al.* 2019), acting as the ‘gatekeepers’ to medical interventions by, for example, directing medical services, prescribing medications and facilitating decision-making (Palanica *et al.* 2019). However, with increased availability of online health information, patients are more informed and active in their health, particularly with some patients having a sense of consumeristic entitlement (Lee *et al.* 2014). This is not a new phenomenon, as patients are seen as developing their intellectual curiosity and ‘getting what they want’ (Lee *et al.* 2015). One element of consumer-driven care is seen in patients requesting a referral for a radiological study from their GPs. It is thought that some of these requests are fuelled by the availability of online health information, where individuals are more aware of their health needs and goals (Lee *et al.* 2015; Hodyl *et al.* 2020). Platforms, such as social media (Esen *et al.* 2019), mobile applications (Groß and Schmidt 2018) and community led online groups (Fiksdal *et al.* 2014), are encouraging individuals to become proactive during patient–doctor consultations. As such, doctors’ gatekeeping roles are diminishing as consumer driven needs increase (Lee *et al.* 2015).

In Australia, only qualified health practitioners, such as GPs, can write a referral letter for radiological services, including imaging and image guided procedures in computer

tomography (CT), magnetic resonance imaging (MRI), X-rays and ultrasounds. Thus, patients who want to have a radiology test performed need to approach their GP for the referral. Moreover, with Medicare subsidised services, most of these requests for studies come at little to no cost to patients. To explore factors contributing to patients' requests for radiological imaging, we used the Andersen Newman Model (ANM) for healthcare utilisation (Andersen and Newman 1973). This model provides a framework with which to discover aspects that facilitate or impede the use of healthcare resources. Past studies using the model have addressed the phenomenon of doctors fulfilling requests for patient satisfaction (Jerant *et al.* 2018), explored patients' spoken and unspoken expectations during a clinical consultation (Fenton *et al.* 2015) and further explored patients' perceived needs during clinical visits (Benetoli *et al.* 2018). Most of these studies have been situated within a general practice context with requests for prescribed medications (Kravitz *et al.* 2003; Paterniti *et al.* 2010; Hogue *et al.* 2012; Fenton *et al.* 2015), while limited work has focused on patient perceived needs for radiological tests and their experiences around these requests (Alamri *et al.* 2014; Walderhaug *et al.* 2022).

The ANM (Andersen and Newman 1973) provides a conceptual framework in recognising antecedents for healthcare use through understanding human behaviour, specifically within the patient–doctor relationship (Andersen 1995; Bradley *et al.* 2002; Petrovic and Blank 2015). A study by Strain (1990) on GP home visits to the elderly, suggested the need to include psycho-social and socio-cultural elements to ANM (Strain 1990). Petrovic and Blank (2015) described adherence to prescribed medication among the elderly with chronic illnesses using ANM, recognising how the model lends itself to examining elements of trust between patients and doctor. Thus, the original model (Andersen and Newman 1973), the purpose of which was to discover conditions that facilitate or impede the use of health care, has evolved throughout the years, originally focusing on the family, but now applicable to individual patients (Andersen 1995; Bradley *et al.* 2002; Andersen and Newman 2005). Kravitz *et al.* (2003) used a modified version of ANM on patients requesting services within a general practice. Their study demonstrated the socio-cultural characteristics or 'predispositions' that exist prior to illness, and extended this to include the logistics or 'enabling' factors of accessing care, and described the 'need' for seeking such care. Using this modified framework by Kravitz *et al.* (2003), we describe 'predisposition', 'enabling' and 'need' factors that initiate patients' requests for radiological studies. We hope, by using a two-phase explanatory design, to address the gap in understanding such patient-initiated radiological requests, particularly with consideration of patient–doctor interactions.

Thus, ANM is an appropriate model to examine in our study, as the individual unit of analysis is the patient requesting a radiological service, but it also lends itself to the expansion of the patient–doctor dyad in which its application occurs

during clinical negotiations, such as the doctor acquiescing to a patient's specific request. In this study, we included the survey instrument, the open-ended questions and concurrent interviews to further identify unique views and experiences.

Aim and objectives

The overarching aim of this study was to explore predisposing, need and enabling elements of patients requesting radiological referrals, and their self-reported experiences and outcomes from such requests.

Objective 1: What themes emerge as patients' predisposing, need and enabling factors specific to requesting radiological referrals?

Objective 2: What are the main drivers for requesting radiological studies?

Objective 3: What is the patient reported outcomes from such requests?

Methods

This mixed method study was approved by the University of Sydney Ethics Review Board. The data was collected from January 2022 to February 2022, starting with a survey that aimed to understand participants' experiences as a patient requesting a radiological referral from a doctor when attending a primary care facility. The questionnaire provided volunteers with the option of a follow-up interview, to further explore their responses. Sixty participants who had requested a radiological referral from their doctor within the last 5 years responded to the survey, and eight participants were interviewed.

Participants

Participants were recruited using the online market research platform Qualtrics (<https://www.qualtrics.com/au>), and were eligible to complete the survey if they were over the age of 18 years and had requested radiological studies in the past 5 years from GPs working in primary healthcare facilities within Australia. Qualtrics members were sent an invitation via email or by in-app and SMS notification asking if they would be interested in participating in a 20 min anonymous survey offering a small reward upon completion. Consent was implied when participants submitted the completed questionnaire. The participants were also asked at the end of the survey if they would be interested in being interviewed to further explore their responses. If they answered yes, they were able to submit their contact details. They were required to read a participant information statement. Individuals were advised their participation was voluntary and verbal consent given at the start of the interview.

Study design

The survey and interview questions were piloted with Qualtrics' first six respondents, and minor alterations made.

The survey consisted of 30 questions to capture patients' demographics such as gender, age, educational attainment and employment status. The survey asked about participants' frequency of internet use, if they had a chronic health condition, their self-reported ratings of health and lifestyle, who they first turn to for health information, their experiences interacting with doctors in requesting referrals and the doctors' response to their requests. The final component asked about the outcome from their request. The questionnaire also included open-ended sections for participants to provide in-depth answers. Overall, the survey took approximately 30 min to complete.

The interview was semi-structured to facilitate an in-depth discussion of the topics. Participants were given an opportunity to speak freely about their experiences in requesting radiological referrals. They were invited to describe their experiences in making a request, including their thoughts around their clinical encounter, the doctor's responses, the types of websites they visited, their overall views on health and lifestyle and their satisfaction with the outcome of their radiological requests. Interviews typically lasted from 20 to 30 min (average = 22.75 min, s.d. 6.88).

Data collection

Both data sets were collected with the intention of using a convergent parallel mixed methods approach for data analysis (Creswell 2008) and to integrate findings. Interviews were conducted by the first author, using the recording app on their iPhone. Interview data was transcribed, anonymised, transferred to secure storage and permanently deleted from the iPhone.

Data analysis

Quantitative data

Using IBM SPSS software (ver. 28), the quantitative survey data were analysed using descriptive statistics resulting in frequency tables and cross tabulations.

Qualitative data

NVivo (release 1.6.1) was used for data analysis of the open-ended questions and the interview data. After recording the interviews, the data were transcribed by the first author into a word document and then imported into NVivo. A two-step approach was used for coding. A conventional thematic analysis (Hsieh and Shannon 2005) allowed codes to flow freely from the data and, using a directed analysis approach (Hsieh and Shannon 2005), were then mapped to the dimensions of the ANM: 'predisposing', 'enabling' and 'needs'. The coded data and the themes were reviewed by the research team with discrepancies resolved through discussion.

Abbreviations used to describe interview and survey participants are as follows: gender (M/F); age (years); level of education high school (HS), university (U), postgraduate

(PG), and diploma (D); and employment status employed (E), unemployed (UE) and retired (R).

Ethics approval

Institutional Ethics Approval was granted by the University of Sydney Human Research Ethics Committee (HREC) Project number: (2020/432): Approval period: 21 September 2020–21 September 2024.

Results

There were 60 respondents who completed the survey of whom 10 agreed to be interviewed, however, thematic saturation was achieved after eight and further interviews were ceased. A true survey response rate was unable to be determined using the external market research panels, as some panel members may have overlooked the invitation, or declined participation based on the incentives offered. Most of the requests were for X-rays and ultrasounds, as indicated in Table 1.

Fig. 1 indicates the steps that drive patients to request radiological referrals and demonstrates variables at play within clinical negotiations between patients and their GPs. These variables form the basis of patients having requests fulfilled.

Predisposition

Three psycho-social determinants that reflect predispositions of patients' behaviour emerged as themes from our analysis. These included health anxiousness, proof of wellness in images and a desire to know.

Health anxiousness

Anxiousness about their health was the dominant driver for patients requesting referrals. This finding was reflected in both the surveys and interviews. Most participants expressed a level of anxiety or worry over their symptoms, in that they

Table 1. Frequency of the types of radiological tests requested in response to the question 'What radiology procedure or test did you mostly ask your doctor for?'

Imaging modality (n = 60)	n (%)
X-Ray	26 (43)
Ultrasound	18 (30)
Magnetic resonance imaging	8 (10)
CT (computerised tomography)	4 (7)
Total	54 (90)
Missing	6 (10)

Response options are not mutually exclusive as respondents could choose more than one answer.

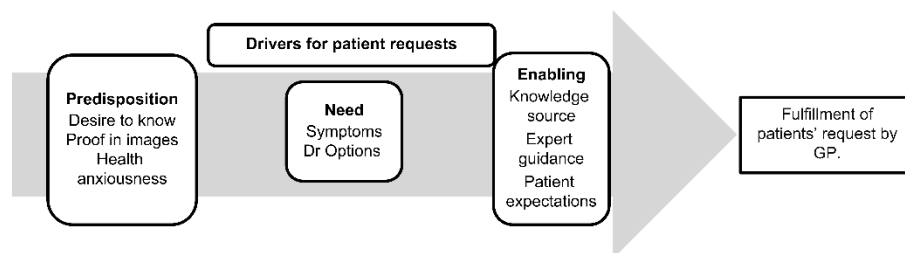


Fig. 1. Emerging themes from interviews and surveys with respect to drivers of patient requests. Adapted from a study by Kravitz et al. (2003), p. 1674.

felt it could be something serious that they needed to address. In the survey responses, 75% of the total population ($n = 60$) were either anxious or worried. In cross-tabulating gender and health anxiousness, males ($n = 12$, 35%) and females ($n = 7$, 28%) indicated anxiousness over their health. Those aged 18–24 years ($n = 4$, 50%) were the least anxious, whereas those aged 35–44 years ($n = 10$, 41.7%) were the most anxious.

In the interviews and open-ended questions, participants explained, 'I would chew myself out just thinking about what could be?' (M, 18–24, U, E). Another interviewee affirmed, 'It is helpful knowing I don't have cancer' (M, 35–44, HS, E). Integrating both methodologies, males are more anxious than females, although the qualitative data indicate that there is a broader age range of anxious individuals in the interviews compared to the surveys, where anxiousness was mostly seen in the 35–44 year age group.

Proof of wellness through imaging

Respondents indicated that they requested radiological scans because they wanted proof of wellness through imaging. This eased their concerns about their symptoms. For example, an obstetric ultrasound patient, concerned about a miscarriage, was reassured by a live image of her baby's beating heart. She wrote in the open-ended section of the survey, 'It became less stressful for me once I knew bubby was okay with a heartbeat' (F, 25–34, HS, E). Similarly, one interviewee stated, 'So, I said (to the doctor) ... the best way to learn about what's happening with my anatomy is through X-rays' (F, 35–44, U, UE), while another commented, 'It is just two pictures. And they can confirm if I have a potentially dangerous, serious respiratory condition' (M, 18–24, U, E). Both surveys and interviews confirmed patients' desires to see proof of their wellness in images.

Desire to know

Participants justified their requests, having researched their symptoms online, indicating that they were knowledgeable about their conditions prior to visiting the doctor. Their confidence increased when their doctor granted their request

and validated their need for imaging. In his interview, one participant with a medical background expressed, 'I just rely on my own medical knowledge. Yes. And then if I feel like I need a referral for something or if I'm not 100% sure, with my provisional diagnosis, then I will consult help' (M, 25–34, PG, E). Meanwhile another interviewee stated, 'I told the doctor, I'm not sure what's wrong but I think its patella tendonitis and they said yes. Then I said, maybe I should get a scan – an MRI and I got a referral for that' (M, 25–34, U, E). In the open-ended questions of the survey one participant was confident about their requests, 'I don't make frivolous requests and we always discuss the relevance of the tests' (F, 65–74, D, R). Such confidence in their medical knowledge was reflected in both surveys and interviews. One of the survey prompts was 'I always consult the internet for health advice'. The majority of those who answered positively ($n = 9$, 60%) had completed university level education. These individuals were mostly employed ($n = 26$, 62%) and in the age bracket 34–44 years ($n = 14$, 61%).

Enabler

Themes emerging from our study indicated that participants acknowledged the accessibility of resources through online sources and recognised the need for medical expertise in guiding their decision-making. However, these individuals also expected their requests to be met.

Resources

Participants indicated in the survey that they often searched Google to expand their knowledge base, as shown in Table 2, and those interviewed were confident that their sources were mostly from reputable sites. According to the interviewees, sites such as PubMed, Harvard Medical School or the Mayo Clinic, had reliable, researched content with sound evidence-based medical information. Interviewees stated, 'I ... go to PubMed and to Google Health and just read journals' (F, 35–44, U, UE), another pointed out 'I don't search by subject. I search by author because they are experts in the field' (M, 35–44, U, E).

Table 2. Frequency of consulting online sources for health information.

Prompt to search websites (n = 60)	n (%)
When the need arises	35 (58.3)
Regularly, I want to keep on top of things	11 (18.3)
Occasionally for curiosity	10 (16.7)
Rarely	4 (6.7)
Total	60 (100)

Participants were asked to select one option that was most applicable.

Table 2 indicates the response to the question 'How often do you consult online sources for health information? Please indicate your most frequent reason'. Most looked when the need arose, such as when experiencing certain symptoms. However, participants in the interview also acknowledged the dangers of non-evidence-based online information, for example, one of the interviewees acknowledged, 'Always a bit worried about being like Dr. Google' (F 35–44, U, E). Another participant was disturbed by social media influencers advising their audience, 'A lot of people thanks to social media and Tik Tok ... are to blame ... all these people suddenly have become experts ... I mean, same with COVID-19. If anything, COVID-19 has taught us ... how people, ordinary people, would give medical advice about COVID-19 ...' (F, 35–44, U, UE). Although the interviews indicated participants were cautious with online information, the surveys reflected greater value in consulting sites when needed.

Expert guidance

Although patients were confident in their self-diagnosis, they often turned to their doctors for confirmation, validation and expert guidance. For example, some participants in the interviews researched their condition and then informed the doctor on the latest available treatments but wanted the doctor to guide them in making their final medical choices. Participants in the interview agreed, 'I started listening ... , sometimes we must unlearn what we've learned to become better patients. When we think we know too much ... , we don't in fact do and we let the experts guide us' (M, 35–44, U, E). A migraine sufferer appreciated the GPs assertiveness, '... and if she says, no, you don't need it. I will always trust what the doctor says, but that's, why I guess I like her' (F, 45–54, U, E).

Although some participants in the interviews appreciated their doctors' assertiveness in refusing certain requests, many survey respondents (n = 52, 85%) indicated that their doctors accommodated their requests. When asked in the survey if their doctors addressed their requests, the majority of those who did not have regular doctors (n = 5, 71%) stated that the doctor was happy to provide a referral without any questions. For those with a regular doctor, most survey respondents (n = 32, 60%) stated the doctor was happy to

write a referral but wanted to discuss the requested study in more detail. Although our qualitative data indicated participants were seeking expert guidance, those in the survey had their requests fulfilled, particularly individuals seeing a regular doctor. Although these regular doctors wanted to discuss in detail the requested study, they still met their patients' expectations.

Expectations

Participants felt the need to share their health information findings or self-diagnosis with an expectation for validation and acceptance from their doctors. When this validation was not given, participants indicated dissatisfaction with their doctors. However, both survey and interview data indicated doctors mostly fulfilled participants' expectations, and when doctors did not, some participants opted to see an alternative doctor who would oblige. In sharing their self-diagnosis, participants in the interview expressed, 'I just looked to different websites saying the symptoms that I had ... and all indicated that I had a broken wrist. I told the doctor I'd like to get an X-ray on my wrist – he agreed with me' (M, 45–54, U, E). However, when this validation was not given, participants were disappointed; as answered by one interviewee, 'But the doctors seem to just brush away my concerns ... And whenever that happens, I am sure I can speak for other patients as well. If that happens to us, we will simply just find another doctor' (M 18–24, U, E). Table 3 shows cross tabulation of survey respondents' satisfaction with doctors' response to their requests.

Need

According to the ANM, the most immediate cause of healthcare utilisation is the need for service, that is, the perceived need recognised by patients (Andersen and Newman 2005). These causes were identified in our study as patients' experience of symptoms and having options to choose alternative doctors.

Table 3. Cross tabulation of doctors' responses to patient requests in the survey. n = 60.

	Number of participants (n) and percentage (%)		
	'Yes' n (%)	'No' n (%)	Total n (%)
How did your doctor respond when you asked for a referral involving a radiological test or procedure?			
He was happy to write a referral but wanted to discuss in detail the test/procedure with me	28 (53.8)	6 (7.5)	34 (56.7)
He was happy to provide a referral without any questions.	24 (46.2)	2 (2.5)	26 (43.3)
Total	52 (100)	8 (100)	60 (100)

Symptoms

Most of the survey responses, as well as the thematic analysis of both interview and open-ended questions on surveys, indicated it was patients' experiences of symptoms that initiated the request. Symptoms associated with a new undiagnosed concern were often linked to patients' outlook on their health and lifestyle, and initiating a scan was a way of health restoration. One participant with a sore knee explained, 'It wasn't the same pain I had before when I had the dislocation' (F, 26, HS E). Another interviewee participant recalled something learnt from his university days to which he attributed his recent experience, 'I was getting some chest pain ... in university I studied that, with my type of body, I'm prone to developing pneumothorax' (M, 18–24, U, E).

Descriptive statistics indicated that indeed most participants were concerned about a new/undiagnosed symptom, as shown in Table 4.

'Dr options'

Some participants even went as far as challenging the doctors' advice, with one interviewee valuing the opinions of a specialist, 'That's what a lot of patients do ... they demand to see specialists rather than general practitioners ... you know, I'm not sure if you've noticed it, but a lot of people demand to see specialists because they find specialists are more knowledgeable about things' (F, 35–44, U, E). Some interview respondents were keen on requesting a second or third opinion and in fact encouraged it, with one participant seeking different doctors' expertise, 'It looks like I'm doctor shopping which is terrible ... I don't have any extensive relationships with any GPs' (M, 25–34, PG, E).

In assessing for the need element of the ANM, a new undiagnosed condition or symptomatic presentation was the main driver for initiating requests. Although participants had sought expert advice, they were quite firm in indicating that if their perceived need was significant and not met, they would be happy to seek alternative GPs.

Whether these individuals saw their doctors regularly or for the first time, most patients had their request approved, as indicated in Table 5 below. Overall, participants

Table 4. Frequency table on reasons for requesting radiological scans responding to the survey question 'When you asked for a radiological test/procedure, what was this for?'

Reasons (n = 60)	n (%)
A new, undiagnosed health concern/experiencing recent symptoms	34 (56.7)
A chronic condition	15 (25.0)
A scan to rule out an illness/disease that you read or heard.	3 (5.0)
Own response.	8 (13.3)
Total	60 (100)

Participants were asked to select one option that was most applicable.

F

Table 5. Frequency of self-reported benefit from referral request responding to the question 'When you asked for the radiological test/procedure from your doctor, did having the test/procedure prove useful?'

Self-reported outcome (n = 60)	n (%)
Yes, my request proved useful	48 (80)
No, I did not benefit from my request	9 (15)
Own response	2 (3.3)
I did not have the test as my doctor refused the request.	1 (1.7)
Total	60 (100)

Participants were asked to select one option that was most applicable.

self-reported achieving intended, desired outcomes from their requests for radiological studies.

Discussion

This study aimed to understand, through cross-sectional surveys and semi-structured interviews, key findings during doctor–patient clinical negotiations when patients request a radiological referral from their doctors in primary care facilities. The results showed that participants were well-informed about their health and desired visual proof of wellness to alleviate their anxiety over new symptoms. The study found that visual proof, predominantly using X-rays and ultrasounds, played a vital role in satisfying patients' needs. Most participants sourced information from reputable online sites and felt validated by their doctors, indicating that they were not making unnecessary requests. For example, in our study, visual proof through real-time ultrasound technology helped a mother see her baby's beating heart and provided reassurance. The participant stated that seeing the images on the screen enabled her to visualise in her mind what was happening within her. Participants espoused the view that care has been received, once images were acquired, so both the GP and the participant could assess the cause for concern. This is in contrast to a study on consumer needs by Lee *et al.* (2015) who found almost half their population reported at least some difficulty locating desired health information (Lee *et al.* 2015). However, according to Jutel (2017), using online sourced information has several caveats, one of which is in 'playing Dr Google', where patients' incorrectly self-diagnose and potentially influence the doctor's better judgement (Gransjøen *et al.* 2018; Docking *et al.* 2022).

However, using the ANM to assess clinical requests in office practices, Kravitz *et al.* (2003) concluded that patients do in fact influence the clinical outcome during consultations. Their results supported the notion that patients' requests are increasingly pervasive and there is a need to better understand and manage such requests, particularly non-clinically indicated requests. The ANM posits that healthcare use is

determined and often weighted by the individuals' beliefs. For example, the patients' attitudes about health services, their desire to know about diseases and how they position themselves within the system of healthcare use (Andersen and Newman 2005). Our study indicates that participants are actively seeking resources, notably evidence-based websites, that grant them confidence in requesting certain tests or procedures. Such confidence in a consumeristic patient leads to higher expectations during consultations. Where such expectations involve doctors recognising and validating their requests, and if such acknowledgement is not granted, participants are willing to seek alternate doctors to fulfil their requests.

However, we recognise that granting patient-initiated requests, particularly with non-clinically indicated tests, may be seen as depleting doctors' valuable time and healthcare resources (Llanwarne *et al.* 2017). Our study does not highlight the negative impact of patient influence causing unnecessary testing, interventions and possibly delayed diagnosis and poor stewardship of healthcare resources (Le *et al.* 2018; Walderhaug *et al.* 2022). Although patients' expectations for doctors to recognise and validate their requests, particularly for non-clinically indicated tests, seem to be prevalent in our study, employing strategies to discourage unwarranted imaging, such as using a 'watch and wait' strategy (Fenton *et al.* 2021) or suggesting alternatives, may prove beneficial to decrease healthcare costs (Docking *et al.* 2022) However, doctors' inclination towards patient satisfaction and practicing defensive medicine may contribute to responding favourably to patient requests (Nilsen and Malterud 2017).

Interestingly, Jerant *et al.* (2018) undertook a cross-sectional observational study on clinicians denying patient requests on 1319 clinical visits made to 56 doctors by 1141 outpatients. The study found most participants reported their request being fulfilled, $n = 1441$ (85%), and of the visits within the requested categories, there were 153 (11%) radiological requests. But some participants understood the doctors' gatekeeping role and tried to remain 'a patient' (Kravitz *et al.* 2003). However, overall, seeing a doctor seems to have become a formality to secure a referral letter, rather than relying on the doctors' knowledge and guidance (De Silva *et al.* 2023). This study, albeit small, found that doctors, in competing for patient satisfaction, maintaining relationships and keeping pace with clinical productivity, tend to adopt a default approach of agreeing to patient requests (Sabbatini *et al.* 2014; Carey *et al.* 2015).

Thus, in answering our objectives, themes emerging from our study were mapped onto the ANM as 'predisposing', 'enabling' and 'need' elements for patients requesting radiological imaging. The predisposing elements were desire to know, proof in images and health anxiousness. The enabling elements included knowledge source, expert guidance and patient expectations, while the need factors included symptoms and 'Dr options.' Our study found that the primary driver for requesting referrals was anxiousness over new undiagnosed

illness or experience of symptoms where visual proof was needed mainly through X-rays and ultrasounds. Such visual proof satisfied individuals to pursue goals in restoring their health and wellness. Furthermore, our study supported the idea that participants were satisfied achieving the intended, desired outcomes, and if requests were not met, participants were inclined to choose an alternative doctor who would fulfil their request.

Limitations and strength

This study has several limitations that should be considered when interpreting the results. Firstly, the data was limited to the Australian population and within the context of a health system providing predominantly 'free' imaging services to patients. Secondly, it was collected retrospectively relying on participants' recall, which could introduce bias, affect the accuracy and may tend to allow overinterpretation of findings. Additionally, the study only investigated participants' views, and it would be valuable to assess doctors' perspectives to gain a more comprehensive understanding of the issue. Moreover, the recruitment of participants was conducted online using Qualtrics and limited to purposively sampled participants requesting referrals from a GP working in primary care facilities. This could potentially skew the results and limit the generalisability of the findings to the broader Australian population. Our study also did not address whether GP's performance was reflective of the proportion of tests ordered, which may influence GP's responses to patients requests.

Our study did employ a mixed method approach, which provided valuable insights into patients' perspectives. The quantitative component was employed to bring a broad approach to the research question while using the interview responses to gain more depth. Additionally, further research could confirm these results, and investigate full paying patients who are not covered under Australian Government's Medicare health insurance rebate to determine if frequency of requests would be different to those who absorb little to no costs. Moreover, further investigation could determine if responses from GPs would be similar to those of our study.

Conclusion

This paper identifies several elements that are involved in clinical negotiations between patients and doctors. The ANM was used in the study as a way of explaining the use of health care within the Australian population, in particular, where patients request imaging referrals from their GPs in a primary care setting. Our findings suggest that patients are more informed than ever before and are confident in their knowledge of the types of radiological scans and

interventions they require. Patients also found comfort in seeing what was happening inside their bodies, particularly during obstetric imaging, and wanted their doctors to validate their concerns by complying with their requests for imaging referrals. While our study did not highlight the importance of appropriate use of imaging, particularly for non-clinically indicated tests, it recognised the increasing involvement of patients as healthcare participants. Overall, our study provides some new insights into the evolving patient–doctor dyadic relationship in radiological services.

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Data availability. Data supporting the results can be found at the University of Sydney research data storage facility.

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4.2 Chapter 4: Summary of Patient-initiated radiology requests: Proof of wellness through images.

The study highlights a key development in contemporary healthcare interactions. This empirical study demonstrates that patients are increasingly motivated to request imaging, and by using the Andersen Newman Model (Petrovic & Blank, 2015), we have been able to understand the drivers behind such requests. Notably, health anxiety, a desire for visual reassurance, and confidence gained from access to online health information emerge as significant factors. Accessibility to information and gaining knowledge enables a sense of empowerment, allowing patients to actively engage in clinical decision-making, often expecting and receiving validation for their requests for imaging services.

The traditional patient-doctor dynamic is reconfigured, with patients no longer being passive recipients of care but rather informed agents seeking specific diagnostic outcomes (Murphy & Salisbury, 2020). While many GPs accommodate these requests to maintain patient satisfaction and prevent disruption to the clinical workflow (Esfandiari et al., 2019), the findings raise concerns about resource utilisation, the risk of unnecessary imaging performed by fulfilling patient requests, and the erosion of clinical gatekeeping.

Building on these findings, the next chapter examines the responses of GPs to patients' evolving behaviours, specifically investigating the strategies they employ to balance patient-centred care with evidence-based practice, resource stewardship, and the management of diagnostic imaging in a consumer-driven environment.

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Chapter 5 : Introduction to Challenging Encounters: A systematic scoping review to understand GP compliance and the role of the patient

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5.1 The Systematic Scoping Review

To understand the paradigmatic shift in the healthcare landscape away from paternalistic care and towards patient-centered care (Huisman et al., 2020), the first two phases of this research project investigated how patients are actively participating in their own health trajectories. However, before exploring the perspectives of healthcare providers in this research, it was deemed necessary to first consider the global landscape and how these providers have been challenged by the transition to patient-centered care. The systematic scoping review presented in this chapter, therefore, explores the barriers and facilitators to managing patient-initiated imaging requests and the strategies GPs use to navigate these challenges. The aim of this review has been to understand the dynamic interactions between patients, GPs, and the broader healthcare system and to provide insights into how to maintain a balance between patient-centered care and value-based care. The research question specifically aimed to answer what challenges are being faced by GPs in responding to patient requests and therefore pose barriers to complying with established guidelines on appropriate imaging, what strategies using evidence-based medicine have been identified by GPs in addressing patients' requests, and what support or help do GPs receive implementing guidelines and managing patient requests for imaging. The scoping review has sought to comprehensively

map the literature related to patient-initiated imaging requests in primary care settings and to inform Phases 3 and 4 of the research.

The systematic scoping review was conducted according to the Joanna Briggs Institute's guidelines and reported in accordance with PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Reviews). The Embase, Medline, Scopus, CINAHL, and Web of Science databases were searched for peer-reviewed articles published between January 2010 and July 2023. Additional articles were included if they described GPs' experiences with patient-initiated imaging requests in primary care settings. Keywords used in the search included terms such as: 'patient request', 'GP', 'general practitioner', 'healthcare provider', 'barriers', and 'strategies,' all of which capture this current research's focus on GPs' challenges and facilitators in managing patient-initiated requests.

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Ethics Approval Statement

Institutional Ethics Approval was not required for this systematic scoping review.

Conflict of Interests

The authors declare no conflict of interests.

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The data underlying this article will be shared on reasonable request to the corresponding author.

Abstract

Background: Healthcare resources have been stretched considerably, particularly with increased availability and use of imaging services and advanced radiological technologies. General practitioners (GPs) however, are facing challenges during consultations, because patients are increasingly becoming more autonomous in their health management and are requesting imaging studies on their own initiative. Our objective was to identify the challenges encountered in consultations by GPs and the strategies employed in addressing patient requests for imaging services.

Method: Embase, Medline, Scopus, CINAHL and Web of Science were searched for published peer-reviewed articles following PRISMA-ScR guidelines. Additional eligible articles were identified using Google Scholar. Articles were included if they focused on patients requesting diagnostic imaging from GPs or GPs' experiences of such requests within primary care.

Results: Out of a total of 2137 potential papers, 11 fulfilled the criteria set out in this review. The challenges encountered by GPs were categorised as barriers, and facilitators were identified as factors encouraging GPs' adherence to imaging guidelines. Seven barriers to guideline adherence were identified: patient-centered care, belief in the benefits of advanced imaging, incentivised care, the involvement of a multidisciplinary team, litigation, patients' health literacy, health anxiety and the demand for imaging. Those identified as facilitators were guideline dissemination and informal knowledge exchange. Strategies to overcome challenges that emerged from the review included trust in the GP, valued clinical skills and decision aids. A quality assessment of the papers revealed that most studies were of moderate

quality for both the quantitative and qualitative papers using Hoy's risk of bias tool and the CASP analysis, respectively.

Conclusion: This scoping review provided an understanding of the challenges encountered by GPs in addressing patient requests for imaging, underscoring the significance of patient-centered care as being pivotal in nurturing a therapeutic patient-GP rapport. Imaging is crucial for reducing diagnostic uncertainty and litigation; however, barriers such as economic incentives are present. Having interdisciplinary communication encourages guideline compliance. Implementing ongoing GP education, restructuring reimbursements and improving imaging accessibility can provide patients with a better understanding and purpose of the requested diagnostic imaging.

Introduction

Healthcare spending has grown considerably in recent years, although it is uncertain whether this increase in the use of healthcare resources has benefited the health of society, with some suggesting the overuse of medical services by healthcare professionals and patients alike (Hensher et al., 2020). One focus of growth has been in diagnostic imaging, with 25.6 million diagnostic services carried out on 9.6 million Australians and a cost of A\$3.5 billion recorded from 2013-2014 to 2018-2019 ("Australian Institute of Health Welfare: Explore New Data on Medicare Subsidies and Service Use by Local Government Area," 2023). A growing concern is the overreliance on medical imaging for clinical diagnosis by general practitioners (GPs) and patients, with one in five diagnostic services being of low value or unnecessary (Müsken et al., 2022). Overuse of healthcare services is defined as providing medical services where the potential for harm is greater than the benefit to patients (Chassin & Galvin, 1998). Brownlee et al. (2017) detailed the effects of overuse, stating that diagnostic testing is primarily driven by its apparent objectiveness and increasing sensitivity to detect illnesses. Therefore, although a positive or negative result from a diagnostic investigation can alter patients' clinical management and/or add confidence to the GPs' diagnosis. An imaging request that does not contribute to the proper management of the patient or their treatment plan is considered inappropriate (Griffith et al., 2015).

With advanced technology such as digital apps (Alsalamah et al., 2020), social media platforms (Au, 2019) and widely advertised health awareness campaigns (Sharma et al., 2021), the general public is constantly bombarded with information to be autonomous in their health management (Nilsen & Malterud, 2017b). Exposure to online health information and government-sponsored advertising encouraging screening for bowel and breast cancer, for example, can also contribute to overservicing. Patients, by exercising autonomy, may feel compelled to ask their GPs for diagnostic tests, such as imaging studies. This places GPs in a position where their traditionally held roles as 'gatekeepers' of patients' health and well-being are relinquished by seeking ways to be more patient centric (Paterniti et al., 2010). Tabenkin and Gross (2000) provide perhaps the most detailed description of gatekeeping:

...the authority to decide upon referrals to specialists, to implement the diagnostic work-up and patient management in the primary care clinics, to consider finances

when deciding about medical care, and to coordinate the actions of other caregivers, thus guaranteeing continuity of care. (Tabekin & Gross, 2000, pg 75)

Hence, as responsible gatekeepers, GPs face challenges related to the appropriate use of imaging, including how to adequately inform patients of the risks versus benefits of a requested test and how to balance what is optimal versus what the patient wants (Walderhaug et al., 2022).

In primary care, establishing a relationship with a patient includes detailed clinical history taking, a thorough clinical examination, and a good knowledge of the patient gained through years of interaction (Nilsen & Malterud, 2017b). Building on these fundamentals creates a functioning ecosystem for patient-centred care. However, there are several impediments to GPs retaining clinical autonomy. Patient factors play a crucial role in enabling best practices, with GPs reporting patient requests and preferences as one of the major impediments to GPs' clinical autonomy (Griffith et al., 2015). These impediments or barriers cause further dismantling of patient-GP rapport, particularly when patients are dissatisfied with nonfulfilled requests (Huisman et al., 2020). GPs have previously addressed problems of patient requests within a consultation, and many literature reviews have addressed patients' perceived need for medical services (Chou et al., 2018), the 'watch and wait' strategies for low back pain (May et al., 2016) and determining women's values and preferences in breast cancer screening (Mathioudakis et al., 2019).

The long-term consequences are a significant burden on the healthcare system, particularly in countries such as Australia, where the government covers a significant portion of medical imaging and imaging-guided procedures with little cost to the individual (Docking et al., 2022). Patients' desire for imaging may involve, for example, concern about a particular disorder (Sun et al., 2013), a symptom (Gallagher et al., 1997), a recent diagnosis (Paterniti et al., 2010), or following guidance from non-evidence-based internet websites (Huisman et al., 2020). While patients have expectations of request fulfilment and GPs are pressured to oblige (Griffith et al., 2015), there is a sparsity of evidence about the challenges faced by GPs in addressing patients' requests for imaging and the strategies they employ to address unnecessary imaging requests.

The review

Aim

As gatekeepers who are deciding upon the most appropriate tests/interventions for patients, GPs are challenged in fulfilling or preventing patient-initiated requests (Griffith et al., 2015) while practicing good stewardship of medical resources (Docking et al., 2022). The overarching aim of this scoping review was to identify the challenges faced by GPs in addressing patient-initiated requests for imaging studies and the strategies employed in addressing patient requests as described and documented in the academic literature. The research questions asked 1) what challenges are faced by GPs in responding to patient requests that pose barriers to complying with established guidelines on appropriate imaging, 2) what strategies, using evidence-based medicine, have been identified by GPs in addressing patient

requests, and 3) what supports or helps GPs to implement guidelines and manage patient requests for imaging?

Design

This review was conducted according to the Joanna Briggs Institute's (JBI) guidance for scoping reviews (Peters et al., 2020) and is reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for Scoping Reviews (PRISMA-ScR). The 'participant, concept and context' (PCC) approach to developing eligibility criteria was adopted by assigning the participant as GPs whose patients requested them for imaging, the concept considered as the challenges encountered by GPs and the strategies employed to address patient requests and the context being in primary care facilities (Tricco et al., 2018).

Methods

A preliminary search was conducted by the first author (LD), using Google Scholar for any published literature on the subject as well as the MEDLINE and Cochrane databases for systematic reviews and JBI evidence synthesis for any existing systematic and scoping reviews on this subject. The search strategy was then devised in consultation with a research librarian. The databases considered for this review were Embase, Medline, Scopus, CINAHL and Web of Science. Additional eligible articles not captured in the database search were identified through Google Scholar. The first author considered the search terms, which were developed iteratively by a multidisciplinary team (see Appendix). The keywords used were patient request, preference, expectation and general practitioner, GP, doctor, physician along with imaging, challenges and strategies. The databases were sourced for original peer-reviewed journal articles from January 2010 to July 2023 and limited to studies in English. In brief, the eligibility criteria for papers were those describing individuals who requested diagnostic imaging from GPs, GPs who were recipients of such requests, and the challenges and strategies employed by GPs in addressing such requests. The context was within primary care settings and excluded hospital and tertiary care. Sources eligible for inclusion were peer-reviewed primary research articles. Excluded studies were those that did not describe patient requests for imaging, theses, grey literature, conference presentations, editorials or review papers. The data were restricted to more recent articles (2010-2023). This was to keep the subject relevant to current standards of practice employed by GPs with results pertinent and reflective of the changing healthcare landscape. Table 5-1 indicates the inclusion and exclusion criteria for the review.

The articles were initially imported into Endnote X9.3.3 (Clarivate Analytics, PA, USA) and then transferred to Covidence (Covidence systematic review software, Veritas Health Innovation, Melbourne, Australia. Available at www.covidence.org). Reviewers (LD, JC and PH) independently screened the titles and abstracts of the first 10 articles in Covidence before coming together for discussion via Zoom meetings (<https://www.zoom.us/>). Once consensus was reached on what type of articles would be included in order to fulfil the inclusion/exclusion criteria, the screening proceeded for the remainder of the articles with the lead author initially

screening all the articles followed by reviewers (JC and PH) screening the articles again with each reviewer taking half of the total. Articles were included for full-text review if patient requests for imaging within primary care facilities were described within the study. For this review, a broad operational definition for imaging requests by patients was established where the healthcare provider/GP was not acting on their own initiative to provide imaging services. Rather, they were influenced by patients' requests, expectations and/or demands. Full-text articles were then screened independently by LD and JC for eligibility, with conflicts resolved through consultations and discussion via Zoom meetings. Details of the study selections and their characteristics are presented in Table 1.

Table 1

Abstract screening inclusion and exclusion criteria for study selection

Inclusion	Exclusion
Adult population	Paediatric population
Studies reporting on patient-initiated imaging	Health practitioner-initiated imaging requests
Studies reporting on health practitioners' responses to patient requests/patient-initiated imaging	Patients responding to health practitioners' directives
Primary care facilities only	Hospital setting or specialised/tertiary care setting
Secondary sources such as articles sourced from reference lists of included studies	Grey literature, reviews, and conference abstracts
Studies in English with full text available	No full text availability
All study designs	Any studies published before 2010.
Studies written/ translated in English	Non-English studies

Data Extraction

Microsoft Excel (Microsoft Corporation (2018)) was used for data extraction. Microsoft Excel. <https://office.microsoft.com/excel>), consisting of the study title, year and author, the country of the research, the aim of the study and its design. The start and end dates of each study, their method of data collection, the inclusion/exclusion criteria and participant numbers were also included. Other elements related to the review were also extracted, including patients' reasons for requesting referrals, healthcare practitioners' reasons for non/fulfilment of requests, challenges presented, and the interventions/strategies used in the included studies.

Methodological Quality Assessment

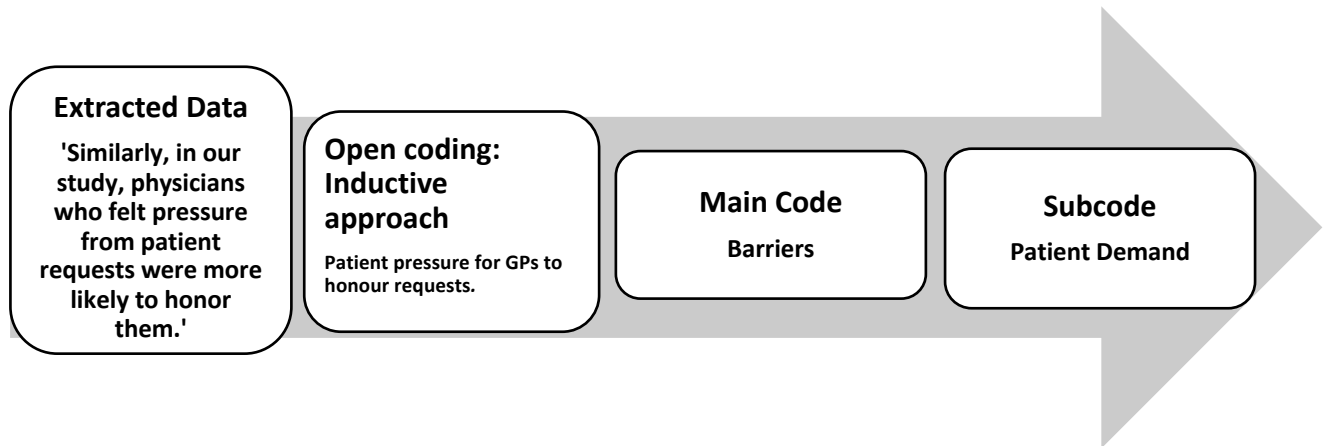
Hoy et al.'s risk of bias tool for quantitative studies (Hoy et al., 2012) and Evans et al.'s Critical Appraisal Skills Program (CASP) for qualitative studies (Evans et al., 2015) were used to assess the quality of the included papers. There were no mixed methods studies resulting from the search results. Two reviewers, LD and JC, analysed the data from the quality assessment template from Covidence to evaluate the consistency and accuracy of the included studies (Hoy et al., 2012). For this review, a detailed critical appraisal of individual studies was performed. For the qualitative studies, articles were appraised on clear statement of the aims (CASP 1), appropriate research design (CASP 2-3), recruitment strategy (CASP 4), data collection (CASP 5), bias (CASP 6), ethical issues (CASP 7), data analysis (CASP 8), research findings (CASP 9), and the value of the research (CASP 10). (Evans et al., 2015) For the quantitative studies, ten questions were used to assess external validity (1-4) and internal validity (5-10). For our review, the number of 'yes' responses yielded a high risk of bias (0-3), moderate risk of bias (4-7), and low risk of bias (8-10) (Hoy et al., 2012).

Data Analysis and Presentation

The data analysis included both descriptive statistical analysis for papers using quantitative analysis and basic qualitative content analysis of textual data for papers using qualitative data (Davies et al., 2023). All the data were synthesised to i) identify challenges experienced by GPs from imaging referral requests by patients and ii) identify the strategy(ies) employed for nonfulfillment by GPs. The research team used an inductive approach and, through collaboration and an iterative process, examined initial thoughts for coding (Davies et al., 2023). Codes were then created from the extracted statements, forming distinct categories. This was done through NVivo (NVivo 14, released 2023), where the original articles were uploaded as files. Each file was open coded for relevant words, parts or full sentences that pertained to the research aims. Once the codes were developed, they were categorically separated into appropriate groups with similar coding statements. Eventually, these categories became themes that were mapped according to the research aims. A team member (MB) who was not involved in the screening or extraction process assessed the coding and emergent themes. The inclusion of a third reviewer (MB) allowed for a nonbiased perspective on the coding scheme. Comparisons of the themes were explored and mapped to identify the overarching objectives of this review. An example is shown in Flow Chart 1.

Flow Chart 1:

Coding sequence



Results

Characteristics of the Included Articles

The search yielded 2137 studies with Covidence removing most of the duplicates ($n=9$) and some ($n=2$) manually removed. The first author screened all titles and abstracts against the inclusion/exclusion criteria and excluded irrelevant articles. The remainder of the review team repeated the process. A total of 66 articles were retrieved, and the full texts were screened by LD and JC, a process that resulted in 6 articles meeting the criteria indicated in the PRISMA flow diagram in Flow Chart 2. Five additional articles were retrieved from the Google Scholar search, resulting in a total of 11 eligible articles.

Three papers were from the United States (Esfandiari et al., 2019; Fenton et al., 2016; Le et al., 2018), two from Canada (Pike et al., 2022; Griffith et al., 2015), two from Norway (Gransjoen et al., 2020; Walderhaug et al., 2022), and one each from the United Kingdom (Sajid et al., 2021), the Netherlands (Ottenheim et al., 2014), South Africa (Botha & Mung'omba, 2012) and Australia (Sharma et al., 2021). The qualitative studies had 10–30 participants, and the quantitative studies had 60–360 participants. A summary of articles identifying characteristics of the articles included in the review is summarised in Flow Chart 2.

Flow Chart 2:

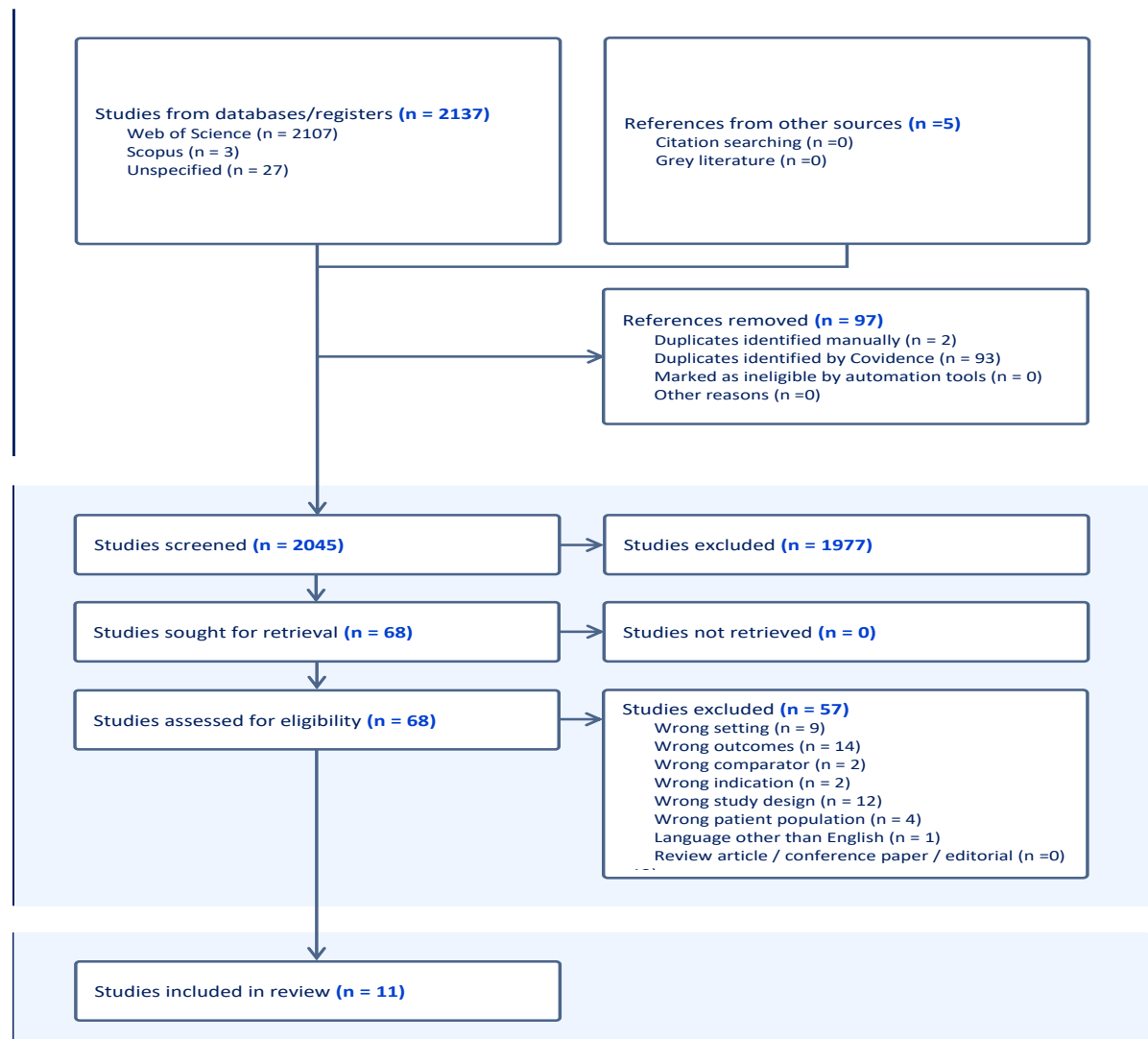
PRISMA flow diagram

Table 2:

Characteristics of the articles included in the review.

Articles Included	Year	Method	Sample size	Country	Imaging of focus	Aim	Challenges	Strategies
Botha et al.	2012	Survey	110	South Africa	X-rays	To examine factors that may be associated with the practices of PCPs* related to ordering imaging in uncomplicated low back pain	<ol style="list-style-type: none"> 1. Overcome embedded beliefs in the perceived benefits of imaging. 2. Poor patient health literacy 	<ol style="list-style-type: none"> 1. Using decision aids in discussions with patients and building trust
Esfandiari, et al.	2019	Surveys	359	USA	General imaging	To elucidate physician-perceived barriers to appropriate thyroid hormone management in clinical practice	<ol style="list-style-type: none"> 1. GPs* satisfying patients through honouring their requests. 2. Pressured to comply with patients 	<ol style="list-style-type: none"> 1. Using decision aids in discussions with patients and building trust. 2. Using past clinical experiences to be informed
Fenton et al.	2016	Randomised Controlled trial	61	USA	MRI	To assess the use of SPIs* to enhance the patient-centered communication skills of resident PCPs* in the context of patient requests for low-value diagnostic tests	<ol style="list-style-type: none"> 1. Patient satisfaction a priority for GPs through honouring their requests 	<ol style="list-style-type: none"> 1. Maintaining therapeutic patient-GP relationships

Articles Included	Year	Method	Sample size	Country	Imaging of focus	Aim	Challenges	Strategies
Gransj�en et al.	2018	Interviews	10-20	Norway	General imaging	To determine the perceived facilitators and barriers to guideline adherence	<ol style="list-style-type: none"> 1. GPs perceived need to exclude diagnostic uncertainty through the use of imaging. 2. GPs fear litigation should denied requests subsequently reveal serious missed pathologies 	<ol style="list-style-type: none"> 1. GPs keep themselves updated on available guidelines 2. Using past clinical experiences to be informed 3. Using decision aids in discussions with patients and building trust
Griffith et al.	2015	Interviews	12	Canada	General imaging	To gain a rich understanding of physician participants' experiences and processes of ordering DI*	<ol style="list-style-type: none"> 1. Poor patient literacy on health information 	<ol style="list-style-type: none"> 1. Maintaining therapeutic patient-GP relationships
Le et al.	2018	Surveys	168	USA	MRI	To identify factors that may be associated with the practices of GPs related to ordering imaging in uncomplicated low back pain	<ol style="list-style-type: none"> 1. GPs' inexperience being a factor on the heavy reliance on imaging 	<ol style="list-style-type: none"> 1. Using past clinical experiences 2. Maintaining therapeutic patient-GP relationships and building trust
Ottenheijm et al.	2014	Interviews	18	Netherlands	Ultrasound	To obtain a deeper understanding of GPs' perspectives on the	<ol style="list-style-type: none"> 1. Disagreement between members 	<ol style="list-style-type: none"> 1. Using past clinical experiences to be informed

Articles Included	Year	Method	Sample size	Country	Imaging of focus	Aim	Challenges	Strategies
						diagnostic work-up of patients with shoulder pain in general practice	within the interdisciplinary team	2. Less reliance on guidelines
Pike et al.	2022	Interviews	9	Canada	General imaging	To inform the barriers and facilitators using a theory-based intervention (TDF*) in following imaging guidelines to reduce imaging for nonspecific (LBP*)	1. GPs fear litigation should denied requests subsequently reveal serious missed pathologies	1. Using past clinical experiences to be informed
Sajid et al.	2021	Clinical Record Audit	306	United Kingdom	MRI	The aim was to determine the appropriateness of use of MSK MRI in primary care	1. Medicalising terminologies by interdisciplinary team members for normal age-related problems 2. Misinterpretations of radiology reports by GPs	Interdisciplinary consultations
Sharma, et al.	2021	Focus Groups	20	Australia	General imaging	To develop a public health campaign that was acceptable and understandable to community members and that had potential to reduce overuse of diagnostic imaging	1. Patients' distrust in the health information given by health professionals	

Articles Included	Year	Method	Sample size	Country	Imaging of focus	Aim	Challenges	Strategies
Walderhaug et al.	2022	Interviews	12	Norway	General imaging	To explore GPs' strategies in encounters with patients' expectations for imaging that are not medically indicated according to current guidelines, as well as how patients experienced these strategies	(any challenges?)	<ol style="list-style-type: none"> 1. Using past clinical experiences to be informed 2. Normalising ailments 3. Deferring to professional authority

*Primary Care Practitioners (PCPs), Standard Patient Instructors (SPIs), Magnetic Resonance Imaging (MRI), General Practitioners (GPs), United States of America (USA), Theoretical Domains Framework (TDF), Low back pain (LBP), Musculoskeletal (MSK), Diagnostic Imaging (DI)

Barriers and Facilitators to Guideline Compliance

GPs experienced several challenges in considering patients' requests, which we categorised as barriers to guideline compliance. We also categorised facilitators that allowed GPs to comply with guidelines shown in Table 3.

Patient Centered Care

Four studies addressed patient centered care (Pike et al., 2022; Esfandiari et al., 2019; Le et al., 2018; Ottenheim et al., 2014). A consistent theme that emerged was GPs' commitment to maintaining a therapeutic relationship with their patients by addressing their fears and anxieties. Legitimising patients' thought processes and adopting an agreeable approach led to greater patient satisfaction. GPs view the fulfilment of patients' expectations as a therapeutic approach that enhances patients' acceptance of treatment outcomes. This acceptance often leads to improved adherence to GPs' recommendations, as patients feel empowered in having contributed to their own solutions (Ottenheim et al., 2014). Furthermore, Pike's study in 2022 underscored GPs' emphasis on prioritising patients' wellbeing over resource stewardship (Pike et al., 2022). In that study, GPs were more concerned about appeasing patients' anxieties by ordering scans, even those not medically indicated to pursue patient satisfaction. This was supported by participants in other studies investigating patient-centered care with illustrative quotes from such studies.

Our finding shows that those ordering imaging were more likely to cite patient-centered care as the rationale for the decision. (Le et al., 2018, pg 760)

GPs are increasingly facing pressure to enhance patient satisfaction in the context of time-constrained visits. However, it remains unclear about how large an impact patient requests have on physician-prescribing decisions and how they may be modified by perceived and actual patient satisfaction. (Esfandiari et al., 2019, pg 1542)

Benefits of Advanced Imaging

GPs also believe that advanced imaging serves as a useful tool in diagnosis, particularly in primary care. Imaging is quicker, often painless, non-invasive and has resolved diagnostic uncertainty (Bhise et al., 2018). A participant in Gransjoen's (2018) study explained the importance of imaging: "For [us] GPs, this meant a shift in modality ... Where you could only use plain radiography before, you now use MRI because you have gotten used to it." This shows that GPs have grown accustomed to referring to modalities heavier on both information and use of resources and that they are viewed as highly useful (Gransjøen et al., 2018).

Incentivised Care

Several papers reported a range of factors that impacted GPs' compliance with guidelines with GP participants in Gransjoen's study (2018), indicating that working in private facilities and offering imaging services meant there was a greater demand for profits (Gransjøen et al., 2018).

If scans were ordered, it would be favourable to the organisation and a way of incentivising GPs. Three studies, Pike et al. (2022), Gransjoen et al. (2018) and Ottenheijm (2014), mentioned the economic benefits offered by various health institutions for ordering more imaging. According to one radiologist in Gransjoen's study, the institution would offer incentives for increased numbers of tests performed, as it was profitable for the organisations offering the services. As stated by a study recruit in Gransjoen's study:

So, ... many institutions who want customers right, I think an essential point here, [is] the privatisation of health care and running a health business rather than healthcare. That's scary, because ... profit decides what you do ... (Gransjøen et al., 2018, pg 5)

Similarly, Ottenheijm (2014) found that economic gain and incentivised GPs meant that patients had an expectation that all GPs working within the same system would accede to their requests. Physicians reported that patients sometimes pressure them for images because other doctors at their place of work image more liberally and patients believe that to be a higher standard of care (Ottenheijm et al., 2014). Moreover, with incentives becoming a driving factor, GPs were also seeing a greater number of patients, which pressured them to consult in a shorter timeframe (Pike et al., 2022). Therefore, GPs argued that responding negatively to patients who seek imaging studies would take too long to explain, and it was easier to accede to patients' requests. In addition, in Pike's study (2022):

Participants [GPs] reported that it takes much longer to explain why an image is not needed than to simply order an image. They don't feel they have adequate time to convince patients that they don't require imaging in the run of a busy clinic day. (Pike et al., 2022, pg 22)

Complex Multidisciplinary Care

Esfandiari et al. (2019) call this 'fragmentation of care', referring to noncontinuity of care due to differences in opinions on existing guidelines between the various disciplines or multidisciplinary healthcare systems. In an era of complex healthcare and multiple providers, there are differences in thinking among interdisciplinary team members. Such differences result in miscommunication within medical disciplines, resulting in guideline noncompliance, as stated by participants in Ottenheijm's (2014) and Esfandiari's (2019) studies respectively.

Orthopaedic surgeons think quite differently in the diagnostic work-up compared to what is stated in the GP guideline. A number of patients also see the physiotherapists, [and] I think it is quite hard to communicate in such vague terms [using general guidelines for imaging] ... (Ottenheijm et al., 2014, pg 241)

Patient requests for tests and treatments are commonly reported as barriers to appropriate management of thyroid hormones, in addition to patient nonadherence and multiple providers managing thyroid hormone therapy (Esfandiari et al., 2019, pg 1539).

Litigation Fears

Partially contributing to GPs fulfilling patients' needs was the fear of potentially missing serious pathologies even when symptoms were not 'red flagged' or considered critical under established imaging guidelines (Pike et al., 2022). In cases where there was diagnostic uncertainty and patients were anxious, GPs relied heavily on imaging (Gransjøen et al., 2018; Ottenheijm et al., 2014). Furthermore, in Gransjøen's study, the majority of GPs stated that diagnostic imaging could increase patient safety, particularly prior to surgery, where surgeons could obtain a detailed overview of the patient's condition.

A participant in the study added, "When someone comes in with a long-lasting cough so you auscultate and think it may be a pneumonia, before you would think it probably is pneumonia. But now, for safety's sake, we take an x-ray to make sure the diagnosis is correct" (Gransjøen et al., 2018, pg 4).

Pike (2022) reported that in the case of nonspecific low back pain, GPs feared missing a serious pathology, which could lead to serious consequences such as litigation suits and patient dissatisfaction. Part of excluding uncertainty and avoiding litigations, emphasised by the majority of GPs in Gransjøen's study, was documenting all treatment plans so that it is on record for further reference. This was insisted upon by patients, other medical professionals and even nonmedical professional agencies (Gransjøen et al., 2018).

Patient Demand and Literacy

Participants in the Griffith's (2015) study described how patients requested diagnostic imaging without a nuanced understanding of the optimal timing for detection, that is, when it is too early to detect an ailment by imaging or imaging more frequently than clinically recommended. GPs in Griffith's study stated in a quote on patient demands:

For example, if there was a plan to follow-up on some finding in 6 months, the patient request might be "why can't it be done next week, or in three weeks?" and usually that involves an explanation on what's being followed; if it's going to change, it's not going to change fast enough to make this worthwhile in which case, you've just had the radiation exposure without any realistic chance of it showing anything new. (Griffith et al., 2015)

Griffith's study revealed that the majority of GPs were concerned about poor-quality online content being sought by patients. They said:

Overall, the majority of participants expressed how patients may request DI [diagnostic imaging] because they have received misinformation or incomplete information and have not appraised the quality of that information. (Griffith et al., 2015, pg 22)

The focus of a South African study by Botha et al. (2012) was on the problem of unwarranted demand for radiological imaging by patients and how sociodemographic factors influenced their demands. Their study revealed that only a few demanding images had a good understanding of the requested exam. In fact, only

“10.9% demonstrated good knowledge about X-rays. Those with average knowledge accounted for 15.5% of the study sample. The majority (73.6%) had a score of 0 or 1 and, as such were considered to having poor knowledge about x-rays” (Botha & Mung'omba, 2012, pg 18).

Botha & Mung'omba, (2012) indicated that patients' perceived benefits and expectations of X-rays often influence their beliefs about the need for them. Their study revealed that 60% of patients felt that X-ray studies were more reliable than clinical evaluations performed by a GP, and half of the respondents believed that X-rays have the ability to reveal illness and are a better option for diagnosis. In fact, they were quite dismissive when they were warned of radiation exposure or costs involved. They found that

50.9% [of patients] answered positively when asked whether they would still be willing to be X-rayed if they knew that there was a health risk associated with the examination. In terms of payment for services, 65.5% said they were willing to make extra payment for x-rays. (Botha & Mung'omba, 2012, pg 18)

Patient Anxiety

One recurring theme from the included papers was that patients were anxious, particularly when they were misinformed about the merits and limitations of imaging studies. GPs in Griffith's study responded to requests for imaging solely to ease patients' anxiety. One GP, quoted from their study, said:

Sometimes, if there's a significant amount of patient anxiety, or yeah, if they are not going to rest until that happens, then, I think, sometimes probably imaging is done in that case, unnecessarily. (Griffith et al., 2015, pg 22)

Moreover, anxiety can be further exacerbated by medicalising terminology in radiology reports, prompting both GPs and patients to seek further testing (John Brodersen et al., 2018). That is, medicalising terms are often found as part of the normal ageing process (Sajid et al., 2021). Their study revealed:

Only 16.7% (95% CI \pm 4.2%, n=51) of MRI reports appeared correctly interpreted. Most patients received pathoanatomical explanations, based on often incidental age-expected findings. Medicalising terminology reduces self-reported health, increases anxiety, perceived severity and preference towards invasive management. (Sajid et al., 2021)

Facilitators to GPs Complying with Guidelines

Two themes emerged as facilitators of guideline compliance. Most GPs agreed that ease of accessibility and readability in a busy clinical setting enabled GPs to consult guidelines more efficiently.

Guideline Dissemination

In their randomised clinical trial, Fenton (2016) evaluated the effectiveness of an educational intervention to increase resident GPs' confidence in handling requests from patients considered unnecessary. Their study did not demonstrate any impact of the intervention; however, Gransjoen (2018) and Sharma (2022) found that GPs and patients were more receptive to printed forms of educational interventions in the form of booklets with guidelines on appropriate imaging services than other methods, such as those formally presented by professional bodies. In Gransjoen's study (2018), one GP is quoted on the benefit of having booklets stating:

Easy access was an important facilitator, since there usually was little time to look up guidelines as soon as they were needed. (Gransjøen et al., 2018, pg 6)

According to the findings of Sharma's study (2021) as quoted:

Participants [patients] felt the combination of the leaflet and poster messages would give them more confidence to ask questions. Specifically, the 'Ask your doctor – do I need this test?' message received almost universal praise across both groups [two focus group patients]—participants [patients] supported components of the campaign that empowered patients with information. (S. Sharma et al., 2021, pg 654)

Informal Knowledge Exchange

In addition to the ease of use, several GPs in Ottenheim's (2014) study stated that generic guidelines can be challenging to use with individual patients' varying needs; however, if there are pragmatic applications and ease of use, then guidelines would often be followed. Moreover, the radiologists in Gransjoen's (2018) study disliked formal national guidelines and preferred protocols involving informal knowledge exchange between interdisciplinary colleagues. They quoted:

...radiologists preferred more local protocols and informal knowledge exchange to formal, national guidelines. Local protocols and informal knowledge sharing were perceived as more up to date and therefore better suited to radiological departments. (Gransjøen et al., 2018, pg 4)

With communication between colleagues within interdisciplinary teams, GPs referred patients demanding imaging to other members of the interdisciplinary team or encouraged patients to refer to guidelines by professional authorities. These are discipline-specific organisations that oversee guideline implementations, such as a registration board. The participants in Walderhaug's study added that: "We also observed that some of the GPs referred to professional authorities when arguing against referrals to imaging" (Walderhaug et al., 2022).

Table 3:

Barriers and facilitators to guideline compliance.

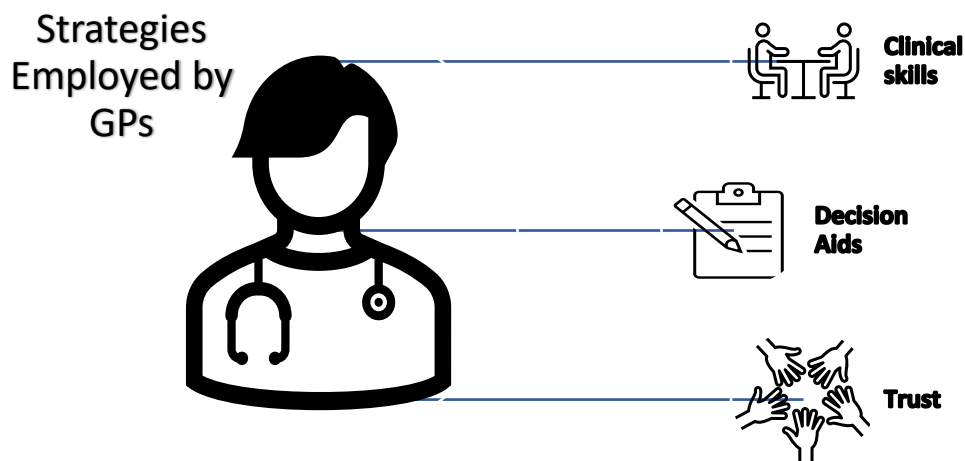
<i>Barriers</i>	Articles investigating barriers
<i>Patient centered care</i>	(Esfandiari et al., 2019; Pike et al., 2022; Ottenheijm et al., 2014; Le et al., 2018)
<i>Benefits of advanced imaging</i>	(Gransjøen et al., 2018)
<i>Incentivised care</i>	(Gransjøen et al., 2018; Ottenheijm et al., 2014; Pike et al., 2022)
<i>Complex multidiscipline care</i>	(Gransjøen et al., 2018; Ottenheijm et al., 2014)
<i>Litigation</i>	(Gransjøen et al., 2018; Ottenheijm et al., 2014; Pike et al., 2022)
<i>Patient demand and literacy</i>	(Botha & Mung'omba, 2012; Griffith et al., 2015)
<i>Patient anxiety</i>	(Griffith et al., 2015; Sajid et al., 2021)
<i>Facilitators</i>	Articles investigating facilitators
<i>Guideline dissemination</i>	(Esfandiari et al., 2019; Fenton et al., 2016; Gransjøen et al., 2018; Le et al., 2018; Pike et al., 2022; Sharma et al., 2021)
<i>Informal knowledge exchange</i>	(Gransjøen et al., 2018; Ottenheijm et al., 2014; Walderhaug et al., 2022)

Strategies Employed By GPs to Reduce Unwanted Patient Requests

Several methods were employed by GPs in cases of either fulfilment or rejection of patient requests. Figure 1 shows an overview of the strategies employed by GPs, as reported in the selected articles.

Figure 1:

Strategies employed by GPs to address patient requests for imaging.



Trust in the GP

Participant GPs in Ottenheim's study reasoned that request fulfilment for imaging could be reduced by earning patients' trust. These authors highlighted the importance of conducting a comprehensive clinical examination to validate patients' symptoms when they consult their GPs. Such a sentiment was echoed in a quote from Ottenheim's study, demonstrating confidence in GPs:

Yes, one advantage is that you extensively examine your patients. (. . .) Gain trust! And often a correct diagnosis, with subsequently less need for additional tests. Maybe these are ordered too much. (Ottenheim et al., 2014, pg 241)

Normalising ailments were often evident in long-term patient-GP relationships where GPs were familiar with their patients and did not appear overly concerned about the presented symptoms during clinical visits. Even when patients' requests were declined, patients expressed how GPs took them seriously and were confident in their GPs' final decisions. Such a positive response was related to the length or extent of the relationship between patients and GPs, as recognised in the study by Walderhaug (2022), with three key points from their study; *1) the patient's confidence in their GP over time, (2) the GPs' knowledge of the patient's medical history and (3) the GPs' knowledge of the patient's background, personality and behaviour. This finding was evident in most consultations. (Walderhaug et al., 2022)*

Valued Clinical Skills

Part of a thorough clinical examination is patients' strongly held view that good clinical skills (e.g., history-taking, symptom recognition, good knowledge of patients) are exercised at each patient visit. Experience with symptom recognition allows GPs to normalise patient concerns and ailments and reassures patients by encouraging a 'watch and wait' strategy prior to obliging patients' requests. Pike's (2018) study reported on GPs' opinions and the benefit of good clinical assessments, as follows:

Most reported considering the patient's history and physical exam findings when deciding whether or not an image is warranted. Other considerations include assessments for red flag conditions and surgical candidacy as well as response to previous treatments and resource stewardship. (Pike et al., 2022, pg 12)

Decision Aids

Moreover, in addition to the 'watch and wait' strategy, GPs had built-in software that aided in prescribing appropriate tests and interventions based on GPs' input about the patient. Such an algorithmic approach seamlessly allowed patients and GPs to come to a shared decision based on the algorithmic output (Fenton et al., 2016).

Esfandiari's study (2019) revealed great benefits of using decision aids, as demonstrated by the following quote:

A total of 79% of respondents stated that a patient-directed intervention would be somewhat to very likely reduce overtreatment, that it would reduce harm to patients, 84% stated that it would increase overall adherence to guidelines, and 81% that it would reduce undertreatment. Overall, 80% of respondents stated that their patients would be somewhat to very likely interested or willing to use a decision aid to facilitate the shared decision-making process. (Esfandiari et al., 2019, pg 1539)

Decision aids using evidence-based medical software were used as interventions to address patient requests. However, a study by Fenton et al. (2016) that explored the effectiveness of using patient-centered techniques within decision aids revealed that they were not effective within the clinical setting. Fenton's study noted that:

In the 155 encounters with [individuals posing as patients for the study] who requested low value tests, residents ordered tests in 41 visits (26.5% [95%CI, 19.7%34.1%]). After adjustment for visit number and case, receipt of the intervention was not associated with a significant difference in the odds of requested test ordering (adjusted odds ratio, 1.07 [95%CI, 0.49-2.32]). (Fenton et al., 2016, pg 195)

GPs thought it was difficult to use decision aids when patients were anxious or demanding, whereas implementing good clinical skills within long-term GP-patient interactions was more effective than relying on software.

Methodological Assessment

Overall, most of the studies were considered moderate to high quality on the Hoy risk of bias tool and the CASP. Two quantitative studies, Sajid et al. (2021) and Fenton et al. (2016), had low risk for bias, with total scores of 8 ‘yes’ out of 10, while Botha’s (2012) study had a high risk of bias, with a total score of 4 ‘yes’. Four out of six qualitative studies met all the criteria, except for Griffith’s (2015) study, which did not meet criteria 2 and 6, and Ottenheim’s (2014) 4 and 6. The potential risk of bias was indicated with appropriate methodology, recruitment strategy and researcher bias. (A detailed outline is available in the Appendix 2 and 3).

Discussion

In summary, our scoping review highlights the challenges GPs encounter when patients demand diagnostic imaging and identifies several strategies employed by GPs to address such demands. Primarily, GPs recognised the value of building trust as part of the therapeutic patient-GP relationship through their extensive clinical experience. With GPs’ increasing experience, skills and confidence in decision making, patients were often satisfied, even when GPs declined their requests. Moreover, GPs often leverage their high level of clinical skills to normalise patients’ concerns and adopt a ‘watch and wait’ strategy.

However, GPs also faced several challenges centered on guideline compliance when acquiescing to patient demands, which we categorised as barriers, and we further explored factors that facilitated GPs’ compliance with guidelines. GPs were aware of existing guidelines for the optimal use of imaging, including the merits and limitations of certain tests and procedures; however, compliance was sometimes challenging. Most guidelines were specific to the discipline of medicine, which allowed GPs to assume their role as gatekeepers in deciding the most appropriate tests for patients while remaining patient centric. This approach included acknowledging and addressing patients’ fears, anxieties and concerns. One such study, Pike (2018), underscored the primacy of shared decision-making, indicating that GPs were more concerned about patient satisfaction than about resource stewardship. This review also emphasised the increased reliance of GPs on imaging as a tool when faced with diagnostic uncertainty, particularly as a means to mitigate litigation due to missed diagnoses of serious ailments. With increasing amounts of online health information and patients being more autonomous in managing their healthcare, many GPs in our review were concerned about patients consulting low-quality sites, which often exacerbated their anxiety. Misinformation and medicalising common ailments led patients to have an inflated perception of illness severity (John Brodersen et al., 2018), with GPs needing to seek additional imaging to appease patients as well as themselves. On the other hand, facilitators of guideline compliance included communicating with interdisciplinary team members. Radiologists and GPs agree that having generic guidelines available across all disciplines facilitated compliance, allowing for ease of accessibility and understanding.

The findings suggest a need for interventions that address both patient-centered care and good stewardship of resources. A system-level change could be initiated through improvements in imaging accessibility and addressing the financial incentives for GPs. Alleviating financial

motives may also afford GPs more time with patients, allowing a thorough examination. Hendee et al. (2010) examined the reimbursement structure within the United States healthcare system. They found that individual imaging costs were reimbursed on a per-procedure basis. This reimbursement model tends to favour institutions and healthcare providers conducting the procedures, potentially fostering a financial incentive for increased use of imaging. Such a process could be realigned with economic incentives prioritising evidence-based medicine and desirable outcomes rather than personal gains from the institution or health professionals and providing patients with more value-based care (Hendee et al., 2010).

The review also highlighted the challenges of time-pressured consultations, missed pathologies and litigation fears. In a systematic review and meta-synthesis of qualitative studies addressing misconceptions and the use of evidence-based medicine for low back pain, Slade et al. (2016) found that GPs across various disciplines reported that the potential for missing underlying spinal pathology without imaging was perceived as a potential risk for managing uncomplicated back pain. Hall et al. (2021), in their systematic review on low back pain and imaging, highlighted that most interventions in the literature did not focus on changing behaviours related to imaging practices among GPs. Rather, most of the ordering practices by GPs were based on the assumption that scans would reassure patients about their condition (Hall et al., 2021). Several sources from our selected studies also explained that GPs lacked the time to explain to patients about the merits and limitations of imaging (De-implementing Wisely Res et al., 2022; R. P. G. Ottenheim et al., 2014). Hendee et al. (2010) further explored the reasons for such caution from GPs, adding that they operate in a legal environment that encourages malpractice claims against health care providers, whether justified or not. In a study in the US, 25% of high-tech imaging studies were ordered principally for defensive purposes, at a cost of \$1.4 billion per year (Business & Health/Medical, 2000). In Australia, although it is uncertain whether the increase in the number of scans is attributable to health professionals in Australia operating in a defensive environment, using data extracted from the Medicare benefit schedule between 2000 and 2021, there was also a significant increase in the utilisation rates of imaging services per 100,000 people for each imaging modality (Medicare Benefits Schedule).

Our review showed that an integral component of GPs reducing unnecessary costs was in earning patients' trust through a therapeutic patient-GP relationship, particularly in earning patients' trust that GPs have conducted a thorough examination. Croker et al. (2013) reported that patients' confidence and trust were most strongly associated with patients' perceptions of having their problems taken seriously by their GPs. This was found to be the case in our review of the literature, whereby legitimising patients' illnesses and normalising ailments, patients were less likely to be anxious and to desire unnecessary imaging. Brodersen et al. (2018) described overdiagnosis as "making patients unnecessarily by identifying problems that were never going to cause harm or by medicalising ordinary life experiences through expanded definitions of diseases" (John Brodersen et al., 2018). Normalising ailments by GPs, as Walderhaug (2022) argues, and encouraging a 'watch and wait' strategy often allows patients time to see if their concerns are alleviated prior to any imaging. As a result, they build confidence in their GPs' clinical skills and increase their trust. Ottenheim's study (2014)

showed that patients were more receptive even when their requests were denied. In contrast to our review findings, Jerant et al. (2017) reported that negatively responding to patient requests resulted in patient dissatisfaction, particularly when dealing with requests for pain medication. With GPs in their studies reportedly suffering the consequences of career dissatisfaction, compensation and patients returning to have their requests reviewed even after being denied (Jerant et al., 2017).

In our review, Fenton et al. (2016) reported that using educational materials was ineffective for resident GPs; however, in Gransjoen's study, where more experienced GPs were participating, there was a preference for using guidelines in the form of booklets. Their study highlighted that having the same guidelines for each interdisciplinary team led to less confusion. GPs expressed the view that guidelines were useful; however, their applicability within interdisciplinary teams was sometimes limited. It was difficult for generic guidelines to accommodate patients' varying needs (Fenton et al., 2016; Gransjøen et al., 2018), and the radiologists in Gransjoen's study preferred informal knowledge exchange as opposed to formalised written guidelines. For a multidisciplinary team, it can be difficult to comply with effective guidelines. Espland (2003) agreed that GPs' ordering practices often rely on recommendations from other interdisciplinary team members, such as physiotherapists. However, resistance to guideline implementation is often complicated by social circumstances, as in our review of economic incentives. Grove et al. (2015) argued that guideline implementation in a specialised discipline such as orthopaedic surgery, where medical experts want to maintain their medical autonomy and judgement, can be difficult. Guidelines conflicting with traditional practice or that run against the norm often encounter resistance from medical professionals who consider themselves well versed or experts in their field of specialty, particularly in highly specialised areas of clinical work where certain practices have been strongly embedded over time (Grove et al., 2015).

Conclusion

This scoping review provides a comprehensive understanding of the challenges faced by GPs in responding to patients' requests for imaging and the strategies employed to address patient needs. This review highlights the importance of patient-centred care in maintaining a therapeutic patient-GP relationship by legitimising patient concerns. The role of imaging has become a central tenet in alleviating diagnostic uncertainty and avoiding litigation. Moreover, health professionals are operating in an environment where economic incentives are provided for more service usage, all of which present barriers to guideline compliance. Effective interdisciplinary communication is valuable in facilitating guideline compliance, allowing each team member to bring awareness on the available guidelines through informal knowledge transfer to other members of the team. Thus, allowing individuals within the team to stay up to date on the latest clinical guidelines and research findings. As such, implementing measures for both GPs and patients would likely provide more desirable outcomes by fostering a healthcare system where patient care remains at the forefront by fostering a culture of guideline compliance. The suggested measures include improving imaging accessibility, realigning reimbursement structures and prioritising evidence-based medicine through ongoing GP education and training.

Appendix 1**Search Strategy**

1. Patient*.mp
 2. Request*.mp
 3. Need*.mp
 4. Desir*.mp
 5. Prefer*.mp
 6. Demand.mp
 7. Expectation*.mp
 8. Consumer*.mp
 9. 1 and 2 or 3 or 4 or 5 or 6 or 7
 10. Diagnostic imaging.mp
 11. Radiolog*.mp
 12. Imag*.mp
 13. Xray*.mp
 14. Computer tomography.mp
 15. Ultrasound*.mp
 16. Positron emission tomography.mp
 17. Magnetic resonance imaging.mp
 18. 9 and 10 or 11 or 12 or 13 or 14 or 15 or 16
 19. 9 and 18
 20. General practitioner.mp
 21. GP*.mp
 22. Healthcare provider*.mp
 23. Primary care*.mp
 24. Healthpractitioner*.mp
 25. Doctor*.mp
 26. Physician*.mp
 27. 19 and 20 or 21 or 22 or 23 or 24 or 25
 28. Strateg* or method* or mean* or process*
 29. Guideline* or outline* or definition*
 30. 28 and 29
 31. 27 and 30
 32. Limit 26 to yr.= '2010-current'
 33. Remove duplicates from 27.
 34. Limit 28 to English language
 35. Limit 29 to humans
-

Appendix 2

Table 4:

Qualitative Assessment using CASP analysis

	No		Yes		Not Applicable
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Author/Year	CASP 1	CASP 2	CASP 3	CASP 4	CASP 5	CASP 6	CASP 7	CASP 8	CASP 9	CASP 10
Ottenheim et al., 2014										
Griffith et al., 2015										
Gransjoen et al, 2018										
Sharma et al., 2021										
Pike et al., 2022										
Walderhaug et al., 2022										

CASP tool for qualitative studies. CASP 1: Was there a clear statement of the aims of the research , CASP 2: Is a qualitative methodology appropriate? CASP 3: Was the research design appropriate to address the aims of the research? CASP 4: Was the recruitment strategy appropriate to the aims of the research? CASP 5: Was the data collected in a way that addressed the research issue? CASP 6: Has the relationship between researcher and participants been adequately considered? CASP 7: Have ethical issues been taken into consideration? CASP 8: Was the data analysis sufficiently rigorous? CASP 9: Is there a clear statement of findings? CASP 10: How valuable is the research?

Appendix 3

Table 5:

Quantitative Assessment using Hoy et al’s Risk of Bias tool

No	Yes	Not Applicable
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Author/Year	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	Criteria 6	Criteria 7	Criteria 8	Criteria 9	Criteria 10
Botha et al., 2012										
Esfandiari et al 2019										
Fenton et al 2016										
Le et al. 2018										
Sajid et al. 2021										

Hoy et al’s Risk of Bias tool for quantitative studies. Criteria 1: Was the study’s target population a close representation of the national population in relation to relevant variables? Criteria 2: Was the sampling frame a true or close representation of the target population? Criteria 3: Was some form of random selection used to select the sample OR was a census taken? Criteria 4: Was the likelihood of nonresponse bias minimal? Criteria 5: Were data collected directly from the subjects? Criteria 6: Was an acceptable case definition used in the study? Criteria 7: Was the study instrument that measured the parameter of interest shown to have validity and reliability? Criteria 8: Was the same mode of data collection used for all subjects? Criteria 9: Was the length of the shortest prevalence period for the parameter of interest appropriate? Criteria 10: Were the numerator(s) and denominator(s) for the parameter of interest appropriate?

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5.3 Summary of Chapter 5: Challenging encounters: A systematic scoping review to understand GP compliance with imaging guidelines and the role of the patient.

The review highlights the need for interventions that balance patient-centred care with responsible resource use. Challenges such as time constraints (Gransjøen et al., 2018), fear of litigation (Kanzaria et al., 2015), and missed diagnoses drive unnecessary imaging (Pike et al., 2022). The studies analysed in this review show that GPs often order scans to reassure patients or avoid legal risk rather than based on clinical need. Many state that the lack of time and working within a medico-legal environment prompt such defensive responses to patients' requests (Pike et al., 2022).

Trust in GPs was key in reducing unnecessary requests, particularly in a long-term patient-GP relationship (Walderhaug et al., 2022). It was also noted that when GPs legitimise and validate patient concerns, patients are less likely to seek unnecessary imaging. Strategies such as normalising symptoms and 'watchful waiting' help reassure patients without medicalising (i.e. imaging) all experienced symptoms (Walderhaug et al., 2022). A thorough clinical examination includes the patients' strong belief that the GPs' effective clinical skills, such as symptom recognition and a solid understanding of patients' history, are applied during each patient visit. Prior experiences that enable symptom recognition allow GPs to validate patient concerns and ailments, providing reassurance by encouraging a 'watch and wait' strategy before fulfilling their requests. Pike et al.'s (2018) study discussed the advantages of such robust clinical assessments.

The scoping review assessed the global perspectives of GPs transitioning from paternalistic care to patient autonomy. GPs face numerous barriers in managing patient expectations. Patient-centred care, trust-building, and effective interdisciplinary communication were crucial. The review underscored the complex interplay in addressing the systemic

restructuring incentive schemes for GPs and promoting evidence-based practice through ongoing GP education.

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Chapter 6 : Introduction to Patients’ requests for radiological imaging: A qualitative study on general practitioners’ perspectives

De Silva L, Baysari M, Keep M, Kench P, & Clarke J. (2023). Patients’ requests for radiological imaging: A qualitative study on general practitioners’ perspectives. *Journal of Health Expectations*, 29(3), 579-592. doi: 10.1111/hex.13849 6.1

6.1 Phase 3: GPs’ Perspectives

The systematic scoping review presented in Chapter 5 explored patient-initiated imaging requests from a worldwide perspective, with consideration given to strategies for mitigating unwarranted imaging requests. Moreover, the studies in Phases 1 and 2 showed that patients are increasingly being informed about their health through various digital platforms, such as online websites (Huisman et al., 2020), software apps (Topol 2015), and government-sponsored media campaigns, or community groups established either in person or online (Suman et al., 2021, Sharma et al., 2020). As shown in the systematic scoping review, the rise in patient autonomy based on knowledge gained via OHI often leads to GPs facing dilemmas in managing patient requests. In this context, GPs must navigate complex responsibilities, balance patient expectations with their own clinical judgment while also maintaining a therapeutic relationship with patients (Walderhaug et al., 2022, Nilsen & Malterud, 2017)

In Australia, primarily GPs (and select other health practitioners) can provide patients with referral letters for specialty services such as imaging, and as such they are well-positioned as gatekeepers who are responsible for ensuring the appropriate use of medical resources. Patient-initiated requests introduce various challenges for patient-GP consultations. As patients have become more autonomous and empowered, there is more pressure on GPs to

meet their demands for imaging studies, even when the clinical justification for this imaging remains unclear (Walderhaug et al., 2022). Defensive medicine—that is, the ordering of unnecessary tests to avoid litigation—adds yet another layer of complexity to GPs' decision-making in this area (Nilsen & Miltrud, 2017).

Accompanying the growing emphasis on patient-centered care are concerns that the overuse of diagnostic imaging results in unnecessary healthcare costs, incidental findings, and exposure to potentially harmful radiation (Docking et al., 2022). There is a critical need, therefore, for an exploration of the factors that influence GPs' decisions to fulfil their patients' requests and also an investigation into the consequences for GPs in denying these requests. The study reported in this chapter aims to identify and analyse the key factors that shape GPs' decisions regarding patients' requests for—and expectations around—imaging studies. The study explores patient expectations, the characteristics of those patients who are more likely to make requests, the experiences of GPs with respect to requests, and the pressures of these expectations place on patient-GP consultations. The research questions specifically address if GPs feel pressured or obliged to acknowledge and validate patients' requests, if there is a relationship between patient characteristics and request fulfillment by GPs, and what are the consequences of declining a referral as self-reported by GPs.

The qualitative study conducted in Phase 3 of this research employed semi-structured interviews to capture the perspective of ten GPs working across five private medical centres in the north-western area of Sydney, Australia. These GPs were recruited through advertisements placed on their medical centres' intranet. Participants expressed their interest in volunteering for the study by informing their own medical centre's head receptionist within each centre, who then informed the researchers of their interest in participating. All of the interviews were conducted face-to-face or via Zoom in August and September, 2022.

Zoom was offered as an option to all GPs to accommodate their busy schedules. Ethics approval was granted by the University of Sydney (2022/520).

In the interviews, the GPs were asked to reflect on their strategies for managing non-clinically indicated patient-initiated requests for imaging, and to identify the professional challenges they faced due to aggressive or overbearing patients. Audio recordings of the interviews were transcribed verbatim. The transcriptions were then analysed using thematic analysis, with the initial coding performed by the lead researcher. Key themes and sub-themes were identified and organised using NVIVO software, which allowed for a detailed examination of these GPs' perspectives. A second reviewer analysed the results to ensure reliability and consistency in the data analysis process, with all final themes agreed upon by the research team.

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ORIGINAL ARTICLE

WILEY

Patients' requests for radiological imaging: A qualitative study on general practitioners' perspectives

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Abstract

Background: With the increasing availability of information, patients are becoming more informed about radiology procedures and requesting imaging studies. This qualitative study aims to explore factors that influence general practitioners' (GPs) decisions to fulfil patient requests for imaging studies during clinical consultation.

Methods: Semi-structured interviews were conducted with 10 GPs working across five private medical centres in Northwest Sydney. Conventional content analysis was used with emergent themes to identify GPs perspectives.

Results: Six themes stood out from the interviews with GPs fulfilling patient requests for imaging studies. They included four pertaining to patient factors: patient expectations, 'therapeutic scans', 'impressive labels' and 'entitled'. Two further themes pertained to the GP perspective and included 'defensive medicine' and 'new patients'. Requests are fulfilled from anxious or health-obsessed patients, with GPs worrying about litigation if they refuse. However, GPs decline requests from patients with entitlement attitudes or during first visits.

Discussion: The findings suggest that GPs struggle to balance their responsibilities as gatekeepers of imaging with patients' expectations of request fulfilment. Clear guidelines on the appropriate use of diagnostic imaging and its limitations could help patients understand its proper use and ease anxiety. Additionally, education and training for GPs could help them manage patient expectations and provide appropriate care.

Patient Contributions: Patients, service users, caregivers, people with lived experiences or members of the public were not directly involved in the design, conduct, analysis or interpretation of the study. However, our study was conducted in primary care facilities where the GPs were interviewed about patients' requests for diagnostic imaging based on their own initiatives. GPs' perspectives in managing patient expectations and healthcare

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utilisation were explored within the Australian Medicare system, where medical imaging and image-guided procedures come at little to no cost to the individual. The study findings contribute to a better understanding of the challenges faced by GPs in dealing with patient consumerism and requests for diagnostic imaging, as well as factors influencing request fulfilment or denial. Insights gained from this study may inform future research about delivering patient-centred care within a similar context.

KEYWORDS

consumerism, doctor–patient relationship, general practitioner, imaging, internet, patient-requested radiology

1 | INTRODUCTION

In Australia, patients are required to have a general practitioner (GP) referral to access imaging services. GPs face several conflicts in assuming this gatekeeping role. They must negotiate patient requests for imaging while maintaining a good rapport with patients. Further, they need to protect patients from the harms of medical exposure, while limiting overuse of healthcare resources.¹ This authoritative or paternalistic role requires expert judgement when deciding what evidence-based tests and procedures are appropriate for achieving patients' clinical diagnoses.^{2,3}

However, with patients' increasing use of the internet,⁴ digital platforms,⁵ and accessibility to personal online health records⁶ has shifted the traditional role of GPs in the healthcare system.^{7,8} With the increased availability of health information online, patients can now more easily access and learn from information about medical conditions and health-related issues independently,⁴ and can consider themselves well-informed health consumers.³ This has contributed to the rise of patient consumerism. As such, GPs increasingly encounter patients who request studies, and rather than relying on their expert guidance, challenge the GPs role as gatekeeper.⁹

One aspect of patient consumerism is the demand for patient-centred care.¹⁰ Patients expect GPs to acknowledge their needs, perspectives and understand the complex psychosocial aspects of the illness process.¹¹ However, there are concerns associated with patient-centred care.¹² Some argue that the increased emphasis on meeting patient demands may drive healthcare costs higher.¹⁰ Moreover, GPs may feel pressured to order unnecessary tests or procedures to alleviate their own anxiety and fear of litigation.^{13,14} This could result in the overutilisation of healthcare resources and potential financial burden.

Thus, with the increasing use of imaging services,¹⁵ concerns have been raised over the appropriateness of the tests and procedures requested by patients.¹⁶ While patients have become more knowledgeable and self-directed, particularly those in higher socioeconomic settings,^{17,18} often medical consultations have become a means to secure a self-initiated request for a medical imaging study. This challenges the traditional role of GPs as the primary source of medical advice and decision-making.

Overall, the evolving landscape of patient consumerism, driven by increased internet access and patient-centred expectations,

necessitates a response from GPs. The perceived pressure on GPs to order diagnostic tests has been explored by Griffith et al.¹⁹ with additional studies centred on patient–GP communication, concerns over unnecessary expenditure in imaging²⁰ and avoiding imaging overuse.²¹ However, there is limited research on how GPs personally respond to patients requesting radiological studies. Our study aimed to explore with GPs, the patient–GP relationship factors that influence granting patient requests and the relationship between request fulfilment and patient characteristics. Specifically, the research questions were: What factors facilitated GPs to meet or decline requests, and what patient characteristics enabled (or not) request fulfilment. The University of Sydney ethical review board approved this study.

2 | METHODS

2.1 | Recruitment

GPs in private medical centres with attached imaging facilities throughout metropolitan North-Western Sydney, Australia were initially contacted via an advertisement on the medical centres' intranet. Those interested indicated their willingness to participate, and the researcher then followed up with each doctor for an interview. A qualitative approach such as interviews lends detailed and nuanced understanding of the research questions with emergent themes adding meaning to the data and contributing to theory development.¹⁴ With such a methodology, participants' experiences and perspectives within primary care facilities were explored through the richness and complexity of the data. Written consent was obtained before commencing. Semi-structured interviews were conducted face-to-face ($n = 6$) or on Zoom ($n = 4$). Interviews were between 20 and 40 min ($M = 25$, $SD = 9.33$) between August 2022 to September 2022.

Participants provided demographic information such as their length of time in practice, and their experiences of patients requesting radiological referrals. The interview was then guided by open-ended questions developed through an extensive literature search^{10,13,21–24} and expert consultation with the imaging department's healthcare professionals, for example, radiologists, specialists and physiotherapists. These

included the types of exams frequently requested, the characteristics of patients, their concerns and demographics of patients likely to request referrals. Participants were also asked about their professional relationship with the radiologists they refer to, and any access to and/or the availability of specific guidelines for GPs regarding tests/procedures used in radiological studies. Additionally, interviewees were asked about any steps taken to avert unnecessary requests, particularly when dealing with aggressive or overbearing patient behaviour. All interviews were conducted by the first author (L. D. S.) who audio-recorded it on her iPhone. As soon as practicable and by the end of the day, she transcribed the interview verbatim allowing full and immediate immersion into the data. All identifying components were removed as the text was typed and then the audio recording was permanently deleted from the iPhone immediately, in compliance with ethical approval.

2.2 | Data analysis

Transcriptions were initially read and reread by the first author (L. D. S.) searching for meanings and patterns used in thematic analysis, allowing immersion into interviewees' perspectives through familiarisation of the depth and breadth of data.²⁵ The transcribed data were organised as codes under generated themes using NVIVO release 1.7(1533) software package. Using such an analytical tool allowed for flexibility as it

adapts to broader textual sources such as interviews by organising, categorising and quantifying textual information through explicit coding rules and procedures for future replicability.^{15,26} In our study, codes representing key thoughts or themes were derived in alignment with research objectives.²⁶ Each code was subsequently separated by categories and subcategories with names that described the nature of each derived code for thematic analysis.²⁶ The first author (L. D. S.) coded all the interviews, with an experienced qualitative researcher supervising the coding process. A second team member (J. C.) looked through the interview data to generate additional themes or review the ones generated by the first author (L. D. S.). Themes and subthemes were sent to the research team for consensus. All came to an agreement on the themes derived.

3 | RESULTS

In total, 10 GPs aged 35–73 years ($M = 56.6$ years, $SD = 14.1$ years) were interviewed until no new themes were generated, reaching saturation. They had 5–40 years ($M = 23.3$, $SD = 2.6$ years) experience in practice, and identified as either male (four) or female (six).

The analysis revealed six themes around factors surrounding GPs meeting patients' requests for radiological referrals shown in Table 1 below, with explanations for each generated theme.

TABLE 1 Themes generated from the interviews with frequency in percentage.

Theme	Explanation and comments	Percentage of participants commenting on theme (n = 10)
Expectations	There is an assumption by patients that in requesting diagnostic imaging they are being proactive in addressing their health concerns. Moreover, this assumption is associated with prior radiological experience.	80%
'Therapeutic scans'	A phenomenon experienced by GPs is where they may feel compelled to oblige patients' requests for certain tests or treatments as a form of reassurance, even if they do not necessarily agree with the nature of those requests. This behaviour is often driven by the desire to satisfy patients and provide them with a sense of reassurance, comfort and closure with their health concerns.	70%
'Impressive Labels'	These concerns were raised by GPs regarding patients' accessibility to diagnostic information from prior radiological scans or reports. When patients have access to their past medical records, including radiological imaging results, there is a potential for them to misinterpret their current symptoms by comparing them to their previous experiences or those of others they know such as family members or friends.	60%
Defensive medicine	In our study, if a patient presents with symptoms indicative of a fracture or any serious medical condition, the GP faces a difficult decision. If the GP decides not to order the requested test and the condition is later diagnosed, there is a possibility that the patient or their family may pursue legal actions against GPs.	30%
New patient	GPs had very strong views about individuals demanding studies on their first visits. Without knowing patients' medical history and previous diagnostic tests, it becomes challenging for GPs to determine the appropriateness of specific medical studies. GPs, however, were more obliging to those in long-term Patient-GP relationships.	60%
Entitled	Most GPs were concerned Medicare subsidised studies allowed greater accessibility to imaging. Such access may lead some patients to perceive it as their 'right' to receive such diagnostic tests whenever they ask regardless of its necessity.	70%

Abbreviation: GP, general practitioner.

3.1 | Expectations

GPs explained that patients were generally aware of imaging services being readily available and that such services were funded under Medicare at no cost to them.

Half of my patients ask [for scans] because they know that radiology is free in this country. (Male, 55)

Such freely available imaging services meant there was an expectation for doctors to fulfil patients' requests. Participants highlighted that such expectations generally came from those who were more health literate, had employment and with higher socioeconomic status. These individuals, GPs explained, were well informed about their symptoms and illnesses and indicated the need to be actively involved in their health by requesting scans and interventional procedures using imaging. Many had concerns over returning to work as motivators.

Some struggling with persistent pain would ask for X-rays because they were familiar with these types of scans and know that it is available to them. You know they've put up with back pain so much they want to fix it quickly so they can get back to work. (Male, 73)

Definitely those in the Type A personality. Those who are very motivated and want to be informed particularly in skeletal injuries wanting to know how long they will be out [of work] for? Whether it is 4–6 weeks. Especially if they have an event and want to take care of their injuries as soon as possible. (Female, 52)

3.2 | 'Therapeutic scans'

Another recurrent theme was that interviewees felt some imaging tests requested by their patients have a 'therapeutic' value through easing their anxiety, for example, related to possible pathologies.

I find X-rays have become a therapeutic requirement, [and] that their [patients'] problem often dissipates once the request is given. (Female, 40)

GPs pointed out that these individuals had experienced illnesses where radiological services resulted in perceived benefits. Having had a prior positive experience with medical imaging, and experiencing anxiety over their illness, prompted patients to request 'therapeutic scans'. Some GPs considered that individuals wanting therapeutic scans were often fixated with their health and self-diagnosed without formal clinical assessments from health professionals.

These individuals are increasingly obsessed with their health, they are particularly anxious and want reassurance with X-ray. (Female, 70)

Every day we have people coming in and asking if they could have an X-ray you know. We can clearly see they don't need it and yeah and saying they possibly have a fracture. I try and do a clinical examination and avoid X-ray and CT especially with kids. But you know they push us just to get that X-ray or CT because you know the last time, they had it [X-ray], they found a fracture or something like that you know, and they insist on having one now because they think it is the same problem. (Male, 60)

GPs also indicated that health anxiety prompted patients to search for their symptoms and illnesses online. Some participants mentioned that government-sponsored advertising increased patient awareness by encouraging patients to check for bowel, breast or prostate cancer. GPs quickly pointed out that although such media publicity and social media platforms provide useful dissemination of health information, they also initiated a level of anxiety.

3.3 | 'Impressive labels'

Therefore, in potentially losing their gatekeeper role, participants agreed that patients needed appropriate guidance discerning the most appropriate test or procedure. Although GPs observed that patients were indeed well informed, they lacked critical understanding on the limitations and merits of various tests and procedures. For example, using X-rays for acute bronchitis is not beneficial but it is useful for pneumonia where the effects are visible on X-rays.²⁷

Often, they have the wrong impression about what a test will exclude or not exclude. (Female, 60)

Prior patient exposure to radiological reports using phrases such as 'degenerative disc disease', a common occurrence found in the aging population,²⁸ were reported as a prompt to seek further scans. One participant observed that these phrases were 'impressive labels' considered significant by patients.

I mean to be honest; a lot of imaging services will give you a label just to find things. Impressive labels on things that are not significant. It's what patients are looking for and it is what they want to hear. (Male, 73)

So, most anxious patients, what they do is they just Google their symptoms. Yes. And then they see differential diagnosis and bowel cancer is high up on the list, they are [then] convinced that they have bowel cancer. (Female, 40)

3.4 | Defensive medicine

GPs expressed concerns about the potential threat of litigation if they denied patients' imaging requests even when they deemed the request inappropriate. Three out of the 10 participants indicated the need to practice defensive medicine.

Because ... if they [patients] do not do physiotherapy, [and] they return to sporting activity and if it shows later on X-rays that there was a chip or fracture, they will point the finger at the doctor—that he didn't do the X-ray. That's the reason I would be more cautious. (Male, 55)

However, most GPs agreed that within a long-term, established GP–patient relationship, GPs were likely informed about patients' personalities, expectations and medical history and could engage in appropriate clinical negotiations.

3.5 | New patient

While participants were concerned about avoiding potential litigation, most agreed that their regular patients, those in long-term GP–patient relationships, would likely comply with their guidance. In other words, if they felt certain tests or procedures were inappropriate and they explained why, they believed their regular patients would likely comply with recommendations. This was not viewed to be the case for the unfamiliar patient who was seeing that GP for the first time.

Yeah, difficulty is with patients who I don't know. They are walk-in patients; They say, I want to have an X-ray of my whatever. The first thing I do is not [get into a] confrontation. First thing I say, oh, excellent. Of course, we can organise that. Can I know the reason? Can you please give me some details? Then, you start talking and you start looking and at some stage you decide whether they actually need the X-ray or not. (Male, 55)

In particular, participants noted that these patients 'tend to be noncompliant and less receptive to guidance often seeking the last available appointment' (Female, 40), giving the GP limited opportunity to explore the reasons for the request and building sufficient rapport to advise if the request is not clinically recommended.

Participants perceived that those patients new to the GP used medical consultations as a formality to secure a referral request, and GPs were generally reluctant to comply with such requests.

They [new patients] probably don't even trust the doctor that much... they will trust the CT or ultrasound scans better than trusting the GP. (Female, 40)

Patients say, oh you're not my regular GP, but can you do this for me? It is that sort of attitude that we sometimes get from some patients ...they insist [saying] my GP will give me what I want, or they usually give me this and that... so I say, Then go [and] see your GP.

GPs generally require more time with new patients to familiarise themselves with patients' medical history. The process of familiarisation often lengthens consultation and disrupts workflow.

But sometimes it was easier and quicker just to accede to them, if they want back X-rays. Well, it's not a good idea. But you know, sometimes you did it, because you had a line-up of people waiting, and that was going to take a long time to explain, and you weren't going to convince them [otherwise] anyway. (Male, 73)

Moreover, GPs explained that new patients making such requests 'have made up their mind and if you [GP] still are hesitant, they most likely find another doctor who will give them their request' (Female, 42).

3.6 | Entitled

With most radiological studies covered under the taxpayer-funded Medicare Benefit Scheme (MBS), patients felt entitled to scans and procedures. MBS describes the types of services that can be subsidised under Medicare (<http://www.mbsonline.gov.au>). GPs found adhering to the MBS guidelines challenging, for example, one GP stated that many of her patients wanted computer tomography (CT) calcium scoring after the death by heart attack of a famous Australian cricketer. The associated publicity explained that CT-measured calcium deposits in coronary arteries indicate an increased risk of heart disease.

CT calcium score requesting was increased so that was significant. In the last six months a lot of patients were prepared to go to cardiologists, but they want to be proactive themselves. They [wanted] to be reassured by scores of 0. I try and stick to the guidelines as much as possible. (Female, 52)

Moreover, if patients had a strong family history of certain illnesses, they were more than likely anxious and want medical imaging to reassure themselves they were disease free.

My patient whose sister had ovarian cancer wanted a pelvic ultrasound. So, it's more for reassurance. Or they will come and ask for bloods and want everything done and you start to pick up unnecessary things that you now need to treat. (Female, 42)

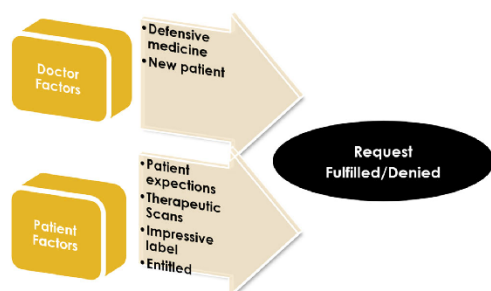


FIGURE 1 Patient–doctor factors in fulfilment or denial of requests.

Whether due to media publicity or anxiety over family history, adherence to Medicare and radiological guidelines was challenging for the GPs. As a result, they often found themselves in conflicting situations of easing patients' anxieties while attempting to enforce existing guidelines.

In summation, four themes centred around patient factors: patient expectations, 'therapeutic scans', 'impressive labels' and entitlement. Two themes centred around the GP's perspectives, including defensive medicine, and 'new patients'. This is portrayed in Figure 1.

4 | DISCUSSION

This study aimed to understand factors influencing GPs' responses to patients' requests for imaging. We found that GPs were more likely to grant requests from health-literate, anxious patients with prior radiological experience who came with explicit expectations. Patients with prior experience with radiological services perceived benefits by requesting referrals for studies, however, with a limited understanding of complex radiological terms, patients may misunderstand pertinent information. Moreover, GPs believed that anxiousness was further emphasised through public health information dissemination and that misunderstanding may lead patients to request radiological studies. However, this was problematic, as they lacked critical understanding of the merits and limitations of tests and procedures. Further, new patients were more likely to request radiological studies, and GPs often complied due to time constraints and a perceived threat of possible litigation.

In Australia, Medicare covers many medical imaging and imaging-guided procedures with little to no cost to the individual,²⁶ leading patients to expect GPs to comply with requests. The GPs in our study acknowledged the challenge of denying requests in established GP–patient relationships and emphasised the importance of focusing on overall patient outcomes. This is consistent with Carlsen et al.,²⁹ who found that denying a patient's request in a well-established GP–patient relationship is difficult, and GPs felt uncomfortable doing so. However, imperatives such as radiation safety and the risk of overservicing due to incidental findings from unnecessary imaging

prompted concerns in our GPs. Mendelsohn³⁰ emphasised the need to justify unnecessary imaging requests for overall patient benefit. Fenton et al.³¹ stressed the value of several interventions to reduce the occurrence of low-value diagnostic requests, including better patient–GP communications and implementing referral guidelines for healthcare practitioners during such situations. Walderhaug et al.²¹ found, as in our study, that patients' trust in GPs negates unnecessary requests, and such trust is usually enabled through long established GP–patient relationships.²¹

However, as patients become more health literate and have greater access to medical records,¹¹ they are increasingly aware of medical terminology and labels. Patients may be concerned by seemingly impressive medical terms, such as 'degenerative disc changes', despite these being considered normal for older adults.²⁸ Brodersen et al.³²(p.1-3) defines this as, 'making people "patients" unnecessarily, by identifying problems that were never going to cause harm or by medicalising ordinary life experiences through expanded definitions of diseases'. These authors agree this can result in unnecessary medicalisation, with patients seeking diagnostic imaging to confirm potential ailments. Echoing one participant in our study, patients are seeking solutions through requests on their own initiative but with little awareness surrounding reasons for their requests. While watchful waiting strategies can reduce low-value spinal imaging,³³ GPs often fulfil patient requests to reduce anxiety, avoid confrontation and increase satisfaction.

Moreover, GPs in this study fulfilled referrals for excessively health-concerned patients to reassure them, calling these 'therapeutic scans'. Part of the reason is the plethora of publicly available medical information which often exacerbates patients' anxiety and leads to unnecessary requests. Similarly, Hogue et al.³⁴ points out that exposure to information about medical conditions and associated treatments in the public domain often prompts consumers to seek further information, predominantly online. Their study argued that patients exposed to information will likely expand their knowledge through online searching to better inform themselves, but that online diagnosis without medical guidance is problematic⁴ as the quality and reliability of the information is not guaranteed. As in our study, participants were concerned with public health dissemination, as some of their patients, in seeking reassurance, had requested screening for bowel or ovarian cancer. Thus, GPs in appeasing patients sometimes overlooked Medicare guidelines to ease patient concerns.

Patients' lack understanding of the true cost of studies, and that unnecessary imaging services can lead to incidental findings requiring further healthcare interventions. Those with a family history of illnesses, in response to media publicity, may request certain tests proactively, as seen in our study with patients requesting CT calcium scores. Berg et al.³⁵ suggested that enforcing guidelines could reduce inappropriate requests and unnecessary imaging. However, our study, as with Gransj en et al.,⁷ found that adherence to guidelines has caveats, including difficulty explaining guidelines in limited consultation time, lack of knowledge of established guidelines, practicing defensive medicine, and satisfying consumer-driven patients.

4.1 | Limitations and strengths

There are some limitations to the study which would include the small sample size and length of the interview for each participant. Interviews were within a limited time frame due to GPs busy schedules. The study could have benefitted from comparing participants who were new graduates to GPs who have been in service for a greater length of time. However, the study's strength was in the in-depth and data-rich information obtained through open-ended interviews with a diverse group of GPs.

5 | CONCLUSION

This study explored how GPs respond to patients requesting imaging referrals and identified the underlying themes emerging from interviews around GPs' perspectives and experiences with patient expectations regarding imaging requests. The findings revealed that 'impressive labels', used in imaging reports, conveyed to patients a sense of seriousness, which in turn exacerbated patients' requests for them. GPs reported that some patients, especially those new to them, often felt entitled to receive imaging scans, with cost being of little concern. Furthermore, many patients who were experiencing anxiety placed significant value on radiological scans, and GPs acknowledged the importance of appeasing patient anxiety through the use of 'therapeutic' imaging while also practicing defensive medicine. Overall, this study highlights the complex dynamics involved in patient-GP interactions regarding imaging requests and suggests that developing evidence-based strategies, perhaps through the professional bodies, might help manage the complexities surrounding such requests.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

Institutional ethics approval was granted by the University of Sydney Human Research Ethics Committee (HREC) Project number: 2022/520. Approval period: August 15 2022 to 2026.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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6.2 Summary of Chapter 6: Patients' requests for radiological imaging: A qualitative study on general practitioners' perspectives

This chapter examined the GPs' perspectives on the growing prevalence of patient-initiated requests for radiological studies, revealing the increasing complexities GPs face in managing primary care facilities (De Silva et al., 2023). The findings of this study suggest that GPs are frequently required to mediate between evidence-based clinical judgement and rising consumer expectations, driven by patients' access to OHI (Huisman et al., 2020).

Six key themes emerged that shaped GPs' decisions on whether to fulfil or deny patients' requests: patients' expectations, relying on scans for therapeutic reassurance, misunderstanding diagnostic terminology, entitlement to publicly funded imaging, functioning within a medico-legal context, and insufficient established history and rapport in a new patient-GP relationship. Although GPs agreed that certain requests were clinically unnecessary (Fenton et al., 2021), they frequently accommodated patients to maintain rapport and enhance patient satisfaction (Walderhaug et al., 2022).

These findings underscore the "grey area" that GPs frequently navigate, balancing patient-centred care with the risk of medical overuse. Consequently, the study emphasises the need for a systemic change as patients transition from passive recipients of care to active participants whose expectations shape their general practitioners' diagnostic decisions making of their GPs (De Silva et al., 2023).

The tension between professional responsibility and patient expectations is not limited to general practice; it also affects imaging departments (Fonseca et al., 2018). In these settings, radiologists must make imaging decisions based on referral letters from patients who have persuaded their GPs to refer them for radiological studies or procedures. The next chapter

delves deeper into the experiences of radiologists who are seen as part of specialised care in the patient's healthcare journey

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Chapter 7 : Introduction to Patient Agency: Insights from Radiologists

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7.1 Phase 4: Radiologists' Perspectives

The introduction to this thesis (Chapter 1) explained how diagnostic imaging, with its ability to provide accurate and non-invasive diagnosis, is becoming a cornerstone of modern medical practice. The increase in patient-initiated requests for imaging is a result of increasing accessibility to OHI, which has empowered individuals to take on a more active role in their health by requesting imaging studies from GPs on their own initiative. However, this rise in patient-initiated requests has raised some concerns among GPs and other healthcare providers, and there are important questions to be answered regarding the role of healthcare providers in this process, particularly as some requests for imaging are seen as unnecessary.

As previously discussed in Chapter 6, access to diagnostic imaging is usually facilitated in Australia through a referral from a healthcare provider, such as a GP. The cost of many imaging studies is subsidised under the Medicare Benefits Scheme (MBS), which has led to a depletion of resources due to increases in patient-initiated imaging. The latest Medicare data reveals a significant rise in imaging service delivery, with an 11.3% year-on-year increase between January and March, 2023 (AIHW, 2022-2023). While subsidised care provides affordable access to diagnostic imaging, it also presents challenges for managing this care appropriately.

Although radiologists are not often directly involved in patient care, they nonetheless play a pivotal role in patient-initiated imaging. They are not only responsible for interpreting the imaging studies requested by GPs but they also need to manage an increasing workload due to non-indicated imaging requests. The study in Phase 4 of this research explores the impact of patient-initiated imaging on radiologists, focusing on how such requests affect their workload and the broader healthcare system. It also seeks to understand radiologists' perspectives on the appropriateness of these requests and to elicit their suggestions for mitigating unnecessary imaging. The research questions specifically addressed whether radiologists were aware of patient-initiated requests for radiological imaging studies, what the facilitators to requesting unwarranted imaging were, if patients were aware of the merits and limitations of various radiological studies and if such unwarranted requests impacted radiologists' workload.

The cross-sectional survey used in Phase 4 was designed to capture the perspectives of radiologists working in private medical centres within the same company across Australia. It was conducted between November 2023 and February 2024 to assess the impact of patient-initiated imaging on radiologists' workloads. Radiologists employed within this large private healthcare imaging company were invited to participate in the study through the company's intranet system. Ethics approval was given by the University of Sydney (2023/831).

The recruitment process was facilitated by an educational coordinator within the company, who distributed the survey link via the company's intranet. The choice of an educational coordinator for this task helped to maintain the researchers' distance from the participants. The study targeted 100 of the full-time radiologists working across various sites within Australia, including in Queensland, New South Wales, Victoria, South Australia, and Western Australia. These radiologists were provided with an information sheet outlining the

reasons for the study and were given the opportunity to participate. The survey included a combination of structured questions, including open-ended and scaled response items. The questions were related to radiologists' awareness of patient-initiated imaging, the impact of such requests on their workload, their perception of patients' expectations within a patient-centred care environment, the reasons why they believed GPs complied with these requests, and their suggested mitigation strategies.

The quantitative data were analysed using IBM SPSS descriptive statistics to summarise the frequency and distribution of the survey responses while cross-tabulation was employed to explore relationships between the key variables. The manuscript included in this chapter has been published in the *Public Health Challenges*.

De Silva L, Baysari M, Keep M, Kench P, & Clarke J. (2023). Patient Agency in Imaging: Radiologists' Insights. *Public Health Challenges*.

RESEARCH ARTICLE OPEN ACCESS

Patient Agency in Imaging: Radiologists' Insights

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ABSTRACT

Objectives: There is a notable rise in patient-initiated imaging requests, with one possible reason being the increased availability of online health information. This study specifically examines the impact of patient-initiated radiological exams on radiologists. Exploring their perspectives on how GPs acquiescing to patients' medical imaging requests impacts healthcare resources and skew patients' expectations of the capabilities of radiological studies. The findings of this study are crucial for understanding the evolving dynamics of radiology practice and its challenges.

Method: A comprehensive cross-sectional opinion survey was administered to radiologists in private multi-specialty medical centers across Australia between November 2023 and February 2024. The survey included structured and open-ended questions distributed via an intranet platform within the same company and reached a wide range of radiologists. A total of 37 survey responses were received from the 100 surveys sent to radiologists, resulting in a response rate of 37%. Of these, 10 provided incomplete responses, leaving 27 for analysis.

Results: Nearly half of the participants (48%) had over 20 years of experience. The majority of radiologists self-reported X-rays (27%), ultrasounds (25%), and computed tomography (CT) scans (24%) as the most commonly requested non-indicated imaging studies. Radiologists attributed these requests to patients' exposure to online medical information and their desire for reassurance. Approximately 24% of radiological studies were deemed unnecessary due to a lack of correlation between clinical history and the imaging or procedure requested to address the clinical issue, with 30% of radiologists reporting feeling pressured by GPs and patients to expedite report completion. Proposed strategies included patient education, communication, and the establishment of clear guidelines.

Conclusions: The study highlights the potential for a growing burden of patient-initiated imaging on radiologists. This burden is further compounded by patients' unrealistic expectations and lack of understanding of diagnostic imaging's limitations, as considered by those surveyed. Radiologists have stressed the crucial role of the broader healthcare context in collaborating with such requests. Patient education was emphasized to reduce unnecessary imaging and manage patient expectations.

Practice Implications: Educating patients about the limitations and appropriate use of diagnostic imaging can help reduce unwarranted requests and manage patient expectations. The study emphasizes the need for clear, evidence-based guidelines to assist GPs in addressing patient demands for unnecessary imaging studies. Another contribution from the study is the necessity for improved communication strategies among radiologists, GPs, and patients to ensure a collaborative approach to imaging requests.

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thereby reducing pressure on the radiologists' workload. Finally, this study highlights how avoiding unnecessary imaging can alleviate resource strain, optimise workflows, and enhance the quality of patient care.

1 | Introduction

In modern medicine, diagnostic testing has increasingly become popular [1]. These diagnostic tests include laboratory tests, medical imaging, and invasive procedures such as image-guided biopsies and injections, all of which contribute to clinically diagnosing and/or treating a patient [2]. These imaging modalities and procedures have become essential tools requested by GPs [3]. In Australia, within the Medicare Benefits Scheme, most tests and procedures are available to patients at little to no cost to them. As such, a surge in the number of diagnostic imaging conducted in 2022–23 has been shown (www.aihw.gov.au/reports/primary-health-care/medicare-subsidised-care-2022-23/contents/diagnostic-imaging-services). For example, in a quarterly Medicare data update provided by the Australian Government, diagnostic imaging services in Australia demonstrated a remarkable year-on-year increase of 11.3% during January–March 2023, compared to the same period in the previous year [3]. One possible explanation for this is the widespread availability of online health information. This encompasses public health campaigns [4], various media outlets (such as television and newspapers) [5], and smartphone software applications [6]. Such accessibility of health information allows patients to make more informed decisions about imaging studies and to make choices for themselves [7]. The rise of patient-initiated imaging has raised concerns within the medical community around its appropriate use [8–10].

In Australia, only healthcare professionals like GPs, acting as gatekeepers, can provide a letter of request to radiology departments for scans or procedures to be performed on the patient. As gatekeepers, the GP's role includes the authority to decide on the most appropriate referrals to specialists, implement diagnostic workup, and coordinate extended care [11]. Patients often desire medical imaging tests based on information obtained through health advertising and/or accessed through their own online searches, requesting studies from their GP that they believe are needed. Patients requests for imaging can potentially devalue the gatekeeper role of GPs as primary caregivers [12]. On the basis of clinical assessment and expert knowledge, GPs may consider patients' requests unnecessary. However, fulfillment of these requests may be seen as supportive of patient autonomy [13], resigning to patient pressure [14], and/or mitigating litigation fears [15].

Patients' proactive management of their health through requests for referrals can be viewed as pursuing preventative medicine. However, when GPs consider these requests are not clinically indicated, they may encounter patient dissatisfaction when responding negatively [16]. This may even escalate to aggressive confrontation [14], particularly when the patient's desire for imaging is due to feelings of anxiety or if they consider it a form of a disservice [17]. Anecdotally, for example, patients who might fear a miscarriage during their pregnancy could ask their GPs for an

ultrasound examination solely to alleviate their anxieties. Once Visualising the live heartbeat of the baby, they feel reassured. Another common scenario in the research literature concerns headaches, for which patients request computed tomography (CT) to rule out underlying pathologies such as brain cancer [18]. Guiding patients through evidence-based medicine and using established imaging guidelines can allow GPs to manage patient care without needing to acquiesce to patients' requests. However, this is not often enacted due to the pressure to fulfill requests from the patients or their family members [19].

Radiologists, on the other hand, have not traditionally been responsible for the direct management of patients. Instead, they act as a means to a patient's progression through the healthcare system [20]. Thus, much like laboratory services, radiology has been utilised as a readily accessible, relatively quick, minimally invasive modality for clinical diagnosis and treatment options [21]. Previous studies have identified challenges to the appropriate use of imaging within the healthcare team and with patients [22], barriers and facilitators to guideline adherence and imaging use [23], and the rising costs of imaging in Australia [24]. However, there is a scarcity of studies within Australia on the impact of imaging use on radiologists' experiences and workload in particular, due to GPs' fulfillment of patient requests.

Patient-initiated requests have consequences that extend beyond the patient–GP relationship and involve a broader healthcare team. These include radiologists and other allied healthcare workers conducting or reporting on these examinations. The aim of our study was to assess the perceived impact of patient-initiated medical imaging requests adding to radiologists' workload. Our research aimed to explore (1) radiologists' perception and experience with patient-initiated imaging requests, (2) their experience with patients' awareness of the merits and limitations of requested radiological studies, (3) the impact of unnecessary requests on radiologists' workload, and (4) what strategies radiologists consider could be employed by GPs to mitigate unnecessary requests.

2 | Methods

2.1 | Design

A cross-sectional survey study was conducted between November 2023 and February 2024 with radiologists working in the same company within private multi-specialty medical facilities across Australia. Education coordinators of this company were recruited to distribute the survey via the company's intranet service. An educational coordinator was chosen to keep recruitment at arm's length from the researchers. There were approximately 100 radiologists working full-time across the various sites when the recruitment flyer was sent. Upon clicking the embedded link, a participant information sheet explained the purpose of the study

and asked if they were willing to volunteer. Once they accessed the online survey, radiologists could consent to participating and answer the survey questions. Radiologists could withdraw at any time during the study by clicking out of their browser.

2.2 | Survey Instrument

The survey was comprised four sections, with a total of 10 questions:

- Section one explored whether radiologists had encountered patient imaging requests and any reasons they were aware of as to why patients requested imaging.
- Section two investigated the impact of patient imaging requests on radiologists' workload and whether they felt pressured to finish reports quickly.
- Section three focused on their views regarding patient-initiated requests, their experiences addressing patient-anticipated outcomes, and the types of diagnostic investigations requested by patients.
- The fourth and final section asked radiologists about their perceptions of GPs' compliance with patient demands. This section used fixed choices, including a sliding scale and a matrix table, and some open-ended questions to enrich the data with more detailed responses.

The research team designed the survey based on similar studies in the literature [25, 26]. The draft survey was piloted by two radiologists to assess its readability and comprehensibility, and alterations were made to some questions based on their feedback. All responses were anonymous.

2.3 | Participants

A total of 37 survey responses were received, indicating a response rate of 37%. Of those, 10 were incomplete, and 27 were analysed. The number of years participants had practiced as radiologists varied, with nearly half having over 20 years of experience ($n = 14$, 48%) and a quarter having less than 5 years of experience ($n = 6$, 21%).

2.4 | Statistical Analysis

Descriptive statistics were used to assess radiologists' perceptions of why patients made imaging requests and, from patients' requests, the types of imaging most requested that were considered unnecessary by the radiologist. To understand the impact of clinically non-indicated studies on radiologists' workload, the cross-tabulation of variables was used to identify patterns and relationships. Using responses from 27 radiologists through cross-tabulation, the data were categorised by two key variables: (1) "The frequency of feeling pressured by GPs and/or patients to complete imaging reports quickly" and (2) "The impact of clinically irrelevant requests on their workload." Results were analysed using IBM SPSS version 27.0 for Windows (SPSS Inc., Chicago, IL, USA).

2.5 | Content Analysis

The open-ended questions asked participants what imaging studies radiologists considered, in their opinion, were the most commonly requested by patients; whether patients were generally aware of the limitations and merits of procedures requested; what expectations patients had during interventional procedures where radiologists interacted directly with patients, such as musculoskeletal injections; and what strategies they believed GPs could employ to address patients' requests.

There were 26 open-ended responses from 37 radiologist respondents who provided a mean of 15 words (minimum of 5 and maximum of 55). Open-ended questions were categorised using conventional content analysis [27]. Considering the limited research on this subject, preconceived categories were not possible. Instead, responses were categorised as they emerged from the data, and these categories were further developed into themes [27]. To do this efficiently, the data were uploaded to a Microsoft Excel worksheet (Microsoft Corporation, 2018). Data were open coded through an iterative process of reading and creating codes from extracted statements. Once codes were developed, the extracted statements were categorised under these codes. These categories eventually became themes that were mapped according to the research questions [28].

3 | Results

3.1 | Results From Multiple-Response Questions

3.1.1 | Radiologists' Experience With Patient-Initiated Imaging Requests and Types of Requested Studies

A total of 18 (55%) participants agreed that they experienced patient-initiated radiological imaging, as reported by GPs via telephone conversations or as noted on referrals. Radiologists reported X-rays as being the most frequently requested non-indicated studies ($n = 17$, 27%), followed by ultrasounds ($n = 16$, 25%) and CT scans ($n = 15$, 24%), with a scattering of other responses as indicated in Chart 1.

Participants reported they believed patients were requesting radiological scans and interventions due to exposure to medical information online and on social media or advice from friends and family ($n = 19$, 65.5%). Many indicated they thought patients were increasingly focused on health and wellness ($n = 18$, 62%) and sought imaging to provide proof of wellness ($n = 13$, 45%). To a lesser extent, radiologists stated that patients were more likely to want radiological studies because Medicare covered the cost, and therefore they felt entitled to these services ($n = 11$, 38%). They further noted they felt some patients were misinformed ($n = 8$, 28%) and/or influenced by government-sponsored advertising ($n = 4$, 14%). This is shown in Graph 1.

When radiologists were asked to comment on what expectations patients bring into the consultation when having interventional procedures, most ($n = 17$, 63%) reported high expectations for immediate pain relief. Some ($n = 5$, 19%) reported that unrealistic expectations (including misconceptions about what the procedure can accomplish) led to disappointment.

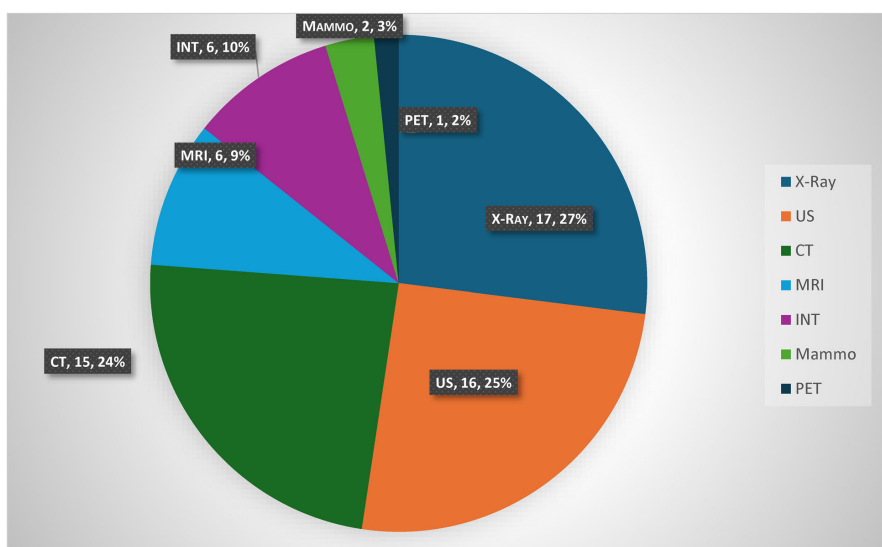
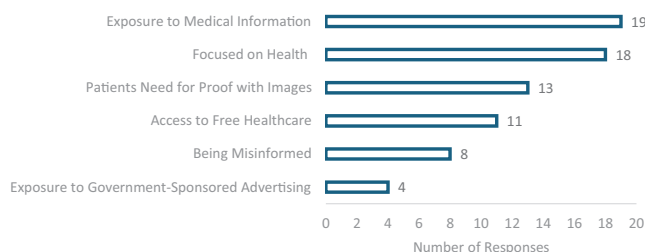


CHART 1 | Non-indicated imaging request types as reported by participants. INT, intervention; CT, computer tomography; MRI, magnetic resonance imaging; PET, positron emission tomography; Mammo, mammography; US, ultrasound.

Reasons for Imaging Requests Reported by Radiologists



GRAPH 1 | Reasons for imaging requests as reported by radiologists.

3.1.2 | The Impact of Unnecessary Requests on Radiologists' Workload

Anecdotally, in an average radiologist's week of reporting approximately 700 radiological studies, six participants considered about 24% of imaging to be unnecessary. In a cross-tabulation analysis, it was observed that nearly a third of radiologists ($n = 8$, 30%) experienced pressure "most of the time" to expedite report completion to align with patient demands. The pressure was also from GPs', who wanted to deliver prompt services to their

patients. At the same time, the remaining respondents ($n = 19$, 70%) did not acknowledge this pressure.

When respondents were asked "why do you think GPs fulfil patient requests?," in a multiple-response question (more than one response available), the majority of radiologists surveyed believed this was because the patients were health-anxious ($n = 20$, 69%), GPs were unable to argue with patients ($n = 17$, 58.6%), or they feared litigation in the event of a missed diagnosis ($n = 16$, 55.2%). Most ($n = 19$, 70%) participants reported that they

did not believe patients were aware of the merits and limitations of the requested imaging tests.

3.2 | Results From Open-Ended Questions: Unrealistic Expectations

Radiologists proposed several strategies to avert unnecessary scanning for GPs and radiologists. These included GPs discussing the risks and benefits of tests with patients and radiologists doing the same in cases where they were consulting with patients for interventional studies. Further, they suggested healthcare providers must be made aware of the necessity of diagnostic tests and clarify the limitations of clinically non-indicated requests and that when patients demand imaging studies, request fulfillment by GPs can result in ambiguous ordering. Participants stressed the importance of a clear statement of the clinical indications for a study on the imaging referral so that they can correlate the tests requested with the GP's clinical concerns. Radiologists suggested GPs should place greater emphasis on reviewing patients' clinical presentation using the "watch and wait" strategy discussed in the literature to give the symptoms time to pass without any interactions [29]. This strategy can be combined with a safety plan if the symptoms do not resolve [29, 30]. Radiologists commented that building rapport with the patient and ensuring continuity of care are essential to patient-centered care, and that unrealistic expectations could be addressed with appropriate discussions with patients about the outcomes of procedures. They also suggested developing guidelines may be useful for GPs, outlining accepted standards of practice when patients request imaging. Radiologists suggested that a reimbursement structure be established with Medicare so that when they consult patients regarding imaging requests from their GPs, they are compensated for the time spent on these discussions. The full list of suggestions is provided in Table 1.

4 | Discussion

Past studies reflect that GPs face several challenges when addressing patient-initiated imaging [23]. Requests from patients may result in GP's nonadherence to existing guidelines through the desire to fulfill requests, for several reasons [Walderhaug et al. (2022) suggested various approaches for GPs to address patients' requests, highlighting the "watch and wait" strategy, where GPs ask the patients to give the symptoms time to pass without intervention, and often combining this strategy with a follow-up plan should symptoms remain unresolved [30]. They further suggested that GPs ease patient anxiousness through reassuring, normalising, recognising symptoms, giving patients confidence in their clinical assessment, and finding effective ways to say "no" [30]. Gransjøen et al.'s study (2018) addressed GPs and radiologists' perspectives on patient imaging requests. They recommended easy-to-access and comprehensible guidelines be made available to GPs to advise their patients on the merits and limitations of the requested study. Their study also indicated that radiologists preferred more informal knowledge exchanges with GPs than adopting formal guidelines on the merits and limitations of tests and procedures [23]. However, considering that each discipline often works within its silos of practice,

TABLE 1 | Radiologists' proposed strategies to mitigate unnecessary requests.

Strategy	Suggestions
Patient education	Emphasise the importance of health providers explaining procedures to their patients, discussing risks and benefits, and educating them on the recommended diagnostic tests' indications and limitations
Follow-up care	Health providers review their patients' condition (such as presenting signs and symptoms) before requesting imaging and/or following up with patients to see if symptoms resolve
Building rapport	Health providers should establish continuity of care and build rapport to provide patient-centered care, enabling productive discussions around imaging requests
Establishing guidelines	Develop guidelines by the organisation and/or professional bodies for all health providers to address patient-requested procedures to avoid unnecessary imaging
Medicare rebates	Radiologists propose that Medicare provide rebates for consultations to reimburse the time spent on discussions, enabling informed conversations among radiologists, GPs, and patients

discussions around guidelines across the various disciplines can be limited due to a lack of communication.

Our study explored radiologists' perspectives on patient requests for diagnostic imaging and GPs fulfilling such requests. We sought to understand the experiences and perceived consequences of patient-initiated imaging on radiologists and propose strategies for mitigating unnecessary scanning to ease the burden on their workload. Our private clinic radiologist participants identified several factors they perceived as driving patient requests, including exposure to online medical information, the need for proof of wellness, and their belief that most requests came at little to no cost under the Australian Medicare Scheme. Radiologists also expressed that patients were largely unaware of the merits and limitations of imaging studies and agreed that the requested imaging studies were often unnecessary. However, radiologists reported an increased workload linked to satisfying both GPs and patients by completing reports quickly. They also identified that patients had many expectations, particularly during interventional studies where there is direct radiologist-patient contact, and expectations were high for immediate therapeutic benefits, particularly with musculoskeletal injections.

Our study showed over half of the surveyed radiologists have encountered patient-initiated imaging requests, this being advised by a GP on a request or by a phone call. The more commonly requested imaging modalities included X-ray, ultrasound, and CT. Maskell (2022) found that the most critical overall

reason for the increased usage of radiological investigations was the need for diagnostic accuracy. Moreover, imaging was a better option for GPs as it was feasible, rapid, inexpensive, and easily accessible [31]. They added that radiologists in their study agreed that managing radiology use by health professionals such as GPs is challenging, as it often depends on the GPs' knowledge, beliefs, training, and practicing methods [31]. This trend is reflected in our study, where the predominant choices are easily accessible, readily available, and primarily covered under the Medicare rebate schedule [3].

In the short response section, radiologists expressed that patients' expectations were high when they underwent interventional procedures, particularly musculoskeletal injections. Radiologists in our study expressed that patients were hoping for immediate pain relief. Little et al. (2004) found that the most significant independent predictor of GPs' behavior was their belief that patients arrived with specific expectations, leading them to feel obligated to meet those needs. This included prescribing medications, conducting examinations, running tests, and referring patients to specialists. However, the study also revealed that patients did not always seek referrals or prescriptions; rather, they primarily wanted their concerns to be acknowledged and addressed. A majority of GPs in their study believed that prescribing medical services because of pressure from the patient was unnecessary. Their study concluded that GPs perceived beliefs about patients' expectations or pressure were far more significant than patients' actual expectations from GPs, encouraging GPs to question patients' expectations at the start of the consultation [33].

In responding to the survey question "Why do you think GPs request scans that are clinically non-indicated?," the majority of participants perceived that GPs felt it was necessary to appease patient anxiety—agreeing that by consenting to patients' requests, they also would deter any litigation concerns, particularly in the event of missing an underlying pathology. Though appeasing patients with imaging can be seen as a contraindication, several complexities arise when addressing a patient holistically. These include the urgency of the situation, the limited time during consultation, and the patient's past medical history. However, Walderhaug et al. (2022) found that GPs in their study were confident in declining requests for imaging, stating that they explained their diagnostic approach to patients, often thinking aloud their reasoning before coming to a negative response. They reasoned that such an approach was favourable as it reflected empathy towards the patient through open communications and transparency and facilitated GPs to ask for a detailed clinical history. Ottenheim et al. (2014) further emphasised that patients were likely to place greater confidence and trust in GPs who were transparent in their diagnostic approach. Such an approach could likely be a foundation for a long-term therapeutic relationship where patients would be more receptive to GP recommendations [19].

We also found that radiologists thought that patients' exposure to online medical information, media portrayal of healthcare, and advice from friends and family play a crucial role in patients' decisions to request imaging studies. Wong & Cheung (2019) found that the majority of their participants used the internet to seek online health information and chose websites based on convenience rather than accuracy or authoritativeness [34].

However, when poorly informed patients request imaging with no clinical merit, denying them the request can pose several challenges [15]. In addressing these issues, Nilsen & Malterud (2017) found that GPs experienced several challenges in declining patients' requests. Many were confronted by patients who openly disagreed with them in anger or sadness and, in some cases, displayed open aggression [35]. Radiologists in our study indicated that patients came with high expectations for immediate pain relief from interventional procedures, sometimes having unrealistic expectations. If patient expectations were not met or if the procedure requested was not carried out, such outcomes were met with disappointment, leading to various negative emotional responses from patients. These findings underscore the complexity of managing patient agency, highlighting the need for patient education and communication strategies to manage expectations [4].

Because radiologists are part of the specialised care arm in the health context and act primarily as consultants rather than direct patient managers, their role in interpreting studies is critical for GPs. The rising demand for imaging, driven by patient expectations, suggests a need for radiologists to collaborate more closely with GPs to ensure appropriate use of resources. When responding to the question, "What do you think are strategies GPs could use to reduce inappropriate patient requests?," our respondents recommended that GPs adopt patient education around imaging. This could be done by implementing guidelines when a patient requests non-indicated imaging. Integrating evidence-based medicine with clinical and patient preferences has proven valuable when avoiding unnecessary scanning [16]. This is particularly so when imaging requests are considered non-medically indicated, as expressed by radiologists in our study, as there is a potential for increased healthcare costs and harmful downstream interventions in the event of false-positive incidental findings [22]. These incidental findings would not have caused harm if left undiscovered. Moreover, in the case of false-positive results, it raises unnecessary alarm and anxiety for patients, leading to more testing (wiserhealthcare.org.au).

5 | Limitations

Although the response rate is modest, it reflects typical survey participation rates in specialised healthcare settings across Australia [36]. In our studies, these responses were from radiologists residing in Queensland, New South Wales, Victoria, South and Western Australia. Many of these radiologists found it difficult to volunteer for this research study because they often had very busy schedules; as such, the results from a small sample size cannot reflect the views of radiologists across complex medical practices within Australia. This also limited their engagement in intranet activities, which limited responses to our survey as it was only available on the intranet. Moreover, some radiologists might hold specific views on patient-centered requests, perceiving them as trivial. This perception could result in their decision to avoid participating in the survey. The diverse levels of experience among respondents, with nearly half having over 20 years of practice, lend credibility to the findings, with the study being the first to examine radiologists' views of patient-initiated diagnostic imaging. The sample consisted solely of radiologists in private practices within a specific company in Australia.

Further studies could be undertaken to understand specialists and subspecialists in both medical and surgical fields. Future research with a larger sample size across public, private, and international settings could be explored to enhance generalisability and consider dichotomous variable of patient and non-patient generated requests affecting radiologists' workload. This study focused on the views of radiologists and did not capture the views of GPs and patients.

6 | Conclusions

This study addressed our four key aims regarding radiologists' perspectives on patient-initiated imaging requests, which has significant consequences for radiologists and the broader health-care system. To understand our first aim, which is to explore radiologists' perceptions and experiences with patient-initiated imaging requests, our survey showed that respondents mainly encountered patient requests through GPs indicating patient requests study "X" in their referral letters or during phone conversations. They also expressed significant concerns about the increasing trend of patient-initiated requests. Most participants perceived that these requests were driven by the availability of online health information and patients' desire for proof of wellness. In addressing our second aim, radiologists confirmed many patients lacked knowledge of the merits and limitations of the studies they requested. However, these respondents perceived pressure to promptly accommodate GPs and patients' imaging needs. Thus, we can provide evidence confirming the third aim of this study, whether unnecessary requests impacted radiologists' workload, showing that the impact of unnecessary imaging extends beyond the patient-GP relationship to radiology services. This is specifically where radiologists experience pressure to complete their work quickly and are burdened by an increased workload. Most radiologists considered GP's compliance was due to patients' health anxiety, GPs' inability to argue with their patients, and litigation fears. Lastly, we asked our respondents what strategies radiologists might consider could be employed by GPs to mitigate unnecessary requests, and our participants suggested clear communication, thorough medical examination, shared decision-making, and building trust to prevent unnecessary imaging. This includes ongoing collaboration with radiology team members so GPs can be updated on the types of tests and treatments that would most benefit patients. These findings, we believe, underscore the tension between patient autonomy and clinical decision-making. To address this, healthcare policy-makers might consider developing more explicit interdisciplinary guidelines that facilitate better collaboration between GPs and radiologists in managing patient-initiated imaging requests. These guidelines could reduce unnecessary imaging and promote evidence-based practice.

7 | Practice Implications

The study underscores the importance of clear, evidence-based guidelines to support GPs in responding to patient pressures for unnecessary imaging tests. An important aspect of implementing guidelines is educating patients and guiding them through the merits and limitations of imaging studies and procedures. This could be achieved through improved communication strategies

among radiologists, GPs, and patients to foster a collaborative approach to imaging requests, which can help ease the workload on radiologists.

Author Contributions

Lizzie De Silva: Conceptualisation, Data Curation, Visualisation, Writing Original Draft Preparation. All other authors: Resources, Supervision, Validation, Formal analysis, Review & Editing.

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Ethics Statement

The University of Sydney Human Research Ethics Committee (HREC) Project number 2023/831. Approval Period: 15/08/2022–15/08/2026.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data are available upon request.

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7.2 Summary Chapter 7: Patient Agency: Insights from Radiologists.

The chapter summarises the findings of the study entitled *Patient Agency in Imaging: Radiologists' Perspective*, which explored the influence of OHI and its impact on the practice of radiology in Australia. The study employed a cross-sectional survey design targeting radiologists across private medical imaging facilities in Australia. The research focused on radiologists' experiences with patient-initiated imaging requests received from GPs, their perceptions of patient expectations, the implications on clinical workload, and strategies to mitigate unnecessary imaging.

Many radiologists acknowledged encountering patient-initiated imaging, with the most requested being X-rays, ultrasounds, and CT scans. They attributed unnecessary imaging largely to patients' exposure to OHI, social media influence, and peer advice. Radiologists noted that many patients sought reassurance from imaging to confirm their wellness rather than due to clinical symptoms. Moreover, the availability of Medicare-funded schemes further incentivised patients to seek imaging at no extra cost.

Radiologists observed that patients undergoing interventional procedures often harbour unrealistic expectations, particularly about musculoskeletal injections, hoping for instant pain relief. This gap between expectations and clinical realities resulted in patient dissatisfaction when results fell short. Although consumer-focused care empowers patients, it also poses challenges to established clinical pathways and can undermine the traditional gatekeeping role of GPs. As consultants in this system, radiologists find themselves indirectly involved in these dynamics, facing increased workloads and misaligned expectations. The findings build on previous research indicating that both GPs and radiologists are coping with rising patient demands, medico-legal issues, and challenges in interdisciplinary communication.

The next chapter integrates all four phases of the research along with the scoping review in a discussion and conclusion section. It builds on the empirical findings and aims to situate itself within the current literature.

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Chapter 8 : Discussion

8.1 Background

The primary aim of this thesis has been to explore the factors driving patient-initiated requests for radiological imaging within primary care settings, the perspectives of healthcare providers involved in these transactions, and healthcare providers' responses to requests. The research comprised four empirical studies conducted across four research phases, each with their own distinct approach. This chapter will discuss how these studies' findings can be used to advance future healthcare practices. The research has incorporated the perspectives of different stakeholders, notably, patients, GPs, and radiologists within the Australian healthcare context. The chapter begins with factors at the patient level, such as seeking Online Health Information (OHI), digital literacy, health anxiety, and the search for 'proof of wellness'. It then proceeds to explore mediating factors at the GP level, including gatekeeping tensions, adherence to guidelines, management of time and therapeutic relationships, and medico-legal considerations. Finally, it examines the impact on radiologists, including workload implications, misaligned expectations, and challenges to delivering value-based care.

A mixed method study design was employed, beginning with a quantitative methodology to assess patient perspectives using surveys (Chapter 3), followed by a survey and interview study which further focused on patient perspectives (Chapter 4). Building on the insights gained from these first two studies, the experiences of GPs and radiologists were then explored through a systematic scoping review designed to understand the challenges encountered by GPs and the strategies they employ to handle patient-initiated requests (Chapter 5). The aim was to develop a comprehensive understanding of how GPs and radiologists worldwide have been addressing the growing incidence of patient-initiated

requests in the context of patient-centered models of care. The research then moved on to explore GPs' perspectives within the Australian context (Chapter 6) through interviews with GPs, while the perspectives of radiologists were sought using a survey (Chapter 7). This current chapter (Chapter 8) consolidates all the findings and discusses them in the context of existing literature. The final chapter (Chapter 9) offers recommendations for stakeholders and professional bodies to guide future patient-initiated diagnostic imaging requests.

A patient-centered approach is critical for effective, efficient, and equitable healthcare service delivery (World Health Organisation, 2008). Research has shown patients who are involved in their own healthcare trajectory can influence the conduct and content of what takes place during medical visits (Kravitz et al., 2003). In fact, it has been found that most patients tend to have better outcomes when they are more involved in their own care, and this can include sharing their desires, agendas, and expectations with their healthcare providers (Kravitz et al., 2003). In primary care consultations, patients regularly ask for diagnostic testing such as pathology tests, referrals, medicine, treatment (Jerant et al., 2017), and imaging (De Silva, 2023). One of the ways in which patients can express their desires and expectations is to request that their GP refer them for an imaging study. Research also suggests that access to OHI is likely to contribute to these individuals making requests of their providers (Huisman et al., 2020). Although this can have positive effects, such as making patients feel more empowered by having access to more information, unfettered access to online information before and after a medical consultation or imaging study can lead confusion and anxiety for patients (Gransjoen, 2020). This is particularly true for patients who do not adequately comprehend this information, and if they are unclear about whether what they are reading online applies to them. This situation can be further complicated when a patient's expectations of an imaging request based on their online findings are not met (Afrin & Prybutok, 2022). GPs therefore have an important role to play in discussing imaging requests

and ensuring that services provided are in the patient's best interest by carefully weighing the benefits and risks of requested tests or interventions, such as biopsies for lesions or steroid injections for musculoskeletal conditions (Hawkes, 2014).

Despite GPs' growing acceptance of the importance of patient autonomy (Hofmann & Lysdahl, 2008) and patient-centred care (Duong et al., 2016), increasing demands for imaging can place GPs in a challenging position, particularly when patients' demands come into conflict with imaging guidelines. A major challenge is that the proliferation of online consumer-generated feedback mechanisms, facilitated by major platforms such as Google reviews, Amazon, Airbnb, TripAdvisor and Yelp, have become a key aspect of promoting customer or patient satisfaction across various sectors of society. This phenomenon has significantly shifted the balance of power between the authority of traditional experts and the influence of online lay users. GPs, once revered for their expertise, now find themselves under scrutiny through patient feedback mechanisms (Van den Bussche & Vollmer, 2024), and their quality of service is subject to public evaluations that constantly dissect their actions, advice, and conduct (Van den Bussche & Vollmer, 2024).

Negative evaluations by patients can arise when there is a significant gap between anticipated standards (such as around expectations, values, or norms) and actual experiences, as described in the 'disconfirmation paradigm' approach (Patterson, 1990). This paradigm was developed within the discipline of psychology and utilises a framework that has since been employed in the assessment of customer satisfaction with services and plays a pivotal role in influencing purchasing decisions and ensuring customer loyalty. Various studies have shown that expectations can be positively disconfirmed when product performance exceeds expectations, resulting in satisfaction, or negatively disconfirmed when performance falls short, leading to dissatisfaction (Mittal et al., 2023). This approach has been used to compare

how the experiences of consumers who purchase goods and services line up with expected performance outcomes. Disconfirmation is the gap between what people expect and actual outcomes, whether these are positive or negative (Mittal 2023). A gap can lead to dissatisfaction among customers if experiences are negative, or to satisfaction if experiences are positive (Mittal 2023). The level of expectation is the standard against which the product is judged, that is, once the product or service has been used, outcomes are compared against expectations (Patterson, 1990). In the medical context, patients assess their satisfaction against their own expectations of imaging (from their online searches, advice shared by friends and family, or anticipated positive outcomes based on a similar previous request) (Fenton et al., 2016).

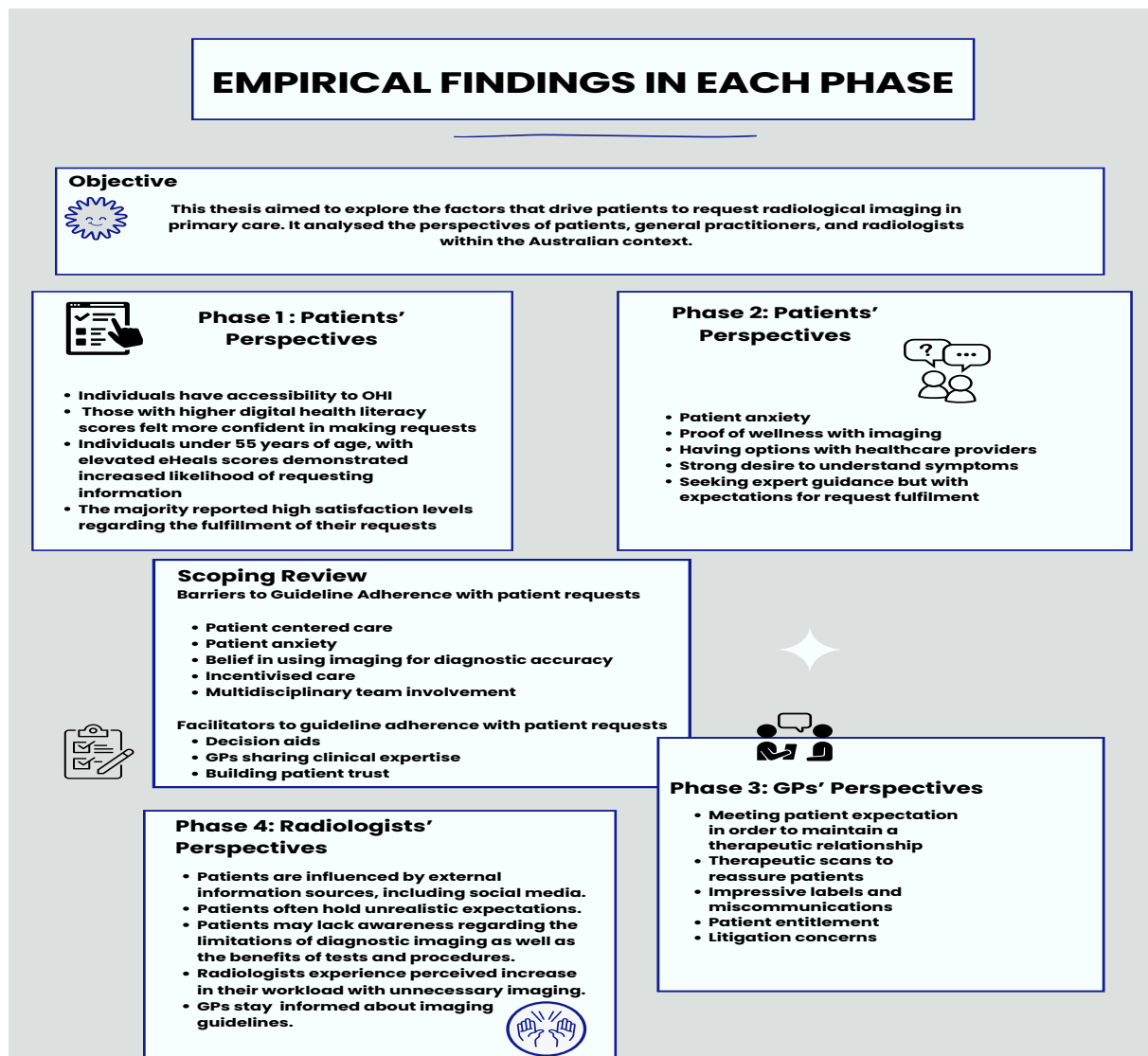
A study by Kravitz et al. (2003) found that requests from patients strongly influence healthcare providers' prescribing and treatment behaviours, with some requests being granted to appease patients and improve their level of satisfaction (Kravitz et al., 2003). Yet, patients often do not fully understand the risks associated with the imaging requested (whether this is for diagnosis or screening purposes), and these risks can involve significant physical and psychological consequences. For instance, a patient's exaggerated perception of their illness can lead to unnecessary imaging and more testing, resulting in an additional psychological burden related to their illness (Brodersen et al., 2018).

This thesis centres on patients' desire for autonomy in their health trajectory, with a particular focus on individuals' accessibility to OHI, which can provide individuals the information to make decisions for themselves. One example of this is diagnostic imaging requests from health providers, in particular, GPs. It offers new insights that extend beyond accepting that the GP must simply acquiesce to patient requests as an intrinsic part of the paradigmatic shift towards patient-centric care. The empirical findings of this research project's mixed methods

design and systematic scoping review are shown in Figure 8-1. One objective was to identify and explore these factors from the patient perspective and then move on to assess the impact of their imaging requests on the clinical decision-making of GPs and radiologists. Another objective was to explore the challenges for GPs and radiologists in the face of these requests and to propose strategies for managing these requests, based on input from all stakeholders. By integrating the existing literature and empirical evidence, the thesis has added to current knowledge in the field by developing an evidence-based approach to addressing patient-initiated imaging requests, thereby enhancing the quality of patient care in healthcare settings.

Figure 8-1:

Empirical studies and scoping review findings.



(OHI – Online Health Information; eHEALS – Health literacy scale)

8.2 Patient Agency and OHI Accessibility

This section discusses OHI-seeking behavioural patterns and their impacts on healthcare providers, in particular, GPs and radiologists. The results from the studies in Phases 1 and 2 of this research project showed that patients increasingly use OHI to make healthcare decisions. However, many of the patients surveyed in these two studies admitted to not being consciously aware of the quality of the website content they were accessing, instead basing their research on algorithmically generated information from their previous online search history. Patients' confidence in requesting diagnostic imaging was found to be significantly

influenced by their digital literacy levels, that is, those with higher eHEALS scores were more confident and satisfied when their requests were met.

Phase 1 of the research provided insights not only into the reasons why patients seek out information online but also the types of information they search for and the role that digital literacy plays in influencing their OHI-seeking behaviour. Most individuals surveyed in Phase 1 were found to be seeking out information online based on their symptoms, next were those who were exploring treatment options and procedures and, finally, there were those who were exploring different types of medications. These findings are significant because if healthcare providers are to engage in decision-making in collaboration with their patients, it is essential that they determine patients' core understanding of health information, their digital literacy levels, and the degree of influence that OHI has on them and their health-seeking behaviours. A Canadian study by Griffith (2015) that explored the reasons why patients pressure GPs to order clinically non-indicated requests for diagnostic imaging found that 92% of GPs attributed this to the accessibility of OHI (in which the information was not always reliable). In fact, these authors reported that the GPs in their study suggested that OHI often led to poor health-related decision-making (Griffith et al., 2015), stating that: "the information they [patients] encounter may be of low quality, unreliable, and incomplete, and therefore guide them to poor health-related decision-making" (Griffith et al., 2015).

In Gransj en's (2018) study of barriers to implementing imaging guidelines, it was found that patients often considered themselves to be well-informed, and some GPs reported that their patients even argued with them when requesting non-clinically indicated imaging. For this reason, GPs found it easier to comply with their patients' requests than to respond with counter-arguments, not only because complying took less time, but because family members were sometimes present, and this placed extra pressure on the GP to agree to the patient's

requests (Gransjøen et al., 2018). This is supported by the findings from Phase 3 in our research concerning Australian GPs' perspectives, where many of the GPs referred to the added pressure for scans—often clinically non-indicated—from patients who wanted these purely for reassurance. In a study by Pike et al. (2022) on the excessive use of imaging for low back pain, seven out of the nine GP participants reported feeling pressure from patients and their family members for imaging. The majority of the GP participants in their study believed that directing patients towards high-quality educational materials could help them more effectively manage pressure from patients and could encourage patients to adopt more conservative ordering practices. They suggested either a one-page handout to give to patients during consultations and/or a trusted online repository for evidence-based patient education materials (Pike et al., 2022).

Interestingly, our Phase 1 survey, which also assessed the digital literacy of patients, found that individuals who obtained high eHEALS scores were more likely to request imaging, were under 55, and were more likely to have a tertiary level education background. Not only did these individuals exhibit a sense of confidence in requesting imaging from their GPs, they also claimed to have achieved their anticipated outcomes based on their requests and reported a higher satisfaction with the patient-GP encounter. Participants in the Phase 1 study perceived their experience to be positive when GPs fulfilled their requests. Similarly, when examining patient satisfaction in shared decision-making during the COVID-19 pandemic, Xu et al. (2021) found a statistically significant association between patient satisfaction and higher eHEALS scores. This finding underscores how an individual's digital literacy can influence an individual's ability to effectively search for and use internet-based health information. Moreover, increased eHEALS scores allow individuals to interact with their healthcare providers more effectively (Xu et al., 2021).

Phase 1 of this research, therefore, provided insights into patients' OHI-seeking behaviour and the influence of digital literacy on their imaging requests. Emphasis was placed on the importance of understanding patients' comprehension of health information as well as the digital literacy levels they require for effective decision-making. However, there were concerns about the quality of the information on online sites that patients were using to establish their knowledge base. Interestingly, the interviewees in Phase 2 of the research, which also focused on patients' perspectives, frequently cited publicly accessible, reputable, evidence-based websites such as from Harvard Medical School (Harvard Medical School, N.D), The Mayo Clinic (The Mayo Clinic, N.D), and PubMed (PubMed, N.D) as their primary sources of medical information. Some even suggested that they preferred to seek out content authored by experts in the field. This contradicts the Phase 1 study findings where participants indicated that they were unaware of the quality of website content. While these results should be approached with some caution due to selection bias, the substantive distinction between patients' OHI-seeking behaviour (Phase 1) and the rigour of the content accessed (Phase 2) is encouraging. Sampling bias is a type of selection bias that usually happens when subjects are chosen non-randomly. It can occur if the selection process is restricted, for example, by recruiting participants through online portals like Qualtrics, which excludes individuals not using the online platform (Popovic & Huecker 2023). One factor that may have contributed to these findings is the COVID-19 pandemic and the associated public health restrictions on face-to-face interactions during this period. The pandemic restrictions were at their height during Phase 1 of this research, and this would have encouraged more individuals than usual to seek out, and perhaps rely on, information sourced online. During this period, GPs were required to engage with patients online, such as through eHealth services like telehealth, so as to abide by the government rules (Isautier et al., 2020; Sánchez-Guillén et al., 2024). The government-imposed restrictions limited public

interactions with health providers and led individuals around the world to become more reliant on the internet to locate and obtain health information, including about the pandemic. In researching symptoms and familiarising themselves with the latest updates surrounding COVID-19, many individuals became more discerning about the types of websites they were consulting for information (Isautier et al., 2020).

The imposed pandemic restrictions limited patients' physical access to GPs, and patients were required to consult their providers online or via the telephone (Isautier et al., 2020). Restricted physical access to GPs meant that some patients needed to attempt to manage their own health diagnoses and to seek out solutions autonomously. A German study conducted several years prior to the pandemic (Halwas et al., 2017) noted that regular use of eHealth services facilitated more effective decision-making for patients diagnosed with serious illnesses such as cancer. Their analysis indicated that patients requiring constant follow-up and monitoring of disease progression became more skilled in their eHealth literacy, profited from eHealth offers, and experienced improved health care (Halwas et al., 2017). Other studies have reported that the use of the internet and web-based platforms are fundamental in enhancing patients' communication skills with medical personnel, particularly in the absence of physical interaction with GPs (Lu & Zhang, 2019; Xu et al., 2021).

In Phases 3 and 4 of this research, individuals' OHI-seeking behaviour was explored with both GPs and radiologists, who were found to share similar concerns. In Phase 3, GPs articulated their concerns regarding their patients' online information searching and subsequent imaging requests, and they commented that individuals are now relying more on "Dr Google". This finding acknowledges the extent and availability of medical information in the public domain. Further, GPs admitted to fulfilling their patients' requests as a type of 'therapeutic scan', whose primary aim is to reassure patients about their wellbeing. While

GPs have an important role to play in advising, informing, and reassuring patients, not meeting patient expectations and demands can be challenging and explaining why a scan is not needed often takes up time that GPs mostly do not have. Additionally, rejecting patients' requests can damage the GP-patient relationship (Nilsen & Malterud, 2017; Salm et al., 2025). Therapeutic scans, as discussed in Chapter 6, were used by GPs to help alleviate their patients' anxiety about their health. As with other over-prescribing behaviours related to the use of pharmaceuticals and healthcare provider specialist services, these scans can be problematic due to the unnecessary use of healthcare resources (Brownlee et al., 2017). For these reasons, and due to time limits during clinical consultations, GPs often resort to these therapeutic scans. Some of the GPs in this study believed that individuals seeking therapeutic scans were often very fixated on their health and tended to self-diagnose without formal clinical assessments from health professionals. As quoted by one GP in this study:

I find X-rays have become a therapeutic requirement, [and] that their [patients'] problem often dissipates once the request is given. (Phase 3, female, GP, 40)

In Phase 4 of the research, 66% of the radiologists surveyed reported (in response to a multiple-choice question) that they believed patients were requesting radiological scans and interventions due to increased exposure to medical information online, social media, and advice from friends and family. About 62% of this same cohort observed that patients were increasingly focused on their health and wellness, while 45% thought that patients were requesting imaging to provide 'proof of wellness'. Further, 38% of the radiologists reported that patients' requests were due to the availability of Australia's Medical Benefits Scheme (MBS), which allows patients to have access to imaging for little or no cost. Flick (2014) argued that the increased availability of information and the dissemination of new public health findings about the effectiveness of screening tests and treatments was likely to be

contributing to patients wanting imaging. Flick noted that patients often requested imaging for several reasons: anxiety about possibly undiagnosed illnesses, which is often based on risk factors such as a family history of a disease; concerns that a symptom may be related to a significant disorder (e.g., cancer); a recent diagnosis (e.g., a heart attack) in someone close to them; concerns arising from advertisements targeting general public, or recommendations from individuals who are not healthcare professionals (Flick, 2014).

The findings from the study of radiologists' perspectives in Phase 4 therefore align with findings from the previous phases and contribute to our understanding of why patients request imaging studies. A significant influence was found to be medical information obtained through social media, which played a substantial role in shaping patients' requests. Together, these findings highlight the growing impact of digital health information and social networks, reflecting broader trends that have accompanied the shift towards patient-centered care. The findings suggest the need for more patient education and enhanced communication strategies that GPs and radiologists can use during consultations as opposed to the strategy of simply acquiescing to patient demands. Notably, patients' reliance on the MBS to cover the cost of requested imaging suggests the need to encourage more value-based care, that is, the use of available resources in a fairer, more sustainable, and transparent manner to achieve improved health outcomes. It also suggests that offering financial incentives to GPs who focus on evidence-based imaging, or establishing regulations with respect to the number of imaging studies each GP can order via the MBS, could be advantageous.

8.3 Health Anxiety and Proof of Wellness

A key driver noted for patients requesting referrals across all phases in this research was health anxiety and the need for reassurance. Participants expressed the need for evidence of their well-being through medical imaging, which allowed them to see what was happening

inside their bodies—that is, medical imaging is used to create a visual representation of different tissues and organs to monitor normal and abnormal anatomy and physiology (Chesson et al., 2002). For instance, pregnant women in the study who were worried about a possible miscarriage during their pregnancy requested an ultrasound scan to see the beating heart of the fetus and were reassured by this visual confirmation. In Phase 2, one participant commented,

It became less stressful for me once I knew bubby was okay with a heartbeat (Phase 2, female, patient, 25–34)

For the patient participants, care was seen to have been received only after images were acquired—being able to see inside their bodies meant that their concerns were being addressed. Sharma et al. (2020), in a systematic review (qualitative) of the overuse of imaging for chronic low back pain, found that patients' increased use of imaging was influenced by their underlying beliefs about diagnostic imaging, namely, that imaging would be able to locate the cause of their symptoms. Moreover, these participants emphasised the importance of having physical evidence of a pathology through imaging to validate their pain, and they reported a sense of satisfaction when they could provide this evidence to their community, family, and GPs (Sharma et al., 2020). Patients also wanted imaging as proof that they needed to pursue further investigations to provide solutions to their health concerns.

The GPs and radiologists in Phases 3 and 4 of this research pointed to health anxiety as a major factor prompting patients to actively search for OHI. The GP participants mentioned that government-sponsored advertising had increased patient awareness of particular diseases and encouraged patients to check for bowel, breast, or prostate cancer. They also pointed out that although media publicity and social media platforms can allow for the dissemination of useful health information, these can also lead to an increased level of anxiety. In response to

the survey question ‘Why do you think some GPs request scans for patients that are possibly considered clinically non-indicated?’, most radiologists noted that they thought GPs felt that these were necessary to appease patient anxiety. Hagg et al. (2018) identified several themes related to the use of social media for health information dissemination in low to middle-income countries. While there are advantages to social media—such as health education, promotion of healthy behaviours, and dissemination of information about infectious disease and outbreaks—misinformation or poorly communicated information can lead to negative health behaviours and adverse health outcomes among individuals, resulting in panic and confusion (Hagg et al., 2018).

Thus, the desire for ‘proof of wellness’ is not just about patients receiving images but is also about easing patients’ underlying fears and addressing erroneous or fragmented information uptake due to poor comprehension of disseminated content (Griffith et al., 2015). Requiring ‘proof of wellness’ is typically accompanied by heightened anxiety, which can often lead individuals to pursue OHI-seeking activities unnecessarily. While the intention of health dissemination campaigns is usually to promote awareness of specific health issues, these campaigns can also inadvertently elevate patients’ desire to seek diagnostic reassurance even when there are no clinical indications (Alzghaibi, 2023).

Therefore, healthcare providers need to be aware of the psychological and social factors influencing patients who request imaging, as seen in the study findings in Phases 3 and 4 of this research. The results have highlighted the need for GPs to build long-term relationships with patients and to discuss family history or past diagnoses that may be fueling their concerns. Healthy discussions with patients about these matters may help manage their anxiety and decrease imaging requests.

8.4 Validating Patient Concerns and Meeting Expectations

The Andersen-Newman model (ANM) employed in Phase 2 of this research posits that individuals' beliefs—their attitudes towards health services, their desire to understand their symptoms, and the accessibility of health services—determine their use of healthcare (Petrovic & Blank, 2015). The empirical findings from Phase 2 suggest that participants who search for resources, especially those on evidence-based websites, are more confident in requesting referrals for imaging tests or radiological procedures from their GPs. Several of the participants in this study noted that they needed a GP to recognise and validate their requests, and if these were not granted, they would seek out alternative doctors who *would* fulfil their requests. In fact, in a study of the strategies that GPs use to avoid the overuse of imaging, Walderhaug et al. (2022) found that GPs who validated their patients' concerns and expectations were able to instil enough confidence in their patients that they were ultimately able to make decisions on their behalf, and this was irrespective of whether their patients' requests were ultimately fulfilled or not (Walderhaug et al., 2022). That is, patients were looking for validation through an acknowledgment of their symptoms or concerns and this usually took place through GPs granting their referral requests. Although patients' requests may be interpreted at face value as a request for services, it is also important to recognise that requests might not be accompanied by any expectation that the GP will actually fulfil them. Instead, the request may be one way in which patients can have their concerns acknowledged and validated. It is therefore important that GPs are able to allocate sufficient time to engage in communication with their patients, to offer them reassurance, and to address any underlying reasons for their concerns.

Identifying patients' expectations was considered by most of the GPs in the Phase 3 study as integral to managing patient requests for imaging. Sir William Osler (1904) has been quoted

as saying, ‘It is much more important to know what sort of *patient* has a disease than what sort of disease a *patient* has ...’. (John, 2013, p. 57). Jerant et al. (2017) have suggested that maintaining patient satisfaction while not meeting patients’ expectations can be challenging. In the current healthcare landscape in the US, they found that the financial compensation for many providers seems to be at least partially linked to patient satisfaction ratings, which are measured by the organisations that employ these providers. Their study offered guidance to clinicians and healthcare administrators who are responsible for providing high-quality, cost-effective care, and recommended patient-centric communication methods. They acknowledged, however, that delivering such care within a patient-centric model while also improving patients’ subjective experiences of how they receive this care can be challenging. The patient participants in Phase 2 of our research expected their GPs to fulfil their requests for radiological imaging and viewed this as a demonstration of proactive healthcare management. Most of these individuals reported that their GPs either granted their imaging requests without question, or—in those cases where there was a long-standing relationship with the GP—the request was granted after a lengthy discussion about the requested study. Meanwhile, the GP participants in Phase 3 pointed out that patients often came to consultations with high expectations that their requests would be fulfilled, and they saw this as an entitlement. This sentiment was also echoed by the radiologists in Phase 4 of the research. As explained by one GP participant:

Half of my patients ask [for scans] because they know that radiology is free in this country. (Phase 3, GP, male, 55)

At the same time, the GPs acknowledged that such individuals tended to be health literate, were employed, and came from higher socio-economic backgrounds. Many came to the consultation specifically to request imaging as they had concerns about returning to work

after an injury or illness. Radiologists also reported that patients often had high expectations of receiving immediate pain relief from the requested radiological interventional procedures, even if these expectations were sometimes unrealistic. If patients' expectations were not met by the interventional procedures or if the procedures requested were not carried out, this led to disappointment and various other negative emotional responses. Walderhaug (2022) identified various strategies that might not only help avoid unwarranted imaging requests from patients who arrive with increased expectations but that might also help avoid conflict and appease patients. One of these strategies is a pedagogical approach that involves explaining why imaging was not indicated, with GPs first empathising with the patient and sharing their diagnostic reasoning in detail out loud before ultimately denying the patient's request (Walderhaug et al., 2022).

8.5 Misunderstandings of the Merits and Limitations of Imaging Requests by Patients

Empirical findings from the Phase 3 and 4 studies regarding GPs' and radiologists' perspectives showed that patients frequently misunderstood the merits and limitations of the medical imaging procedures requested. This misunderstanding sometimes created tensions between the patient and GP, as each held differing opinions on the best approach to managing the patient's health. The GPs involved in Phase 3 of the research agreed that patients needed clear direction to identify the most appropriate tests or procedures for their individual circumstances. It was also pointed out that patients lacked the critical evaluation skills to be able to analyse the usefulness of tests and procedures for their current needs.

A GP participant from Phase 3 observed:

Often, they have the wrong impression about what a test will exclude or not exclude.

(Phase 3, GP, female, 60)

The radiologists surveyed for this research also expressed the opinion that patients were largely unaware of the merits and limitations of imaging studies. They agreed that the requested imaging studies were often not backed up by reasoning and, in some cases, were clinically non-indicated. Moreover, they noted that when patients demanded imaging studies, fulfilment of their requests by GPs could result in ambiguous ordering. The radiologists emphasised the importance of the GP clearly stating the clinical indications for any given request so that they are able to correlate the tests requested by the GP to the most appropriate imaging modalities. Ambiguous ordering practices, they said, often resulted in an increased workload because they were trying to satisfy GPs and patients through expedited reports. Moreover, the GPs who were interviewed in Phase 3 commented on how they tended to respond positively to imaging requests by patients although they understood that they were acquiescing to their patients' needs. In other words, they saw these as 'therapeutic scans', and the requests were approved despite the fact that they had the potential to increase radiologists' workloads.

A main focus of this thesis has been on the paradigmatic shift that has led to changes in the roles of patients, GPs, and radiologists over the past several decades, which itself has been due to the shift away from the traditional healthcare delivery model and towards a patient-centric one, facilitated by increasing patient access to OHI. The European Society of Radiology Patient Advisory Group (ESR-PAG) consists of representatives from patient groups across Europe as well as radiologists and radiographers who are members of various European Society of Radiology (ESR) committees (Carrié et al., 2022). The ESR group's main objective is to foster positive relationships between radiologists, radiographers, and patients, with a view to enhancing patients' understanding of various imaging techniques and to promote a patient-centered approach to medical radiology practice in Europe. The ESR group in their short paper created the "PATIENT CARERS AIMS" mnemonic (see Appendix

A) to highlight key patient expectations from the perspective of radiologists and imaging professionals throughout Europe. This statement covers crucial aspects of patient care—before, during, and after imaging examinations—and emphasises the importance of clear communication, transparency about the limitations of imaging, shared decision-making, patient comfort, and timely results. The committee advocates a patient-centred approach in radiology, particularly in light of advancements such as artificial intelligence (AI) and telehealth, to ensure that radiologists address patients’ evolving needs and expectations throughout their medical journeys (Carrié et al., 2022).

8.6 Patients Captivated by ‘Impressive Labels’

Interviews with the GPs in Phase 3 of this research revealed widespread concerns regarding patients’ misunderstandings of radiological terminology, particularly with respect to normal aging processes. GPs in the Phase 3 study raised concerns that some terms for conditions may be too expansive and could be interpreted by patients as pathological and thus requiring attention. Even when informed that these terms were not significant, patients still sought reassurance through imaging studies to confirm that they did not in fact have a serious underlying condition.

For example, Stephan et al. (2025) explains the use of AI tools to assist patients with unfamiliar terms that may cause them to overestimate the severity of findings. He reports that radiology reports using terms such as “lesions” or “opacity” can lead to unnecessary anxiety when patients are provided with these reports digitally or as a printed document, without sufficient explanation (Stephan et al., 2025). Brodersen et al. (2018) describe ‘over-definition’ as a broadening of disease definitions to include individuals with unclear or mild symptoms, which can result in the unnecessary classification of individuals as patients. Brodersen suggests that ‘over-definition’ seeks to provide validation to patients by

acknowledging their symptoms (Brodersen et al., 2018). As one GP who was interviewed for Phase 3 commented:

I mean, to be honest, many imaging services will give you a label to find things. Impressive labels on things that are not significant. It's what patients are looking for, and it is what they want to hear. (Phase 3, GP, Male, 73)

Other GPs interviewed in Phase 3 added that patients were often influenced by past imaging diagnoses or reports that contained terms such as “degenerative disc disease”. Even though the use of such terms is common and typically not a cause for concern, it often leads patients to request additional imaging in the belief that their symptoms are a sign of a more serious condition. The GPs believed that “impressive labels” contributed to patients requesting imaging without fully understanding the clinical significance of their conditions.

In O’Keefe’s (2022) randomised, blinded experiment on individuals with and without low back pain, participants were provided with different labels such as ‘disc bulge’, ‘degeneration’, ‘arthritis’, and ‘lumbar sprain’. The main aim of this study was to investigate participants’ beliefs regarding the necessity for imaging based on these various labels. The study concluded that labels such as ‘episode of back pain’, ‘lumbar sprain’, and ‘non-specific low back pain’ reduced the need for imaging, surgery, or the seeking of a second opinion, whereas labels such as ‘arthritis’, ‘degeneration’, and ‘disc bulge’ led patients to believe that they required further assessment. The results of this experiment suggested that the latter set of diagnostic labels (‘arthritis’, ‘degeneration’, and ‘disc bulge’) had the effect of prompting patients to seek out further testing (e.g., lumbar imaging) and treatments (e.g., surgery) (O’Keefe, 2022). Their finding suggests that terminologies used by health providers when diagnosing low back pain can significantly influence patients’ perceptions and consequently their management plan.

8.7 Litigation Concerns

GPs in Phase 3 also revealed that in the event that a patient's request for imaging was of little clinical relevance, they sometimes acquiesced to these requests as a way of practising defensive medicine due to the threat of litigation. Even when they believed a scan was unnecessary, some GPs felt pressured to fulfil their patients' requests to avoid potential legal repercussions should the patient's condition worsen later, which created a tension between the GPs' clinical judgment and their desire to protect themselves from litigation. Most GPs agreed that such concerns were not acknowledged by patients with whom they had long-term relationships. However, the GPs in our study noted that new patients were less likely to comply with their advice and were less receptive to their guidance. This may be attributed to the lack of confidence and trust between a GP and a new patient, as opposed to long-term patient-GP relationships (Thomas et al., 2020). However, a study by Hall et al. (2019) assessed the behaviours of GPs that could be seen as either barriers or enablers to adherence to guideline recommendations, for instance, in determining imaging for patients with low back pain. This study, which recognised the complexities involved in implementing guideline-based care, found that complying with patients' needs was foundational to building trust. GPs who ordered patient-requested imaging were found to be more likely to build trust with their patients than GPs who denied requests. Those who denied their patients often experienced an undermining of trust, leading to the patient no longer visiting them (Hall et al., 2019).

8.8 New Patients and Lack of Trust

GPs interviewed in Phase 3 also emphasised that new patients' complete medical history was often unavailable during the first consultation, which made it harder to determine if the imaging request was appropriate. They also explained that new patients who were seeking

imaging often chose the last available appointment time, which encouraged a quick consultation that GPs perceived as being a mere formality to secure a referral. GPs also felt that while their long-term, established patients were more likely to accept their guidance that imaging requests were unwarranted, new patients were more likely to seek out another doctor if their requests were denied.

A study conducted by Kanzaria et al. (2015) found that 85% of emergency healthcare providers acknowledged that they were ordering too many diagnostic tests. In emergency medicine, health practitioners often see patients once, and mutual trust and confidence tend to be absent due to no or limited prior interactions. Most respondents (97%) in their study acknowledged personally ordering at least some medically unnecessary imaging (CT or MRI), with the main perceived contributors being the fear of missing a diagnosis and possible subsequent litigation (Kanzaria et al., 2015). These findings suggest that defensive medicine, where tests are ordered to protect against legal consequences, contributes to unnecessary healthcare costs, and for patients, to radiation exposure risks. The study further suggested the need to address systemic issues such as malpractice reform, patient education, and improved health provider training to engage in shared decision making with patients.

8.9 Holistic Care

Thomas et al. (2020) emphasised the importance of providing holistic care to patients in primary care settings. They advocated treating patients from various psycho-social perspectives, taking into consideration factors such as psychological and emotional health, social determinants of health, family context, culture, spirituality, environment, stage of life, and attitudes toward health. Their approach involves caring for the whole person over the longer term and extends beyond just addressing biomedical concerns (Thomas et al., 2020, p. 55). This ‘whole person care’ approach emphasises the importance of the long-term GP-

patient relationship and encourages personalised and context-based care combined with biomedical treatment, which has been found to be key to continuous care (Thomas et al., 2020). Their research thus emphasises the value of continuity of care and relational continuity in the doctor-patient relationship, and highlights the benefits of personalised care within a team-based approach (Delva et al., 2011). Murphy (2020) found that most patients, particularly those with multi-morbidities, perceived continuity of care with a GP, that is, a long-term patient-GP relationship, to be essential. In some cases, this meant that the GP was part of a larger healthcare team where the members all have a relational commitment to the patient (Murphy & Salisbury, 2020).

This type of relational continuity has been found to foster trust, allow for personalised decision-making, improve preventive care, and reduce healthcare costs (Rhodes et al., 2014).

As explained by one participant in Murphy's (2020) study:

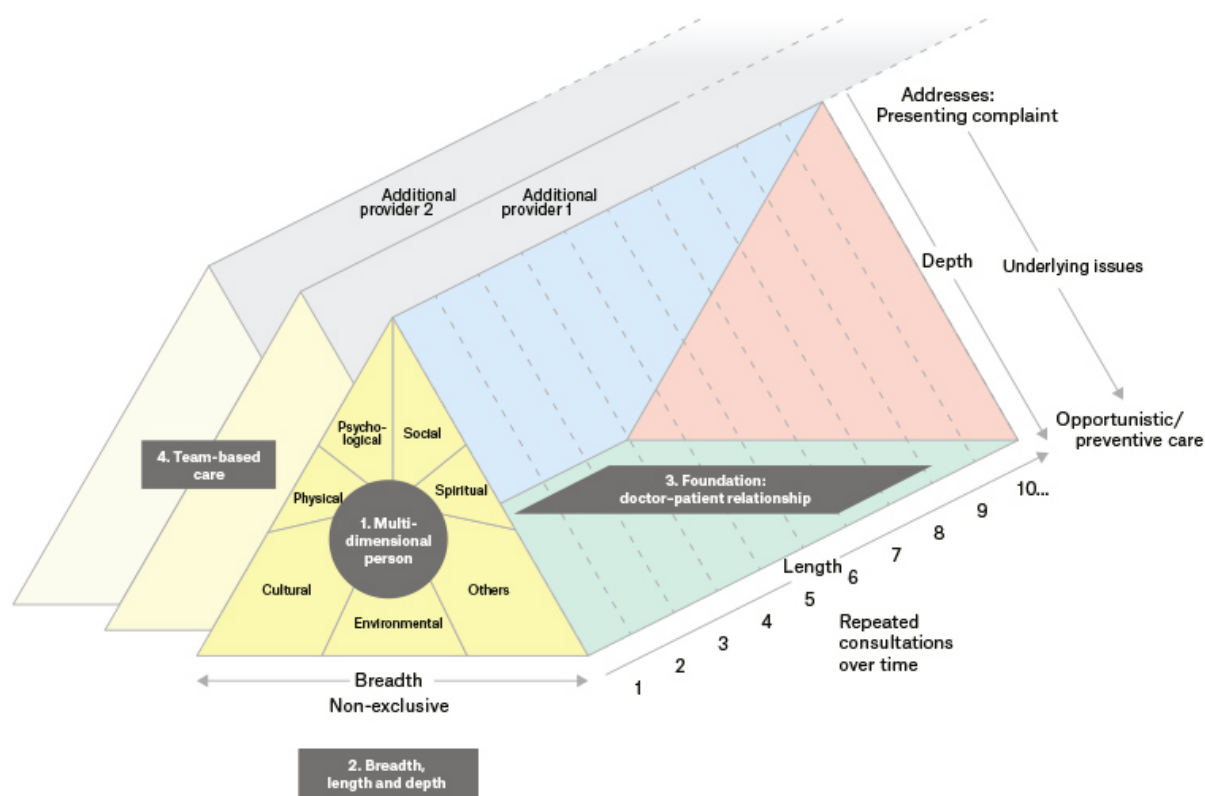
I don't like being brushed aside as being ... neurotic or something like that... I think it occurs more with doctors that don't really know you ... I mean, there's a trust issue, isn't there? (Murphy & Salisbury, 2020).

While similar sentiments were shared by participants in all phases of our research, it was especially highlighted in Phase 3 by GPs who stated that they were less concerned about threats of litigation from individuals with whom they were in long-term patient-GP relationships because trust had been established. These GPs indicated that most patients in their continuous care had trust in their clinical skills. This was a recurring theme in the systematic scoping review conducted for this thesis, where most GPs expressed the view that long-term patients had more confidence in their clinical skills. In other words, GPs suggested that by having extensive knowledge about their patients, they could help normalise their patients' ailments and reassure them. Moreover, by not being overly reactive or especially

concerned about their patients' presented symptoms during clinical visitations, GPs were able to instil in their patients a great deal of trust regarding their medical competency and skills (Ottenheim et al., 2014; Pike et al., 2022; Walderhaug et al., 2022). The diagram presented in Figure 8-2 shows the importance of a continuous relationship between patient and GP, and the involvement of a multidisciplinary team, to manage the patient's journey through the healthcare system.

Figure 8-2:

The significance of a patient's ongoing relationship with GPs and the role played by a multidisciplinary team.



Australian Journal of General Practice. 49(3), 139-144. doi:10.31128

Image reproduced with permission from Thomas et al. (2020). Whole-person care in general practice: The doctor-patient relationship.

8.10 Healthcare Perspectives

Growing patient demand for radiological services has important implications for healthcare providers, policy implementation, and the establishment of best practices within clinical sites. Healthcare providers often seem to be unaware of the latest guidelines for the appropriate use of imaging in screening or diagnosis and do not know how such guidelines relate to a particular patient's situation (Hendee et al., 2010). Even when they do have such information at hand, providers can face several questions. How will fulfilling the requested test alter the course of the disease and how will declining the test affect patients psychologically? (Chen et al., 2022). Can they, as GPs, adequately advise their patients about the risk or necessity of a particular test in a pedagogical way such that patients can understand this information and not feel a sense of disservice? (Walderhaug et al., 2022). How can GPs communicate public health information, including statistical data about disease occurrence, in a way that relates to individual patient circumstances? In a healthcare system that prioritises patient satisfaction, how can GPs balance what is medically appropriate with what their patients want? (Fang et al., 2011). Exacerbating the issues faced by GPs are factors such as the increasing demand—by healthcare providers and patients—for diagnostic accuracy (Rosen et al., 2003), a global aging population (Wang et al., 2008), and the growing incidence of healthcare provider burnout (Flick, 2014a). The systematic scoping review conducted for this research (see Chapter 5) recommends the development of more explicit guidelines for GPs and radiologists to facilitate these healthcare providers in enhancing patient awareness of imaging procedures. Such guidelines would enable GPs to make better-informed decisions, thereby aiding in balancing patient requirements with resource conservation.

The following subsections discuss the systematic scoping review and barriers and facilitators around guideline adherence. The systematic scoping review was conducted after Phases 1 and

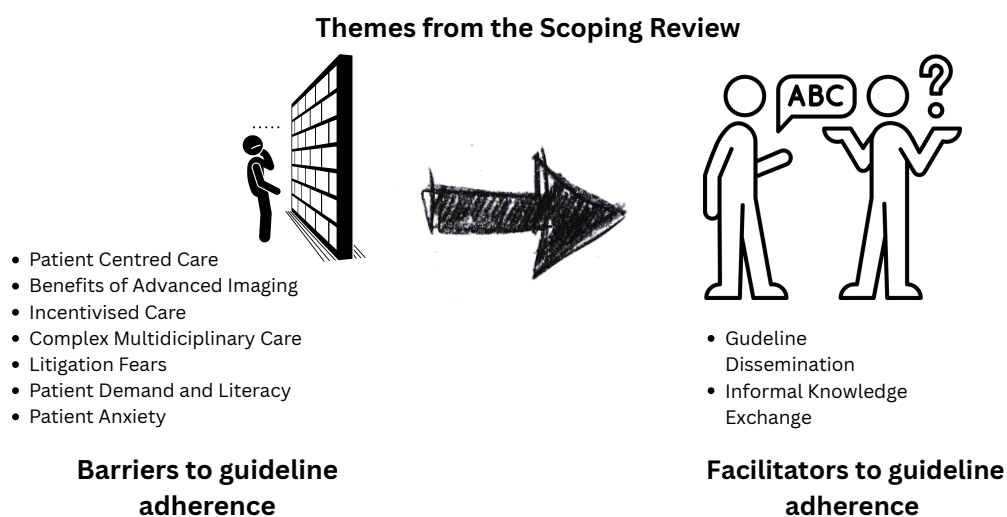
2 of the research (and before Phases 3 and 4) and was informed by the results of the empirical studies in the first two phases. These initial empirical studies used surveys (Phase 1) and interviews (Phase 2) to provide a comprehensive understanding of the complexities of managing patient requests for diagnostic imaging within the Australian healthcare system. The objective of the systematic scoping review was to explore this issue from a global perspective and to provide further insight into the initial empirical findings. The review underlined the importance of understanding and evaluating the impact of digital health and patient requests from a worldwide perspective. It has contributed to the existing literature by providing valuable insights for healthcare providers, empowering them to develop more effective strategies for navigating the current healthcare landscape.

8.11 Maintaining a Therapeutic Relationship

It might be assumed that GPs, as gatekeepers, are best placed to determine the most appropriate tests and procedures for their patients. However, the findings of the systematic scoping review in this thesis echoed the results of the empirical studies (in all phases of the research) by highlighting how GPs often fulfilled patients' requests to maintain therapeutic relationships rather than to comply with imaging guidelines. Hall et al. (2019), in recognising the barriers and enablers to reducing unnecessary imaging for low back pain, suggested that key barriers to ordering appropriate tests were patient pressure, the desire for GPs to maintain therapeutic rapport, and the need for GPs to mitigate potential conflict and litigation. Hall et al. found that most GPs in their study viewed imaging as providing a 'fail-safe' method to ease their patients' anxiety and increase their satisfaction (Hall et al., 2019). Yet, in taking this approach, GPs were often disregarding imaging guidelines. Figure 8-3 outlines the barriers and facilitators to guideline adherence, as highlighted by the systematic scoping review.

Figure 8-3:

Barriers to and Facilitators of Guideline Adherence.



(Image produced using Canva (<https://www.canva.com/policies/free-media-license-agreement-2022-01-03>). No permission required.)

8.12 Imaging Reliance

As seen in Figure 8-3, the systematic scoping review highlighted GPs' increasing reliance on imaging when faced with diagnostic uncertainty and found this to be a key barrier to guideline adherence (Botha & Mung'omba, 2012; Gransj oen et al., 2018; Ottenheim et al., 2014; Pike et al., 2022; Walderhaug et al., 2022). Interestingly, the GPs interviewed in Phase 3 mentioned that after the death of the Australian cricketer Shane Warne, they frequently referred patients with a family history of heart attacks for CT calcium scores when patients requested these. The media coverage surrounding Warne's death highlighted the importance

of being informed about cardiac health, and especially the value of determining CT-measured calcium deposits in coronary arteries, which are indicators of an increased risk of heart disease (Yokota et al., 2019). Another example can be found in the national reports and guidelines from the UK that emphasise the need for heightened vigilance and use of diagnostic imaging to detect conditions such as pulmonary embolism (blood clot formed in the body that blocks an artery in the lung) and aortic dissection (tear in the inner lining of the body's main artery)—both are not only fatal if left undiagnosed but can only be confirmed through imaging due to their clinical complexity (The Royal College of Emergency Medicine & The Royal College of Radiologists, 2021). Further, the broader range of therapeutic options now available to treat most forms of cancer, as well as the increasing survival of patients with this disease, has been accompanied by the need for more frequent and prolonged monitoring of treatment response through the use of imaging (Jenniskens et al., 2017). Indeed, enthusiasm for radiological studies is now an essential component of clinical examinations for this disease. Maskell (2022) notes that while there are frameworks to promote consistency of imaging use, there is still pressure on the health providers to overinvestigate or overrefer, especially when symptoms are vague or unexplained (Maskell, 2022).

8.13 Incentivised Care

The systematic scoping review also revealed that GPs tend to order more imaging services due to financial benefits and incentives if the GP is connected to an organisation with attached imaging facilities. For example, one participant in Gransjøen's study (2018) stated that:

So, many institutions want customers, and I think an essential point here is the privatisation of healthcare and treating it as a business rather than focusing on

patient care. That's concerning because profit dictates our actions. (Gransjøen et al., 2018, p. 5)

A Swedish study by Vengberg et al. (2020) examined how payment incentives in the Swedish primary care context—particularly financial compensation mechanisms—influence provider behaviour. They found that GPs who receive fee-for-service payments prioritise a high volume of short and easily manageable patient visits to maximise financial returns. The study also revealed that private medical centres with attached imaging facilities pressured their salaried GPs to increase profits for the centre by ordering a higher volume of imaging services. With incentives being a driving factor, GPs saw more patients, which put more pressure on them to consult within shorter timeframes (Vengberg et al., 2021). Managed care systems have been criticised for incentivising GPs to care for the greatest number of patients and to reduce overall resource utilisation, potentially leading to an inappropriate reduction in the time available to see patients (Dugdale et al., 1999). GPs who are thus incentivised to comply with patients' imaging requests are more likely to fulfil requests that are not clinically indicated. At the same time, these requests for imaging are validated under the pretext of promoting patient-centred care and increasing patient satisfaction (which includes better satisfaction ratings for the organisation) (Jerant et al., 2017; Salm et al., 2025).

8.14 Standard of Care

A study by Pike et al. (2021) found that GPs faced challenges in attempting to dissuade patients from imaging studies when providers within the same clinic do not follow uniform imaging practices. GPs observed that patients sometimes pressured them for images because other doctors at their workplaces used imaging more liberally, and patients perceived this as providing a higher standard of care (Pike et al., 2022). An example of this was seen in the Phase 2 study on patient perspectives where participants expressed an inclination to seek out

an alternative healthcare provider if a GP rejected their request for imaging. Similarly, GPs in Phase 3 acknowledged that patients, particularly those from higher socio-economic backgrounds, were more likely to change to another GP if their requests were declined as these patients were more willing to pay for their consultations above the MBS if this meant that their needs would be fulfilled. In fact, one GP participant in a study by Griffith et al. (2015) on the overuse of diagnostic imaging services in Canada stated that:

If they come and see you and they don't like what you say they can turn around and see somebody else the next day or even the same day, right. So they are the biggest driver and they are not the smartest driver because they don't know anything about guidelines or clinical decision support, but they do drive you because it is, unfortunately, a business, and they're forcing you to do things that are inappropriate.
(Griffith et al. 2015, p. 23).

Therefore, in complex healthcare settings with multiple providers, differing perspectives among team members may lead to miscommunication and guideline noncompliance (Walderhaug, 2022; Gransjøen, 2018).

8.15 Guideline Dissemination and Informal Exchange

GPs must collaborate with other healthcare providers to effectively manage the complexities of patient care within a multi-disciplinary care facility. This collaboration involves the sharing of knowledge and skills to enhance patient outcomes. This section delineates the strategies employed by GPs to promote adherence to clinical guidelines, particularly when patients request non-indicated imaging studies that are inconsistent with established recommendations. These strategies were identified through a systematic scoping review and underscore the interactions between patients and GPs that facilitate the management of such requests in accordance with clinical guidelines.

A myriad of terms have been used to describe multidisciplinary collaborations, such as ‘teamwork’ (Adamson et al., 2022), ‘partnership’ (Eder et al., 2018) and ‘coordination’ (Pertierra-Galindo et al., 2019). Furthermore, terms such as ‘interdisciplinary’ and ‘multidisciplinary’ are often used interchangeably (Gans et al., 2015; Kluter et al., 2021). Despite the lack of consistency in the use of these various terms, the reality is that GPs often collaborate with other healthcare team members to cope with, coordinate, and communicate about the complexities and demands related to effective patient care delivery (Yelland et al., 2016). Collaboration is a dynamic process that involves communication and decision-making processes that allow for both separate and shared knowledge and skills of different health professionals to provide synergistic patient care (Bouchez et al., 2024).

Imaging guidelines provide a framework or reference point for discussions among team members that include multidisciplinary providers such as radiologists, specialists and surgeons. For such collaborations to be effective, guidelines are needed to provide optimised patient care and facilitate effective communication between practice disciplines and GPs within organisations. For example, Gransjøen (2022) explored barriers and facilitators to guideline adherence in diagnostic imaging, focusing on the perspectives of GPs and radiologists. Their study found that while guidelines were essential for reducing unwarranted imaging, their effectiveness depended heavily on the accessibility and practicality of these guidelines for providers. GPs and radiologists agreed that easily accessible, clear, and concise guidelines were more likely to be followed whereas lengthy, rigid, and outdated guidelines were seen as significant barriers to guideline adherence. Effective imaging guidelines help multidisciplinary team members better comprehend their content and context and stay up-to-date on what is being recommended (Gransjøen et al., 2018).

The systematic scoping review also revealed that most GPs preferred printed materials written by radiology and general practitioner professional bodies (Gransjøen, 2018; Walderhaug, 2022; Sharma, 2021). Several GPs indicated that generic guidelines, which are often used in their workplaces, can be challenging to apply due to the varying needs of individual patients. The radiologists in Gransjøen's (2018) study stated that they preferred informal knowledge exchange among interdisciplinary colleagues over formal national guidelines. These radiologists expressed concerns that formally written information was often outdated because most guidelines change frequently. Local protocols and informal knowledge sharing were perceived as more current and therefore better suited within organisations with multidisciplinary teams (Gransjøen et al., 2018). Tay et al.'s (2025) recent systematic review provides a comprehensive overview of how imaging referral guidelines impact patients, radiology services, and healthcare systems. When referral guidelines are followed, the effects include reduced patient exposure to radiation, shorter wait times for imaging, increased satisfaction, and improved clinical effectiveness in detecting pathology. Furthermore, GPs have reported that such guidelines empower them to communicate better with patients, especially when declining requests, and support safer, cost-effective, and rational use of imaging, thereby helping to avoid overuse of healthcare resources. Tay and colleagues' systematic review concludes that guidelines offer measurable benefits across the healthcare system, particularly in supporting GPs' evidence-based referral practices (Tay et al., 2025).

8.16 Patient Decision Aids

The systematic scoping review in this research revealed that several factors are facilitators of guideline implementation, and one of these is patients' use of patient decision aids. Patient decision aids are standardised, evidence-based tools that help patients make informed, value-based choices about imaging use. Patient decision aids do not replace expert advice but allow

patients to personally reflect on their choices and to share their thoughts with their healthcare providers (Nyhof et al., 2020). To understand the extent to which patient decision aids are useful, Hersch et al. (2021) conducted a randomised trial investigating the long-term impact of decision aid usage. The aim of their study was to inform women about over-detection in breast cancer screening. The trial consisted of 879 women aged 48-50 years who had no strong family history of breast cancer and no mammograms done in the past two years. The trial gave participants one of two aids: an intervention decision aid explaining the risks of over-detection via an information booklet, and a tool with evidence-based details about over-detection, screening benefits, and the increased risks of false positives. The control decision aid was similar but did not include information about over-detection. Participants were interviewed at 6, 12, and 24 months. Over the two-year study period, women who used the intervention decision aid demonstrated a significantly better understanding of the potential harms associated with over-detection. The study found that 34.4% of women in the intervention group had adequate conceptual knowledge compared to 20.1% in the control group. At the same time, the intervention participants neither experienced higher anxiety nor reduced their screening participation rates. The study highlighted how the use of a well-designed decision aid, which includes information about overdiagnosis, can improve individuals' understanding of the potential harms of over-detection without negatively impacting screening rates, thus supporting the broader use and promotion of informed decision-making about breast cancer screening (Hersch et al., 2021).

As in Gransj en's (2018) study, the radiologist participants in Phase 4 of our research project suggested that GPs should have more detailed discussions with patients about the risks and benefits of imaging. Similar to the GPs in Gransj en's study, who recommended educating patients about the necessity and limitations of tests, the radiologists in our study recommended the development of guidelines to explain when an imaging study is

appropriate. They also recommended the introduction of a reimbursement structure for radiologists when they consult with patients and GPs under the MBS. Such resources, they suggested, would facilitate more informed multidisciplinary team-based discussions about imaging.

Studies by Gransj oen (2018) and Sharma (2021) found that the use of printed information—such as in booklets—facilitated guideline adherence. For instance, Sharma’s study found that patients were more inclined to read leaflets, and these proved to be invaluable. According to Sharma et al.:

Participants [patients] felt the combination of the leaflet and poster messages would give them more confidence to ask questions. Specifically, the ‘Ask your doctor – do I need this test?’ message received almost universal praise across both groups [two focus group patients with 9 in focus group 1 and 10 in focus group 2]—participants [patients] supported components of the campaign that empowered patients with information. (Sharma et al., 2021, p. 654)

Decision aids, therefore, play a critical role in encouraging adherence to diagnostic imaging guidelines for both GPs and patients. They can help GPs and radiologists navigate the challenges surrounding patient-requested imaging in collaboration with other healthcare providers. Informal knowledge sharing can also strengthen collaborations between healthcare providers and ensure that guideline practices remain current and relevant. The systematic scoping review in this thesis shows that the use of patient decision aids facilitates informed discussions between GPs and patients. Providing access to tailored guidelines relevant to the context and reinforcing their use through printed materials supports GPs in managing patients’ requests and helps patients develop a better understanding of the requested studies, all within a positive patient-GP relationship based on mutual trust.

8.17 Gaining Trust

The systematic scoping review also emphasised the importance of patient trust in their GPs. For instance, a study by Fenton et al. (2016) showed that an educational intervention for newly qualified GPs did not significantly change their decisions to order treatments or imaging for low back pain. The study found that when interacting with simulated ‘patients’ registered as new patients for the purposes of the study, most GPs complied with their requests. On the other hand, the participant GPs in Ottenheim’s study (2014) suggested that cultivating trust with patients can mitigate the necessity for imaging requests. Similarly, the study in Phase 3 of our research underscored the importance of GPs conducting thorough clinical examinations during consultations to validate their patients’ symptoms and gain their trust. This finding is echoed in the following quote from a GP in Ottenheim’s study (2014) who emphasised the advantages of establishing trust and conducting comprehensive patient examinations, ultimately reducing the need for additional tests:

Yes, one advantage is that you extensively examine your patients. (. . .) Gain trust! And often a correct diagnosis, with subsequently less need for additional tests. Maybe these [imaging] are ordered too much (Ottenheim, 2014, p. 241).

8.18 Clinical Skills

The systematic scoping review conducted for this thesis revealed that GPs consider clinical skills such as history-taking, symptom recognition, and a comprehensive understanding of patients to be essential for competent and thorough clinical examinations. GPs’ expertise in symptom recognition, for example, allows them to reassure their patients using a ‘watch and wait’ strategy. If symptoms fail to resolve, imaging may then be considered (Ottenheim et al., 2014). Most of the GPs in Pike’s (2022) study took into account their patients’ history, assessed for red flag conditions and surgical suitability, evaluated responses to previous

treatments, and considered resource stewardship before deciding whether imaging was necessary (Pike et al., 2022).

The Phase 4 study in our research found that radiologists believed that GPs should not only discuss the risks and benefits of tests with patients but also clarify the limitations of various modalities. The radiologists emphasised the importance of GPs clearly stating clinical indications to facilitate the correlation between clinical concerns and the requested tests. Such an approach, they said, would allow GPs to consider the most suitable modality for addressing patients' needs. They added that reviewing patients' clinical presentations using the 'watch and wait' strategy, as discussed in the literature, was essential and could allow symptoms time to pass without recourse to intervention (May et al., 2016; Walderhaug et al., 2022).

Building rapport with patients and ensuring continuity of care were highlighted during all phases of this research as being essential to patient-centered care. Radiologists stressed the importance of GPs discussing with patients any unrealistic expectations about procedure outcomes. They also highlighted the need to establish guidelines for meeting imaging requests and to address medicare rebates when radiologists are involved to determine the most appropriate scanning needs for the patient. They stressed that these actions are important and represent a responsibility and commitment to patient care.

The findings highlight that patient behaviour in requesting imaging referrals cannot be viewed in isolation. Instead, it should be understood within a relational system involving healthcare providers and, in this research, from a dynamic perspective involving the three key stakeholders. This research expands the ANM by incorporating system-level mediators that influence imaging use, demonstrating that utilisation decisions stem from a cumulative interaction within the healthcare ecosystem. The adapted model emerging from this thesis

positions patient-initiated imaging resulting from the behaviours, expectations, and structural constraints that continually affect the three stakeholders. By placing the findings within this broader conceptual framework, the chapter emphasises the importance of value-based care, including collaboration among healthcare providers and recognising the interconnected roles of the tripartite stakeholders. This conceptual model offers a foundation for the recommendations in the next chapter, providing valuable insights for future research and policy development aimed at addressing patient-initiated imaging studies.

The following conclusion chapter offers recommendations for patients, GPs/ RACGP, radiologists/RANZCR, and the patient consumer groups. These suggestions are grounded in the entire body of research presented in this thesis, including empirical data from all four phases and the systematic scoping review. It concludes with limitations of the studies conducted in this thesis and suggests future research to better understand the reasons behind patient requests, which will ultimately promote more value-based care.

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Chapter 9 : Recommendations for Targeting Value-Based Care and Conclusion

9.1 Introduction

This chapter concludes the thesis by emphasising the importance of patient education and informing patients about the benefits and limitations of diagnostic imaging studies, which will facilitate the management of patient expectations in the appropriate use of imaging and preserve therapeutic relationships. As patient demand for diagnostic information increases, often driven by OHI, anxiety, and the need for reassurance, there is an urgent need to align healthcare practices with value-based care principles (Docking et al., 2022; Lu et al., 2024; Walderhaug et al., 2022). The empirical studies in this thesis demonstrates that individuals with higher eHealth literacy are more likely to request referrals and often consult reputable online sources like the Mayo Clinic's patient information sites (De Silva et al., 2023b). These patients frequently receive their requested scans, as noted by GPs in Phase 3 who regard them as 'therapeutic scans' that are mainly aimed at providing reassurance rather than for any direct benefit or out of necessity (De Silva et al., 2023c).

The following tables detail the reasons and prompts behind patients' imaging requests and offer recommendations for patients/consumer groups, GPs/RACGP and radiologists/RANZCR, to support more informed decision-making. This is important because understanding what motivates imaging requests helps healthcare providers improve communication, develop decision aids, and promote shared decision-making to better manage patient expectations. Patients often see imaging as confirmation or 'proof of wellness', as it provides a visualisation of their internal anatomical structures to demonstrate the absence of pathology.

Table 9-1 provides an overview of patients' motivations for seeking imaging, the behavioural prompts that can lead to requests for diagnostic imaging, and makes suggestions for responding to these requests. These are based on the empirical studies conducted in this thesis and the scoping review. The tables are contextualised within a value-based care approach, which focuses on using available resources fairly, sustainably, and transparently to achieve improved patient health outcomes (Bouchez et al., 2024). The studies and literature presented indicate that patients are increasingly relying on OHI, which can often be an unreliable source if not approached with caution. This concern is amplified when patients consult sites that lack authority. Therefore, there is a pressing need to guide them towards trustworthy, evidence-based resources. This guidance is especially crucial given the rise in health anxiety (Sharma et al., 2020) and the belief that imaging provides a physical indication of a patient's well-being, as this can lead to excessive use of imaging and potentially contribute to overdiagnosis (De Silva et al., 2023b).

Table 9-1:

Patient Drivers for imaging requests and Suggested Scenarios to promote value-based care

Patient prompt leading to imaging request	Suggested scenarios to promote value-based care
Randomly visiting online health information sites due to exposure to advertising, experience of symptoms and other health-related needs	Seek health providers' advice about reputable sites and evaluate website to assess if it is from a reputable, well established healthcare facility. These may include government sites and reputable teaching organisations
Confused about health information, particularly when you are experiencing illness/symptoms or having recently received	Avoid repeated/constant consultations of online platforms and seeking counsel from non-healthcare friends and family, even in the absence of symptoms or when experiencing vague, non-

Patient prompt leading to imaging request	Suggested scenarios to promote value-based care
a diagnosis for yourself or someone you know	specific concerns. Instead consider accessing support and information from a reliable, qualified and trusted health professional. Furthermore, focus on building a trusting relationship with your GP which can foster confidence and reassurance, allowing you to benefit from their clinical experience and judgement, rather than relying on online content
Experiencing anxiety following a recent diagnosis of a friend or family member, being acutely aware of a known family disease history or exposure to public health information that raises concerns about personal health risks that you consider need screening with imaging	<p>Seek your GP's advice when experiencing anxiety about your illness or when you are having symptoms. GPs are trained to recognise symptoms and guide you towards appropriate care</p> <p>Consider and practice mindfulness based therapies recommended by your regular GP</p>
Feeling that you need proof of wellness or you have a desire to request a scan for reassurance after an online search suggesting the use of imaging, even in the absence of any distinct symptoms	<p>Ask your GP about patient decision aids which support informed choices. Such tools aid in the understanding of the benefits and risks of tests and treatments. Recognise that excessive imaging can lead to further complications such as increased exposure to radiation, false positive results (where a test indicates the presence of a disease when it actually is not present), and overdiagnosis (where an abnormality is found but it would not have caused harm or become problematic if left undetected or untreated)</p> <p>Inquire with your GPs about the need for the imaging you have found online, and ask them about alternative methods, such as consulting a physiotherapist, a specialist, or alternate therapies, rather than only relying on imaging</p>

Patient prompt leading to imaging request	Suggested scenarios to promote value-based care
Concerns about the limited time your GP seems to have to talk to you	<p>Before visiting your GP, consider writing down your thoughts, concerns and expectations, especially if you are planning to request a specific test or investigation. Note what you hope to gain from the consultation and any outcomes you anticipate. A helpful tool is the Patient Reported Outcome Measure (PROM), which is a questionnaire that allows you to report on your symptoms, daily functioning, and quality of life</p> <p>This information comes from your experience, without being influenced or interpreted by a healthcare provider, supporting a more personalised and meaningful discussion during your appointment. For example, if you are experiencing low back pain, PROM can help your GP better understand how the pain affects your daily life</p>
If you are not sure you trust your GP's clinical skills	Your GPs knows your background and will inform you of any tests /procedures based on your previous history. Write down what your expectations are from your request, so the GP has an understanding. You can always seek a second opinion, although it is encouraged that you build a stable long-term relationship with your current GP

(This table was created by the author based on the empirical studies conducted in this thesis.).

9.2 Recommended Strategies for GPs and RACGP

The RACGP recognises the need for a high performing healthcare system that delivers quality care and health outcomes for the entire population. GPs who are members of the

RACGP have developed a framework that supports patients to have easy access to GPs. This framework includes promoting an established, long standing relationship with the medical practice and their nominated GP, allowing seamless, integrated and continuous care where patients needs are understood and prioritised.

Moreover, the RACGP undertakes advocacy on behalf of GPs as well. This includes supporting GPs at a national level to manage their medical practice through grassroots advocacy with local MPs and candidates (RACGP.org.au). As a professional body is capable of shaping future outcomes, active participation in professional organisations such as these allows GPs to exert more influence on the ongoing execution of these recommendations.

Table 9-2 provides recommendations for GPs who need to address clinically non-indicated imaging requests from patients.

The RACGP's website has handy online tools for GPs so they have a clear indication of when to refer for diagnostic imaging. Diagnostic imaging pathways offer evidence-based guidelines that outline the appropriate use of medical imaging for the diagnosis of specific clinical conditions (https://radiologyacrossborders.org/diagnostic_imaging_pathways/imaging-pathways). Such pathways assist providers in assessing whether i) imaging is necessary, ii) which type of imaging is appropriate, iii) when such imaging should be conducted, and iv) how to interpret and act upon the results. Pathways provide guidance on the appropriate types of tests and also promote value-based care (Towards appropriate imaging: Tips for practice, 2016). Examples of pathways include Radiology Across Borders's imaging pathways advice (https://radiologyacrossborders.org/diagnostic_imaging_pathways/imaging-pathways) and Inside Radiology's recommendations (<https://www.insideradiology.com.au/for-health-professionals/tests/>).

The results from the studies in Phases 3 and 4, as well as the systematic scoping review, showed that a contributing factor to the overuse of imaging was GPs' fear of litigation, which often led to defensive medical practices that decreased adherence to the established guidelines. Additionally, there were concerns about how to effectively manage patient expectations. The recommendations described in Table 9-2 advocate a 'watch-and-wait' approach that emphasises the importance of GPs engaging in comprehensive discussions with patients. These conversations should clarify diagnostic needs and explore the advantages and limitations of various imaging modalities so that GPs can more easily comply with imaging guidelines. Table 9-3 suggest recommendations for RACGP, the professional body to aid GPs in managing patient requests.

Table 9-2:

Recommended strategies for GPs to employ when patients request clinically non-indicated imaging.

Factors contributing to GPs' non-compliance with imaging guidelines	Recommended strategies for GPs
Fear of litigation, even in the event of a low likelihood of missing a serious pathology	<p>Use 'watch and wait' strategy. Assess patient's symptoms and allow time for them to resolve. Develop a clear follow up plan and inform the patient about potential interventions or diagnostic steps if symptom persist</p> <p>Articulate your rationale and provide the evidence behind the 'watch and wait' approach, to reassure the patient and address their concerns about missing a serious pathology</p> <p>Incorporate shared decision-making frameworks that involve both you and the patient to collaboratively assess the risks and benefits of delaying immediate imaging while ensuring the patients feels involved in the care plan</p>

During the ‘watch and wait’ period, provide patient with educational materials about low-risk conditions to further support the course of action. You or your practice may be able to provide a reliable repository of health-related information for patients to use

Document the rationale for the clinical decisions to protect yourself against legal risks, particularly in the event of having declined a patient’s request for imaging should it subsequently result in an unexpected negative outcome

Refer patient to the organisational governance team at your place of employment and suggest using a patient advocate if they are unsatisfied with a non-fulfilled request. Such advocates liaise with patients, GPs, radiologists and consumer groups to assess the best outcome for the patient (<https://www.patients.org.au>)

Patient and family expectations

Have an in-depth conversation with the patient to gain an understanding of their expectations and outcomes from the request for imaging. This should allow you to process the drivers behind the request and what the patient hopes to achieve from having their request fulfilled

Give the patient a complete diagnostic evaluation by ‘speaking aloud’ the reasons for your decision(s). When health providers speak their diagnostic reasoning aloud, patients have a greater understanding of the merits and limitations of certain scan or procedures. It gives patients a brief inward look into how you have made the diagnostic reasoning and come to a decision for their particular circumstances

Be involved in training offered by the organisation (or the broader healthcare system) around managing patient expectations and how to decline requests by using an

empathy-based communication style and evidence-based reassurance

Provide resources or information to patients around the risks of overdiagnosis and offer alternative monitoring strategies that can satisfy them without the need for imaging

Difficulty justifying to patients a declined request for imaging

Be involved in and educated about patient decision aids. Play an active role in implementing patient decision aids that can educate your patient on the limits and merits of tests and procedures

Guide patients on how to use decision aids during the consultation rather than defaulting to take-home material and integrate this into the patient-GP visit workflow. This may include follow-up consultations with your patient on how they have been using the decision-aid

Uncertainty about imaging guidelines

Seek out current clinical guidelines that are clearly written and easily accessible. Protocols from professional societies or those implemented in your organisation should be regularly updated and shared among GPs

Adopt clinical decision support tools embedded in electronic health records that automatically flag unwarranted imaging based on presenting symptoms

Participate in interdisciplinary collaboration with radiologists to ensure that everyone is aligned on best practices for imaging requests

Table 9-3

Recommendations to RACGP

Clarify and strengthen diagnostic imaging guidelines	<p>Develop concise, GP friendly guidelines for commonly requested imaging studies. These include explanations for when imaging is not indicated so GPs can share this with their patients</p> <p>Introduce or encourage the use of patient decision aids which are embedded in GPs' software systems to support real time adherence and justification of imaging choices (this includes declining requests that are unnecessary)</p>
Education Intervention	<p>Provide training modules on how GPs can empathetically reassure anxious patients without defaulting to 'therapeutic scans' (scans referred for reassurance rather than necessity)</p> <p>Use clinical findings (recent research findings or pedagogical reasoning) to justify non-imaging-based decisions. These resources can be accessed through webinars for continuing development plans on their staff intranet sites</p> <p>Update these clinical findings regularly</p> <p>Offer medico-legal education to clarify what can be potential litigation risks based on evidence-based findings in imaging use</p>
Patient communication strategy	<p>Develop RACGP endorsed resources for when imaging is useful and when it is not. This means suggesting ways in which GPs can highlight the dangers of false positives and overdiagnosis to their patients. It could further emphasise the ways in which GPs can assert the importance of patients seeking clinical expert opinions rather than relying on their own self-diagnosis and/or online information</p>

Address media influence	Work with public health bodies such as the AIHW to ensure public health dissemination is balanced and minimise reactive behaviour by patients
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9.3 Recommended Strategies for radiologists and RANZCR

Radiologists in the empirical study in Phase 4 indicated they have perceived a trend in patient-initiated imaging that is facilitated by GPs fulfilling patient requests. These radiologists estimated that approximately 24% of imaging requests were unnecessary, primarily due to the lack of correlation between the request and the patient's clinical history. They further elaborated that interventional radiology, such as corticosteroid injections for musculoskeletal concerns, were often fraught with unrealistic expectations. The mismatch in expectations in terms of merits and limitations of certain procedures led to patient dissatisfaction. Most radiologists considered that the lack of insight into the limitations of imaging and an overestimation of its diagnostic value led to increased referrals for imaging. The table below provides recommendations for radiologists in mitigating unwarranted imaging requests.

Table 9-4:

Recommended Strategies for Radiologists.

Become the radiologist representative of your organisation's clinical guideline committee with representatives from radiology, primary care, and patient advocacy groups	Promote Clinical Decision Rules (CDR) uptake during committee meetings, and ensure awareness of evolving guidelines
Partner with GPs as a collaborative team	<p>To co-lead (with stakeholders) in training programs, ensure interdisciplinary collaboration and encourage consistency with medical imaging guidelines</p> <p>Ensure best practices with complex cases where guidelines cannot be applied in a straightforward manner but require consultations with professional bodies for patients' best outcome</p> <p>Schedule regular meetings with the relevant education and training committee members and stakeholders</p>
Disseminate imaging guidelines through various channels	<p>Develop quick reference flow charts</p> <p>Provide printed guidelines</p> <p>Have dedicated portals for radiologists to obtain up-to-date information that can be shared with GPs</p>

The radiology community has developed educational modules aimed at promoting appropriate imaging referrals and refining the process that healthcare providers, such as GPs, can use to make imaging requests (ranzcr.com/college/document-library/clinical-decision-rules). These modules are intended to educate healthcare providers from all disciplines on how they perceive the role of imaging in the assessment and care of patients (ranzcr.com/college/document-library/clinical-decision-rules). The Royal Australian and

New Zealand College of Radiologists (RANZCR) has advised introducing these interventions early on in a healthcare provider's career to enhance the likelihood of long-term adoption of these practices (ranzcr.com/college/document-library/clinical-decision-rules). In Phases 3 and 4 of this thesis' empirical studies, it was observed that GPs and radiologists did not mention the modules, indicating that they may have been forgotten or that such modules may not have existed during their registrar training.

These educational modules comprehensively explain the evidence underpinning imaging practices and illustrate how to apply high-quality, evidence-based clinical decision rules (CDRs). CDRs are presented in user-friendly flow diagrams in a booklet that can be found on the RANZCR website for anyone to download. However, these CDR modules are not always adopted by health providers as they can be cumbersome to download and it takes time to read through the various clinical pathways. The modules were designed to support a range of stakeholders (including for ongoing use in medical practice) and to empower healthcare providers, including GPs, to make more informed imaging decisions, which can ultimately lead to improved patient outcomes. Nonetheless, the scoping review indicated that health providers are more receptive to easy-to-read booklets and online modules were poorly received (Gransjøen et al., 2018). Additionally, there was a preference for an informal exchange of information rather than formally written guidelines (Gransjøen et al., 2018).

Table 9-5 extends these suggestions to the professional body RANZCR and incorporates the empirical findings from this thesis.

Table 9-5:

Recommended Strategies for RANZCR.

Recommendation for RANZCR	
Policy	Develop national, evidence-based guidelines on commonly misused modalities (e.g. CTs for headaches). This may include co-designing guidelines with GPs and considering clinical appropriateness and medico-legal strategies
Campaigning for changes to Medicare	Structure rebates for radiologist-patient consultation during imaging studies and/ or procedures to encourage collaboration with GPs in deciding the most appropriate choice for patients
Educational modules	<p>Create awareness of and promote accredited continuing education online modules. Co-design further educational modules with GPs and RACGP. These modules should discuss how to handle patients who request imaging studies using evidence-based reasoning</p> <p>Present case studies on the benefits of ‘watch and wait’ strategies</p>
Patient awareness	Disseminate information through channels frequented by consumers such as social media, flyers, posters and health messages on television located in waiting rooms
Radiologist wellbeing	<p>Track imaging workload nationally, with RANZCR leading efforts into monitoring imaging volumes and non-indicated imaging rates across private and public practices</p> <p>Allocate time for interventional radiologists to engage in patient conversations, not just the procedure itself, so the right information is communicated to patients first hand</p>

9.4 The Patient Consumer Group

Many patient consumer groups promote patient-centred care, shared decision-making, and healthcare system transparency, with a central tenet of validating patients' voices (Timmermans, 2020). Such groups, also known as patient advocacy organisations, can provide tools to empower patients and ensure their perspectives are recognised, for example, Health Consumer New South Wales (<https://hcnsw.org.au>) and medicinesaustralia (<https://www.medicinesaustralia.com.au>). When a patient can provide detailed information about their request, their GP can better understand the relevant context, even in time-pressured consultations, which can facilitate more effective interactions (<https://hcnsw.org.au>). A study by McKinley and Middleton (1999) sought to understand what patients expected from their GPs' consultations. Their study, which involved 819 participants who completed a form prior to their consultations listing concerns, possible causes of their symptoms, questions, and desired actions from their GPs, found that 95% of patients made specific requests, and 69% sought explanations (McKinley & Middleton, 1999). While patients often arrived at consultations with clear agendas, ignoring these agendas could undermine the outcomes of the consultation. These authors emphasised that GPs should elicit patient concerns, beliefs, and questions, and training needs to be provided to new registrars to help them become skilled in identifying agendas (McKinley & Middleton, 1999). Clarity was found to be crucial when a patient is articulating their views on imaging, for example, in their descriptions of the ways in which they obtained information, and their reasons for believing this information. It was found that dialogue between patients and GPs could encourage more balanced discussions, allowing GPs to share their expertise while still respecting patient autonomy. Table 9-6 is adapted in part from McKinley and Middleton's study (1999) and highlights strategies derived from the empirical research in this thesis to help patient consumer groups communicate their needs more effectively.

Table 9-6:

Suggested actionable steps in mitigating clinically non-indicated imaging for the patient advocate in consumer groups

Patient communication style to consumer group	For the patient advocate in a consumer group
Patient describes their desire for an imaging test	Provide information/education for patients around the notion that GPs need to gain an understanding of the background for their request. This information should encourage them to write down what they anticipate the outcome will be from the request
Patient states explicitly or writes down their thoughts and options for imaging, how their medical information was sourced, and why they have come to their decision	Allows patient autonomy but gently steer their researching to more reputable sites. This ensures patients' decision-making process is respected and they feel validated
The patient mentions past imaging studies	Advise patient to bring all relevant imaging to the appointment so the GP can avoid unnecessary repeated imaging and understand how previous results can impact the current concerns
Patient asks questions regarding tests/procedures and explains why they consider the requested study to be beneficial	Allow patient to explain their understanding of test/procedure and their anticipated outcome and then have discussions with them using websites from professional bodies such as RANZCR that advise on the merits and limitations of tests. This also gives you as their advocate an insight into the patient's thoughts, values, norms, and what is perceived by the patient as having received good care

Patient communication style to consumer group	For the patient advocate in a consumer group
<p>Patient is explicit about what they want the GP to do (e.g. order the requested study, give a referral, further investigate, provide an explanation or consider the need for tertiary care)</p>	<p>Promote the idea that patients can be more explicit about their expectations to avoid misunderstandings and to make the request clear. Consumer groups can advise patients on how to communicate with their GP</p>
<p>Patient articulates expected outcomes: return to work, be able to play sports, resume 'normal' duties like driving, cooking, etc.</p>	<p>Provide information to the GP which will clarify for them what will satisfy the patient upon completion of the requested imaging; that is, what the patient hopes to achieve once imaging is complete. When a patient is poorly informed, the request often does not fulfil patient's anticipated outcome. The GP needs to consider the patient holistically and align the care plan with patient's expectations as a result of the imaging request. As an advocate, you can mediate this interaction</p>
<p>Patient expresses difficulty in understanding decision aids</p>	<p>Develop and deliver continuing professional development programs that are focused on communication techniques for GPs</p> <p>Incorporate mandatory training modules for new GPs and refresher courses for others</p> <p>Promote the use of clinical decision aid tools to GPs that could be automatically uploaded as customised clinical guidelines during consultations, relevant to the patient's condition. This can assist GPs in flagging unwarranted requests</p> <p>Provide resources to GPs that encourage alternative means of treatment based on the</p>

Patient communication style to consumer group	For the patient advocate in a consumer group
	<p>clinical history using decision aids rather than defaulting to imaging</p> <p>Ensure that organisations implement local protocols and continuously upgrade to the latest guidelines available, as advised by RACGP and RANZCR, and open lines of communication with RANZCR through a committee or advisory group</p>
<p>Patient expresses their frustration with time limited consultations</p>	<p>Liaise with you as the patient advocate, hold structured consultations, which may mean asking patients to fill out questionnaires that specifically address patient requests/needs and expectations prior to consultation</p>

(Adapted from McKinley and Middleton (1999). 'What do patients want from doctors?

Content analysis of written patient agendas for the consultation'. *British Journal of General Practice*, 49(447), 796-800. PMID: 10885083

The research findings of this thesis have shown that patient-initiated imaging requests are influenced by a complex interplay of factors, including patient empowerment, digital literacy, health anxiety, patient-GP dynamics, organisational structure, and the accessibility of OHI. Patients increasingly perceive imaging as a way of receiving self-assurance and validating their health concerns, particularly in a healthcare landscape that promotes patient autonomy and proactive health management. The availability of imaging at minimal cost under the Medicare Benefits Scheme (MBS), as well as increased levels of digital literacy, has strengthened patients' sense of entitlement around care. The thesis highlights the significant impact of OHI on patient behaviour, especially when sourced from websites that lack credibility for reliability or accuracy, which can lead to requests for imaging based on

incomplete or misunderstood information. For these reasons, healthcare providers need to be better equipped to critically engage with patients who arrive at consultations with preconceptions based on online sources and/or who respond to health promotions they have encountered online or through other media. GPs also need to have strategies in place to address patients' needs through educational interactions.

This research explored the complex situations that GPs may have to deal with in responding to patient requests for imaging. It was found that GPs are often required to balance adherence to guidelines with meeting patient expectations, and not meeting this challenge can lead them to order non-clinically indicated imaging for fear of disrupting the therapeutic interaction, which can result in dissatisfied patients, receiving negative reviews, or being threatened with litigation. In addition, the research has unveiled GPs' concerns about patients being misled and enamoured with 'impressive labels' that have no significant impact on their health outcomes. For example, degenerative disc disease, a common condition in the aging population, is often noted in radiological reports and is frequently perceived by patients as problematic and requiring additional scans (Battié et al., 2019). The research therefore underscores the need to maintain a delicate equilibrium between patient-centred care and reasonable utilisation of healthcare resources.

The research findings have implications for healthcare practice as they show the need for enhanced communication between healthcare providers and patients, notably, to clarify the limitations of imaging and pursue appropriateness for individual patients. They have also revealed the need to develop decision-making frameworks for patients and GPs. These frameworks enable the use of evidence-based software to be installed on GPs' computers to prioritise decision-making, with patient involvement being a central tenet. On the other hand, radiologists reported that the adoption of informal guidelines to collaborate with GPs would

be more effective. The findings suggest the need for more explicit guidelines for healthcare providers on imaging practices and highlights the critical role of patient education in understanding the risks and benefits of radiological studies.

The findings of this research have contributed to the existing body of literature by highlighting the importance of patient-centered care and responsible stewardship of diagnostic resources. By providing recommendations for patients, GPs, radiologists, professional bodies and patient advocate groups with respect to managing requests for diagnostic imaging, this research has sought to provide strategies that will allow therapeutic patient-provider relationships to be maintained while simultaneously respecting patient autonomy. It has also highlighted the important role played by clinical judgement and has stressed the challenges healthcare providers face in navigating patient expectations within a patient-centric model of care.

As patient requests for imaging continue to rise, the empirical findings of this research demonstrate the critical need for healthcare systems to foster improved communication, provide more explicit guidelines around imaging, and engage in shared decision-making to align patient needs with optimal clinical outcomes. The practical recommendations from these findings are designed to improve care quality, maximise patient satisfaction, and promote high-value care. They focus on avoiding over-servicing and overdiagnosis, thereby reducing patients' risk of unnecessary radiation exposure and false positive results.

Additionally, these recommendations suggest ways to foster collaboration among multidisciplinary team members, focusing on communication between radiologists, GPs, and patients to clarify the benefits and limitations of different scans and imaging procedures. They also raise awareness among professional bodies about the importance of ongoing education programs in collaboration with GPs, focusing on communication and informal

knowledge sharing, while providing patient advocacy groups with a clear focus on current patient needs.

9.4 Limitations

The thesis has several limitations. Participants taking part in Phases 1 and 2 of the research were individuals who had requested diagnostic imaging services five years prior to the distribution of the survey. Recruitment was limited to members of a marketing research panel residing only in Australia. Qualtrics is an external online market research platform that incentivises individuals who sign up as members to participate in surveys and interviews for research studies, and provide small rewards for members based on the length and complexity of their research projects. Therefore, caution is needed when applying the findings to the general Australian population or a global audience, since Qualtrics uses a selective sample of participants who are incentivised to take part. In this study, the participants were recruited online, and the focus was on those who had sought imaging referrals from GPs in primary care facilities. The studies in these phases did not consider individuals in specialised care or in hospitals, where patient needs may be more critical and dependent on providers. Inclusion of these individuals could have led to different patient responses concerning requesting imaging.

Additionally, since the participants in this study needed to have had prior radiological examinations as part of the recruitment criteria, and they received background information about the research and its aims via Qualtrics, there is a possibility of selection bias. One form of selection bias is sampling bias, which typically occurs if subjects are selected in a non-random way. Subject selection was also limited by recruiting participants through online portals such as those used by Qualtrics, which excludes individuals who do not utilise this online platform (Popovic & Huecker, 2023). Considering the Qualtrics' survey is only

available online, its use excluded those individuals who are not active on these types of online platforms. Moreover, the studies relied predominantly on self-reporting and did not gather data from actual imaging requests within clinical practices. Participants' responses were therefore based on their recollections, which has the potential to introduce bias, compromise the accuracy of the findings, and lead to overinterpretation. All participants in Phases 1 and 2 had access to imaging services covered under the MBS, resulting in no out-of-pocket expenses; the study did not consider the experiences of fully paying patients, whose behaviour in requesting imaging may have been different due to their different financial situation.

A further limitation is related to the small sample sizes for the GPs and radiologists in Phases 3 and 4, respectively, with only a modest response to the survey from radiologists. Both studies were conducted within Sydney Australia and in a single medical company. To enrich the understanding of GPs' perspectives, the study would have benefited from a comparison between the responses of new graduates and those of more experienced GPs. Moreover, although the radiologist survey in Phase 4 was available on the intranet, many radiologists do not frequent this platform. Nonetheless, their responses were varied with nearly half of the participants had over 20 years of practice experience (and can be seen as experts) while the other half had less than 10. This diversity may have enhanced the credibility of the findings. Phase 3 incorporated in-depth interview responses from participants. These interviews were brief because GPs have busy schedules and tend to be unavailable for lengthy discussions. Phase 4 incorporated short-answer questions to deepen understanding of the radiologists' responses. Similar to the GPs, the radiologists preferred the convenience of responding to an online survey due to their busy schedules. All studies focused on primary care individuals, meaning the research did not cover public, specialised care, or international settings, which could have improved the generalisability of the findings.

9.5 Future Research

Recent international evidence helps contextualise the shifting dynamics identified in this thesis. Farmer et al. (2020) shows that radiology reporting guidelines remain largely technical and lack a patient-centric approach for non-specialist individuals (i.e. the public). This gap in understanding leads to miscommunication between GPs and patients, who are increasingly accessing their radiological reports directly (Alarifi et al., 2024). At the same time, Johansson et al. (2021) demonstrates that online health communities are boosting patient empowerment by providing peer-generated knowledge, emotional support, and advocacy skills, which reshape expectations of what patients can and should request during clinical encounters. These trends intersect with the rise of large language models (LLMs) in clinical decision support, providing patient reassurance and further expanding public access to medical information, enabling an active role in shared decision-making (Xuyan et al., 2025). Moreover, these developments reflect a broader shift towards increased patient agency and information accessibility. The findings in this thesis show that with greater access to medical information, patients are more confident in their interpretations, have higher expectations regarding their diagnostic needs, and gain greater control over their health journey. The findings of this research suggest promising avenues for future research and translational applications in healthcare. Further research is required to test the recommendations presented in this chapter, specifically through studies, for example, using Delphi methods, that can engage GPs and radiologists as stakeholders and gather their expert opinions on how to effectively manage patient-initiated imaging requests. This could include patient advocacy organisations that can contribute their expertise by evaluating situations from the patient perspective. The aim of such research would be to confirm the empirical evidence presented here and refine the proposed strategies to ensure they are feasible across different healthcare contexts.

There is a need for increased collaborative research involving GPs and radiologists to identify best practices that accommodate patient expectations for imaging scans and procedures.

These collaborations could include educational interventions for healthcare providers to evaluate the effectiveness of patient decision aids and different communication tools aimed at managing patient expectations around imaging. The findings of this research show that digital health literacy influences patient behaviour, especially around locating and interpreting health information. Future efforts could involve integrating eHealth literacy into patient education programs developed by professional organisations and teaching institutions; for example, decision-making tools that could assist patients in critically evaluating OHI.

It is noteworthy that Australia does not have a single coordinated digital patient consumer group capable of adopting or advocating for recommendations related to patient empowerment. As a result, opportunities for shared, collaborative decision making between patients, GPs and radiologists related to patient agency remains fragmented. The findings of this research could also be used to help create guidelines or policies that promote patient-centred care in addressing patient-initiated requests. The recommendations presented for consumer groups could be used to develop explicit protocols for GPs and radiologists, which would help promote patient centered responses to patient requests. This approach would help optimise resource use and minimise unnecessary imaging. Suggesting standardised responses may also benefit GPs working in larger organisations, as it would prevent patients from repeatedly seeking providers who are more inclined to meet their demands.

In terms of patient-centered communications, the findings of this research could be translated into practical clinical workflows for GPs and radiologists, although this may involve systemic changes such as: longer booking times, incentives centered on value-based care, utilisation of patient-GP decision aids, and engaging with patient advocates before consultations to advise

patients on the OHI they have sourced. These steps would allow healthcare providers to engage with patients in meaningful conversations about the benefits, risks, and limitations of imaging. Practical workflows would enable healthcare providers to conduct in-depth discussions with patients with a view to aligning their expectations with clinical realities. However, workflows could necessitate revising healthcare financing models to incentivise evidence-based practices and address reimbursement structures

The above suggestions could mean developing policies that reward healthcare providers for minimising clinically non-indicated imaging and encouraging more sustainable healthcare systems. The results could inform both clinical practice and policy reforms, thereby creating a healthcare environment that is more responsive to patient needs while maintaining an efficient use of diagnostic resources.

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APPENDICES

Appendix A: Patient, Carer and Aims

Before: PATIENT

1. Purpose: Patients should understand why the imaging examination is necessary.
2. Advance Information: Patients should receive information ahead of time to prepare for the procedure and make informed decisions.
3. Transparency: Radiologists should be open about the limitations and risks of the examination.
4. Information: Clear, educational information provided by the referring GPs is crucial. It helps address patient concerns and expectations, ensuring they are well-prepared for the imaging healthcare examination.
5. Equality: All patients should have equal access to timely and necessary imaging without discrimination based on non-medical factors.
6. Needs: Patients' needs, such as access to specialists after imaging, should be considered.
7. Trust: Good communication and preparation build trust in the healthcare process and ensure patients feel informed and comfortable.

During: CARERS

1. Comfort: Reduce patient stress by providing physical comfort to patients while they are waiting.
2. Attentiveness: Staff should be readily available and responsive to patients' needs throughout the examination process.
3. Reassurance: Patients should receive empathetic care from staff who address their concerns.

4. Explanation: Staff should offer continuous explanations during the imaging process, such as preparation steps, updates on waiting times, or the need for additional imaging.
5. Results: Patients should know when and how they will receive their results, and radiologists should be available to explain the outcomes.
6. Safety: Patients should feel confident in their safety throughout the imaging procedure, knowing that precautions have been taken and best practices followed.

After: AIMS

1. Ascertain: Radiologists should ensure patients are satisfied by welcoming feedback on the imaging experience.
2. Involvement: Patient involvement should be encouraged with opportunities to contribute to improving services.
3. Monitoring: Follow-up instructions and potential monitoring should be clearly articulated to the patient.
4. Satisfaction: Patients' overall satisfaction with the process should be assessed and used to inform future service improvements.

(Adapted from the PATIENTCARERSAIMS, The ESR group, 2022)

Appendix B: Poster Winner Certificates

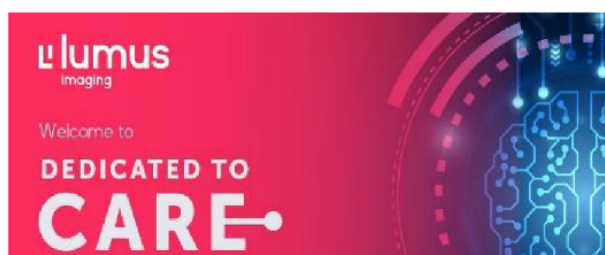
Certificate Winner

This is to certify that
Lizzie De Silva

Winner Poster Section

Unnecessary Imaging: Insights from Radiologists

13th – 15th September 2024



Education Activity Presentations & Publications



Certificate of Attendance

This is to certify that

Lizzie De Silva

Winner Poster Section

Patient requests for radiological services:

An Australian study of patient agency and the impact of online health information

The

Lumus Imaging National Radiologist Conference

23rd October 2021

7.25 RANZCR CPD points can be claimed for attendance at Lumus Imaging 2021 National Imaging Conference

Appendix C: Ethics submissions for the four phases of the study



Research Integrity & Ethics Administration
HUMAN RESEARCH ETHICS COMMITTEE

Monday, 15 August 2022

Assoc Prof Jillian Clarke
Clinical Imaging; Faculty of Medicine and Health
Email: jillian.clarke@sydney.edu.au

Dear Jillian,

The University of Sydney Human Research Ethics Committee (HREC) has considered your application. I am pleased to inform you that after consideration of your response, your project has been approved.

Details of the approval are as follows:

Project No.: 2022/520
Project Title: Doctors' Perspective on patients' request for referrals.
Authorised Personnel: Clarke Jillian; Keep Melanie; Kench Peter; Baysari Melissa; De Silva Lizzee;
Approval Period: 15/08/2022 – 15/08/2026
First Annual Report Due: 15/08/2023

Documents Approved:

Date Uploaded	Version Number	Document Name
02/08/2022	Version 2	Interview Questions Version 2 Clean
02/08/2022	Version 2	Participant Information Statement Version 2 Clean
01/07/2022	Version 1	Participant Consent Form Version 1
01/07/2022	Version 1	Letter of Invitation to doctors

Condition/s of Approval

- Research must be conducted according to the approved proposal.
- An annual progress report must be submitted to the Ethics Office on or before the anniversary of approval and on completion of the project.
- You must report as soon as practicable anything that might warrant review of ethical approval of the project including:
 - Serious or unexpected adverse events (which should be reported within 72 hours).
 - Unforeseen events that might affect continued ethical acceptability of the project.
- Any changes to the proposal must be approved prior to their implementation (except where an amendment is undertaken to eliminate *immediate* risk to participants).
- Personnel working on this project must be sufficiently qualified by education, training and experience for their role, or adequately supervised. Changes to personnel must be reported and approved.
- Personnel must disclose any actual or potential conflicts of interest, including any financial or other interest or affiliation, as relevant to this project.
- Data and primary materials must be retained and stored in accordance with the relevant legislation and University guidelines.

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Research Portfolio
Level 3, F23 Administration Building
The University of Sydney
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ABN 15 211 513 464
CRICOS 00026A



- Ethics approval is dependent upon ongoing compliance of the research with the *National Statement on Ethical Conduct in Human Research*, the *Australian Code for the Responsible Conduct of Research*, applicable legal requirements, and with University policies, procedures and governance requirements.
- The Ethics Office may conduct audits on approved projects.
- The Chief Investigator has ultimate responsibility for the conduct of the research and is responsible for ensuring all others involved will conduct the research in accordance with the above.

This letter constitutes ethical approval only.

Please contact the Ethics Office should you require further information or clarification.

Sincerely,



Associate Professor Helen Mitchell
Chair
Human Research Ethics Committee (HREC 1)

The University of Sydney of Sydney HRECs are constituted and operate in accordance with the National Health and Medical Research Council's (NHMRC) [National Statement on Ethical Conduct in Human Research \(2018\)](#) and the NHMRC's [Australian Code for the Responsible Conduct of Research \(2018\)](#)



Research Integrity & Ethics Administration
Human Research Ethics Committee

Friday, 8 December 2023

Assoc Prof Jillian Clarke
Clinical Imaging; Faculty of Medicine and Health
Email: jillian.clarke@sydney.edu.au

Dear Jillian,

The University of Sydney Human Research Ethics Committee (HREC) has considered your application.

After consideration of your response to the comments raised your project has been approved.

Approval is granted for a period of four years from **08/12/2023** to **08/12/2027**.

Project No.: 2023/831

Project Title: The Radiologists' Perspective

Authorised Personnel: Clarke Jillian; Keep Melanie; Kench Peter; Baysari Melissa; De Silva Lizzee;

First Annual Report due: 08/12/2024

Documents Approved:

Date Uploaded	Version number	Document Name
03/12/2023		Flyer
03/12/2023	Ver 2	PIS clean
03/12/2023	Ver 2	Survey Clean

Note: Please include dates and version numbers on all participant-facing documents.

Condition/s of Approval

- Research must be conducted according to the approved proposal.
- An annual progress report must be submitted to the Ethics Office on or before the anniversary of approval and on completion of the project.
- You must report as soon as practicable anything that might warrant review of ethical approval of the project including:
 - Serious or unexpected adverse events (which should be reported within 72 hours).
 - Unforeseen events that might affect continued ethical acceptability of the project.
- Any changes to the proposal must be approved prior to their implementation (except where an amendment is undertaken to eliminate *immediate* risk to participants).

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- Personnel working on this project must be sufficiently qualified by education, training and experience for their role, or adequately supervised. Changes to personnel must be reported and approved.
- Personnel must disclose any actual or potential conflicts of interest, including any financial or other interest or affiliation, as relevant to this project.
- Data and primary materials must be retained and stored in accordance with the relevant legislation and University guidelines.
- Ethics approval is dependent upon ongoing compliance of the research with the *National Statement on Ethical Conduct in Human Research*, the *Australian Code for the Responsible Conduct of Research*, applicable legal requirements, and with University policies, procedures and governance requirements.
- The Ethics Office may conduct audits on approved projects.
- The Chief Investigator has ultimate responsibility for the conduct of the research and is responsible for ensuring all others involved will conduct the research in accordance with the above.
- The Clinical Trials Support Office has been notified as outlined in the University's Clinical Trials Policy where a clinical trial is being undertaken.

This letter constitutes ethical approval only.

Please contact the Ethics Office should you require further information or clarification.

Sincerely,



Associate Professor Stephen Fuller
Chair
Human Research Ethics Committee (HREC 2)

The University of Sydney HRECs are constituted and operate in accordance with the National Health and Medical Research Council's (NHMRC) current National Statement on Ethical Conduct in Human Research (2018) and the NHMRC's current Australian Code for the Responsible Conduct of Research (2018).



Research Integrity & Ethics Administration
HUMAN RESEARCH ETHICS COMMITTEE

Tuesday, 14 December 2021

Assoc Prof Jillian Clarke
 Clinical Imaging; Faculty of Medicine and Health
 Email: jillian.clarke@sydney.edu.au

Dear Jillian,

Your request to modify this project, which was submitted on 24 November 2021, has been considered.

This project has been approved to proceed with the proposed amendments.

Protocol Number: 2020/432
Protocol Title: Digital Health, Patient Literacy and requests for Radiology Referral.

Documents Approved:

Date Uploaded	Version Number	Document Name
24/11/2021	Version 1 18/11/21	Interview Questions Version 1
24/11/2021	Version 1 18/11/21	Participant Consent
24/11/2021	Version 2 18/11/21	Participant Information Statement Version 2
18/11/2021	Version1 17/07/20	Survey Questions Version 1

Special Condition/s of Approval

In future, please upload a tracked changes version of the PIS, instead of just new and old versions as this assists the reviewers to identify the specific changes for review.

Sincerely,



Associate Professor Stephen Fuller
 Chair
 Modification Review Committee Chair (MRC 1)

The University of Sydney of Sydney HRECs are constituted and operate in accordance with the National Health and Medical Research Council's (NHMRC) [National Statement on Ethical Conduct in Human Research \(2018\)](#) and the NHMRC's [Australian Code for the Responsible Conduct of Research \(2018\)](#)

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ABN 15 211 513 464
 CRICOS 00026A

Appendix D: Permission letters for surveys and interviews to be conducted within the company sites from general manager and educational coordinator Phase 3

Level 4
203 Pacific Highway
ST LEONARDS NSW 2065
TEL: (02) 9432 9400
FAX: (02) 9432 9449

2nd June 2022

Ethics Committee
Discipline of Medical Imaging Science
School of Health Sciences
Faculty of Medicine and Health



Dear Ethics Committee Members

Lizzie De Silva is the senior sonographer at our Lumus Imaging Baulkham Hills practice, and we are aware of her research study with the University of Sydney in fulfilment of her thesis, and we are fully supportive of her research involvement.

We have notified all managers within the medical centres in the Northwest cluster about Lizzie De Silva research program and they are happy for Lizzie to request interviews from all the doctors willing to participate.

A letter of request outlining the research program and participant information statement will be sent to all the sites and doctors, so they may choose to volunteer their time.

Many thanks for your kind consideration.

Prof Noel Young FRANZCR National Director of Education and Training



Level 3

3 Columbia Court

Baulkham Hills NSW 2153

TEL: (02) 9432 9400

Mobile: 0413 453351

7th June 2022

Ethics Committee
School of Medicine
University of Sydney

Dear Ethics committee Members

Lizzie De Silva is the senior sonographer at our Lumus Imaging Baulkham Hills practice and I am aware of her research study with the University of Sydney in fulfilment of her thesis, and I fully supportive of her research involvement.


I acknowledge the request within the medical centres in the Northwest cluster regarding Lizzie De Silva research program and am happy for Lizzie to request interviews from all the doctors willing to participate. I am responsible for the following sites:

- Baulkham Hills
- Blacktown
- Mt Druitt
- Rouse Hill
- Wentworthville

A letter of request outlining the research program and survey will be sent to all the sites and doctors so they may choose to volunteer their time.

If you require any additional information, that will support Lizzie's research endeavours, please do not hesitate to contact me.

Many thanks for your kind consideration.



Stephen Coyle

North- west Cluster Manager



13 August 2023

Dear Ethics Committee,

I would like to inform you that Lizzie De Silva has received permission to conduct the fourth component of her study involving radiologists. As the National business development manager, I am aware that Lizzie will be liaising with Sue Pohlman who is our clinical education manager in sending the surveys via a link to all radiologists at Lumus Imaging.

She is given our full support to conduct the study. We are aware that the survey will be anonymous and any identifiable information will be removed prior to publication and presentation of results.

Yours sincerely,

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Appendix E: Survey- Digital Health, eHealth Literacy and Patient Requests Phase 1

Q1 Patient information statement part 1

Q2 Please indicate your age (18 years and over only).

Skip To: End of Block If Condition: Please indicate your ... Is Less Than 18. Skip To: End of Block.

Q3 Your Gender

- Male (1)
- Female (2)
- Prefer not to say (3)

Q4 Highest completed education level

- Primary (1)
- Secondary (High School) (2)
- Tertiary (University, College, TAFE) (3)

Q5 What is your current or previous occupation?

Q6 Have you used any of the following to find health-related information?

	Yes (1)	Maybe (2)	No (3)
Any website (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Only websites from a health organisation Mayo Clinic (or similar hospital/medical trusted sites) (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Government sites such as Better Health Channel of Health Direct Australia, (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PubMed/ Medline/ WebMD journal articles (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social Media (e.g. Facebook, YouTube, Twitter) (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Blogs (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
News Site (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Is this statement true about you "I do not use the internet to find health-related information?" (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Skip To: End of Survey If Have you used any of the following to find health-related information? = Is this statement true about you "I do not use the internet to find health-related information?" [Yes]

Q7 What kind of health-related information have you sought online? Please check all that apply.

- Symptoms
- Disease condition
- Medications
- Tests/Investigations
- Treatments and Procedures
- Other _____

Q8 Why did you look for health-related information online? You can choose more than one answer?

- I noticed new symptoms or a change in my health condition.
- I wanted more information.
- I heard something on the news, social media or friends.
- Other _____

Q9 Do you feel you are comfortable asking your doctor for a referral for specific treatments, tests or to see specialists?

- Yes, I am comfortable asking the doctor.
- Yes, I am comfortable but only after discussing with the doctor.
- No I am not comfortable asking even though I want to do so.
- No I would not ask the doctor.

Q10 Which of the following have you asked your doctor?

	Yes (1)	No (2)
Diagnostic Tests e.g. blood tests, X-Rays, CT, MRI, Ultrasound	<input type="radio"/>	<input type="radio"/>
Specialist	<input type="radio"/>	<input type="radio"/>
Procedures e.g. injections, biopsy	<input type="radio"/>	<input type="radio"/>
Medications	<input type="radio"/>	<input type="radio"/>
Is this statement true about you "I would never ask for a referral from my doctor"?	<input type="radio"/>	<input type="radio"/>

Skip To: Q13 If which of the following have you asked your doctor? = Is this statement true about you "I would never ask for a referral from my doctor"? [Yes]

Q11 Did you have the outcome you had hoped for with the referral request?

- Yes
- Maybe
- No

Q12 Do you feel your doctor would write a referral if you asked them?

- Yes
- Maybe
- No

Q13 When it comes to making important health decisions with my doctor /health professional

- I prefer to make my own decisions.
- I prefer to discuss with my doctor and together make a decision
- I prefer the doctor making the decisions on my behalf.
- Other _____

Q14 How useful do you feel the Internet is in helping you make decisions about your health?

- Extremely useful
- Very useful
- Moderately useful
- Slightly useful

Q15 This is eHEALS scale and it is used to measure your ability to access health resources on the Internet.

	Strongly agree (1)	Somewhat agree (2)	Neither agree nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
I know what health resources are available on the internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I know where to find helpful health resources on the internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I know how to find helpful health resources on the internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I know how to use the internet to answer my questions about health

I know how to use the health information I find on the internet to help me

I have the skills I need to evaluate the health resources I find on the internet

I can tell high quality health resources from low quality health resources on the internet (7)

I feel confident in using the information from the internet to make health decisions (8)

Q16 I understand by submitting this questionnaire, I am consenting the use of the data collected for research purposes. The results from this study may be used for publication and conference presentation. There will be no identifiable components to you and all information will be stored securely under a password protected University of Sydney computer and later stored in a Research Data storage.

Appendix F: Survey/Interview- Digital Health, eHealth Literacy and Patient Requests**Phase 2**

Q1 Patient information statement

Q2 Your gender?

- Male (9)
- Female (10)
- Non-binary / third gender (11)
- Prefer not to say (12)

Q3 Your education level completed?

- Less than high school (9)
- High school graduate (10)
- Diploma (12)
- University (13)
- Post graduate (14)

Q4 Your age bracket?

- Under 18 (10)
- 18-24 (18)
- 25 - 34 (11)
- 35 - 44 (12)
- 45 - 54 (13)

- 55 - 64 (14)
- 65 - 74 (15)
- 75 - 84 (16)
- 85 or older (17)

Skip To: End of Block If Your age bracket? = Under 18

Q5 Your current employment status?

- Employed (10)
- Unemployed looking for work (11)
- Unemployed not looking for work (12)
- Retired (13)
- Student (14)
- Disabled (15)

Q6 In the last 5 years, have you asked your doctor to write you a referral for a radiological test or procedure? These tests/procedures involve X-rays, Computer Tomography(CT), Ultrasound or an MRI (Magnetic Resonance Imaging).

- Yes (21)
- No (22)

Skip To: End of Block If In the last 5 years, have you asked your doctor to write you a referral for a radiological test o... = No

Q7 How often do you consult online sources for health information?

- When the need arises (1)
- Regularly, I want to keep on top of things (2)
- Occasionally for curiosity (3)

- Rarely (4)

Q8 What sort of sites do you consult and how helpful are these sites?

Q9 Do you have a chronic condition for which you might use online health-related websites? A chronic condition requires ongoing medical attention for which you need to make regular visits to the doctor. For example, diabetes, heart disease or mental health conditions?

- Yes (1)
- No (2)
- I don't know (3)

Skip To: Q10

If Do you have a chronic condition for which you might use online health-related websites? A chronic... = Yes

Skip To: Q11

If Do you have a chronic condition for which you might use online health-related websites? A chronic... = I don't know

Skip To: Q11 If Do you have a chronic condition for which you might use online health-related websites? A chronic... = No

Q10 How many different chronic conditions do you have? For example, if you have both diabetes and heart condition, that would be considered 2-3.

- 1 (1)
- 2-3 (2)
- 3-4 (3)
- >5 (4)

Q11 How would you describe your current health status?

- Excellent (1)
- Good (2)

- Average (3)
- Poor (4)
- Terrible (5)

Q12 How anxious are you about your current health status?

- Extremely anxious (1)
- Anxious (2)
- Worried (3)
- Concerned (4)
- No concerns (5)

Q13 How would you describe your overall quality of life?

- Excellent (1)
- Good (2)
- Average (3)
- Poor (4)
- Terrible (5)

Q14 Have you been diagnosed with a medical condition/s or currently experiencing a health-related concern? Please explain what this is and where you usually get your information or advice about your condition or concern?

Q15 Is this statement true about you? 'I always consult the internet for health advice'

- No (21)

- Yes (22)

Q16 Is this statement true about you? 'I only consult the doctor for health advice'

- No (31)

- Yes (32)

Q17 If you wanted a radiological test or procedure e.g. X-ray, Computer Tomography(CT), Ultrasound or an MRI, and you need to ask the doctor to write you a referral, would you say it is easy to do this?

- Yes (19)

- No (20)

Skip To: Q19 If Requesting referrals = Yes

Q18 Since you answered no to the previous question, could you please say in your own words why you gave that response?

Q19 How did your doctor respond when you asked for a referral involving a radiological test or procedure?

- He was happy to provide a referral without any questions. (1)

- He was happy to write a referral but wanted to discuss in detail the test/procedure with me. (2)

- He was NOT happy with my request but wrote the referral for me anyway. (3)

- He declined my request. (4)

Q20 Would you like to explain in your own words your doctor's response to your request, for example were they surprised, annoyed or accommodating? Did they say anything specific when you asked for a radiological referral?

Q21 What radiology procedure or test did you ask your doctor?

- MRI (Magnetic Resonance Imaging) (1)
- Ultrasound (2)
- X-Ray (3)
- CT (Computer Tomography) (4)
- Other (please explain below) (5)

Q22 When you asked for a radiological test/procedure, what was this for? A new, undiagnosed health problem. (1)

- A chronic condition that you see the doctor regularly. (2)
 - A general check-up because you were worried about recent symptoms you were experiencing. (3)
 - A scan to rule out an illness/disease such as cancer you heard or read online/media. (4)
 - Your own response (5)
-

Q23 When you asked for the radiological test/procedure from your doctor, did having the test/procedure prove useful?

- Yes, my request proved useful (26)
- No, I did not benefit from my request (27)
- I did not have the test as my doctor refused my request. (28)
- Your own response (29)

Q24 Did your doctor recommend an alternative to your request?

- Yes, my doctor suggested a different approach to what I requested. (18)

- No, my doctor failed to suggest an alternative (19)
 - Your Response (20)
-

Q25 Did your doctor's recommendation ever prove more effective or helpful than what you have requested, in the past or present? Please explain in your own words.

Q26 Did your doctor give you an explanation for denying any of your requests in the past or present? Please explain in your own words

Q27 In general, would you say you are satisfied with doctors in addressing your concerns?

- No (21)
- Yes (22)

Q28 Do you have a regular doctor?

- Yes (1)
- No (2)

Q29 How has asking for referrals from your doctor been beneficial/helpful to you?

Q30 Thank you so much for participating in this research so far!

As a part of this research, we really want to understand some of the reasons behind the answers you have provided here. With your permission, we would like to contact you for a follow up interview with the lead researcher, Lizzie De Silva from the University of Sydney, Faculty of Medicine and Health. The information you provide will greatly benefit both doctors and patients during clinical consultations with patients efficiently communicating their needs and doctors providing effective care for their patients.

Participation in this interview is completely optional. Can Lizzie contact you for an interview?

- Yes (23)
- No (24)

Display This Question:

If Thank you so much for participating in this research so far! As a part of this research, we real... = Yes

Q31 Thank you for agreeing to participate in a follow-up interview!

Please provide your name, and best contact details below. You will be contacted by Lizzie De Silva from the University of Sydney, Faculty of Medicine and Health, in the coming days to arrange a date and time most suitable for you.

You can also get in touch with us directly by contacting Lizzie at lize7124@uni.sydney.edu.au, if you have any questions or concerns about this process.

Name (1) _____

Email (2) _____

Phone Number (*optional*) (3) _____

Digital Health, eHealth Literacy and Patient Requests

Interview Questions Phase 2

Thank you for agreeing to speak to me today. Do you understand that you may stop the interview at any time if you do not wish to continue? Unless you indicate otherwise, any recordings will be erased and the information provided will not be included in the study?

Please also understand that you may refuse to answer any questions you don't wish to answer.

Questions	Leading questions	Probing questions
Q1	How would you describe your current health status?	Are you currently experiencing any health concerns you may wish to share? Have you got a diagnosed health condition (???)
Q2	In the previous study you have indicated looking online for health-related information. Why do you search online health-related information?	What sort of information are you after? How do you use that information?
Q3	How do you search for online health-related information?	What websites do you check? Have you looked for radiology-related information? What do you think of the websites that you visit? Are they easy to read and understand? Do you feel they are of good quality? Do you check other sites to see if the information is the same?

Questions	Leading questions	Probing questions
Q4	Who do you most often turn to when you have a health-related question?	Why do you feel you can turn to 'X'? Do you feel 'X' has given you good advice in the past?
Q5	Tell me about your relationship with your doctor and how you go about making health decisions?	Can you describe your last visit to doctor's office? Are they your regular doctor? Would you say your doctors knows you well?
Q6	Can you remember a situation when you asked your doctor for a referral for a radiological test or procedure?	What happened?
Q7	Why did you ask for the referral?	Was it easy to ask for the referral?
Q8	How responsive was the doctor to your request?	Were you satisfied with the outcome from your request?
Q9	What was your experience in the clinic like when you had your radiology test?	Were you asked any questions about your referral?
Q10	What was the outcome from that request?	Did you find having the test/procedure beneficial?
Q11	Can you tell me how you and your doctor go about making health decisions?	Does it often run smoothly?

Questions	Leading questions	Probing questions
Q12	Can you remember a situation when you disagreed with the doctor about something?	What happened?
Q13	Can you remember any situations where you think your doctor should have done something differently?	What happened?
Q14	Why do you take an active role in your health?	Do you want to resume working, take up a particular sport/gym, or be able to play with your kids/grandkids?

Thank you for participating in our interview, we value your input and grateful for your tim

Appendix G: General Practitioners' Perspectives Phase 3

Just a reminder that this interview is completely voluntary and at any time you wish to stop the interview, please let me know. You may decline to respond to any questions you don't wish to answer. If you provide an interview and change your mind later, we may be able to withdraw your responses, up until the point at which it becomes part of the de-identified analysis. All interviews will be held in strict confidence and your name will not be included in the research analysis and publication. In line with this confidentiality, we do ask for you to kindly omit mentioning patient names during interviews. I would like to thank you for your time in agreeing to participate in this interview.

Interview Questions

Questions	Probe
Patient taxonomy	
Do you have patients that request radiological imaging from you?	Can you recall dealing with many in the past? What sort of studies do patients generally request? How do you address these requests?
What are the presenting health concerns or circumstances that likely precede these requests?	Are there any specific characteristics of a patient that you have observed who are most likely to have their request fulfilled. For example, a certain demographic type, personality trait, etc.?
Use of radiology by doctor	
Imaging has become an important part of patient care. How do you see the value in advancement of radiological technology, including high-tech imaging services such as	In terms of accessibility to imaging, do you always have access to patients' imaging history when they come to see you? When patients' previous images are not available, how does it impact you?

Questions	Probe
multi-section computed tomography (CT), ultrasound, magnetic resonance (MR) imaging, and positron emission tomography (PET) aid in patients' diagnosis?	Could you please explain how you go about getting a patient's past imaging history?
Interactions with radiologists	
How would you describe your level of interactions with radiologists? Are they easy to contact and ask questions?	In terms of discussing limitations and merits of tests/procedures, are radiologists readily available to discuss these matters? Have you had any experiences that you can recall in the past where you needed to clarify information about a test/procedure? What was this experience like?
Guidelines to dealing with irrelevant requests	
What steps do you take when patients present with an unnecessary imaging referral request?	Do you follow any particular guidelines in dealing with patients who are "pushy" with their requests?
How pressured do you feel when needing to oblige patients' requests?	What steps do you take to address unnecessary requests?
What would you feel are the repercussions of declining a patients' request?	Have you recently had any experiences with this situation and what happened

Appendix H: Radiologists' Perspective

Thank you for your interest in our study of radiologists' perspectives on patient-initiated imaging requests. Your participation is voluntary and your answers will be anonymous.

Please read the following Participant Information Statement: [Participant information statement for radiologists](#) If you no longer wish to continue this study or you wish to withdraw at any point, you can just close the link. By submitting this survey you are consenting to let us collect data from you. We will be unable to withdraw your responses after you submit them, as we will not be able to identify which responses are yours. Have you read the PIS and do you wish to proceed?

No

Yes

Skip To: End of Survey If Thank you for your interest in our study of radiologists' perspectives on patient-initiated imagi... = No

Q1 Have there been cases where general practitioners (GPs) have informed you that requests are initiated by patients?

No

Yes

Q2 Why do you think patients are requesting imaging? Please tick all that apply.

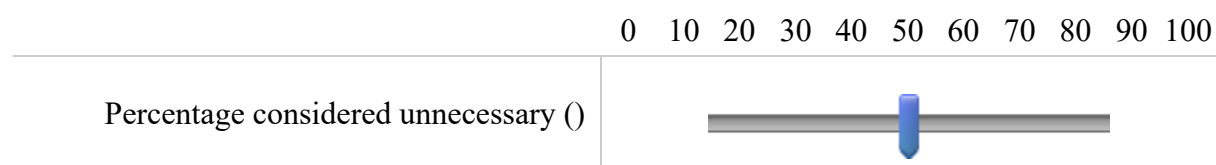
Exposure to medical information online, media, friends and family

Obsessed with health and wellness

Need proof of their wellness in images such as concerns with foetal viability or being cancer-free

- Government funded advertising promoting health checks
- Misinformed about online health information
- They consider scans are 'free' under Medicare and/or feel entitled to them
- Other _____

Q3 On an average week of reporting about 700 scans per week, as indicated by some of our radiologists, approximately what percentage of the requests for imaging studies that you received in the past 7 days would you consider unnecessary?



Q4 What are some of the most requested studies for imaging that you consider to be clinically inappropriate or non-indicated? Select all that apply.

- Xrays
- Computer Tomography
- Magnetic Resonance Imaging
- Positron Emission Tomography
- Mammogram
- Ultrasounds
- Interventional procedures such as biopsies and injections
- Other _____

Q5 What in your experience is the most common imaging request that you receive?

Q6 Do you feel pressured to satisfy GPs, by for example, getting reports done quickly so patients can get results faster, or needing to meet their expectations?

- Rarely
- About half the time
- Most of the time

Q7 How has clinically irrelevant requests impacted your workload?

- Increased my workload a lot
- Slightly increased my workload
- No impact on my workload
- Slightly decreased my workload
- Decreased my workload a lot

Q8 Have clinically unnecessary, patient-initiated imaging requests impacted other areas of your work? Please tick the one that applies to you the most from each of the categories on the left.

	Negative Impact	No Impact	Positive Impact
Report quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reporting time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Diagnostic accuracy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

An increase in false positive results

An increase in false negative results

Q9 In your experience, are patients generally aware of the merits and limitations of the diagnostic imaging and procedures they are having?

No

Yes

Your thoughts _____

Q10 Based on your clinical experiences of reporting on average 700 scans per week, in the past 7 days, when reading clinical indications, how often do you see imaging requests that would likely not give the desired answers? For example, chest x-rays for acute bronchitis.

Never

Once a week

2-3 times a week

4-6 times a week

Daily

Q11 Based on your experience, especially during interventional studies, what sort of expectations do patients have when they come to the radiology department? For example, expectations for immediate pain relief or needing to exclude cancer.

Q12 We know that patients request imaging from their GPs and that many requests are granted. What do you think are strategies that GPs could use to reduce inappropriate patients' requests?

Q13 Why do you think GPs request scans that you feel are unnecessary? Please tick all that apply.

They recognise patients are anxious about their health

- They cannot argue with some patients' requests
- They fear litigation
- Patient has a strong family history and GPs need to address their concerns
- Your response _____

Thank you for your time in responding to this survey. Please contact Lizzie De Silva at lidle7124@uni.sydney.edu.au for further information on this study.

Appendix I: Advertising Poster For Phase 4



We are seeking radiologists to answer our online survey!

We're conducting a research study on patients' requests for radiological imaging from their general practitioners and how such fulfillment of requests impacts the radiologists. Can you help us by answering a few questions on this online survey ?

The Survey will only take you 20 minutes. We value your time and appreciate your input.

Winner Of Best Abstract Presentation at the Lumus National Conferences

Education Activity Presentations & Publications

Certificate Winner

This is to certify that Lizzie De Silva

Winner Poster Section

Patient requests for radiological services:

An Australian study of patient agency and the impact of online health information 2021 &

Unnecessary Imaging: Insights from Radiologists 13th – 15th September 2024