What is the impact of a Community Orthopaedic Triage Service in the management of hip and knee osteoarthritis in the New Zealand public health system?

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Abstract

Background: Osteoarthritis (OA) is a worldwide highly prevalent disease that causes loss of function, disability, and pain. Despite the prevalence and financial burden of the disease, the New Zealand public health system has yet to adopt a national model of care for OA management. One of the key goals of New Zealand Better, Sooner, More Convenient Care draws attention to freeing up highly trained health professionals to focus on the most complex patient. This involves training other health professionals to complete simpler tasks that would otherwise have been done by a doctor or senior medial professional. Advanced Practice Physiotherapists (APP) are physiotherapists that have undertaken advanced training and potentially specialisation in a particular area of physiotherapy. These APPs have the ability to examine, provide early conservative management strategies and reassurance to patients that are currently referred to orthopaedic surgeons. OA models of care led by APPs who specialise in orthopaedics, have long been implemented in health care systems around the world but are a new concept for New Zealand District Health Boards. The implementation of the Community Orthopaedic Triage Service (COTS) within the Bay of Plenty District Health Board (BOPDHB) was established as part of a larger orthopaedic transformation project to improve the patient journey through the public health system by providing earlier assessment and onward referral to the most appropriate intervention for patients with OA of the hip and knee.

Aim: This study evaluated the impact of the COTS in the management of hip and knee OA directly to patients, staff, and stakeholders within the New Zealand public health system.

Methods: A pragmatic mixed methods evaluation was undertaken. Part one included a retrospective audit of outcome variables from APP led orthopaedic assessments and part two included prospectively collected data in the form of semi-structured interviews from patients, staff and stakeholders. Data was analysed using descriptive statistics and thematic analysis and then triangulated for further discussion.

Results: Results demonstrate that the COTS could manage 49-52% of the volume of patients referred to orthopaedic outpatients within a 12-month time period. There was a higher percentage of patients reported as Māori seen in the COTS compared to those seen in orthopaedics. The COTS had a lower wait time of 37 days as opposed to 158 days to be seen in orthopaedics. ANOVA comparing the 3 groups shows statistically significant difference (p-value<0.0001) in mean waiting times across the 3 groups. Eighty per cent of patients referred for an orthopaedic First Specialist Appointment (FSA) from the COTS received appropriate orthopaedic management. Data analysis of the interviews resulted in one central organising concept: *Changing the narrative about OA care delivery in the New Zealand Public Health System*. This concept is entwined within three main themes: *Making OA a national health priority*, *optimisation of public health resources* and *embedding best practice*.

The triangulated data found multiple benefits of the COTS to patients regarding their hip or knee care trajectory including improved experience, access to earlier intervention and increased satisfaction. The COTS also has direct impact to the DHB as an organisation, to its physiotherapy workforce and to GPs including bridging the gap between primary and secondary care, providing musculoskeletal support and utilising physiotherapy at top of scope. The study has highlighted positive impacts of the COTS directly to the orthopaedic workforce including improving conversion rate to surgery and providing an equal playing field. However, data reports some negative impacts of the COTS including its potential to increase surgical workload on orthopaedics unless additional surgical resources are provided to allow the surgeon to shift from clinic into the operating theatre. There were further concerns that the pathway may impact access by merely shifting the waiting list from orthopaedics to COTS, subsequently having no intended benefit to the patient. Further work needs to be undertaken to determine the impact of the COTS in its ability to impact orthopaedic workload and freeing up surgeon time in the longer term. To maximise its impact, the DHB needs to consider fostering meaningful relationships with orthopaedic surgeons, support clinicians in ongoing education and engage with GPs to raise the profile of the service.

Conclusion: This study contributes to a better understanding to the beneficial impact of an APP led model of care for hip and knee OA including how it affects experience, waiting times, quality of care and resource use. Further research is needed to strengthen the impact of this model in freeing up surgeons, enhancing more surgeries and spending less time with initial assessment. The COTS is a pragmatic and evidence-based model of care for OA and should be considered by the Ministry of Health as a new way of working in the management of orthopaedic patients.

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List of Abbreviations

ANOVA	Analysis of Variance
APP	Advanced Physiotherapy Practitioner
AUT	Auckland University of Technology
AWA	Activity With Arthritis
BOPDHB	Bay of Plenty District Health Board
CI	Confidence Intervals
COTS	Community Orthopaedic Triage Service
CT	Computerised Tomography
DHB	District Health Board
ESP	Extended Scope Practitioner
FSA	First Specialist Appointment
GP	General Practitioner
HrQoL	Health related Quality of Life
MAP	Mobility Action Plan
MoH	Ministry of Health
MRI	Magnetic Resonance Imaging
MSK	Musculoskeletal
NHS	National Health Service
NICE	National Institute of Clinical Excellence
OA	Osteoarthritis
OASRI	Osteoarthritis Research Society International
PHO	Primary Health Organisation
QALY	Quality Adjusted Life Years
SD	Standard Deviation
THJR	Total Hip Joint Replacement
TKJR	Total Knee Joint Replacement
UK	United Kingdom
WHO	The World Health Organisation

Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

20/2/2023

Signature

Date

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This research would not have been possible without the unwavering support from several important people.

Firstly, I would like to express my deepest gratitude to my supervisors Professor Duncan Reid and Associate Professor Peter Larmer for their patience, feedback, and ongoing support during my doctoral journey. Their knowledge and expertise have been instrumental, and I have been lucky to have had their guidance on this piece of work.

My deepest thanks to the Bay of Plenty District Health Board for not only the financial support in my research, but for their significant contribution in the data handling process and assisting with the interview recruitment. A special thanks to all the participants who gave up their time to be interviewed, this research would not have been possible without your voices.

To my colleagues, thank you for your support and patience in my attempt to improve the management of osteoarthritis in New Zealand. A special thanks to Heather and Gary for being there from the first until the final chapter. Your friendship has been invaluable.

To my parents, thank you for your never-ending love and support. I promise this is my last time being a student.

My final thanks to my husband Michael, and daughter Francesca. Michael, thank you for carrying the load while I found my feet in both my research and motherhood. And to Francesca, for teaching me so many things about myself that books cannot. I hope this inspires you to dream big and find your passion for learning.

I dedicate this piece of work to my Grandad and friend Shannon who have passed away while writing this thesis. Both dearly loved and so very missed.

Ko te manu e kai ana i te mātauranga, nōnā te ao

The world belongs to the bird who feasts on knowledge.

Ethics Approval

The research application was approved by the Auckland University of Technology Ethics Committee on 21st October 2020: AUTEC Reference number 20/36.

Chapter 1 Introduction

1.1 Introduction

This chapter aims to introduce the reader to the COTS in the management of hip and knee OA delivered within the BOPDHB. The first section introduces the COTS, the role of Advanced Practice Physiotherapists (APP) and their place in the New Zealand health system. The second section will introduce world health systems and the New Zealand health model with a specific focus on the BOPDHB and the population it serves. The third section presents OA and the burden of the disease globally, to New Zealand and directly to the Bay of Plenty. The final section will explore the current social, political, and organisational factors that affect the current management of OA care. Following this, the rationale of this study will be explained including the statement of the problem and its contribution to knowledge by contextualising the problem into a New Zealand landscape. An outline of subsequent chapters will also be presented.

1.2 Reflexive statement

I am a physiotherapist with 12 years' experience in musculoskeletal physiotherapy. During this time, I have practiced physiotherapy in the United Kingdom (UK) and New Zealand. I have undertaken a Master's degree in trauma and orthopaedics which has allowed me to focus my expertise on the management on orthopaedic conditions such as OA. As part of my previous roles, I have worked in outpatients, emergency departments, orthopaedics, and private clinics as well as undertaking roles in service development, student education and clinical leadership. I have worked at the BOPDHB since 2017 in a triage capacity within orthopaedic outpatient clinics where I was involved in assessing and managing hip and knee OA patients referred to the orthopaedic surgeon from primary care. This included the requesting of radiology, referring to community rehabilitation programmes, individualised physiotherapy intervention, dietetics and/or referring patients to surgeons for consideration of joint replacement when appropriate. In 2019, I was involved in a large orthopaedic transformation project at the BOPDHB in which my role was transitioned into a community initiative where the service was relocated to satellite clinics and the COTS was created. Whilst establishing this new community pathway, it was apparent that this was not a widely implemented model within the New Zealand health system and further research needed to be undertaken to explore its impact immediately to our organisation and the health system. This is where I began my journey with the Doctor of Health Science which has supported my role from an academic and evaluative lens. It is important for the reader to understand that I was working as a triage physiotherapist within this service at the time of the data collection prior to going on maternity leave. Although the COTS has now evolved to include assessment and management of all musculoskeletal conditions, it was initially established in the management of hip and knee OA and is therefore the primary focus of this research.

To provide further background and understanding to the rationale for this research, the following section describes the New Zealand health system, the burden of OA and the current OA management within this health landscape.

1.3 The Community Orthopaedic Triage Service

In 2020, the BOPDHB implemented a Community Orthopaedic Triage Service (COTS) to address the ever-increasing demand of referrals for hip and knee OA into orthopaedic services. It was established as part of a larger orthopaedic transformation project to improve the patient journey through the public health system by providing earlier assessment and onward referral to the most appropriate intervention. Although based in community locations, the service was delivered as a secondary care service due to funding streams. The aim of the COTS was to improve access to musculoskeletal services through lower threshold criteria whilst utilising physiotherapists as an alternative pathway for orthopaedic patients with hip or knee OA.

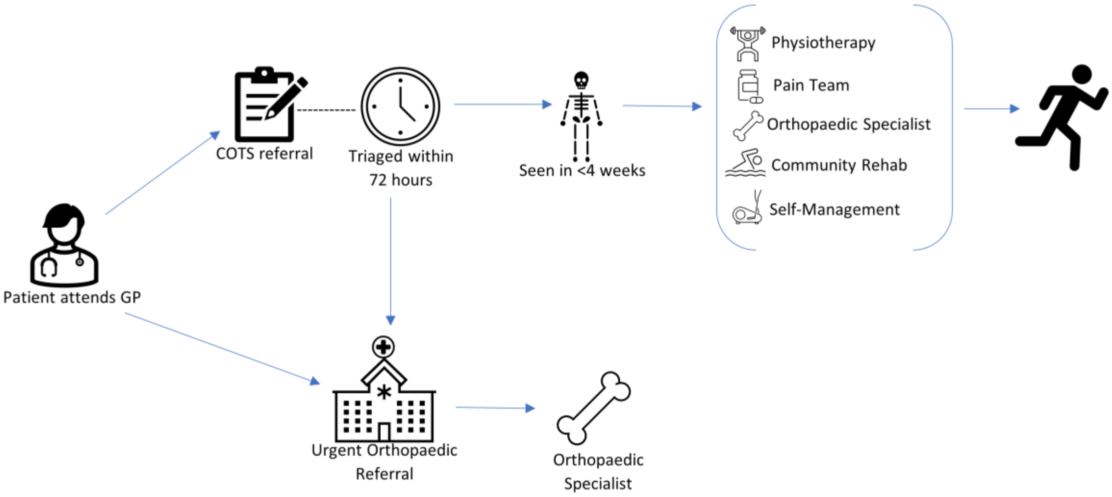
The COTS was accessed via GP referral and was designed to be the first point of contact in the patient journey through the public health system (Figure 1). GP practices were informed of the new service in a staged approach via a GP liaison through a large communication platform. Therefore, during the commencement of the COTS, the standard orthopaedic pathway was still available for some GPs to refer directly to orthopaedics. A new electronic referral form through Best Practice was available for the involved practices and GPs were guided on the referral criteria to the COTS in the Best Practice Guidelines. Patients referred to the COTS by their GP were triaged within 72 hours by an APP and seen in an APP orthopaedic clinic within 4 weeks. The inclusion criteria to be seen in the COTS included patients with primary hip or knee OA who were being referred for orthopaedic opinion. The exclusion criteria included those for consideration of revision arthroplasty, post-surgical complications, arthroplasty for the management for other conditions such as tumours and patient request. These patients were still able to be referred by their GP directly to orthopaedics for grading by a Senior Medical Officer (SMO). The COTS did not assess patients who were already listed for joint replacement at the request of orthopaedic services. Patients referred into the COTS were required to have an X-Ray prior to their appointment, however the physiotherapists could request new images if clinically appropriate.

When arriving at their COTS appointment, patients were given patient reported outcome measures by administration staff including the impact of life questionnaire and Knee Injury and Osteoarthritis Outcome Score (KOOS) (Roos & Lohmander, 2003). This was used by the APP to assist with clinical decision making. The assessment by the APP involved completing a full subjective and objective examination and completing the National Orthopaedic Clinical Priority Score (CPAC) for prioritisation of hip and knee replacement (The Ministry of Health, 2007).

Following their assessment, patients were then referred to the most appropriate intervention as determined by the APP which included one on one physiotherapy, First Specialist Appointment (FSA) with an orthopaedic specialist, Activity with Arthritis (AWA) community rehabilitation programme, chronic pain team or returned to GP for ongoing care. Basic information on OA in the form of a handout was provided to the patient at the time of their appointment. Following the appointment, the APP completed a clinic letter which was sent to the GP with the recommended outcome. The COTS appointments were scheduled in 45-minute slots as a one-off appointment. The COTS clinics were not delivered in conjunction with orthopaedic clinics or with orthopaedic surgeons, but clinicians had direct contact with an orthopaedic surgeon for case discussion and clinical support if indicated. The COTS did not alter the existing model of care that was being delivered in orthopaedic clinics by orthopaedic specialists during an FSA.

Figure 1

Flow diagram representing the Bay of Plenty new Community Orthopaedic Triage Service (COTS) pathway



Two community clinics across the Bay of Plenty were initially set up. They were based at two community clinics operated by the Bay of Plenty District Health Board in Te Puke and Whakatane. Patients attended the clinic closet to their permanent residence. At the commencement of the data collection period, the COTS was staffed by a 1.0 full time equivalent (FTE) clinical lead physiotherapist and two 0.5 FTE physiotherapists. An additional 0.4 administration role was appointed for assistance with administration tasks such as bookings and uploading clinic letters. As this was a service being evaluated in real time, the clinics and FTE were continuing to expand during the data collection time frame and further funding for its expansion was secured. At the conclusion of the data collection there were five clinicians including one full time clinical lead working across four community clinics. These clinics were situated in Te Puke, Whakatane and two in central Tauranga.

In a newly implemented model of care based in the community, it was important to understand the impact of this service within a local and New Zealand health context. Only recently have orthopaedic triage services been implemented and evaluated in a New Zealand context (Abbott et al., 2019). To our knowledge, this is the first time a community triage service has been evaluated in the New Zealand public health system. With an initial focus on patients with osteoarthritis (OA) of the hip and knee, the implementation of the COTS is the impetus for this short-term evaluation.
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1.3.1 Advanced Practice Physiotherapy

Advanced Practice Physiotherapists (APP) are physiotherapists that have undertaken advanced training and potentially specialisation in a particular area of physiotherapy (Chartered Society of Physiotherapy, 2016; Government of Western Australia, 2015). APPs have the ability to examine, provide early conservative management strategies and reassurance to patients that are currently referred to orthopaedic surgeons (Stanhope, Grimmer-Somers, Milanese, Kumar, & Morris, 2012; Vedanayagam, Buzak, Reid, & Saywell, 2021). Many countries including the UK, Canada and Australia have implemented orthopaedic triage services whereby the physiotherapist formulates a diagnosis, triages potential surgical candidates, orders imaging or laboratory tests and prescribes medication for patients with musculoskeletal disorders (Marks, Comans, Bisset, & Scuffham, 2017). They have been shown to improve resource utilisation, improve access to services, reduce wait times, improve care coordination, and lead to better health outcomes for patients (Desmeules et al., 2012; Marks et al., 2017; Oakley & Shacklady, 2015; Stanhope et al., 2012).

Although the term APP is widely recognised, there is some ambiguity around the terminology and the titles ‘advanced practice’, ‘extended scope’, ‘experienced’, ‘specialist’ and ‘clinical specialities’ have all been used in the literature to describe the role of a physiotherapist who has specialist training working within orthopaedic or musculoskeletal triage clinics (Vedanayagam et al., 2021) Literature has also shown significant variations between the years of clinical experience, post graduate qualifications and clinical competencies of the physiotherapist in this role (Brand et al., 2011). This is likely due to the inconsistencies in specialist titles between physiotherapy registration boards worldwide. Due to this, the regulation, scope of practice and role recognition internationally is challenging. For the purpose of this thesis, the term APP will be used to define these roles within an orthopaedic capacity.

1.3.2 Advanced Practice Physiotherapy in New Zealand

APP roles were first piloted in New Zealand in 2002 (The Physiotherapy Board of New Zealand, 2019). Despite recommendations from Ministry of Health policies, The New Zealand Board of Physiotherapy have only recently approved the APP scope of practice roles (Naik, 2021). Developed by the New Zealand Board of Physiotherapy, the APP role recognises physiotherapists who are practising at an advanced level. The board defines the purpose of the APP scope is to ‘aid both the public and referrers to identify those physiotherapists who have demonstrated advanced skills and competencies in a chosen area which may be more suitable for their complex needs’ (The Physiotherapy Board of New Zealand, 2023). To qualify for APP status, a physiotherapist must apply to the board and demonstrate advanced clinical skills, competencies and knowledge and contribute to the profession through mentoring and developing leadership skills. The process involves a portfolio assessment showing they meet the qualifications and competencies as well as receiving patient and peer feedback. Due to the only recent approval of the APP role, there is a lack of literature using this terminology within a New Zealand context.

1.3.3 Advanced Practice Physiotherapy in the COTS

At the time of COTS implementation, APP roles across New Zealand were not approved by the New Zealand Board of Physiotherapy and were ad hoc and opportunistic. There was an identified need for a role within the COTS to improve patient flow and add value to the clinical and operational demands of health care in the face of growing complexity and increasing demand on orthopaedic services. Therefore, the orthopaedic triage roles within the context of the COTS were developed as a reactive need of the organisation. The physiotherapists were determined by the organisation as to be working at an APP level as per the Physiotherapy Board of New Zealand proposed guidelines. At the time of this research, the three physiotherapists conducting the assessments within the COTS had clinical experience in orthopaedics ranging from 11 to 25 years, relevant post graduate education to a Master’s level and were committed to undertaking relevant workplace competency-based training as per The Musculoskeletal Association of Chartered Physiotherapists (MACP) guidelines. The physiotherapists also spent time with orthopaedic surgeons in clinic observing FSAs and attended orthopaedic registrar training sessions. Having physiotherapists working in the COTS with this experience provided quality assurance to stakeholders and service users. However, since the physiotherapists working in the service were completing tasks within the general scope of practice as documented by the New Zealand board of physiotherapy, using experienced physiotherapists without the APP title is legislatively more straightforward and more sustainable.

1.4 Health systems

An introduction to world health systems will now be presented with a specific focus on the New Zealand health model. Following this, the BOPDHB and the population that it services will be discussed.

1.4.1 World health systems

A health care system is defined as an organisation of people, institutions and resources that deliver health care services to a desired population (Encyclopedia of Bioethics, 2019). Its purpose is to provide quality care to people when and where they need it (The World Health Organisation, 2019b). The configuration of health systems and how they operate varies significantly around the world. However, in order for an effective health system to operate it usually requires reliable information to develop policy, well maintained facilities, a well trained workforce, a robust financing mechanism and access to quality medicines and technologies (The World Health Organisation, 2019b). There are several major influences that drive the delivery of health care. These can include the country's unique culture and population history, identified health priorities and availability of economic resources (Lameire, Joffe, & Wiedemann, 1999).

The three main models that are used to finance healthcare include private health insurance, social health insurance, and taxation (The Kings Fund, 2017). Despite this, each countries government has some degree of involvement within public health measures, usually regarding surveillance of infectious diseases and interventions to prevent epidemics (The World Health Organisation, 2019a). The amount of involvement and expenditure tends to be higher in countries with lower income (The World Health Organisation, 2019b). Beyond public health measures, there is an extensive variation in regard to the extent of private versus public control when comparing world health systems (The Kings Fund, 2017). There are few countries where most of the healthcare expenditure is from the private sector under a private insurance health model. A private health insurance model is funded predominately on premiums paid directly to private insurance companies and care is delivered mainly through private providers for profit (Davis et al., 2007). This type of care delivery is particularly recognised in the United States (US), with private healthcare expenses accounting for 56% of all revenue (Davis et al., 2007). Although, the US healthcare expenditure is higher than any other country, the US health system has been shown to be under performing (Davis et al., 2007; Squires & Anderson, 2015). It has been reported that American people have a shorter life expectancy, a greater incidence of long-term conditions, poorer health outcomes and higher infant mortality rate (Gauld et al., 2014; Ridic, Gleason, & Ridic, 2012).

Tax based health systems are systems that are generally funded through tax revenues (The Kings Fund, 2017). Regarding health care financing, funding via taxation is a relatively recent innovation (The World Health Organisation, 2004b). The aim of tax based health systems are to make services available on a universal basis by pooling risk across large populations (The Kings Fund, 2017). The paradigm for tax-based systems is Great Britain's National Health Service (NHS) but can also be found in Nordic countries and Spain (Wallace, 2013). Although tax based systems have many advantages such as providing health care for all and containing healthcare costs, they often have long waiting times to access services and have less choice for service users (The World Health Organisation, 2004b).

1.4.2 The New Zealand health system

The New Zealand health system has been accustomed to change over the last several decades. At the time of writing this thesis, the New Zealand Government announced a major transformation of New Zealand's health and disability system. In response to the Health and Disability System Review, The Pae Ora (Healthy Futures) Act subsequently took effect on 1st July 2022 (The Ministry of Health, 2023). To reflect the position of the New Zealand Health System during the time of this research, the following section will introduce the Health System in place during the establishment of the COTS and then reflect on the potential impact of the major transformation to the COTS in Chapter 5.

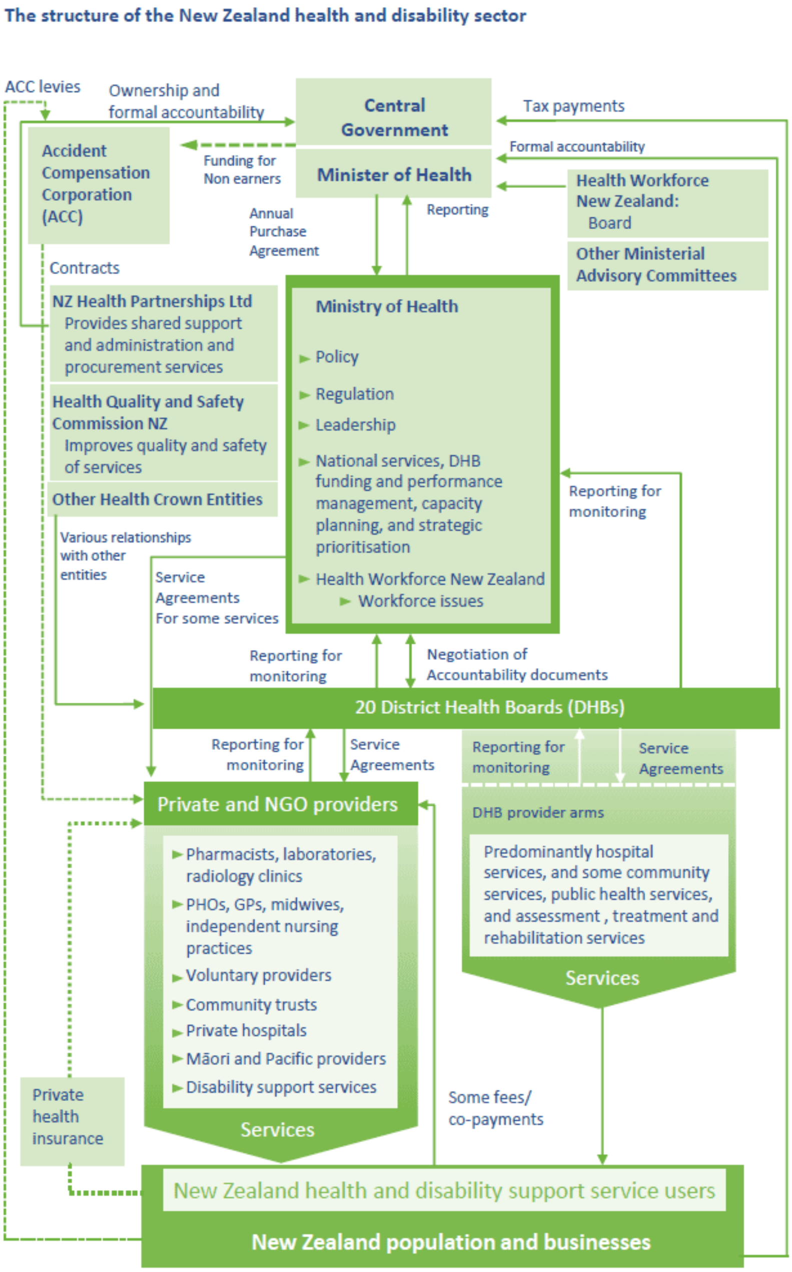
Following the passage of the Social Security Act commissioned by the first Labour Government in 1938, there was a consensus in which to support a health system which was essentially fully publicly funded (Social Security Act 1964). The current New Zealand health system is a comprehensive network of organisations each having a specific role in delivering health services to the people of New Zealand (The Ministry of Health, 2017). The New Zealand health system has much in common with the NHS in

Great Britain which was launched following the passage of the National Health Services Act in 1946 (Gauld, 2016). Both countries have nationally funded models with similar goals; universal access to health services, a strong focus on preventative medicine and integrated services from primary to secondary care (Gauld, 2016). Following further restructuring in 2000 by the Labour led coalition government, there has been a greater emphasis on New Zealand health care delivery from a community orientated standpoint (Reid & Larmer, 2007).

The New Zealand health system is comparable to that of Canada, Australia and Nordic countries which relies predominantly on general taxation to fund its health care (The Kings Fund, 2017). The Ministry of Health (MoH) is New Zealand’s public service department responsible for funding the majority of healthcare delivery in New Zealand (72%) (Gauld, 2016). Overseen by the Minister of Health, it plays a central role in developing policy, providing leadership and determining the annual health budget for publicly funded health care (Ashton & Tenbensel, 2012). The majority of tax funding is disseminated by the MoH using a population-based formula and devolved to 20 District Health Boards (DHB) across New Zealand. Each DHB is then individually responsible for how the funds are distributed to meet the needs of the population that it services (Gauld, 2016).

Figure 2

The structure of the New Zealand health system



Note: The Structure of the New Zealand health and disability sector. From “Overview of the health system,” by The Ministry of Health (2017). (https://www.health.govt.nz/new-zealand-health-system/overview-health-system).

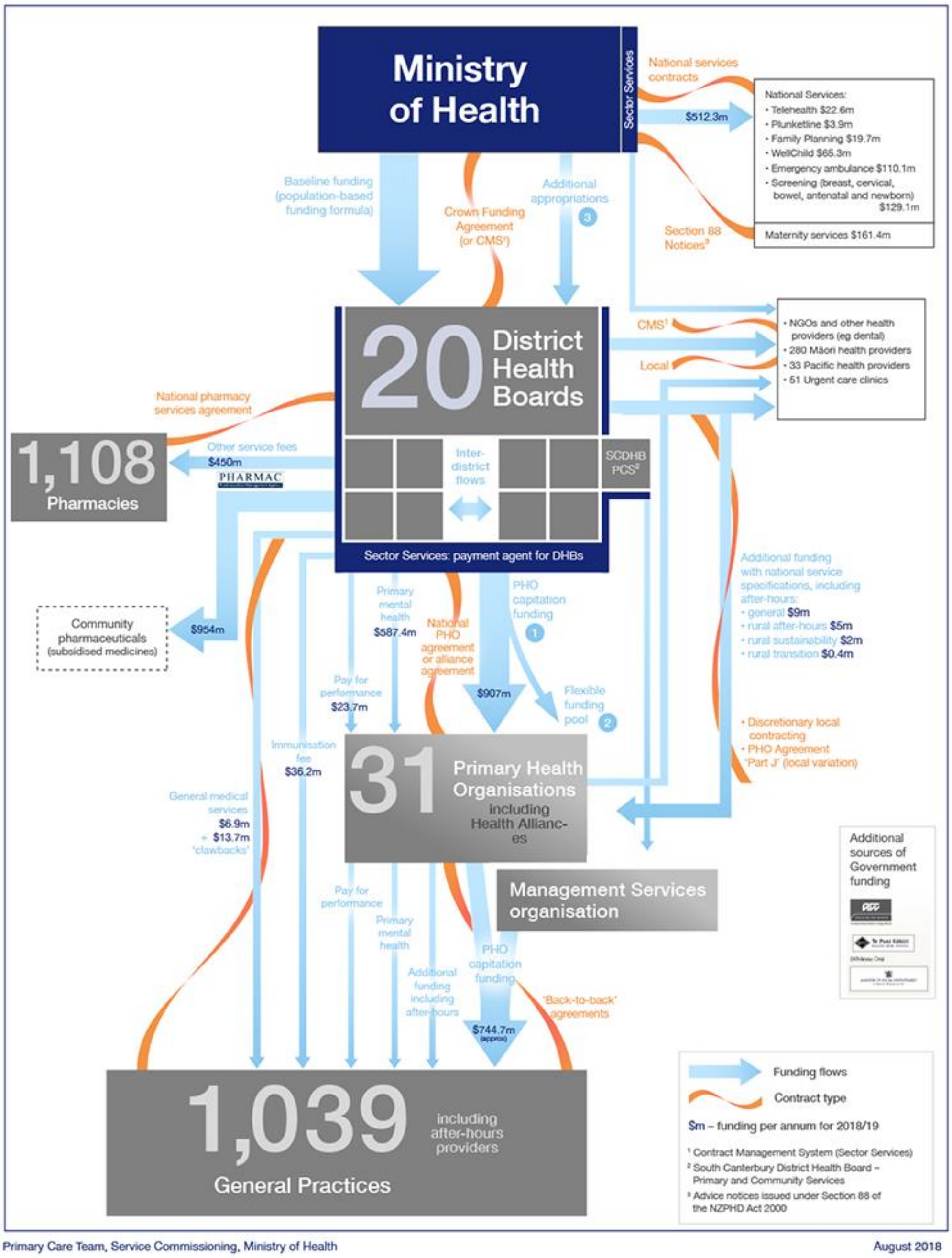
The New Zealand health system can be considered in two parts – primary and secondary care. Primary healthcare in New Zealand relates to a broad range of professional health care services provided in the community. Secondary healthcare refers to the second tier of the health system, in which patients from primary health care are referred to consultants in DHBs for more specialist treatment.

Primary healthcare in New Zealand has been recognised as the first level of contact for patients within the health system and an integral component to its successful function (King, 2001). Primary healthcare services in New Zealand are delivered by a range of health professionals including General Practitioners (GPs), podiatrists, pharmacists, physiotherapists, nurses and counsellors (Pegasus, 2014). Their objective is to provide a comprehensive range of services such as health education, diagnosis and treatment, disease prevention, counselling and health screening within the local community (The Ministry of Health, 2019a). The vision and delivery of primary healthcare services across New Zealand is heavily influenced by the Primary Health Care Strategy (King, 2001). The primary focus of the strategy is to ensure first tier services in New Zealand are easy to access and allow people to improve their health, keep them well and co-ordinate ongoing care (King, 2001).

Primary Health Organisations (PHOs) are the funding providers that ensure primary healthcare services are delivered within New Zealand (The Ministry of Health, 2019a). The 31 PHOs currently operating are directly funded via DHBs. Each PHO has an aim to ensure seamless continuation of care whilst being influenced by the population that they service (The Ministry of Health, 2019a). A PHO provides services directly or through contracted providers, mostly general practices. Although most GP practices around New Zealand are now part of a PHO, enrolment is optional. Unlike the UK, most New Zealand GPs are usually self-employed working within independent practices (Gauld, 2019). With only half of their income being capitated government-determined subsidy by the PHOs, GPs set patient co-payments to account for their remaining compensation (Gauld, 2019). Over the last few years, GP co-payments have been shown to be steadily increasing (Toop & Jackson, 2015). These increasing costs have led to an unfair method of accessing public health services (French, Old, & Healy, 2001).

Figure 3

Figure showing organisation of New Zealand primary health care services

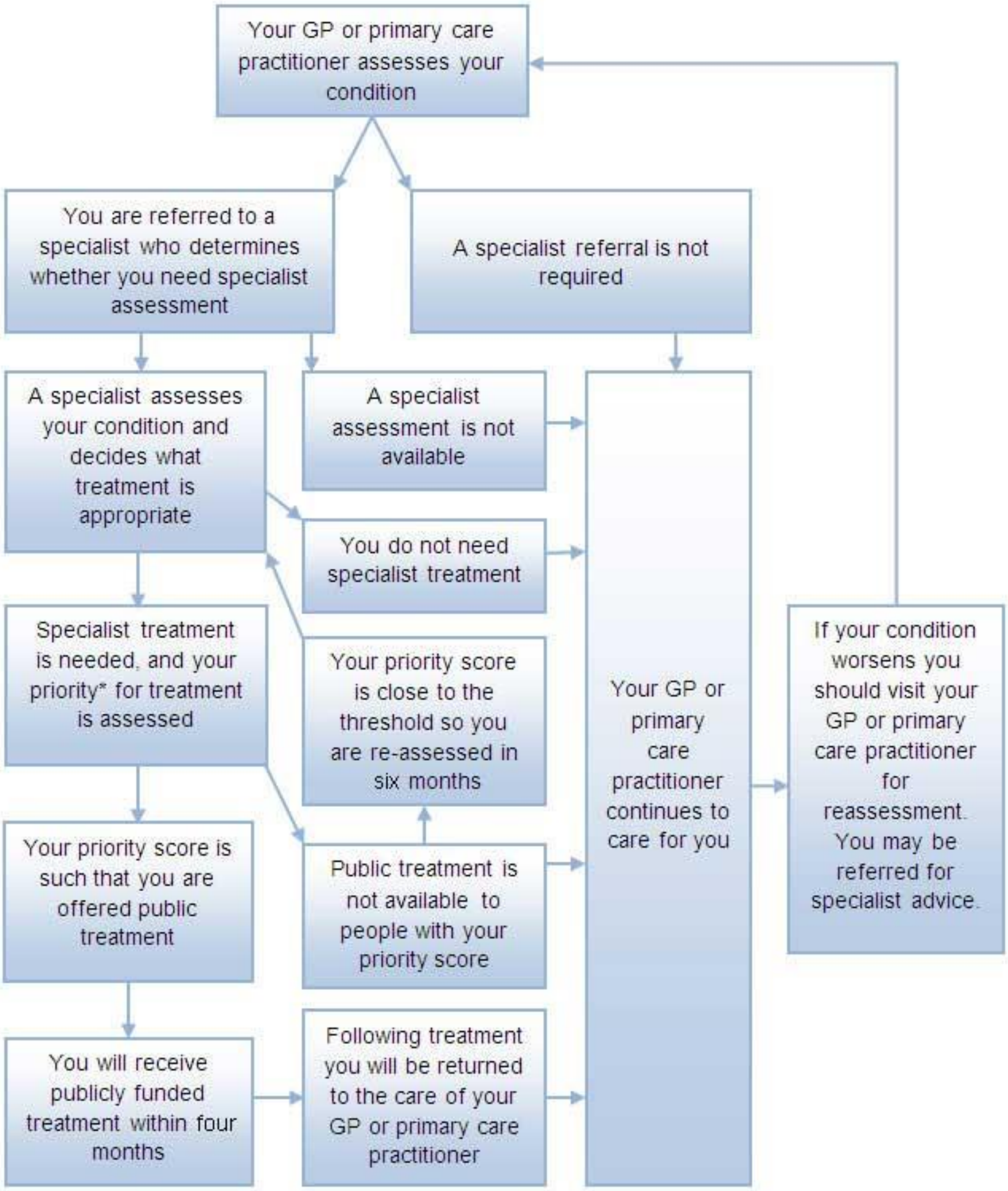


Note: Primary Health Care Services, Funding and Contracting. From "Primary Health Care Services, Funding and Contracting," by The Ministry of Health (2018). (https://www.health.govt.nz/our-work/primary-health-care/primary-health-care-services-funding-and-contracting).

Secondary care health services in New Zealand are provided both privately and publicly, with often the same specialists working in both sectors (French et al., 2001). Specialist treatment in New Zealand's public system can be accessed via a GP referral under the planned care pathway and is free to the service user if they meet the eligibility criteria (The Ministry of Health, 2016a). The planned care process is initiated via a referral and describes the health journey from when a person develops a condition to when the problem is resolved or under control (Figure 3). However due to a high volume of referrals into the public system, not all referrals are accepted and there is often a long wait time before receiving an appointment (Pegasus, 2014; The Ministry of Health, 2016a). There is also an option of seeing a specialist through a private clinic or hospital, however all services must be paid for directly by the patient (The Ministry of Health, 2016a). New Zealanders have the option to pursue medical insurance which allows quicker and cheaper access to specialists for non-urgent medical conditions. However with the rising cost of medical insurance, research has shown the number of adults opting for private insurance cover is decreasing (The Ministry of Health, 2016b). This alone has the potential to increase the workload of an already stretched public health system.

Figure 4

Figure of the Ministry of Health planned care process



Note: Flow diagram outlining the basic steps in the Planned Care process. From 'How the planned care process works', by Ministry of Health. (2019) (https://www.health.govt.nz/our-work/hospitals-and-specialist-care/planned-care-services/how-planned-care-process-works*)*

Although the majority of public health services in New Zealand are funded by general taxation, there is also a component derived from social insurance for accident related injury (8%) (Ashton & Tenbensel, 2012). Following the passage of the Accident Compensation Act in 1972 (Accident Compensation Act 1972), New Zealand was the first country to establish a comprehensive, no-fault insurance for all work and non-work accident-related injuries (French et al., 2001). This led to the formation of the Accident Compensation Cooperation (ACC) under the New Zealand Crown. Primarily funded by government contribution and employer levies, the role of ACC is to increase awareness of health and safety in the workplace, prevent injury and rehabilitate those injured back to everyday life (Accident Compensation Corporation, 2018). ACC currently stands as the sole provider of accident-related insurance in New Zealand. The financial cover provided by ACC includes payment towards income support, treatment and assistance at home (Accident Compensation Corporation, 2018). As ACC buy services from private hospitals, patients receive access to privately funded specialist care and typically experience shorter wait times. Although this is beneficial for patients receiving care under ACC, it creates an inequity between individuals seeking treatment for non-injury related conditions through the public system.

1.4.3 The Bay of Plenty District Health Board

The Bay of Plenty is situated on the north-eastern coast of New Zealand's north island and is demographically split into the Eastern and Western Bay. It spans from Waihi Beach in the west, to Whangaparoa Bay in the east and inland to Murupara covering a total area of 9,666kms.

Figure 5

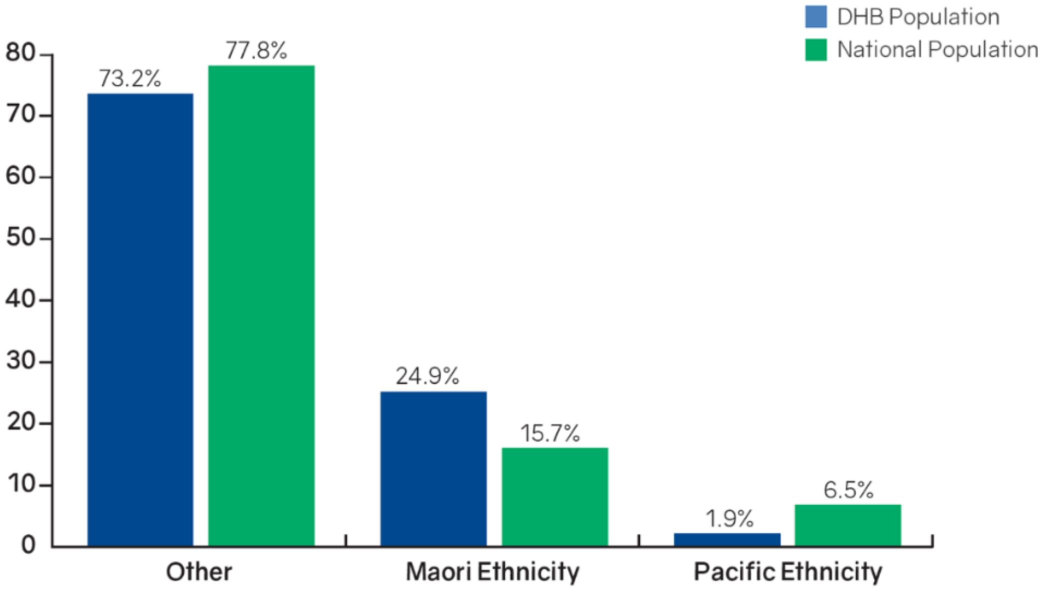
Map of Bay of Plenty region

Note: Map of the Bay of Plenty. From 'Our District and Health Population' by Bay of Plenty District Health Board, n.d. (https://www.bopdhb.health.nz/about-us/nau-mai-haere-mai-welcome-to-our-bopdhb/#Our%20district%20and%20health%20population)

Established under the Health and Disability Act (The Ministry of Health, 2000), The Bay of Plenty District Health Board provides personal health services and disability support to the Bay of Plenty population. It serves approximately 255,1102 residents with the majority (78.3%) being situated in the Western Bay (The Ministry of Health, 2018). Of the entire population, 25.6% identify as Māori and there are 18 Iwi (local indigenous tribes) located within the district.

Figure 6

Graph representing Bay of Plenty ethnicity statistics

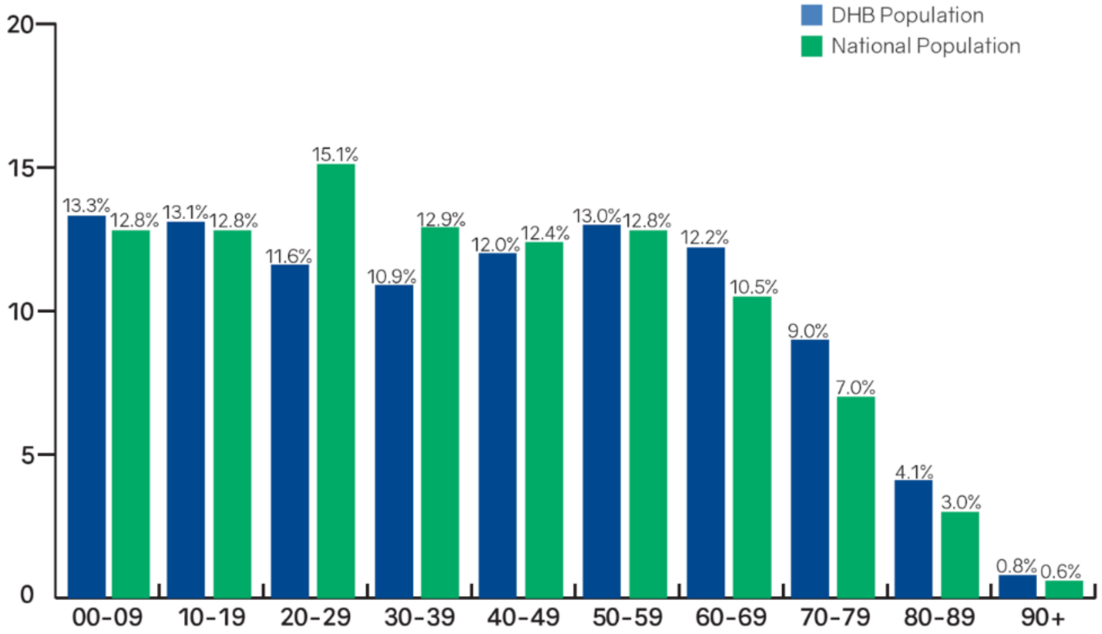


Note: Chart representing Bay of Plenty ethnic mix. From 'Our District and Health Population' by Bay of Plenty District Health Board, n.d. (https://www.bopdhb.health.nz/about-us/nau-mai-haere-mai-welcome-to-our-bopdhb/#Our%20district%20and%20health%20population).

It has been documented that the region is growing at a faster rate than the average New Zealand population with a projected growth rate of 20.5% from 2016 to 2026 (Bay of Plenty District Health Board, 2017). It has also been reported that the Bay of Plenty elderly population age 65 and over is 20%, higher than the nation average of 15.2% (The Ministry of Health, 2018). This is forecasted to reach 23% by 2026 (Bay of Plenty District Health Board, 2017). The rate of obesity in the Bay of Plenty region is 32% compared to the national average of 34.3% (The Ministry of Health, 2021).

Figure 7

Graph showing the Bay of Plenty age distribution

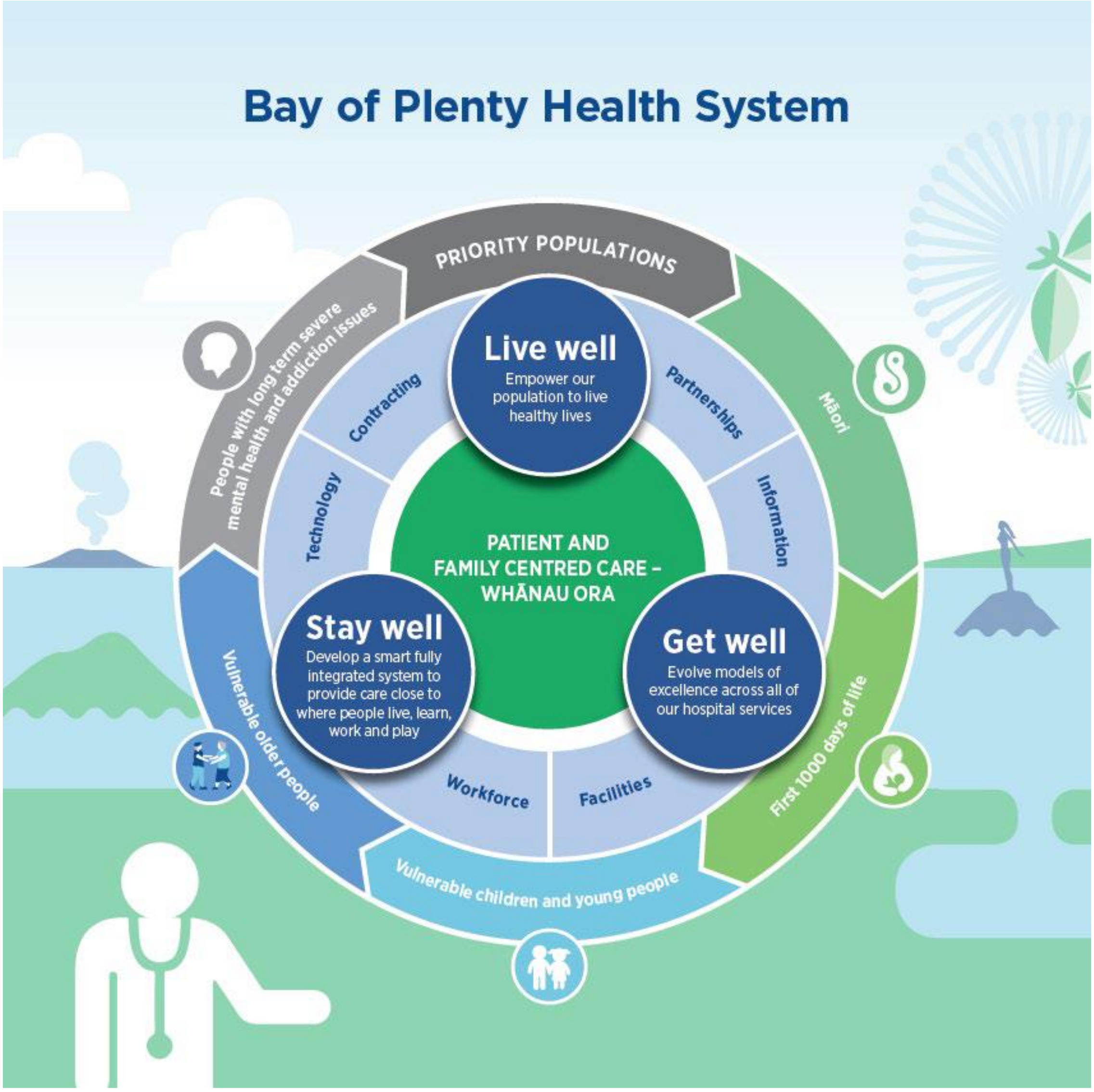


Note: Graph representing the Bay of Plenty age distribution from 'Our District and Health Population' by The Bay of Plenty District Health Board, n.d. (https://www.bopdhb.health.nz/about-us/nau-mai-haere-mai-welcome-to-our bopdhb/#Our%20district%20and%20health%20population).

The BOPDHB acknowledges the current challenges in providing healthcare to its communities and is refocusing its approach to achieving health outcomes. It has identified over the next 30 years a collective effort will be required, and care provision will become more collaborative with communities and local health providers. The BOPDHB has a strategic direction in which it sets out a vision and mission with a focus on three strategic objectives that will enable the population to Live Well, Stay Well and Get Well whilst concentrating on specific local outcomes and how it will achieve them (Bay of Plenty District Health Board, 2019). They are committed to achieving their vision of *Healthy, Thriving Communities - Kia Momoho Te Hapori Oranga* for the Bay of Plenty population under the building blocks of Manaakitanga - providing a better-connected health system that is patient and family/whānau centred (Bay of Plenty District Health Board, 2019).

Figure 8

The Bay of Plenty health system



Note: Bay of Plenty Health System from 'Bay of Plenty District Health Board Statement of Intent 2019/20 – 2022/23 by The Bay of Plenty District Health Board (2019).

1.5 Osteoarthritis

An introduction into the pathology, symptoms and treatment of osteoarthritis will now be presented. Following this, the prevalence of the disease in a worldwide and New Zealand health context will be considered.

1.5.1 Pathology

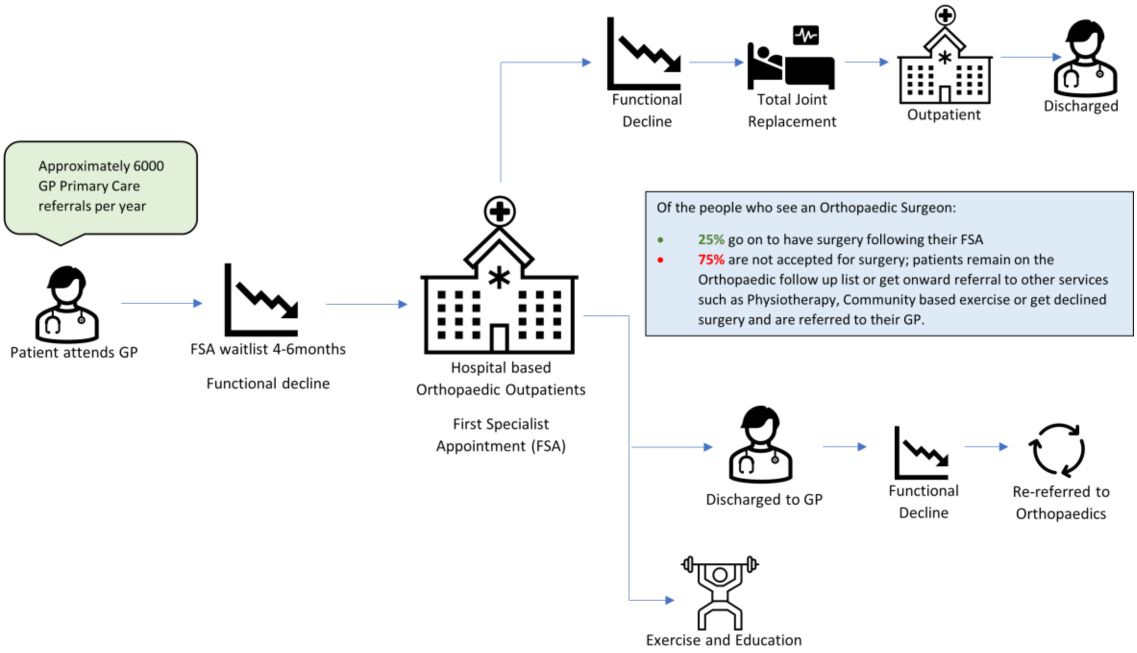
Osteoarthritis (OA) also referred to as degenerative joint disease or osteoarthrosis, is a disease process of a synovial joint (Mobasheri & Batt, 2016). Historically regarded as a condition of wear and tear, it is now known that OA is a complex process of metabolic and inflammatory factors (Abramoff & Caldera, 2020). OA is primarily known for its effects on articular cartilage, which becomes progressively degraded as the disease process advances. Cartilage, which is located at the end of long bones and intervertebral discs, provides a low friction surface to transmit heavy loads (Abramoff & Caldera, 2020). Although cartilage has the most pronounced changes in the OA disease process, the entire joint is also affected including ligaments, subchondral bone and synovium (Mobasheri & Batt, 2016). Acute synovitis and systemic inflammation play a key role in the pathogenesis of OA and more recently studies have suggested that degraded cartilage leads to an abnormal reaction in the synovial cells resulting in the production of metalloproteases, synovial angiogenesis, and inflammatory cytokines (Abramoff & Caldera, 2020).

1.5.2 The burden of OA on the Bay of Plenty

As per the planned care process directed by the MoH, the BOPDHB allows the GP to refer directly to the orthopaedic surgeon in secondary care for specialist advice regarding ongoing management for symptomatic OA. The BOPDHB continues to experience ever increasing referrals from the GP into orthopaedic Services. In 2019, approximately 5800 adults were referred from primary care to orthopaedic services. Of those, 3500 (60%) were for major joint non-urgent musculoskeletal conditions and it is anticipated there will be a 20% increase from primary care referrals alone by 2030 (Bay of Plenty District Health Board, 2017). According to a data support analyst at the BOPDHB, only 25% of patients assessed in orthopaedics in 2019 were listed with certainty for surgical intervention as a direct outcome of their appointment (N. Toms, personal communication, February 9, 2023). This not only demonstrates an unsustainable demand on orthopaedic services but also that the most appropriate patients are not being seen by the orthopaedic surgeon, providing a delay in access to appropriate treatment and management for service users. With the projected increase in population growth and rise in aging, the current model will fail to meet the increasing demand and presents an ongoing problem for the orthopaedic workforce (Figure 9).

Figure 9

Flow diagram representing the Bay of Plenty orthopaedic pathway



Of the people who see an Orthopaedic Surgeon:

- 25% go on to have surgery following their FSA
- 75% are not accepted for surgery; patients remain on the Orthopaedic follow up list or get onward referral to other services such as Physiotherapy, Community based exercise or get declined surgery and are referred to their GP.

1.5.3 Risk factors

Research suggests there are many elements that lead to OA presentation and progression, and it can be classified into two distinct types; primary OA and secondary OA (Abramoff & Caldera, 2020). Primary OA has no known cause whereas secondary OA is caused by other conditions such as obesity, trauma or disease (Musumeci et al., 2015). There are a number of OA risk factors discussed in the literature and have been categorised into modifiable and non-modifiable (Musumeci et al., 2015). The most significant risk factors for the development of OA include age, obesity, gender, joint injury/trauma, certain occupations, genetics and metabolic disease (Musumeci et al., 2015). It has been documented that most types of arthritis are in females, and it has been hypothesised that there is a metabolic link with OA and obesity (Teichtahl, Wluka, Proietto, & Cicuttini, 2005). There is ongoing evidence to support that the risk of developing OA can be reduced through lifestyle changes including weight control, increasing activity and reducing sedentary habits (Mobasheri & Batt, 2016). However, there are ongoing challenges in managing co-morbidities and reducing the risk of joint injury in the development of OA.

1.5.4 Symptoms

Pain is the primary symptom in patients with OA (Hawker et al., 2008). Early pain symptoms are often predictable and linked with activity whereas in the advanced stages are often constant and unpredictable, leading to an avoidance in certain activities. However, research has found that structural pathology on imaging and pain levels are not always concordant with symptoms of OA; some individuals with high pain levels have a lack of radiological findings and vice versa (Neogi, 2013). Psychological factors, prior pain experience, sociocultural environment and treatment expectations all contribute to an individual's pain experience (Neogi, 2013). Other OA symptoms include clicking, locking, joint swelling, reduced range of movement, giving way and structural deformity (Abramoff & Caldera, 2020).

1.5.5 Treatment

Although there is no cure, there are several evidence-based treatment options available to assist with the management of OA in the hip and knee. These include medication, exercise therapy, complementary therapies, joint protection strategies and as a last resort, surgical management in the form of a total hip joint replacement (THJR) or total knee joint replacement (TKJR) could be considered (Bannuru et al., 2019; The National Institute of Clinical Excellence, 2014). Physiotherapy uses evidence-based treatment techniques to help people affected by a disability or health condition to restore health and function (Physiotherapy New Zealand, 2023). The role of the physiotherapist in the management of OA has been well researched (Abbott et al., 2013; Jansen, Viechtbauer, Lenssen, Hendriks, & de Bie, 2011). Exercise, manual therapy, education and fitness are the fundamental treatments offered by a physiotherapist and there is a strong evidence base to their clinical effectiveness in the management of lower limb OA (Bannuru et al., 2019; Bruyère et al., 2019).

1.6 The global burden of OA

OA is a worldwide highly prevalent disease that causes loss of function, disability and pain (Long et al., 2022). The Global Burden of Disease study has reported that OA is the 17th most common chronic condition worldwide and is recognised as the number one cause of chronic disability globally in individuals over 70 years old (Long et al., 2022; Mobasheri & Batt, 2016). The highest number of prevalent cases in 2019 were seen in

China (132.81 million), India (62.36 million) and the United States (51.87 million) (Long et al., 2022). Over the past three decades, cases of OA have significantly increased. Research has found that OA cases increased from 247.51 million in 1990 to 527.81 million in 2019, a rise of 113% (Long et al., 2022). Researchers attributed greater life expectancy and rising obesity rates both playing a part in the increase (Long et al., 2022). Due to the increasing prevalence of the condition, The World Health Organisation (WHO) have classified OA as a priority disease (The World Health Organisation, 2004a). From a financial perspective, OA represents one of the top five healthcare costs in Europe and is the highest causes of work loss in the United States (Long et al., 2022). OA of the hip and knee have specifically been identified as the 11th highest contributor to global disability and chronic pain, with knee OA accounting for more than three in every five cases globally (Long et al., 2022). Hip and knee OA has been shown to have a substantial personal burden in younger people aged 20-55 years and the provision of targeted services to improve health related quality of life and maximise work participation are recommended (Ackerman et al., 2015)

1.6.1 The burden of OA on the New Zealand health system

New Zealand faces an ever-growing problem with the prevalence of OA. In Australasia alone, recent literature has reported a 116% increase of OA cases, from an estimated 1.76 million cases in 1990 up to 3.8 million in 2019 (Long et al., 2022). OA has been documented as the most common cause of arthritis in New Zealand with one in ten New Zealanders currently living with the degenerative disease (Wilson & Abbott, 2018). There is a high prevalence of OA within the older adult population, with 28% of New Zealanders aged 56-74 and 35% aged 75+ being affected (Deloitte Access Economics, 2018).

The current management of OA incurs high socioeconomic costs to the New Zealand health system. In 2018, the cost of arthritis in New Zealand was estimated at $12.2 billion (Deloitte Access Economics, 2018). These costs include financial loss to both the health sector and the person living with the disease, cost of associated care and loss of productivity (Deloitte Access Economics, 2018). With the projected growth in prevalence of the disease coupled with current lack of appropriate management models, the economic burden on the New Zealand health system is set to increase (Baldwin, Briggs, Bagg, & Larmer, 2017). Recent media reports have predicted that the health costs of treating knee OA is likely to almost double in the next 20 years; from $199 million in 2013 to $370 million in 2038 (Te, 2019). Other literature has predicted that there will be a 76% increase in the prevalence of OA by 2038, which includes 86% increase in healthcare costs, 70% in health and productivity loss, and 78% in joint replacement surgery (Wilson & Abbott, 2018).

Literature has identified how an OA model of care should be a national priority for New Zealand and robust modelling is important for long term solutions (Baldwin et al., 2017). It has been advised that the New Zealand health system should explore other more efficient ways of working to cope with the predicted growth of people requiring OA management and care. International OA guidelines recommend a holistic approach to OA care and management with exercise and education being offered as core treatment (McAlindon et al., 2014; The National Institute of Clinical Excellence, 2014). However, people who experience symptoms that have a considerable impact on quality of life, and are refractory to non-surgical treatment could be considered for surgical intervention following an assessment with an orthopaedic surgeon (Glyn-Jones et al., 2015; The National Institute of Clinical Excellence, 2014). DHBs are responsible for providing publicly funded healthcare to meet the needs of the New Zealand population which includes access to an orthopaedic surgeon when the need for surgery arises (The Ministry of Health, 2017). Due to the increased prevalence of the disease, New Zealand is struggling to manage the current demands of OA on the public health care system, particularly regarding the demand for First Specialist Appointments (FSA) with an orthopaedic surgeon (Bay of Plenty District Heath Board, 2022). Therefore, DHBs across New Zealand are currently looking at methods to improve efficiency of care: how people access surgery, when and where assessment and treatment is available, and who is providing the care (The Ministry of Health, 2011b). With an ever-increasing demand on health care to provide timely access to assessment and treatment for patients with musculoskeletal complaints, there is an urgent need for alternative models of care (Baldwin et al., 2017).

In the New Zealand public health system, the current model allows the GP to refer directly to the orthopaedic surgeon for specialist advice regarding ongoing management for symptomatic OA via a planned care process. However, it has been reported that approximately 40% of patients referred from their GP to a specialist do not meet threshold for surgical intervention and are returned to their GP for ongoing management (Blackett et al., 2014; Gwynne-Jones, Hutton, Stout, & Abbott, 2018). This suggests that the most appropriate patients are not being seen by the most appropriate provider, causing an unnecessary delay in patients accessing the most appropriate treatment and creating considerable healthcare waste.

1.7 OA management in the New Zealand health system

The management of OA within the multifaceted New Zealand health system lacks consistency. There are several social, political, and organisational factors that affect the current delivery of OA care and significance of these shall be explored further.

1.7.1 An absent health priority

Due to its high personal and economic burden, key reports around the world identify the management of musculoskeletal disease such as OA as a major health priority (European Action Report, 2017). The NHS have identified musculoskeletal care within its NHS Right Care Workstreams due to 9.6 million adults in the UK living with a musculoskeletal condition (NHS England, 2019). The Australian Government have specifically identified arthritis and musculoskeletal conditions of importance within their eight main health priorities alongside medical conditions such as asthma, mental health, cancer control, diabetes and obesity (Australian Institute of Health and Welfare, 2005). Identifying musculoskeletal conditions as a health priority has major advantages to the delivery of care including policy development, increased funding, improved models of care and positive changes in day-to-day practice (Brand et al., 2011). Since identifying OA as a health priority in 2002, Australia has developed a National Policy for OA care under the Better Arthritis and Osteoporosis Care initiative (Australian Institute of Health and Welfare, 2005). This has led to national evidence based clinical practice guidelines: The National Strategic Framework for OA and the Arthritis and Musculoskeletal condition National Action Plan (Australian Commission on Safety and Quality in Health Care, 2017; Brand et al., 2011). Individual states around Australia have translated national policy into service models for improving OA care of the hip and knee. New South Wales have introduced an Osteoarthritis Chronic Care Programme (OACCP) with aims of improving conservative management of OA through a co-ordinated interdisciplinary approach (Agency for Clinical Innovation, 2012; Briggs et al., 2018). Improved communication between healthcare professionals has been shown to improve OA management and outcomes and other countries around the world have supported this model of care (Lorig, Ritter, Laurent, & Plant, 2008; Thorstensson, Garellick, Rystedt, & Dahlberg, 2015).

Over the past 20 years, care delivery in New Zealand has been heavily influenced by two major health documents: The New Zealand Public Health Strategy (King, 2000) and The Primary Health Care Strategy (King, 2001). The New Zealand Health Strategy developed in 2000 has since been superseded by The New Zealand Health Strategy in 2016. The former New Zealand Health Strategy draws on 13 major health priorities including reducing obesity, cardiovascular disease and smoking, improving nutrition and increasing physical activity (King, 2000). The most recent document recognises that New Zealand faces a growing problem with long term conditions. Although it has been identified that 20% of adults in New Zealand will consult with their GP regarding a musculoskeletal problem at some point during their lifetime, New Zealand health strategies fail to acknowledge musculoskeletal conditions in their health priorities (Taylor, Smeets, Hall, & McPherson, 2004). Recent literature has identified that an OA model of care should be considered as a national health priority, requiring system wide approaches targeting prevention and early intervention (Baldwin et al., 2017). However, this is not yet being addressed in local or national health strategies. The discrepancy in health priorities regarding the management of long-term musculoskeletal conditions may reflect why OA is not being managed appropriately in the New Zealand public health system.

Following the recent seismic reform to the New Zealand Health system, the 20 DHBs have disestablished, and their functions have been merged into Te Whatu Ora. Te Whatu Ora now leads the day-to-day running of the system for the whole country. Having a national system means that changes can be made to achieve better outcomes for the health of the whole population (Te Whatu Ora Health New Zealand, 2023). This will mean that hospital and specialist services will be planned and delivered nationally across the country, have more consistency, and improve access. Having a healthcare system that is nationally planned, regionally delivered and locally tailored has the opportunity to improve the delivery of OA care across the country.

1.7.2 Inequitable access to physiotherapy

Physiotherapy involves using proven techniques and in-depth knowledge to improve function and restore movement to a person affected by an injury or illness (Physiotherapy New Zealand, 2019). The role of the physiotherapist in the management of OA has been well researched (Abbott et al., 2013; Jansen et al., 2011). Physiotherapy has been recognised as an important part of the healthcare system in New Zealand for over 100 years (Nicholls & Larmer, 2005). In contrast to the UK and Sweden where physiotherapy coverage is universal, the New Zealand health system has a unique 2-tiered funding model for accessing physiotherapy care: Publicly funded via DHBs or ACC funded. Private physiotherapy funded by ACC makes up a substantial component of the physiotherapy services offered in New Zealand (Reid & Larmer, 2007). Most physiotherapy services around the country are delivered in private clinics, meaning a patient can seek a provider of their choice in their local community. This in part is accommodating as it aligns with strategic health plans of receiving care closer to home (Bay of Plenty District Health Board, 2017). Should physiotherapy treatment be sought following an accident, an ACC claim is lodged and if accepted ACC is responsible for covering a substantial portion of the treatment cost (Accident Compensation Corporation, 2018).

However, since the majority of OA is of insidious onset, individuals in New Zealand living with OA are not eligible for ACC subsidised physiotherapy. This means a patient would need to finance the total amount of the consultation. This is either of significant expense or unaffordable for many. Research suggests that the costs associated with physiotherapy services and medical consultations in New Zealand have been shown to prevent access to care and may suggest why only 51% of patients had received physiotherapy prior to accessing a total joint replacement (Reid, Potts, Burnett, & Konings, 2014).

As seen in other health systems such as the NHS and Norway, it is also possible for individuals with OA to access physiotherapy treatment at no cost through the public health system via their local DHB. However, the physiotherapy workforce in the public health sector have limited resources and due to this there is often a long wait for a person with OA to access appropriate treatment. The impact of long waiting time to access musculoskeletal physiotherapy has also been shown to have potential detrimental effects on the health of individuals including pain, disability, quality of life and psychological symptoms as well as at health system level including healthcare utilisation and costs (Deslauriers et al., 2021; Mahon et al., 2002; Morris, Twizeyemariya, & Grimmer, 2018; Morris, Twizeyemariya, Pillin, & Grimmer, 2017) whilst a reduction in waiting times has been shown to improve participation in musculoskeletal pain services (Lewis, Harding, Snowdon, & Taylor, 2018). In addition to long wait times, most physiotherapy funded through the DHB is delivered from hospital outpatient departments. Due to the discrepancy between private and public physiotherapy provision, patients with OA often find it difficult to navigate their way to the most appropriate and affordable care, or don’t access it at all (Winter Di Cola et al., 2014). This creates a disadvantage to those individuals unfortunate to have a long-term condition.

Literature shows that Māori health statistics and morbidity rates are disparately poor compared to non-Māori (Abbott et al., 2022). These inequalities extend to Māori living with disability and to their access and engagement with rehabilitation and disability support services, including physiotherapy (Hale et al., 2015). It has been reported that people identifying as Māori are 1.4 times more likely to have chronic pain and 1.3 times more likely to have arthritis, after adjusting for age and sex differences (Ministry of Health 2019). Previous research has shown that attending services which require transport can limit access to services, especially in low-income groups (Mbada et al., 2013). The disparities in the delivery of publicly funded musculoskeletal physiotherapy and ACC physiotherapy may contribute to the ongoing inequities in providing best care for OA management for Māori.

In order to address this inequity, The MoH have invested funding into improving community based conservative pathways for the management of musculoskeletal conditions. In 2015, six million dollars was devoted to implementation of The Mobility Action Programme (MAP) (The Ministry of Health, 2019b). This was the first time that private physiotherapy providers had delivered public health services in this manner. The aims of the programme were to improve musculoskeletal care with a focus to increase early access to education, advice, treatment and rehabilitation services in the community (The Ministry of Health, 2019b). The programme was specifically aimed at adults with musculoskeletal conditions such as OA that aren’t covered by ACC thus improving patient access to conservative care. The fundamental principles of the programme were to ensure the right care was being provided in the right place at the right time by practitioners with the right knowledge and resources (The Ministry of Health, 2019b). Evaluation of the MAP provides strong recommendation that early intervention programmes such as this result in health outcome gains, are cost effective and contribute to health equity for Māori and Pasifika, and those living in areas of higher depravation (Allen and Clark, 2021). It was the expectation of the Ministry of Health that once these models of care were established, further adaptation and refinement of these services could be translated into long term publicly funded entities (The Ministry of Health, 2019b).

1.7.3 A dichotomous orthopaedic system

Having various health funding models operating within the same system has led to dichotomy within the New Zealand health system. It is evident that the New Zealand health system lacks a fair method of financing OA particularly when it comes to the surgical management of the disease. OA is most commonly of insidious onset but a substantial fraction (12%) of the disease arises secondary to joint trauma (Anderson et al., 2011). Research suggests that more than 40% of people will develop post traumatic OA after significant ligament or meniscus tears, or articular surface injuries (Anderson et al., 2011). Once OA progresses to reach end stage, surgical intervention could be indicated, with a total joint replacement being the most common arthroplasty utilised in New Zealand (Hooper, Lee, Rothwell, & Frampton, 2014). If a patient has a pre-requisite ACC covered injury to the knee and subsequently develops OA, ACC is likely to cover the costs of a TKJR as the OA is attributed to a traumatic onset. This management pathway involves a referral to a private orthopaedic specialist at a private hospital with little to no waiting time for treatment.

Alternatively, should a person develop OA insidiously, they are either required to fund the operation completely or be referred into the public system. In the public system there are often long waiting times to see an orthopaedic specialist and evidence suggests that there is a significant reduction in function when a patient has to wait for an assessment of their hip or knee (Pace, Orpen, Doll, & Crawfurd, 2005). Literature has also reported that long waiting times to be seen has detrimental effects and increases problems not only for patients, but also for families, society, and the health system (Morris et al., 2018; Morris et al., 2017). When a patient attends an FSA with an orthopaedic specialist in the public system regarding a surgical opinion, the patient is scored using the national Clinical Priority System (CPS) on the severity of their symptoms and the urgency of treatment (Gwynne-Jones & Iosua, 2016). These surgical threshold measures mean acceptance onto a surgical waiting list is not always guaranteed and varies significantly between DHBs around the country. Therefore, an individual may wait a significant length of time for the consultation and not be offered any treatment. It appears that the New Zealand health system rewards those having suffered an injury more than those who suffer a non-accident related disease (Flood, 2000). The dichotomy between funding for a TKJR or THJR may suggest why the New Zealand health system is lacking in comprehensive conservative pathways.

1.7.4 Low uptake of core treatment

There are comprehensive guidelines that support core treatment of weight loss, patient education and exercise for lower limb OA. Alongside the National Institute of Clinical Excellence (NICE) guidelines published by the NHS, the Osteoarthritis Research Society International (OARSI) have recommended these core treatments as first line options for all patients with OA (Bannuru et al., 2019; The National Institute of Clinical Excellence, 2014). These recommended interventions are a fundamental part of a physiotherapists role and there is strong supportive evidence on their clinical effectiveness (Jamtvedt et al., 2008). Despite these recommendations, there is evidence that guidelines are underutilised by medical professionals with a low uptake of core nonpharmacological options in primary care (Dziedzic & Allen, 2018; Mills et al., 2023; Moseng, Dagfinrud, & Østerås, 2019).

Limited use of guidelines has a profound effect on the quality of care provided. A major health focus in New Zealand is empowering people to stay healthy in the community for longer. This involves ‘identifying problems earlier, when they can most effectively be addressed’ (The Ministry of Health, 2011a). It has been identified that a lack of core treatments in primary care results in early and unnecessary escalation of care, reduced productivity of orthopaedic services and lower surgical conversion rates (Reid et al., 2014). This negatively impacts on FSA waiting times and timely access to elective surgery (Reid et al., 2014). The discrepancy between the evidence-based guidelines and clinical practice suggests problems with the implementation of comprehensive OA guidelines within New Zealand primary care. It has been identified that there are numerous barriers to implementation including guideline complexity, clinician opinions and beliefs, current systems and pathways and individual factors (Okwera & May, 2019). Literature also confirms that patients with common musculoskeletal conditions such as OA often feel that their GP doesn't take their problem seriously as the GP tends to prioritise other health conditions (Bishop, Foster, & Croft, 2013). This may contribute to the lack of core treatment being delivered by GP in primary care.

This has also been recognised as a problem within New Zealand primary care. A study by Reid et al. (2014) surveyed New Zealand medical practitioners on their expectations, experiences and perception of effectiveness of treatment regarding physiotherapy management of hip and knee OA. Results have demonstrated that in a cohort of 24 GPs only 53% of patients were referred to physiotherapy, half of these immediately and one fifth as a last resort (Reid et al., 2014). With one in five New Zealanders attending their GP for a musculoskeletal complaint at some point in their lifetime, patients rely on their GPs knowledge of best practice guidelines in directing them towards the most effective treatment (Taylor et al., 2004). Without adequate information and early education from health professionals, people do not know what they should and should not do for OA. As a consequence, they avoid activity for fear of causing harm. Providing reassurance and clear advice about the value of core treatments in controlling symptoms, may encourage an improvement in condition management.

1.7.5 Underutilisation of health professionals

One of the key goals of New Zealand Better, Sooner, More Convenient Care draws attention to freeing up highly trained health professionals to focus on the most complex patient (The Ministry of Health, 2011a). This involves training other health professionals to complete simpler tasks that would otherwise have been done by a doctor or senior medial professional. Despite this, the New Zealand public health system does not currently follow best practice for the triaging of musculoskeletal conditions in secondary care (Abbott et al., 2022). An orthopaedic surgeon is a highly trained specialist and with the current model in place are the first practitioner to assess the patient when referred from primary care, thus spending a considerable amount of time seeing nonsurgical cases. Not only is this a significant expense to the DHB, but with the increasing demand for orthopaedic care, this model may no longer be viable.

There are reports, particularly from the United Kingdom (UK) and Australia of successful implementation of physiotherapists in orthopaedic triage clinics as well as within a primary care setting (Desmeules et al., 2012; Samsson, Bernhardsson, & Larsson, 2016; Samsson & Larsson, 2014). It has been reported that physiotherapists can successfully triage orthopaedic patients into surgical and non-surgical pathways as well as showing positive results in regards to cost effectiveness (direct or indirect), clinical appropriateness, resource utilisation, and patient and health outcomes (Marks et al., 2017; Oakley & Shacklady, 2015; Stanhope et al., 2012). These models have been described in the literature as advanced practitioner models of care, utilising professionals at top of scope to do jobs previously been completed by medics such as; diagnosing, image requesting, prescribing medications, administering injections and triaging surgical candidates (Desmeules et al., 2012). Although it is well supported that an advanced practitioner model is effective in other health systems, its implementation has yet to be researched in a New Zealand context. Having physiotherapy practitioners as a first-tier level of assessment and management for orthopaedic conditions such as OA could provide desired reduction in inappropriate referrals, improved access to elective care services and improve patient health outcomes.

1.7.6 GPs as gatekeepers

As seen in many health models worldwide, primary care practitioners are the first point of contact for patients within the New Zealand public health system (King, 2001). The GP in New Zealand acts as a gatekeeper; authorising access to diagnostic tests and speciality care (Greenfield, Foley, & Majeed, 2016). Essentially the GP should ensure that only conditions not able to be managed in primary care should be referred to a specialist, thus saving specialists for more complex cases (Greenfield et al., 2016). However, with the expected increase in prevalence of Musculoskeletal conditions, the public expectations and demands on GPs is set to rise (Bishop et al., 2013). Many GPs only have limited training and interest to deal with musculoskeletal complaints effectively (Tregonning & Bossley, 2011). In knee OA, researchers have found that only

33% of patients received surgery within 12 months when referred to an orthopaedic Specialist for an opinion of joint replacement (McHugh et al., 2011). It has also been shown that GPs have low confidence in OA management (Briggs et al., 2019). This not only suggests that improved strategies need to be developed between primary and secondary care but questions whether the traditional model of GPs as gatekeepers is the most effective way of providing care for musculoskeletal complaints.

A possible alternative is the use of physiotherapists who have specialist skills, expertise and training in the management of musculoskeletal conditions. They are well placed in making a positive contribution by taking responsibility for musculoskeletal complaints in primary care, reducing the burden on the GP (Greenfield et al., 2016). Physiotherapists are confident in managing people with OA and literature has supported having a workforce capacity building that de-emphasizes biomedical management and promotes high-value first-line care for OA is necessary (Briggs et al., 2019). These models have not only been shown to cut down waiting times and cost but prevent acute problems becoming chronic, reduce sick time, and reduce long term disability thus having a positive impact to the service and its user (Addley, Burke, & McQuillan, 2010; Savigny, Watson, & Underwood, 2009). A recent study by Ho, Thorstensson, and Nordeman (2019) has reported that there is no difference in health-related quality of life when the healthcare process was initiated with a physiotherapist assessment rather than a physician assessment. This suggests that both professionals are equally qualified as first point of contact assessors for the management musculoskeletal conditions. It is recommended that a patient waits around four months to see an orthopaedic specialist through the New Zealand public pathway, (The Ministry of Health, 2016a). However with population growth and the COVID-19 pandemic, the number of people waiting longer than 4 months has trebled since 2020 (Abbott et al., 2022). Early intervention with a physiotherapist could provide correct management through information and appropriate referral to secondary care services if required.

1.7.7 Summary

In summary, the current management of OA in the New Zealand health system lacks consistency. There are several social, political and organisational factors that affect the current delivery of OA care. These include the lack of musculoskeletal diseases as health priorities, inequitable access to physiotherapy, low uptake of core treatment via primary care, a dichotomous orthopaedic system and underutilisation of health professionals. New Zealand has a significant amount of work to do in order to improve the pathway for OA care in the public health system. Implementing an orthopaedic triage model delivered by APPs to assist with improving the management of hip and knee OA may be an effective model but the impact of this model in a New Zealand context is not yet known.

1.8 Statement of the problem

With an ever-increasing demand on health care to provide timely access to assessment and treatment for patients with musculoskeletal complaints, coupled with the lack of streamlined OA care pathways, there is an emphasised need for alternative models of care for OA in New Zealand (Baldwin et al., 2017). The BOPDHB strategic plan has identified an increasing demand on the Bay of Plenty public health services and that current structure ‘cannot sustain its current patterns of resource allocation and ways of working’ (Bay of Plenty District Health Board, 2017). There are several issues within the New Zealand health system that prevent access to best practice for OA care and management. Orthopaedic services at the BOPDHB are struggling to cope with the current volume of patients attending FSA regarding management of symptomatic OA. Data has shown that there is a high volume of patients being referred into orthopaedics that are not suitable for surgical management and would be best managed via alternative pathways.

1.9 Aims of the research

This research intends to answer the research question:

‘What is the impact of a Community Orthopaedic Triage Service in the management of hip and knee OA in the New Zealand public health system?’

There are four key questions which are pertinent to this study:

- What is the impact of a COTS to patients with knee or hip OA in the Bay of Plenty?
- What is the impact of a COTS to the BOPDHB as an organisation?

- What is the impact of the COTS to orthopaedic services?
- What is the impact of the COTS to GPs in primary care?

1.10 Contribution to knowledge

This study contributes to the body of knowledge in the area of advanced practice models of care delivered by physiotherapists in Aotearoa New Zealand, specifically addressing the impact of this model of care on patients experiencing hip or knee OA, stakeholders and the public health system. While there are many APP models of care described in several countries, there is very little knowledge of these models reported in the literature.

1.11 Structure of the thesis

This thesis has been written in a traditional format and an overview of chapters is presented below:

Chapter one provided a broad overview of the significance of the problem and its relation to the increasing demand for orthopaedic services by adults with hip or knee OA in the New Zealand health system. It introduced an APP model of care including the development of the COTS at the BOPDHB to manage this demand and improve the patient journey.

Chapter two is a narrative review of the literature on the evaluation of APP triage models of care for patients with OA of the hip and knee and synthesises the existing body of knowledge. It examines the various outcomes evaluated and the significance of these in clinical practice. The chapter concludes by identifying the gap in knowledge that this research study aims to answer.

Chapter three provides an insight into the theoretical paradigm that underpins this research study. It then provides justification for the research methodology adopted to construct the research including the methods chosen to conduct the quantitative data collection, semi-structured interviews, and analysis. Ethical consideration and rigour will also be presented.

Chapter four is a presentation of the quantitative and qualitative results of the data collected over the two parts. Descriptive statistics provide summaries for the quantitative data and thematic analysis interprets the qualitative data.

The final chapter of this thesis, chapter five, is a discussion of the study findings in relation to current literature. Study strengths and limitations are discussed as well as the implication of the study and contribution to future practice. The final chapter also draws conclusions regarding the research question and objectives.

1.12 Summary

New Zealand faces an ever-growing problem with the prevalence of OA and incurs high socioeconomic costs on the health system. In particular, the BOPDHB continues to experience increasing referrals from the GP into orthopaedic services and current strategic plans report it cannot sustain its current patterns of resource allocation and ways of working. Physiotherapists known as Advanced Practice Physiotherapists (APP) have the ability to examine, provide early conservative management strategies and reassurance to patients that are currently referred to orthopaedic surgeons. Orthopaedic triage services led by APPs have long been implemented in health care models around the world. They have been shown to improve resource utilisation, improve access to services, reduce wait times, improve care coordination, and lead to better health outcomes for patients. To improve the patient journey through the public health system the BOPDHB has implemented a Community Orthopaedic Triage Service. The COTS aims to improve access to musculoskeletal services through lower threshold criteria whilst utilising allied health professionals as an alternative pathway for orthopaedic patients. Although this model of care has been proven to be clinically effective in other health care systems around the world, the impact of this model has yet to be explored in this specific health environment.

Chapter 2 Review of the Literature

2.1 Introduction

This chapter provides an appraisal of the literature relating to the question *'What is the impact of a Community Orthopaedic Triage Service in the management of Hip and Knee Osteoarthritis in the New Zealand Public Health System?'*. It investigates the various evaluation outcomes of APP OA models of care and the impact of these outcomes in both an international and New Zealand landscape. The chapter begins by describing and justifying the method of search and then reports the results. The results of the literature review are then presented and are organised into relevant categories to provide an overview of the research topic and to demonstrate the knowledge gap.

2.2 Method

The methods of the literature review including justification for the choice of review, search strategy, inclusion and exclusion criteria and will now be discussed.

2.2.1 Choice of review

As there has been extensive research including a systematic review of systematic reviews on the clinical effectiveness of APPs with orthopaedic surgeons in a variety of clinical areas (Vedanayagam et al., 2021), it is not within the scope of this literature review to re-examine this via a further systematic review. What is less frequently asked is the organisation of care specifically for hip and knee OA: how is it done, where is it carried out and the relationships between these factors and their outcomes. Due to the complexity of the muti-faceted outcomes, the topic area does not lend itself to a systematic review and therefore a narrative literature review was undertaken. A narrative review has been shown to provide a deeper understanding of the literature whilst still providing interpretation and critique (Greenhalgh, Thorne, & Malterud, 2018). It has allowed for inclusion of both quantitative and qualitative studies from a broad range of data sources, allowing the researcher flexibility in selection of literature from a specific evaluative standpoint (Greenhalgh et al., 2018).

2.2.2 Search strategy

Literature was accessed via a variety of means including systematically searching in journals, electronic databases, textbooks, webinars, and conference proceedings. A literature review was first initiated during the research proposal in 2020 and concluded in April 2022. A librarian was sought to assist with the search to ensure that it was comprehensive.

Although not a systematic review, a systematic search strategy approach was devised and consisted of a comprehensive search of electronic databases including AMED, CINAHL, EBSCO, Medline, Scopus, PEDro, Science Direct and Google Scholar. Database searches were limited to full text peer reviewed articles written in English between 1st January 1999 and April 2022. A list of keywords related to each concept was produced, and a search was performed using Boolean operators and truncation. Search terms used for database searches were "advanced practic*" OR "extended scope practic*" OR "physiotherap*" AND “triage” or “ortho* triage” AND “osteoarthritis”. Reference lists were checked, and citations tracked for further available literature. A literature review search strategy can be seen in Appendix L.

2.2.3 Inclusion Criteria

For the purpose of this literature review, the term APP is used as a generic term and refers to a physiotherapist working under the umbrella of titles including ‘advanced practice’, ‘extended scope’, ‘experienced’, ‘specialist’ and ‘clinical specialities’. Full text articles that reported some method of evaluation of an orthopaedic triage service or musculoskeletal assessment service delivered by APPs in primary or secondary care for patients specifically with hip and/or knee osteoarthritis were included. All methods of evaluation including health outcomes, patient satisfaction, cost effectiveness, quality of care, patient experience or other were included for review. To capture the diverse range of outcomes both quantitative and qualitative papers were included for review. Only papers that included a population of 18 years and over were included.

2.2.4 Exclusion Criteria

Papers that were delivered by other disciplines or services such as podiatry triage, sports physicians and in an emergency department were excluded. Papers that focused on areas other than the hip or knee joint including spinal triage services, upper limb triage services and studies that included a paediatric population were also excluded from the review. Publications were excluded if their primary focus was post-surgical care, generalised inflammatory arthropathy or did not include hip and knee joint specific data.

2.2.5 Data extraction and synthesis

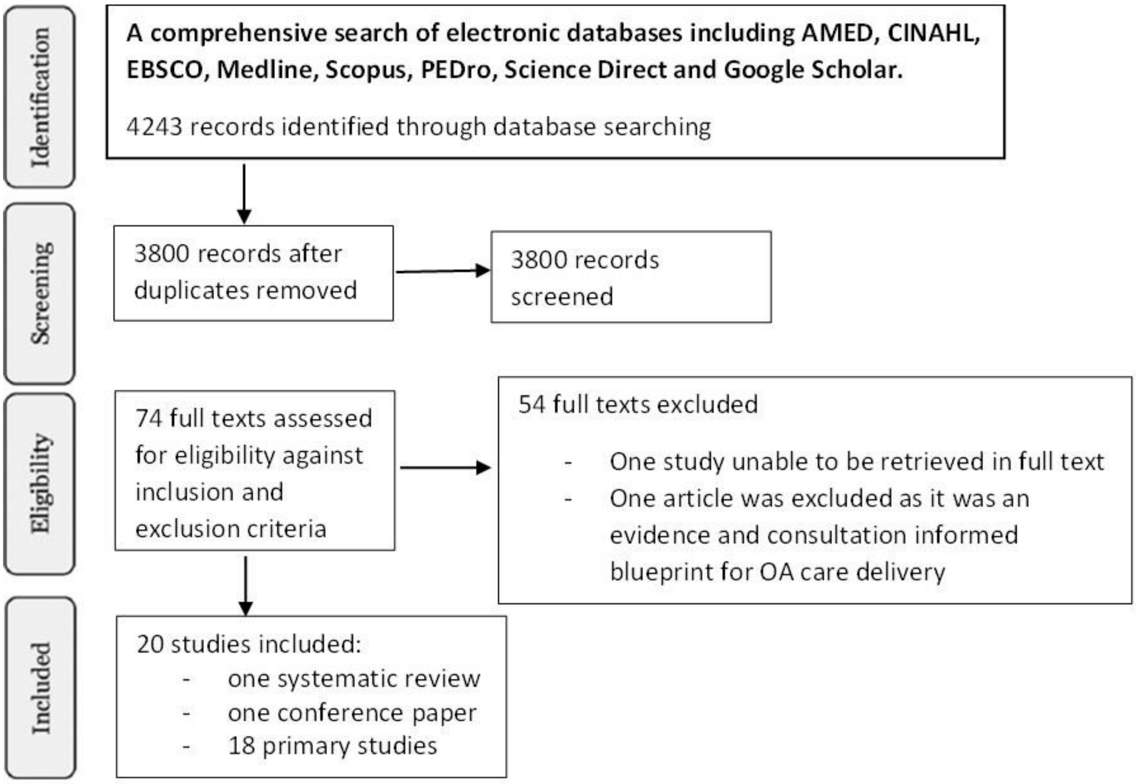
Identified articles were subjected to data extraction utilising the Patient, Intervention, Comparison, Outcome (PICO) framework (Eriksen & Frandsen, 2018). The results are presented narratively by primary outcome type in Table 1. The outcome categories identified in the data include professional competency (diagnostic concordance between APP and surgeon or physician), patient and stakeholder satisfaction, patient experience, time, resource utilisation (clinical and cost effectiveness) and patient flow (the movement of patients between health professionals, health services and organisations).

2.3 Results

Following an initial search strategy on APP triage services, 4243 articles were found. Duplicates were removed, and the remaining articles were screened against the inclusion and exclusion criteria. Of the 3800 records, 3726 records were deemed inappropriate after reviewing the title or abstract and excluded from the review. A further 53 full texts were excluded after full read when assessed for eligibility due to the studies primarily evaluating intervention models of care rather than assessment models of care. One article was excluded as it was an evidence and consultation informed blueprint for OA care delivery (Briggs et al., 2018). Twenty articles were retained for further review. A diagrammatic flow chart of the literature search can be seen in Figure 10. Out of the retained papers, there was one systematic review (Button, Morgan, Weightman, & Jones, 2019), one conference paper (Kapakoulakis & Collings, 2011) and the remaining 18 articles were primary studies including four cross sectional studies, three case series, three retrospective studies, two prospective studies, two randomised controlled pragmatic trials, one evaluation, one feasibility study, one exploratory study and one clinical audit. See Table 1 for the literature review table, which includes authors and a summary of design, study aims, pathway features, evaluation outcome, summary of findings and study limitations for each primary paper.

Figure 10

Flow diagram on literature review search strategy



2.4 Systematic review

One recent systematic review by Button et al. (2019) has evaluated the evidence for the clinical and/or cost effectiveness of current care pathways for adults with hip and/or knee pain referred for specialist opinion. Although all articles included were not specific for OA, the article is pertinent and has therefore been included this review. The quality of this systematic review has been critiqued using the Critical Appraisal Skills Programme systematic review checklist in the analysis process (Critical Skills Appraisal Programme, 2018). The review was well conducted with a clearly focused question, the inclusion of relevant studies and the application of appropriate critical analysis tools to quantitative and qualitative studies. Eighteen studies included in the review were based on healthcare activity within hospitals in secondary care with three studies led by physiotherapists and seven led by physiotherapist and surgeon. The remaining studies were either delivered by orthopaedic surgeons or GPs. Seven of the studies in the systematic review have been included in this literature review due to their focus on OA management pathways. When analysed using the hierarchy of evidence proposed by the Oxford Centre for research, this review identified the overall level of evidence from the studies was low. authors attributed this to study designs and methodological flaws including a lack of randomised controlled trials (RCT) in this research area. The study reports outcomes on a meso, micro and macro level including time, resource use, professional competency and patient flow. However due to the lack of RCTs, caution needs to be taken when interpreting these results around clinical or cost effectiveness. The findings suggest that a hip and knee model of care is not linear and there are a variety of activity loops between pathways. It is also suggested that these models of care must integrate the skills of different healthcare professionals to ensure the patients' needs are met by the most appropriate provider. A substantial limitation in the review is the lack of studies exploring patient experience of hip and knee pathways. There is an urgent need for research which is designed with the involvement of patients in developing effective assessment models of care for hip and knee OA.

2.5 Primary studies

Analysis of the literature reveals an increased focus on some elements of models of care over others. To provide a narrative overview of the literature, outcomes evaluated in each model of care have been grouped into six categories: patient experience, time, professional competency (diagnostic concordance between APP and surgeon or physician), patient and stakeholder satisfaction, resource utilisation (clinical effectiveness and cost effectiveness) and patient flow (the movement of patients between health professionals, health services and within organisations). The evaluation outcome categories can be seen in Table 1.

Table 1 *Table showing characteristics of primary studies*

Author	Country	Design	Study aim	Population/ participants	Pathway features	Evaluation outcome type	Summary of findings	Limitations of study
Abbott et al. (2019) Implementation of a joint clinic to resolve unmet need for orthopaedic services in patients with hip and knee osteoarthritis: a programme evaluation	New Zealand	Longitudinal programme evaluation	Conduct a comprehensive, longitudinal programme evaluation of the implementation of the joint clinic initiative	111 GPs 66 patient surveys 28 semi-structured interviews of hospital staff and GPs 637 patient visits	Orthopaedic outpatient department – patients referred from GP to orthopaedics and then redirected to the joint clinic	Resource use Patient flow Satisfaction	Unmet need reduced by 90% High levels of confidence in the joint clinic and its staff High patient satisfaction High GP satisfaction	Generalisability of results to other regions is limited
Aiken, Harrison, Atkinson, and Hope (2008) Easing the Burden for Joint replacement Wait Times: The role of the Expanded Practice Physiotherapist	Canada	Cross sectional	Correlation of pre-op assessments done by physiotherapist and orthopaedic surgeon, determining appropriateness of THJR and TKJR. Compares conservative treatment options offered.	38 subjects – unknown ages	Outpatient orthopaedic in tertiary care clinic: one physiotherapist and one Orthopaedic surgeon	Professional competency Satisfaction	100% agreement on surgical vs non-surgical patient. Surgical prioritisation agreement in 64% of cases. Physiotherapist recommended more conservative treatment options than surgeon. Patients were satisfied with both surgeon and physiotherapist.	Low subject numbers Only two assessing clinicians therefore low generalisability of findings
Aiken, Harrison, and Hope (2009) Role of the advanced practice Physiotherapist in reducing surgical wait times	Canada	Case Series	To examine the role of an APP in outpatient orthopaedic clinics to determine the effect on hip and knee replacement wait times through direct care and in terms of saving surgeons' time in clinic.	107 patients with hip and knee OA	Tertiary hospital – one APP assessed all patients who were referred with hip or knee OA	Time Satisfaction	Waiting time reduced from 140 to 40 days Number on waiting list reduced from 200 to 59 High satisfaction for service and APP skills	Low generalisability – only one APP doing assessments No reference of type of satisfaction questionnaire used

Author	Country	Design	Study aim	Population/ participants	Pathway features	Evaluation outcome type	Summary of findings	Limitations of study
Ashmore, Smart, O'Toole, and Doody (2014) Triage of knee pain by an Extended Scope Physiotherapist (ESP) in an orthopaedic clinic: A clinical audit	Ireland	Clinical audit	Examine the proportion of patients managed independently by ESP, accuracy of diagnosis and conversion rate to surgery	140 patients with knee pain 55 patients with knee OA	Orthopaedic outpatient department at a tertiary hospital Knee screening clinic delivered by ESP in conjunction with an orthopaedic surgeon	Professional competency Resource use	ESP independently managed 59.3% patients Of 40.7% referred to Orthopaedics, 84% underwent surgery Diagnostic accuracy was substantial	Small sample size Single ESP Not specific for OA
Cavka et al. (2015) Mixed methods evaluation of a comprehensive osteoarthritis hip and knee service (OAHKS); patient, clinician and administrative perspectives	Australia	Mixed methods evaluation	To assess the impacts and outcomes of the OAHKS using quantitative and qualitative methodology	250 patients pre/post intervention analysis 15 patients interviewed Focus groups with clinicians	Orthopaedic outpatient department at a tertiary hospital. Pre and post intervention analysis of the OAHKS Patients triaged to APP instead of Surgeon	Time Patient experience	High levels of satisfaction General consensus that OAHKS is a valuable service Reduced wait time in OAHKS compared to orthopaedics Reduced wait time for surgery	Cannot generalise results to other countries
Decary et al. (2016) Diagnostic and surgical triage concordance between a Physiotherapist and physicians for patients' sufferings from OA	Canada	Cross sectional	Evaluate the agreement between a physiotherapist and physician (orthopaedic surgeon or medicine Physician) for diagnosis and triage of knee OA patients	90 patients Only 52 patients diagnosed with knee OA	Not clearly defined	Professional competency	Raw data agreement proportion for clinical diagnosis for knee OA was 95.6%. Inter-rater agreement PABAK 0.91. Raw agreement for surgical recommendations was 88.5%	Low subject numbers. Only surgical outcomes assessed. Not a specific OA pathway so not generalisable

Author	Country	Design	Study aim	Population/ participants	Pathway features	Evaluation outcome type	Summary of findings	Limitations of study
Décary et al. (2017) Diagnostic validity and triage concordance of a Physiotherapist compared to physicians' diagnoses for common knee disorders	Canada	Prospective diagnostic study	Evaluate concordance between physiotherapist and expert physician in diagnosis and surgical triage of common knee disorders without imaging	179 participants with any knee complaint. OA (n=79)	One physiotherapist, two orthopaedic surgeons and two sports physicians. Outpatient orthopaedic department and primary care family medicine clinic.	Professional competency Patient flow	High diagnostic inter-rater agreement between physician and physiotherapist Good inter-rater agreement on recommendations for treatment	Not an OA specific pathway. Physiotherapist only had one-year clinical experience. Only one physiotherapist and one physician assessed patients therefore limiting generalisability of results.

Author	Country	Design	Study aim	Population/ participants	Pathway features	Evaluation outcome type	Summary of findings	Limitations of study
Desmeules et al. (2013) Validation of an advanced practice physiotherapy model of care in an orthopaedic outpatient clinic	Canada	Cross sectional	Evaluate agreement between advanced physiotherapist and orthopaedic surgeon in regard to triage, diagnosis, treatment recommendations, and imaging	120 patients with knee or hip pain 41 patients diagnosed with OA.	One advanced practice physiotherapist and 3 orthopaedic surgeons Department of orthopaedic surgery in a supra regional university hospital with a tertiary trauma centre. Blinded to each other results.	Professional competency Satisfaction Resource use	Professional competency: Very high diagnostic agreement between physiotherapist and surgeon. Resource use: No difference in imaging requests. Treatment recommendations: Physio referred for more advice and education, supervised physio, home exercise and NSAIDs than the orthopaedic surgeon Physiotherapy visit time was significantly longer (13min vs 11.2mins). Patient were significantly more satisfied with Physio assessment	Low subject numbers Only 11 patients with hip problems. Not a specific OA pathway. Only conducted a short-term data collection. Wait time for appointment not assessed.
Doerr, Graves, Mercer, and Osborne (2012) Implementation of a quality care management system for patients with arthritis of the hip and knee	Australia	Case study/report	Outcomes of a service redesign	Patient with hip and knee OA (no demographics given)	Orthopaedic unit at a general hospital	Time Satisfaction	Reduction of assessment and surgery Improved equity Improved satisfaction in timeliness of access Improved preparation for surgery Increased efficiency	No specifics regrading population and impact of physiotherapist

Author	Country	Design	Study aim	Population/ participants	Pathway features	Evaluation outcome type	Summary of findings	Limitations of study
Farrar, Ghalayini, and Raut (2014) Efficacy of musculoskeletal assessment services	UK	Retrospective review	Comparing referral to advanced physiotherapist to referral to an orthopaedic surgeon for hip and knee complaints	432 patients over 5 years (226 seen by physiotherapist, 206 in orthopaedics)	One orthopaedic surgeon and one APP	Time Resource use	Longer wait for orthopaedic consultation opposed to physiotherapist. Physiotherapist longer time to diagnosis. Imaging used more by physiotherapist. Surgery more common in orthopaedic patients.	Only utilised one GP surgery for referrals Not specific for just OA
Gibbs et al. (2020) Osteoarthritis Hip and Knee service (OAHKS) in a community health setting compared to the hospital setting: A feasibility study for a new care pathway	Australia	Feasibility study	Examine whether implementing OAHKS in a community health setting is feasible – comparing community OAHKS with hospital OAHKS	91 patients 40 attended community based OAHKs and 51 hospital based OAHKS	Patients seen via a community route or a hospital route. Community service ran from GP clinic and hospital ran from orthopaedic department	Resource use Professional competency Patient flow Satisfaction Time	Both groups high levels of satisfaction with patients and GPs – small favour in community based Waiting times significantly shorter in the community Shorter time in commencing non-surgical management Referral to orthopaedics lower from community OAHKS	Low GP response rate No orthopaedic feedback on the community OAHKS service Low generalisability to other health settings

Author	Country	Design	Study aim	Population/ participants	Pathway features	Evaluation outcome type	Summary of findings	Limitations of study
Gillis et al. (2014) Physiotherapy extended-role practitioner for individuals with knee arthritis: patient perspectives of a rural/urban partnership	Canada	Qualitative descriptive case study	Ascertaining participants perspectives on how the model affected ability to access services for hip and knee OA and the quality of the care	13 participants	Partnership between rural community health centre and urban teaching hospital. GP refers to physiotherapist for joint replacement assessment	Patient flow Time Patient experience	Three main themes: timely access to care, distance as a factor in seeking care and perceptions of the extended role practitioner model of care.	Unable to generalise results Used a single physiotherapist
Gwynne-Jones et al. (2018) The joint clinic: managing excess demand for hip and knee osteoarthritis referrals using a new Physiotherapy-Led outpatient service	New Zealand	Prospective cohort	Assess the effectiveness of the joint clinic in prioritising patients needing specialist assessment and optimising non-surgical for those who don't	358 patients with hip or knee OA	Patients referred to Joint clinic by GP, paper triaged then assessed in joint clinic by nurse or physiotherapist. Only referred to surgeon if needed.	Patient flow Resource use	18 days from referral to assessment. 196 not referred to surgeon. 54 referred directly to surgeon and 89 after physiotherapist assessment. 115 proceeded to surgery, 18 didn't meet threshold and 10 not recommended surgery.	Not generalisable to other settings No statistical analysis
Ho et al. (2019) Physiotherapist as a primary assessor for patients with suspected knee osteoarthritis in primary care – a randomised controlled pragmatic study	Sweden	Randomised controlled pragmatic study	Examine the difference in health-related quality of life for patients with knee OA when process is initiated by physiotherapist assessment over physician in primary care	35 patients assessed by physiotherapist and 34 by physician	Primary care facility. Patients randomised to assessment by physiotherapist or physician.	Resource use	No difference in health-related quality of life for pain and physical function when assessment initiated by physiotherapist or physician.	Low 12 month follow up Small cohort of patients

Author	**Country**	**Design**	**Study aim**	**Population/ participants**	**Pathway features**	**Evaluation outcome type**	**Summary of findings**	**Limitations of study**
Ho-Henriksson, Svensson, Thorstensson, and Nordeman (2022) Physiotherapist or physician as primary care assessor for patients with suspected knee osteoarthritis in primary care – a cost-effectiveness analysis of a pragmatic trail	Sweden	Cost effective analysis alongside a randomised controlled pragmatic trail	To determine whether physiotherapists as primary assessors for patients with suspected knee OA in primary care are a cost-effective alternative compare with traditional physician led care	69 patients	Primary care. Patients randomised to physiotherapists or physician	Resource use	Both groups improved quality of life measures at one year with no significant difference between groups 72-80% probability that physiotherapist is less costly than compared to traditional physician care	Low sample size Organisational changes during data collection
Jovic, Mulford, Ogden, and Zalucki (2019) Diagnosis and management of chronic hip and knee pain in a Tasmanian orthopaedic clinic: a study assessing the diagnostic and treatment planning decisions of an advanced scope Physiotherapist	Australia	Exploratory study	Investigate clinical effectiveness of an APP triaging patients referred to orthopaedics with chronic hip and knee pain	94 patients with hip or knee pain 90% diagnosed with OA	Orthopaedic department at a general hospital One APP	Resource use Professional competency	Diagnostic agreement between APP and consultant almost perfect Treatment agreement substantial Surgical conversion rate doubled using APP service	Patient satisfaction not reported
Kapakoulakis and Collings (2011) The implementation and evaluation of the Osteoarthritis Hip and Knee Service and its impact in a regional setting	Australia	Evaluation	Evaluate an Osteoarthritis hip and knee service and its impact in a regional setting	800 patients with hip or knee OA	Regional setting. One musculoskeletal co-ordinator running clinics alongside orthopaedic outpatients	Satisfaction Time Patient flow Resource use	Optimise care for patients Greater patient satisfaction Decreased waiting time to assessment	Descriptive only – no statistical analysis of data

Author	Country	Design	Study aim	Population/ participants	Pathway features	Evaluation outcome type	Summary of findings	Limitations of study
MacKay, Davis, Mahomed, and Badley (2009) Expanding roles in orthopaedic care: a comparison of physiotherapist and orthopaedic surgeon recommendations for triage	Canada	Prospective cross sectional	Compare the clinical recommendations and diagnostic agreement of specially trained physiotherapists with an orthopaedic surgeon	62 patients with hip or knee OA	Two physiotherapists and three orthopaedic surgeons. Patients assessed by physiotherapist first and then by surgeon	Professional competency Patient flow	Good agreement for orthopaedic appointment. Agreement in diagnosis in 69% of cases Variation in treatment given – physiotherapists gave more advice and education in appointment	Not generalisable to other health care settings
O'Farrell, Smart, Caffrey, Daly, and Doody (2014) Orthopaedic triage at a physiotherapist-led 'Musculoskeletal Assessment Clinic': a seven-month service evaluation of outcomes	Ireland	Retrospective review	To evaluate the outcomes of a recently established 'Musculoskeletal Assessment Clinic'	714 patients – 16% with knee OA, 2% hip OA	Orthopaedic outpatients in a secondary care hospital. Two APPs. Clinic assesses selected patients referred for orthopaedic consultation	Resource use	Majority of patients (76%) managed by APP without need for orthopaedic consultation. Conversion rate to surgery of 73%	Not specifically for knee OA Only descriptive
Parfitt, Smeatham, Timperley, Hubble, and Gie (2012) Direct listing for total hip replacement (THR) by primary care Physiotherapists	UK	Retrospective cohort	Compare waiting times between APP led hip replacement service and traditional GP to surgeon route for direct surgical listing	140 patients from physiotherapist and 40 from GP	Patients seen via physiotherapy route in primary care or standard route	Resource use Time	APP referrals for surgery – 127/130 had THJR Potential cost saving of £145 Reduced waiting time in APP service	Traditional route to surgery not reported Uncertainty on how cost savings were established

Note: Colour coding to represent distinct outcome evaluation categories - Resource use, Patient flow, Satisfaction, Time, Professional competency, Patient experience

2.5.1 Patient experience

Three primary studies have explored the experience of people with hip or knee OA utilising an APP pathway (Cavka et al., 2015; Gibbs et al., 2020; Gillis et al., 2014). A qualitative descriptive study by Gillis et al. (2014) has explored the perspectives of people with hip and knee arthritis regarding an APP model of care in a rural setting in Canada. The model of care examined a partnership between a rural community health centre and an urban teaching hospital where an APP travelled to a rural health centre once a month to assess and triage for either surgical or conservative management. Thirteen patients who had experienced the model of care were interviewed for the study using a semi-structured interview guide. Data was analysed and three main themes were identified: (1) timely access to care, (2) distance as a factor in seeking care and (3) perceptions of the model of care. Results suggest that overall participants report high levels of satisfaction in the model relating to minimising travel access and personalised components of care including opportunities for education and addressing questions about their care trajectory.

A further study, Gibbs et al. (2020) also evaluated the feasibility of a similar model of care where an APP screens hip and knee OA patients in a community-based clinic in Australia with no onsite access to medical services. Alongside a satisfaction questionnaire, patients were asked two open ended questions and asked to comment on the positive and negative aspects of their experience of being seen in an APP led triage model. The most reported positive aspects were communication and time with the physiotherapist. There were very few negative comments from either the hospital or community-based service. Results of the survey report patients supported the acceptability of the community-based service as an alternative to the hospital-based OA pathway. However, due to the sampling method and non-responders to the survey, the generalisability of the findings may be limited.

A study by Cavka et al., (2015) conducted a mixed methods evaluation of a comprehensive OA hip and knee service by exploring patient, clinician, and administration perspectives. The Osteoarthritis Hip and Knee Service (OAHKS) was implemented at a large tertiary hospital in Australia and was designed to improve the management of patients with OA by effectively prioritising for joint replacement surgery. The service involved a multidisciplinary approach in which APPs screened patients for conservative or surgical intervention. Fifteen patients were interviewed to ascertain their experience and satisfaction with the OAHKS, and focus groups were undertaken with current clinicians which included eight orthopaedic surgeons, five rheumatologists and three physiotherapists. Results suggest high satisfaction with the OAHKS service which was attributed to education about their condition, and optimisation of non-operative pathways. There was a general consensus amongst clinicians that the service was valuable and was effective at minimising inappropriate surgical referrals and facilitating timely access to care. This study reports the implementation of this type of model has improved the care pathway, with both patients and providers being highly satisfied and improved the patient experience.

2.5.2 Time

Six primary studies and a conference paper utilised time as an outcome when evaluating hip and knee OA models of care in clinical practice (Aiken et al., 2009; Cavka et al., 2015; Farrar et al., 2014; Gibbs et al., 2020; Kapakoulakis & Collings, 2011).Time was analysed in several ways including time to initial consult (Aiken et al., 2009; Cavka et al., 2015; Doerr et al., 2012; Farrar et al., 2014; Gibbs et al., 2020; Kapakoulakis & Collings, 2011), time to achieving a working clinician diagnosis (Farrar et al., 2014), time to commencing non-surgical management (Gibbs et al., 2020) and time to undergo surgery (Aiken et al., 2009; Cavka et al., 2015; Doerr et al., 2012; Parfitt et al., 2012). This will now be discussed further.

Time to initial consultation

Five studies and one conference paper utilised time to initial consult as an objective outcome when evaluating the effectiveness of APP led hip and knee triage pathways (Aiken et al., 2009; Cavka et al., 2015; Farrar et al., 2014; Gibbs et al., 2020; Kapakoulakis & Collings, 2011). Two articles, (Gibbs et al., 2020; Kapakoulakis & Collings., 2011) both evaluated an OA hip and knee service in a community health setting in Australia, reporting decreased waiting times to initial assessment. Gibbs et al. (2020) compared data from 91 eligible patients (40 community based and 51 hospital based) over a nine month period and results found a significantly shorter wait time when seen in a community setting (community based 17 days; hospital based 155 days). A study by Kapakoulakis and Collings (2011) also report decreased waiting times to assessment but does not report specific time values. Due to the lack of detailed wait time reporting in this study caution needs to be taken in extrapolating these findings into practice.

Four studies evaluating physiotherapy led OA clinics in secondary care have also analysed time to first appointment as an outcome (Aiken et al., 2009; Cavka et al., 2015; Doerr et al., 2012; Farrar et al., 2014). A large retrospective review by Farrar et al. (2014) compared the referrals for APPs to the referrals for orthopaedic surgeons for hip and knee complaints over a five year period in the UK. Four hundred and thirty-two patients were analysed, and results show time to initial consult was on average four days longer in secondary care (p=0.05). However, since this model is not specific to OA the generalisability of findings are limited. Aiken et al. (2009), Cavka et al. (2015) and Doerr et al. (2012) all analysed wait times specifically in OA triage models of care and all found a reduction in waiting time to initial appointment. Aiken et al. (2009) report a reduction from 140 to 40 days, Cavka et al. (2015) reports 81 days compared to 105 days and Doerr et al. (2012) from 10 months to a maximum of three months wait time.

Time to achieving a working clinician diagnosis

As well as evaluating time to initial consult, Farrar et al. (2014) evaluated time to achieving a working diagnosis as an outcome to the clinical effectiveness of a hip and knee pathway. The pathway involved patients being assessed by either an APP or a consultant orthopaedic surgeon with the subgroup data being recorded. One thousand five hundred and eighty-eight referrals were made into the service in which 432 patients were for hip or knee complaints. Twenty-six per cent of patients in the APP pathway were diagnosed with hip or knee OA compared to 44% in the consultant pathway. Results indicated that time from the first consultation to working diagnosis was on average 11 days longer for the APP group (p<0.001). However, there was no evidence of randomisation or blinding of assessments in this retrospective review, which limits the ability to generalise these findings.

Time to commencing non-surgical management

One feasibility study by Gibbs et al. (2020) evaluated time to commencing non-surgical management as an outcome for a new OA care pathway in the community compared to a hospital setting. At both sites patients were assessed by APPs. Results state waiting times were significantly shorter in commencing non-surgical management when seen in a community setting as opposed to a hospital setting [community based 17 days (SD11); hospital based 155 days (SD22)].

Time to undergo surgery

Four studies also evaluated time to undergo surgery as an outcome to the success of their implemented hip and knee pathways (Aiken et al., 2009; Cavka et al., 2015; Doerr et al., 2012; Parfitt et al., 2012). A retrospective data review by Parfitt et al. (2012) examined the time to surgery in a pathway where APP listed directly for a THJR. A group of 40 patients were identified from referrals that had followed a conventional GP to consultant route and compared to those that followed direct listing for surgery. One hundred and thirty patients were directly listed by the APP for a THJR, in which 127 (98%) progressed onto have surgery. The mean waiting time for patients directly listed was 21.4 weeks, compared with 24.2 weeks in the conventional pathway group.

Aiken et al. (2009), Cavka et al. (2015) and Doerr et al. (2012) also reported a reduction in time from consultation to undergo surgery in APP led OA triage pathways. All three studies implemented similar pathways in which an APP screened patients prior to orthopaedic review. Aiken et al. (2009) report consultation to surgery waiting times decreased from a minimum wait of three months for the most urgent cases to a maximum wait of six months for all cases, including the least urgent. However, these results must be interpreted with caution. Once consented for surgery Cavka et al. (2015) reported patients waited a median of 141 days as opposed to 218 days ($p<0.01$) whereas Doerr et al. (2012)reported a reduction from 18months to 3 months.

2.5.3 Professional competency

Seven primary studies evaluating hip and/or knee models of care have explored the professional competency of APPs including their agreement in treatment recommendations (Aiken et al., 2008; Décary et al., 2017; Decary et al., 2016; Desmeules et al., 2013; MacKay et al., 2009), diagnostic concordance with orthopaedic surgeons and investigative accuracy (Ashmore et al., 2014; Décary et al., 2017; Decary et al., 2016; Desmeules et al., 2013; Jovic et al., 2019). Physiotherapy professional competency in OA triage models will now be explored.

Treatment recommendations

An early Canadian study by Aiken et al. (2008) has explored the correlation of pre-operative assessments done by an APP compared to an orthopaedic surgeon in 38 subjects with knee or hip OA. Additional to surgical need, the study also compared treatment recommendations between the two professionals. The study findings report that there was a 100% agreement on surgical versus non-surgical determination between APP and surgeon, with surgical prioritisation agreement in 64% of cases. Regarding treatment recommendations, the physiotherapist made more recommendations for conservative treatment than the surgeon, due to the physiotherapist referring for exercise even if the patient was listed for surgery. However the low subject numbers included in the study coupled with only two assessing clinicians results in a low generalisability of results. MacKay et al. (2009) also reported on agreement of treatment recommendations between APP and orthopaedic surgeon in triage models of care for patients referred with OA. A larger cohort of 62 patients were assessed independently by both physiotherapist and surgeon. In 91.8% (56/62) of cases they agreed on the recommendations of appropriateness to see a surgeon (kappa 0.69) and 85% (53/62) agreement on whether a patient was a candidate for joint replacement (kappa 0.70). Decary et al. (2016) found a substantial agreement in surgical triage recommendations in a cohort of 52 patients suffering from knee OA. The raw agreement proportion was 88.5% (46/52) and inter-rater agreement was substantial (PABAK:0.77; k=0.45; 95% CI0.11-0.80). The comprehensive reporting on agreement in this study improves the readers confidence in the findings.

Two further studies have reported on triage recommendations which include agreement in surgical or conservative management. When validating an APP model in an orthopaedic outpatient clinic, Desmeules et al. (2013) evaluated treatment concordance of APPs compared to surgeons. One hundred and twenty patients presented for initial consult for a hip or knee complaint and assessed by an APP or surgeon. The triage recommendations (surgical or conservative) raw agreement proportion was found to be 88% and inter-rater agreement was very high (K=0.77; 95% CI: 0.65-0.88). In terms of conservative recommendations, they found APPs gave significantly more education and prescribed more exercise, physiotherapy, anti-inflammatory medication and injections ($p<0.05$). Décary et al. (2017) also evaluated surgical triage concordance between a physiotherapist and expert physician in 179 participants for any knee complaint. Findings report inter-rater agreement for triage recommendations of surgical candidates was good (k+0.73; 95% CI:0.60-0.86).

Diagnostic concordance

Five studies evaluated the concordance between APPs and surgeons or physicians in their diagnosis within an APP model of care. Two studies included a cohort of chronic hip or knee pain (Desmeules et al., 2013; Jovic et al., 2019) two included only knee complaints (Ashmore et al., 2014; Décary et al., 2017) and one specifically for knee OA (Decary et al., 2016). Décary et al. (2017) reported on 179 knee complaints with the primary diagnoses including anterior cruciate injury (n=8), meniscal injury (n=36), patellofemoral pain (n=45) and osteoarthritis (n=79). Diagnostic inter-rater agreement between the APP and the physician was high (k=0.89; 95% CI: 0.60-0.94). Ashmore et al. (2014) audited 140 patients with knee pain with the primary diagnoses including OA (n=55), meniscal injury (n=32), anterior cruciate ligament (ACL) injury (n=14) and biomechanical (n=16). Results report APP clinical diagnostic accuracy was ‘substantial’ (percentage agreement = 88%; k=0.795; 95% CI: 0.58-1.00). Desmeules et al. (2013) analysed a sample of 120 patients with hip or knee complaints with the primary diagnoses including OA, ACL rupture, meniscal injury, and patellofemoral pain. The APP assessing the patients had 30 years clinical experience. The overall proportion of agreement for the primary diagnosis was 88%. When the secondary diagnosis was considered, proportion of agreement increased to 93%. Primary diagnostic inter-rater agreement was very high (k=0.86; 95% CI: 0.80-0.93). However, the inclusion of all knee or hip complaints into these study samples reduces the ability to apply these findings to OA models of care.

Two studies evaluated diagnostic concordance specifically in OA triage models of care. Jovic et al. (2019) assessed 87 patients from the orthopaedic hip and knee waiting list, with 90% of these being diagnosed with OA. The APP had eight years clinical experience with post-graduate training. The diagnostic agreement between the APP and the orthopaedic surgeon was almost perfect (weighted kappa 0.93; 95% CI: 0.87-1.00). Decary et al. (2016) also evaluated diagnostic agreement in a cohort of 90 patients suffering from knee OA. The raw agreement proportion for the primary clinical diagnosis of knee OA was 95.6% (86/90) and inter-rater agreement was perfect (PABAK: 0.91; k=0.91; 95% CI: 0.81-1.00). These results show high diagnostic agreement, supporting the integration of an APP in the diagnostic process and management of patients with OA in an orthopaedic triage model of care.

2.5.4 Satisfaction

Seven studies have utilised satisfaction as an outcome alongside other variables when evaluating hip and knee OA triage models (Abbott et al., 2019; Aiken et al., 2008; Aiken et al., 2009; Desmeules et al., 2013; Doerr et al., 2012; Gibbs et al., 2020; Kapakoulakis & Collings, 2011). This includes patient satisfaction (Abbott et al., 2019; Aiken et al., 2008; Aiken et al., 2009; Desmeules et al., 2013; Doerr et al., 2012; Gibbs et al., 2020; Kapakoulakis & Collings, 2011), GP satisfaction (Abbott et al., 2019; Gibbs et al., 2020) and staff satisfaction (Abbott et al., 2019; Gibbs et al., 2020). Five studies utilised quantitative satisfaction questionnaires with only two studies evaluating satisfaction by qualitative means (Abbott et al., 2019; Gibbs et al., 2020). This shall now be explored in depth.

Patient satisfaction

All studies included in this review that evaluated satisfaction included the patients' perspective. Five studies evaluated patient satisfaction using quantitative surveys alone (Aiken et al., 2008; Aiken et al., 2009; Desmeules et al., 2013; Doerr et al., 2012; Kapakoulakis & Collings, 2011) and a further two studies evaluated satisfaction using mixed methods such as surveys and interviews (Abbott et al., 2019) or open-ended survey questions (Gibbs et al., 2020).

Two studies in which APPs and surgeons determined whether a patient was a surgical candidate for a hip or knee replacement asked patients to complete a survey following their appointment (Aiken et al., 2008; Desmeules et al., 2013). Aiken et al. (2008) surveyed 38 participants following their appointment pertaining to their satisfaction of seeing both the surgeon and the physiotherapist. Results state that in all cases patients were satisfied with both the physiotherapist and surgeons' assessments, receiving valuable information during their visit. However low participant numbers reduce its quality. A similar study by Desmeules et al. (2013) surveyed a larger sample of 120 patients following their appointments, using a modified version of the 9-item Visit-

Specific Satisfaction Questionnaire (VSQ-9). Results from the survey state that patient satisfaction was higher for APP assessment (93.2%, SD 13.5) than orthopaedic assessment (86.1%, SD 23.3)($p<0.001$). These results suggest that patients are as satisfied if not more satisfied seeing a physiotherapist than an orthopaedic surgeon regarding their hip or knee OA in an orthopaedic outpatient department.

Further studies that have evaluated patient satisfaction in APP models have also reported high satisfaction rates. A study by Aiken et al. (2009) in which an APP independently assessed and triaged OA patients onto a surgeon waiting list, surveyed patients following their appointment. Eighty-six subjects (80%) returned their survey in which satisfaction was high or very high with all measures. Patients found their APP appointment helpful and informative and were happy with the very expeditious time in which they were seen. A further study by Abbott et al. (2019) in which 66 patients were sent a satisfaction survey after being seen for one follow up report patients were very satisfied with knowledge of the joint clinic staff (98%), with most patients satisfied or very satisfied to see a physiotherapist rather than an orthopaedic surgeon (70%). Doerr et al. (2012) and Kapakoulakis and Collings (2011) also report high levels of patient satisfaction with OA triage models of care delivered independently by APPs. Kapakoulakis and Collings (2011) sent out a satisfaction survey to 528 patients who were seen through the service with responses from 254 (48%). Doerr et al. (2012) report high levels of satisfaction in timeliness of access but fail to report on number of responses.

A mixed methods study exploring feasibility of a community-based triage model for OA undertook satisfaction surveys to evaluate the acceptability of the service to patients. They utilised open ended questions as well as a Likert scale to better understand both positive and negative aspects to their care (Gibbs et al., 2020). Sixty-four (91%) of eligible patients responded to the survey with at least 90% being satisfied or highly satisfied at both settings. Comments on the surveys were provided by 48-63% of patients with mostly positive comments for both hospital and community sites. The common themes in the data regarding patient acceptability include information regarding their OA, therapist time and communication and waiting time/process. Patients felt comfortable with the therapist, felt they listened and provided relevant information including understanding their condition, managing their pain and how to do the right exercise. They also commented on the overall experience stating they were very happy, short wait time and was a positive experience. Some suggestions from patients regarding improvement of the service included reducing waiting time for intervention (surgical or conservative), information about parking and improve GP awareness. This mixed methods study is valuable as combining the quantitative and qualitative data provides a more complete understanding of patient satisfaction with this model of care. Further studies should consider this method when evaluating similar models.

GP satisfaction

Two primary studies have evaluated the satisfaction of GPs in services where APPs triage patients to surgical or non-surgical pathways (Abbott et al., 2019; Gibbs et al., 2020). Abbott et al. (2019) completed a longitudinal programme evaluation following the implementation of a 'Joint Clinic' to resolve unmet need for orthopaedic services in patients with hip and knee OA. The use of an end-to-end programme evaluation with an evidenced based framework in this study gives the reader confidence in the relevance and quality of the results. As this study was also conducted in New Zealand, its outcomes are considerably useful to this review. The study design included pre and post implementation interviews and surveys of GPs, staff, and patients. Pre-implementation surveys were sent to 111 GPs with 81 respondents, for a 73% response rate. The survey found that around 90% of GPs were 'very unsatisfied' or 'unsatisfied' with the access to FSA, with 30-35% expressing dissatisfaction with the overall management. Post 'Joint Clinic' implementation surveys were sent to 111 GPs with 58 respondents, for a response rate of 52%. The majority of GPs remained unsatisfied with access to FSA but 60% of GPs reported being 'satisfied' or very satisfied' with access to the joint clinic, and the quality and timeliness of feedback from the appointment. Although satisfaction rate increased, there was a lower response rate to the survey and some concern from GPs that the 'Joint Clinic' added further delay for those that need a joint replacement and would be a more appropriate service earlier in the disease process. Alongside GP surveys, interim and final implementation interviews of GPs and staff were also conducted. Although 16 participants were interviewed in the interim interviews which provides data richness, there was only one

GP which limits the readers confidence in their interim findings. In the final implementation interviews, seven GPs were invited for interview with only one accepting. The included GP commented on the gratitude of his patients being seen in the service, seeing an improvement in function and assistance to manage a long-term problem. The lack of GP input for the interview data suggests results must be interpreted with caution. Further research would be required to determine the satisfaction of GPs to APP led triage services in a New Zealand context.

A further study by Gibbs et al. (2020) who undertook a feasibility study of a community based OAHKS also evaluated the satisfaction of GPs via a survey. Only 21 GPs returned the survey, with a low response rate of 27% (21/79). Ten responses related to the community-based service and 11 responses related to the hospital-based service. Results suggest overall satisfaction was high with 100% at community based and 82% at hospital based OAHKS with no difference ($p>0.05$) in acceptability of the services.

Staff satisfaction

As well as evaluating GP satisfaction, the same two primary studies evaluated staff satisfaction of the APP triage model which included orthopaedic surgeons, practice nurses, allied health clinicians and administration staff (Abbott et al., 2019; Gibbs et al., 2020). Abbott et al. (2019) describe surveying of staff but fail to report who the surveys were sent to and their results. They also report interim and post implementation interviews of staff. Interim interviews comprised of six orthopaedic department or joint clinic clinicians, one allied health clinician, seven hospital administrative or managerial staff and one Māori liaison. Overall, the data from these interviews indicated it was well accepted by key stakeholders and staff. Six themes resulted from the data including: care co-ordination, appropriate care provision, the joint clinic model, promotion of the service, staffing, and the Hauora Māori (the health and wellbeing of Māori). Final implementation interviews comprised of six DHB staff. The main impacts were generally positive. Six themes resulted from the final implementation data including: clinic impacts, clinic value, knowledge and understanding of the clinic, communication, and the future of the clinic. The data indicated that the APP led clinic was perceived to bridge the gap between primary and secondary care for patients with OA and was welcomed by staff. The DHB staff generally agreed that the joint clinic was assisting in meeting the unmet need with support from the wider multi-disciplinary team and was a cost-effective use of resources. Staff commented on the trust and respect between the staff members in the pathway and that once the process was explained to them, patients found the service very beneficial to their care trajectory. One weakness of the clinic from staff was the lack of clarity and understanding about the service and its visibility needs to increase moving forwards. This included making the service clear about its intentions in the primary care space.

Gibbs et al. (2020) also evaluated orthopaedic surgeon satisfaction using a single item 5-point Likert scale survey with two open ended questions. Out of 7 surgeons, 6 responded (86%) and comprised of four orthopaedic consultants and two registrars. Overall satisfaction was high, with 100% satisfaction at the community-based triage service and 82% as hospital-based triage services, with no difference in acceptability ($p>0.05$). Orthopaedics were generally happy with the overall comprehensiveness of the assessment however there was some constructive feedback about care management from orthopaedic surgeons including need for earlier referral and further radiological investigation.

2.5.5 Resource utilisation

Evaluation of resource utilisation in APP models of care are encompassed within two main categories in the literature including clinical effectiveness (Ashmore et al., 2014; Desmeules et al., 2013; Doerr et al., 2012; Farrar et al., 2014; Gibbs et al., 2020; Gwynne-Jones et al., 2018; Ho et al., 2019; Jovic et al., 2019; Kapakoulakis & Collings, 2011; O'Farrell et al., 2014) and cost effectiveness (Abbott et al., 2019; Ho-Henriksson et al., 2022; Parfitt et al., 2012). Clinical effectiveness has been evaluated in a variety of ways including radiological requests, quality of life, conversion rate to surgery and orthopaedic efficiency. Results on resource utilisation shall now be critically discussed.

Radiological requests

Farrar et al. (2014) and Desmeules et al. (2013) have evaluated the number of imaging requests as outcomes in similar models where APPs triage hip and knee pain. A retrospective review of 432 patients over a five year period by Farrar et al. (2014) found overall the use of cross-sectional imaging was greater by APPs than by orthopaedic surgeons (p=0.04). However, since this was not an OA specific pathway, it included detailed imaging request such as magnetic resonance imaging (MRI) and computerised tomography (CT) scan to formulate diagnosis, not routinely used in OA management. A study by Desmeules et al. (2013) assessed 120 patients specifically with hip or knee OA in a Canadian orthopaedic department. They evaluated the agreement between APP and orthopaedic surgeon regarding triage, diagnosis, treatment recommendations, and imaging and found no differences between surgeons and APPs with respect to imaging tests ordered ($p \geq 0.05$).

Quality of life

Health related Quality of Life (HrQoL) has become increasingly important in healthcare practice and health related research (de Wit & Hajos, 2013). Although there is no universally accepted definition, it is a multidimensional concept which relates to an individual's or a group's perceived mental and physical health over time (Centers for Disease Control Prevention, 2001). It can include both subjective and objective perspectives and is considered a valid indicator of intervention outcomes (de Wit & Hajos, 2013). A well conducted randomised controlled pragmatic trial by Ho-Henriksson et al. (2022) evaluated quality of life measures in a model where a physiotherapist acted as a primary assessor for suspected knee OA. Sixty-nine patients were randomised to either physiotherapist or GP assessment and HrQoL was used as the generic measure for health improvement. HrQoL was measured at baseline, 3, 6 and 12 month follow up using a Swedish version of the EQ-5D-3L. Following statistical analysis, both groups improved their health-related quality of life one year after assessment when compared to baseline and there was no statistical significance in quality adjusted life years (QALY) between groups. However, patients were not blinded to who they were seeing which needs to be considered when interpreting results.

Conversion to surgery

Four studies have reported on conversion rate to surgery when evaluating clinical effectiveness of APP models of care (Ashmore et al., 2014; Gwynne-Jones et al., 2018; Jovic et al., 2019; O'Farrell et al., 2014). Two studies were specific to hip and knee OA (Gwynne-Jones et al., 2018; Jovic et al., 2019), one to knee pain (Ashmore et al., 2014) and the other to all body sites which included knee and hip (O'Farrell et al., 2014). A prospective audit on triage of knee pain by an APP reported on conversion to surgery of the patients referred for orthopaedic consultation (Ashmore et al., 2014). One hundred and forty patients were assessed in the knee screening clinic, in which 57 patients (40.7%) were referred to the surgeon. Seven of these patients were lost to follow up, leaving a valid sample of 50 patients. Of these, 42 patients underwent surgery, giving a conversion rate of 84%. A larger retrospective service evaluation by O'Farrell et al. (2014) assessed 714 patients, in which 110 were referred onto see a surgeon. From the valid sample, 80 patients required orthopaedic intervention, giving a conversion rate of 73%. The most common surgical interventions were arthroplasty (22%) and arthroscopy (16%). However, both studies had a low sample of patient with OA (39.3% and 18% respectively) and limits the application of findings.

Two studies evaluating conversion rate to surgery in knee and hip OA models of care have also reported high conversion rates. Gwynne-Jones et al. (2018) assessed 358 patients over a two-year period in a joint clinic in which 143 were referred for FSA. Of these, 115 underwent or were awaiting surgery, 18 were recommended surgery but scored below prioritisation threshold and 10 were not recommended surgery. This suggests that using APPs was an effective triage pathway with 93% of those referred for FSA being recommended surgery. Jovic et al. (2019) assessed 87 patients with chronic hip and knee pain. The surgical conversion rate was calculated for both the current orthopaedic model of care and the APP model of care. In the current model, conversion rate to surgery was 38% and in an APP model, 78% could be expected. This suggests over 50% of patients presenting with hip or knee pain at time of assessment in the current model were not appropriate for surgery. Under an APP model of care, the surgical conversion rate doubled suggesting it has the potential to support high quality orthopaedic care.

Orthopaedic efficiency

Orthopaedic efficiency has been reported on it the literature as a way of evaluating OA triage pathways. A study by Abbott et al. (2019) aiming to resolve unmet need for orthopaedic services reported on service level outcomes over a two year period. Three hundred and fifty-eight new patients and 279 follow ups were seen at the clinic, with the proportion of GP referrals returned without offer of consultation reduced by 90%.

The implementation of the joint clinic resulted in an overall 5.7% increase in capacity of the orthopaedic department to provide FSAs compared to the year prior. Doerr et al. (2012) also reported on surgical capacity showing improved service operation and efficiency with the new pathway. They found an increased throughput of arthroplasty surgery from 396 procedures in 2005-2006 to 548 procedures in 2009-2010. They attributed this to improvements in triage systems, dedicated arthroplasty clinic, additional physiotherapy screening clinics and conversion of half day to full day operating theatre lists. A study by Kapakoulakis and Collings (2011) also report an APP led triage clinic can improve orthopaedic efficiency by allowing surgeons to only see patients that are ready for and need surgery. However, since no quantitative data was presented, it is difficult to interpret these results with confidence.

Cost effectiveness

Three primary studies have evaluated cost in the effectiveness of APP pathways (Abbott et al., 2019; Ho-Henriksson et al., 2022; Parfitt et al., 2012). A pragmatic trail by Ho-Henriksson et al. (2022) randomised patients with suspected OA to be assessed by a physiotherapist or physician in primary care. Sixty-nine patients were assessed, and a cost effectiveness analysis conducted. Cost effectiveness was evaluated from a societal and health care perspective one year after first assessment. Total average costs from a health care perspective were 515 euro/patient for physiotherapist and 748 euro/patient for physician. Although differences were not statistically significant, there were significantly higher costs in letter writing, visits, radiography, and telephone costs in the physician group. Due to the difference in health models and data collected in a Swedish healthcare system, results are not applicable to the New Zealand primary care system. Abbott et al. (2019) included cost effectiveness in their longitudinal programme evaluation of a joint clinic. The net marginal unit cost for all joint clinic service and physiotherapy was assessed and compared. Results show a reduction in net marginal unit cost for all joint clinic services and physiotherapy treatments from 550 New Zealand dollars (NZD) per patient in year one to 384 NZD per patient in the second year. They attributed this to greater efficiency of clinician time over the two-year period.

Only one study described cost savings in a model where APPs list directly for THJR rather than being seen by orthopaedic surgeon (Parfitt et al., 2012). The retrospective review of 130 referrals over a two-year period found an approximate saving of £145 to the primary care trust per directly listed patient. This was a salary cost difference attributed to the patient not requiring an orthopaedic outpatient appointment before being listed for surgery and a reduction in inconvenience and travel costs for the patient.

2.5.6 Patient flow

Current research has reported on the ability of APPs to independently manage patients referred into an orthopaedic pathway without them ever requiring seeing an orthopaedic surgeon showing an improvement in patient flow. A retrospective study set in the UK by Parfitt et al. (2012) compared waiting times between APP led hip replacement service and traditional GP to surgeon route for direct surgical listing. One hundred and thirty patients with hip OA were assessed, of which 127 (98%) were successfully listed for surgery by an APP. An APP directly listing for surgery has shown a reduction in inconvenience to the patient and reduced travel costs by only requiring a hospital orthopaedic appointment at their pre-operative assessment shortly before surgery. Patient level outcomes reported by Gwynne-Jones et al. (2018) have reported that 60% of patients with hip or knee OA referred into a joint clinic were managed non-operatively by an APP, with a significant improvement (18% improvement on baseline Oxford score, p=0.0013 for change by paired, 2 tailed t-test) noted from that group. Ashmore et al. (2014) have reported of 140 knee pain patients referred to orthopaedics, an APP independently managed 59.3% with the remaining 40.7% referred on for orthopaedic surgical consultation. In a similar musculoskeletal assessment pathway by O'Farrell et al. (2014) in which 714 patients were referred, the majority of patients who attended (76%) were independently managed by APPs without the need for orthopaedic consultation. These suggest utilising an APP pathway can reduce to need for onward referral to an orthopaedic surgeon and improve the patient flow through the system.

2.6 Discussion

There are several OA models of care described and evaluated in the literature. Although the pathways are not linear, the available evidence suggests the integration of appropriate healthcare professionals such as APPs assist with streamlining of care. There is very limited evidence of patient experience to inform hip and knee models of care. This review has identified only three primary studies that explored patient and stakeholder experience of hip and knee models of care delivered by APPs. These studies reported high levels of patient satisfaction, good educational opportunities, and less chance of needing surgery. There was a shortage of qualitative studies within the literature showing a gap in knowledge based on human experience including a lack of understanding as to the impact of these pathways on experience, actions, and behaviour. A qualitative study by Gillis et al. (2014) is therefore significant as it adds the patients’ perspectives to an APP model of care and informs future research on rural programme delivery and ongoing programme evaluations. This lack of research utilising qualitative methodologies highlights the need for further studies in this area to determine the impact of these models of care specifically to the service user.

There are several ways in which time was evaluated as an outcome in hip and knee OA triage models of care. This includes time to initial consult, time to achieving a working clinical diagnosis, time to commencing non-surgical management and time to undergo surgery (Aiken et al., 2009; Cavka et al., 2015; Farrar et al., 2014; Gibbs et al., 2020; Kapakoulakis & Collings, 2011). All six studies that evaluated time as an outcome in APP pathways reported positive benefits in all domains. This suggest that APP delivered triage pathways for hip and knee OA can be more efficient than standard care, especially in their ability to reduce time to initial consult and wait time to undergo surgery. However due to the patient population, and a low percentage of patients being diagnosed with OA in the study by Farrar et al. (2014) these results cannot be generalised to a specific OA model of care. In a further study by Gibbs et al. (2020) that evaluated time to assessment, the authors showed a reduction in waiting time in a community OA model of care compared to a hospital based model of care. This suggests there are potential benefits to having OA assessment and triage models in a community setting compared to being placed within the orthopaedic department of an acute hospital.

There was a significant focus in the literature on professional competency of APPs as an outcome to the effectiveness of the pathway. Results have suggested that there is a high diagnostic agreement between APPs and surgeons when assessing hip or knee complaints (Ashmore et al., 2014; Décary et al., 2017; Decary et al., 2016; Desmeules et al., 2013; Jovic et al., 2019). Although literature supports diagnostic concordance between doctors and APPs, there is a significant variation in the years of clinical experience of the APP between models. The lack of clarification in the literature regarding what is considered as a novice, or an expert practitioner may have influence on other evaluative outcomes and therefore the years of clinical experience must be considered when interpreting results. An evaluation study of an APP directly listing for surgery has reported that APPs based in primary care can effectively list for THJR, with a mean reduction in waiting time to surgery (Parfitt et al., 2012). No other studies have evaluated the role of an APP in listing for total joint replacement and is an area of ongoing interest. However, it is critical to note that the benefits of APPs in reducing surgical wait time are only optimised if additional surgical resources are provided which allows the surgeon to shift from clinic into the operating theatre (Gwynne-Jones & Iosua, 2016). If additional resources are provided, these studies suggest an APP can have a positive impact in reducing the waiting times for patients waiting for total joint replacement.

Due to the variation between pathways when evaluating models of care for hip and/or knee OA, quality of life indicators are not deemed useful outcomes as the patients are often only seen for one appointment. It has been suggested that reviewing diagnostic agreement is a more appropriate way to measure the impact of a pathway and highlights the significance of these studies (Griffiths, 2012). Our findings show a high concordance in treatment recommendations between orthopaedic surgeons and APPs (Aiken et al., 2008; Décary et al., 2017; Decary et al., 2016; Desmeules et al., 2013; MacKay et al., 2009). This suggests patients with hip or knee pain referred for consideration of a joint replacement can be referred for appropriate treatment by a physiotherapist working in an extended role. However, for further validation, future studies should consider replication of data for only OA patient to make their results more robust (Décary et al., 2017; Desmeules et al., 2013).

Patient satisfaction with the care they receive can influence and improve compliance, maintain patient-provider relationships, communication, and treatment outcomes (Aharony & Strasser, 1993; Carr-Hill, 1992). Patient, GP, and staff satisfaction has been shown as an integral component in evaluating new models of care in which APPs triage patients with OA onto surgical and non-surgical pathways (Abbott et al., 2019). Studies that have evaluated satisfaction have agreed in general that patients and staff are highly satisfied with the care provided by APPs within these models (Abbott et al., 2019; Aiken et al., 2008; Aiken et al., 2009; Desmeules et al., 2013; Doerr et al., 2012; Gibbs et al., 2020; Kapakoulakis & Collings, 2011). GPs referring patients into APP models were less satisfied and preferred existing pathways of referring straight to an orthopaedic surgeon (Abbott et al., 2019). However, the lack of GP input for the interview data suggests results must be interpreted with care. Further research would be required to determine the satisfaction of GPs to APP led triage services in a New Zealand context. The mixed methods study by Gibbs et al. (2020) that explored patient satisfaction is pertinent to this review as combining the quantitative and qualitative data provides a more complete understanding of patient's satisfaction with this model of care. Mixed method evaluations of satisfaction are integral in allowing a more comprehensive assessment and should be considered as a method of choice in future studies.

Evaluation of resource utilisation has shown APP models of care are clinically effective (Ashmore et al., 2014; Desmeules et al., 2013; Doerr et al., 2012; Farrar et al., 2014; Gibbs et al., 2020; Gwynne-Jones et al., 2018; Ho et al., 2019; Jovic et al., 2019; Kapakoulakis & Collings, 2011; O'Farrell et al., 2014) and cost effective (Abbott et al., 2019; Ho-Henriksson et al., 2022; Parfitt et al., 2012). Literature has suggested that these models can improve orthopaedic efficiency, increased conversion rate to surgery and improve cost effectiveness without compromising patient outcomes. Although Kapakoulakis and Collings (2011) report an APP led triage clinic can improve orthopaedic efficiency by allowing surgeons to only see patients that are ready for and need surgery, no quantitative data is reported and makes critical evaluation of results difficult. Literature has suggested that health consequences utilising a physiotherapist as an initial assessor for knee OA seems to be comparable to that of a physician which has significant implications in redesigning care models (Ho-Henriksson et al., 2022).

Further literature should continue to evaluate clinical and cost effectiveness specifically for OA models of care to further support their use in clinical practice.

Results suggest a large proportion of patients being referred for a first orthopaedic consultation can be managed independently by an APP without need for orthopaedic input. This is likely to lead to reduced waiting times to access these services and to improve patient flow through an already pressured health system.

2.7 Strengths and limitations of the review

It is identified that this review has strengths and limitations. The analysis of strengths and limitations to each primary study is demonstrated in Table 1 and identifies the level of critique in this review. The main strengths and limitations of this review will now be discussed.

2.7.1 Strengths

This narrative review aimed to understand the evidence for the evaluation and effectiveness of current models of care for adults with hip or knee OA accessing specialist opinion. Using a narrative review allowed for inclusion of both quantitative and qualitative studies from a broad range of data sources, allowing the researcher flexibility in selection of literature from a specific evaluative standpoint (Greenhalgh et al., 2018). The efficacy of narrative reviews is unique in tracking the development of a clinical concept and allows a wider exploration of the research. Although it lacks explicit structure, it has allowed description and discussion on the research topic from a theoretical and contextual viewpoint. A significant amount of literature has already been conducted including a systematic review of systematic reviews on the effectiveness of APP pathways (Vedanayagam et al., 2021). Therefore, undertaking another systematic review would have added little knowledge to this topic and reduced the focus of this research.

2.7.2 Weaknesses

Although there are strengths to the use of a narrative review, the choice of review may be perceived as a limitation due to its inability to make consistent assessment of the study's methodological quality. There is significant variation and lack of homogeneity in the study designs in this review with most of the literature being conducted in high income countries, limiting the generalisability of the findings to countries where medical care is more costly (Button et al., 2019). There is also variation and complexity within the pathways described in the literature including referral prioritisation, fast tracking systems, differing models of care and variation in years of clinical experience making data synthesis difficult. The review has highlighted the lack of literature available using qualitative methods and reduces the ability to provide detail regarding patient experience and behaviour which is essential in designing services that will be appropriate for the user.

Only a limited number of studies were eligible to be included in this review as most studies did not disaggregate their findings to report OA specific data. Due to the structure of the New Zealand health system and the majority of acute hip and knee injuries being seen through the private sector, more OA specific data is therefore required to determine the impact of these models to this specific cohort of patients and the New Zealand public health system.

2.8 Conclusion

Overall, research on OA specific APP models of care have been shown to improve patient experience, reduce waiting time to accessing appropriate care, have high diagnostic concordance with orthopaedic surgeons, improve patient satisfaction, resource utilisation and patient flow. However, there has been very little research evaluating APP models of care in a New Zealand context with respect to OA hip and knee especially when considering the patient experience using qualitative methods. Due to the continued pressure on the New Zealand public health system, further research is required to evaluate whether these models of care have an impact on patients and stakeholders in this health environment.

Chapter 3 Research Methods

3.1 Introduction

This chapter describes the methodology of the study and the methods for the collection of the quantitative data in part one and the qualitative data in part two as part of the mixed methods design. Firstly, an insight into hierarchies of evidence in evaluating healthcare is presented followed by the rationale for a pragmatic evaluation methodology within this mixed methods study. Following this, a detailed description of the research methods will be presented including the research aim, design, recruitment process, data collection and data analysis. Finally, ethical considerations will be presented.

3.2 Hierarchies of evidence

Hierarchies of evidence have been developed as an approach to grading scientific research (Burns, Rohrich, & Chung, 2011). First popularised in 1979 by the Canadian task force on the Periodic Health Examination, a hierarchy was produced to help decide on research priorities when looking for studies to answer clinical questions (Petticrew & Roberts, 2003). Historically focusing on effectiveness, scientific research in the biomedical western world in disciplines such as physiotherapy, has predominately been situated in a quantitative paradigm (Phillips & Burbules, 2000). For this reason, randomised controlled trials (RCT) have often been regarded as the gold standard, providing the most reliable evidence in this paradigm. Over the past few decades there have been considerable challenges raised as to the status of science as a knowledge producing paradigm and the role of RCTs alone in the evaluation of healthcare. It is not within the scope of this research to discuss this in detail, but an overview of the shift in hierarchies of evidence regarding evaluating healthcare interventions will now be discussed.

The hierarchy of evidence is an ongoing contentious topic when it comes to evaluating public health and health promotion. Research suggests that a weakness of current hierarchies of evidence for evaluating healthcare delivery is that they solely focus on effectiveness (Burns et al., 2011). Although this is important when considering formal evaluations, evidence focused on effectiveness including appropriateness and feasibility provide a much more comprehensive base for healthcare evaluation (Evans, 2003). Evidence considering appropriateness should attain the psychological aspects of the intervention including whether it would be approved by the consumer, its acceptability and the impact on a person receiving it (Evans, 2003). An interventions feasibility incorporates much broader issues related to implementation including cost, practice change and explores the impact an intervention could potentially have to a provider or organisation (Evans, 2003). Considering effectiveness, appropriateness and feasibility together acknowledges the complexities that impact on the success of a healthcare intervention.

Conducting research in the real world requires an appreciation of other types of health knowledge such as qualitative data in evaluating public health interventions. Research suggests there should be a greater emphasis on the appropriateness of the methodological aptness rather than the individual study design (Petticrew & Roberts, 2003). Therefore, rather than having a singular hierarchical order, the hierarchy will depend on the specific question that is being asked. This is because different types of research questions are best answered with different types of methodologies and methods. When evaluating healthcare interventions, both information on process and outcomes are of value. Knowing an intervention works does not guarantee that it will be used. As this study was an evaluation of a service in real time, it was important to consider the broad types of studies suitable to answering this research question and not be influenced by designing a study according to its evidential weight.

3.3 Finding methodological fit within the research question

Knowledge is a multifaceted and complex concept. According to the dictionary, knowledge can be defined as ‘facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject’ (Oxford University Press, 2019). Ways of knowing can be described as tools for which knowledge is gathered and ways of knowing will be employed differently in different areas of knowledge (Leavy, 2017). Peoples ideas can be formed based on different ways of knowing such as reason, imagination, emotion, sense perception, faith, memory, intuition and language (Stange, 2010). In everyday life, there are many ways that knowledge is gathered. Ideas about the world can develop based on sensory experiences, cultural beliefs and from authority or expert sources (Leavy, 2017). Although daily life experiences are important in acquiring knowledge, there are considerable limitations to these sources; knowledge and beliefs are not the same. Each way of knowing has its strengths and weaknesses and it is important to appreciate that knowledge can be formed from how these ways of knowing interact rather than looking at them in isolation.

Social research is a method which has been developed to help learn about people and the social world in which we live (Punch, 2013). It has been developed as a way of helping researchers avoid and expose the weaknesses of the other ways of knowing (Leavy, 2017). This includes reducing bias and pre-conceived prejudice from the research topic. The purpose of social research is to either explore, describe, explain, change or evaluate a particular topic which is of particular interest to a person (Leavy, 2017). Although research may have one specific purpose, it may also fall into more than one of these categories. Understanding the purpose of research can result in many different types of methodologies.

The impact of APP led orthopaedic services has been well documented in the literature. Within the New Zealand context, there are only a few recent studies which have explored this, with none of these studies exploring the impact of these services being delivered in a community setting. Gaining insights from this group requires a methodology which centres the participant’s experience and recognises how these are shaped by social factors. This research aims to explore the impact of the COTS to patients and stakeholders and as a result to determine future recommendations for these services. With this in mind, the researcher acknowledges that there were several different methodologies in which the research question could be answered including action research theory (McNiff, 2013), case study design (Yin, 2014) and evaluation methodology (Powell, 2006). These considered methodologies will now be explored before arriving at the chosen research methodology that was used in this study.

Action research is commonly used in healthcare for improving conditions and practices (McNiff, 2013). It was first categorised action research in 1944 by Professor Kurt Lewin, a social psychologist (Adelman, 1993). He describes the process of action research as "a spiral of steps, each of which is composed of a circle of planning, action and fact-finding about the result of the action" (Reason & Bradbury, 2001). Action research is contextual and involves conducting systematic inquiry to improve practice (Koshy, Koshy, & Waterman, 2010). It is a broad term for a family of methods in conducting research with a practical rather than theoretical motive and therefore It often involves the researcher being actively involved in changing change processes. It also requires considerable reflection throughout the change process to achieve practical outcomes. It therefore produces knowledge useful in everyday life as well as finding new ways of understanding. Action research places the researcher inside of the research, rather than an observer from the outside. The methodology of action research provides a step-by-step process of understanding the behaviour of participants, in this case patients and stakeholders using the COTS.

Case study research (Yin, 2014) was considered as a methodological design due to its ability to generate a multi-faceted real life understanding of often complex issues using multiple sources of evidence. This often means that the research is being carried out within the actual context where the phenomena being studied are occurring. Case study design has been established in a variety of disciplines, particularly social sciences and can help to understand casual links from a new policy initiative or service development such as in this study. It lends itself to answering the ‘who’, ‘what’ and ‘why’ questions, obtaining a more naturalistic understanding of real-world issues. Case study design has been implemented by Doerr et al. (2012) and Gillis et al. (2014) in the implementation of management pathways for patients with OA of the hip and/or knee OA.

Evaluation research is a specific methodology which can be used as an assessment process unique to the evaluation of a social programme (Powell, 2006). The purpose of an evaluation can be broadly categorised into three groups: formative evaluation, process evaluation and outcome evaluation (Dickinson, Adams, Asiasiga, & Borell, 2015). Outcome evaluation is a specific activity looking at the short, intermediate, or long-term outcomes of a programme and how successful it has been at achieving its outcome. Short and intermediate term outcome evaluations can be useful in informing immediate effects of a programme including an individual’s perception of a programme, changes in the environment affected by the programme and changes in knowledge and behaviour (Dickinson et al., 2015). Programme evaluation can be practically conducted by health professionals to determine the impact and quality of the initiatives that they are delivering and 'whether they are having the desired outcomes for individuals and communities' (Adams & Neville, 2020). Evaluation methodologies have been utilised effectively by Abbott et al. (2019) and Cavka et al. (2015) in evaluating comprehensive hip and knee OA services.

Each methodological approach offers effective tools to examine the research question, with each having strengths and weaknesses in relation to this study. These have been summarised in Table 2. Having explored methodological options and previous research, an evaluation methodology has been used to answer this research question. This is in line with previous well conducted literature that have conducted evaluations on OA models of care (Abbott et al., 2019; Cavka et al., 2015).

Table 2

Table showing advantages and disadvantages of considered methodologies.

Methodology considered	Advantages to this research study	Disadvantages to this research study
Action research theory	- Positions research within the research allowing them to work on any problems. - The conclusions may be useful in other organisations. - Allows for continual change cycles. - Useful for small scale, in-depth research.	- Time consuming and requires intensive investment. - Unable to detach researcher from research approach.
Case study design	- Useful for examining real world processes and their results - Relevant to all participants. - Utilises a variety of different data collection methods.	- Research subjectivity – especially in multi Professional groups. - Difficult to replicate. - Requires onsite observations which may be difficult in a community based project.
Evaluation methodology	- Can provide direction and advise of strategic decisions. - Utilises a variety of different data collection methods. - Useful as a formal approach to determining the worth, merit or value of something using methodological tools	- Can be confusing between terms of evaluation, research, monitoring and audit. - Sometimes criticised for being an assessment.

3.4 Evaluation methodology

In order for health professionals to conduct effective evaluations, knowledge, understanding, skills and confidence around programme understanding must be sought. Using a clear practical framework when conducting an evaluation is essential in ensuring evaluations are robust and findings can be used to inform decisions and identify areas for improvement (Davidson, 2012). Easy evaluation is a New Zealand framework which has been widely taught to the public health workforce since 2007 (Adams & Neville, 2020). It has been used successfully as a framework to a number of research evaluations in a variety of health-related settings (Dickinson et al., 2015;

Wilkinson, Carryer, & Adams, 2014). It highlights the role of formal evaluation in health care specifically focusing on evaluations undertaken on projects, programmes or policies.

Whilst some evaluators largely stick to one approach or method in conducting evaluations, the easy evaluation framework is an integrated approach based on the work of Davidson (2012). The easy evaluation acknowledges that there are a wide range of approaches to evaluation due to the lack of agreement among evaluation theorists on its definition. The evaluation tree developed by Alkin and Christie (2004) is a way of making sense of these approaches. With its trunk rooted in foundations of accountability, the three main branches of use, methods and value arise which cover its three main approaches. The approach to this research is focused on the value branch of the evaluation tree based on work of Scriven (1991) who states the foundational description of evaluation as the systematic definition of merit, worth or significance of a programme, project or policy. Scriven (1991) states it is the work of the evaluator to make judgement about what is being evaluated. Evaluation uses methodological tools to gather data so the evaluator can make judgment regarding its value or importance.

3.5 Evaluation in Aotearoa New Zealand

Some features of New Zealand society impact on how evaluation is conducted in New Zealand, and this will now be considered.

The Treaty of Waitangi is an agreement between the Crown and tribes of New Zealand outlining each party’s rights and obligations to each other in the development of the nation. It has become an integral framework in acknowledging respectful and genuine relationships with Māori groups, communities, and organisations (Waitangi Tribunal, 2019). Evaluation in New Zealand raises obligations to be considered under the Treaty. Although this evaluation was not designed by and for Māori, the researcher engaged with Māori Health services as early as possible to ensure maximum effectiveness as per best practice guidelines. The researcher acknowledges the importance and nature of respectful relationships, and a shared understanding of the kaupapa (purpose) that bind the parties in conducting sound evaluations. The researcher also encompassed

Māori concepts into the evaluation including whanaungatanga (building and maintaining relationships), manaakitanga (respect for hosts, generosity, and genuine sharing), aroha (treating people with respect on their own terms) and mahaki (sharing knowledge with humility).

The researcher acknowledges that the model of care being evaluated was developed and running prior to the commencement of this research. The researcher therefore acknowledges the lack of Māori engagement during the development of this model. A common interpretation of the Treaty highlights the importance of principles such as partnership, protection, and participation however there are many related considerations to reflect on when considering a bicultural way of conducting evaluations (Dickinson et al., 2015). Further research must reflect on how the Treaty of Waitangi can be utilised as a useful starting point to negotiate important aspects related to respect, equity, participation and knowledge transfer when designing new services.

3.6 Research Philosophy

Each general research approach – quantitative, qualitative and mixed methods – adopts numerous different research approaches (Creswell & Creswell, 2017). Each approach is underpinned by a philosophical belief/s and thus different methodological practices (Leavy, 2017). Leavy (2017) also believes that knowledge and beliefs form the 'philosophical substructure of research'. A paradigm has been described as a framework or worldview through which knowledge is filtered (Denzin & Lincoln, 2011). It is formed from the joining of ontological and epistemological beliefs which then guide our thinking and actions (Guba, 1990). They remain largely hidden in research but since they significantly influence the practice of research, they need to be identified (Creswell & Creswell, 2017). There are numerous different philosophical paradigms that guide research, and the chosen approach adopted in this study will now be discussed.

This evaluation research methodology is guided by the theoretical world view of pragmatism. In the 1870s, a philosophical movement of pragmatic thought arose. With its name originating from Greek literature, the word 'pragma' or otherwise known as action, highlights its practical and practise-based meaning. Strongly influenced by the work of Charles Darwin, who emphasised the interactions between the environment and organisms, Charles Sanders Peirce (1839-1914) was an active member in defending that theories must be linked to experience. In the article 'How to make our ideas clear' (Peirce, 1878), Peirce shifts the thinking away from previous philosophical traditions and towards a sense of reality. He looks for a clear logical path for which there is a practical purpose. For Peirce, pragmatism was a way of clarifying our ideas in the objective world. He refers to the importance of practical consequences to a hypothesis, and the lack of interest in results that do not have sense (Peirce, 1878). Therefore, pragmatism is considered as a philosophical view that orientates itself to solving problems in the real world (Feilzer, 2010). It is an evolving research paradigm in which concepts and behaviours are considered valuable in identifying meaning and truth (Shaw, Connelly, & Zecevic, 2010).

More recently, research has focused on pragmatism as a paradigm for social research (Allemang, Sitter, & Dimitropoulos, 2022). While it is a relatively new emerging paradigm, it maintains focus on patient outcomes to produce socially useful knowledge (Cornish & Gillespie, 2009; Shaw et al., 2010). Given the significance of problem solving in research design, this new worldview offers an alternative epistemological paradigm (Allemang et al., 2022).

Many authors have been passionate about giving physiotherapists a clear identity (Roberts, 1994). With an ever-changing society and more prevalent chronic pain behaviours including those living with OA, physiotherapists consider patient centeredness and reablement in a diverse range of physical and psychological conditions. Therefore, it is important to recognise that knowledge from research in physiotherapy practice is changing (Pratt, 1989). Traditionally in science, which includes much of physiotherapy, reductionist practice under the medical model is considered the 'normal' (Pratt, 1989). Reductionism, especially in biology and science, is the theory that everything complex can be explained by analysing basic mechanisms, and that one phenomenon can be reducible to a second (Given, 2008). Due to the complexity of social and physical facets to disease and health, research needs to reflect this. Physiotherapy research is abandoning its narrow reductionistic view, and moving towards holism (Shaw et al., 2010). Shaw further suggest that tensions, emotions, patient journeys, stories and experiences are difficult to collect using quantitative means alone (Shaw et al., 2010). Therefore, research conducted under a pragmatic paradigm allows multiple concerns to be addressed within one research project and is the reason it has been adopted in this evaluation study.

3.7 Mixed Methods

Research on practice pragmatism establishes the significance of mixing qualitative and quantitative methods to achieve 'expert practice' that is concerned with improving outcomes whilst incorporating patient beliefs (Shaw et al., 2010). Mixed methods research under a pragmatist paradigm allows insight into the complexity of physiotherapy practice and allows the integration of research epistemologies, optimally informing practice (Shaw et al., 2010).

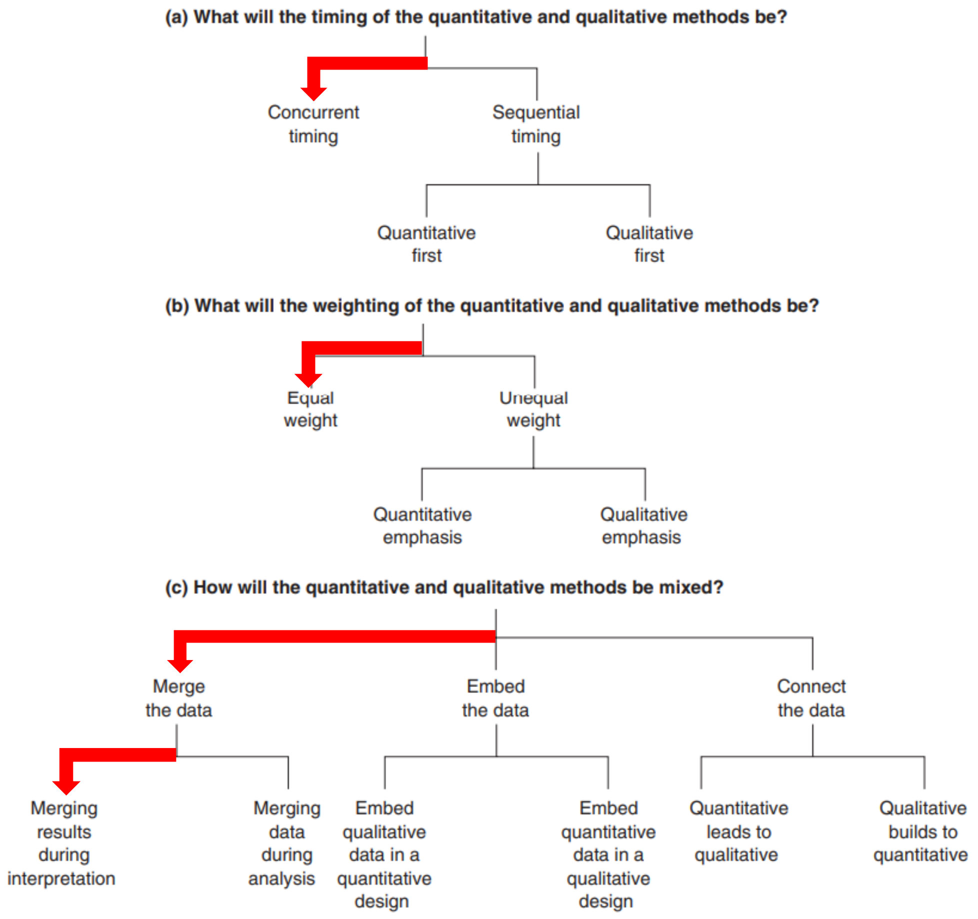
Within mixed methods research, there are four major types of mixed methods designs, each with their own intent, procedures, strengths and challenges (Cresswell & Cresswell, 2017). The type of mixed method design chosen for this research study will now be justified.

3.7.1 Triangulation

When designing this mixed methods study, the primary researcher utilised the decision tree for mixed methods designs as documented by Creswell and Creswell (2017). This assisted with identifying the choices for each of the decisions made when selecting the appropriate mixed methods design. The researchers' choices can be seen in Figure 11.

Figure 11

Decision tree for mixed methods design criteria – researchers' decisions

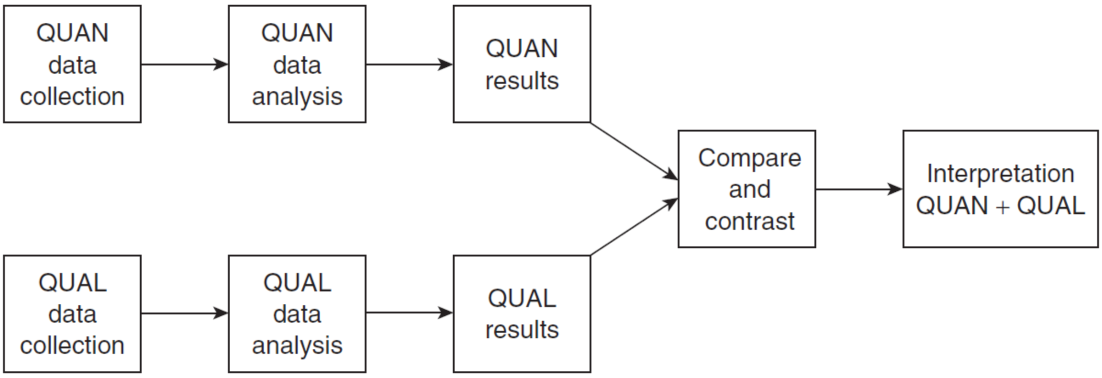


Note: *Red arrows highlight researchers' decisions*

As this study was an evaluation of the triage service in real time, a convergence triangulation mixed method design was applied (Creswell & Plano Clark, 2011). Triangulation design is a one phased design where the researcher implements the quantitative and qualitative methods simultaneously with equal weight to both methods (Creswell & Creswell, 2017). The rationale for this design is it is efficient and makes intuitive sense as the researcher was also working clinically within the service during the time of the data collection (Creswell & Plano Clark, 2011). It also adhered to the timeframe allocated for the writing of this thesis. The quantitative data collected from part one was collected in parallel with the interviews in part two. The data was analysed separately using their chosen data analysis methods before the results were compared and interpreted simultaneously. The process of the concurrent triangulation design used can be seen in Figure 12. The researcher has merged the data together in the discussion to provide insight into understanding the impact of the COTS, relating the quantitative results to the qualitative findings for a deeper understanding.

Figure 12

Triangulation design in mixed methods research



Note: Convergence triangulation design. From Designing and Conducting Mixed Methods Research (2nd ed., p.63), by Creswell and Plano Clark, 2011, Sage Publications.

3.7.2 Chosen methods

The researcher acknowledges that there were multiple methods available to gather information to answer the research question. Table 3 highlights the evaluation methods that were considered including the advantages, challenges and resources required for each method. Following this the chosen methods will be discussed.

Table 3

Table showing evaluation methods considered including advantages, challenges and resources needed for each method.

Method	Purpose	Advantages and challenges	Resources required
Interviews	To obtain information from individuals about their experiences	+ Excellent for process and outcome evaluation as you can get in-depth information. -Data can be difficult and complex to analyse -Interviewer can bias the responses.	-Time consuming -May require data inputting and analysis programs.
Focus groups	To facilitate discussions with groups of people to understand in-depth what they believe were the effects of the program, or how they saw the program implemented.	+ Good for outcome evaluation as the researcher can ask people to explain how the program affected them. + Can identify a lot of issues and effects. + Can give staff better understanding of the program from participants' own words.	+ Can be done relatively quickly (1-2 hours per focus group). -Requires a good facilitator. -Time consuming to analyse and interpret the discussion.
Surveys and questionnaires	To get information from individual people about their changes in tobacco use knowledge, attitudes, and behaviour.	+ Excellent for outcome evaluation + Can include a lot of people. + Can be done anonymously, so may be more valid. + Can use questions from existing surveys -Is more impersonal for participants, and usually not good for getting quotes in participants' own words.	-Time to develop questionnaire. -May require database program to manage and analyse a lot of data. -May require extra resources for participant incentives and data analysis.
Document review	To gather information from pre-existing material including newspaper articles, working groups, reports and budgets.	+ Uses information that is already available. + Good method for reviewing a programme that was implemented.	+ Can be done by staff working in the programme. -Time consuming.
Case studies	To describe a program or experience in depth, often using some or all the other evaluation methods to construct a case study.	+ Good for combining process and – outcome evaluation. + Can be a powerful way to describe the program. + Can depict personal experiences, quotes, and unique program processes.	-Can take a lot of time to collect information, organize and describe the program.

Notes: + advantages, - challenges

To specifically answer the research question, which is attentive to the impact of an APP led orthopaedic triage service to stakeholders and consumers, it required an appreciation of the patient journey through the health system and the perspective of DHB leaders in establishing such a service. The majority or previous research on the impact of APP models of care have evaluated these services using quantitative methods. By using only quantitative methods limits the research methodology and shows an inability to explore human behaviour which is a critical component of physiotherapy practice (Johnson & Waterfield, 2004). Research also suggests that most sound evaluations should include a mixture of data collection methods. When the data collected shows similar results, the evaluator can be more certain of the outcomes (Dickinson et al., 2015).

This study has therefore been conducted in two parts to appreciate both retrospectively and prospectively collected data with consideration to a short term evaluation (Creswell & Creswell, 2017).

Part one has utilised an electronic database at the BOPDHB to retrospectively report on outcome variables from APP led and orthopaedic assessments including demographics including patient age, ethnicity and body area, referral volumes, time waited for an appointment, referral intake, outcome of assessment and conversion rate to surgery.

Part two has prospectively collected data in the form of semi-structured interviews from four distinct subgroups to explore the impact of the COTS including its acceptability. Semi structured interviews were chosen as they are an excellent method in conducting evaluations due to their ability to provide in-depth information from individuals about their experience. The four participant interview subgroups are defined as:

Subgroup 1: Patients with hip or knee OA who have had an appointment in the APP led pathway.

Subgroup 2: Patients with hip or knee OA who have had an appointment in the standard orthopaedic pathway.

Subgroup 3: Bay of Plenty DHB leaders who were instrumental in the development and implementation of the service. This included four physiotherapy managers at various clinical and organisational levels and one orthopaedic surgeon.

Subgroup 4: GP stakeholders who have been referring into the APP led orthopaedic triage service and who have previously used the standard orthopaedic pathway.

3.8 Data analysis

Thematic analysis is an analytical method widely used in qualitative psychology (Braun & Clarke, 2022). The use of thematic analysis requires deliberation from researchers allowing them to make visible the various elements about the data and how they connect. Thematic analysis is uniquely flexible in that in can be applied to any research question. However, conceptual and design thinking are critical in its application compared to other off the shelf methodologies such as grounded theory and narrative analysis (Braun & Clarke, 2022). Conceptual and design thinking involves all elements of the research project, including whether elements will work together and the justification of those choices. Thematic analysis is not tied to a particular theoretical framework so can be deducted in different ways. These are conceptualised as a series of continua including essentialist versus constructionist epistemologies; experiential versus critical orientation to data; inductive versus deductive analyses, and semantic versus latent coding of data (Byrne, 2022). The role of the researcher is to identify where their analysis is situated on each of these continua including why the analysis is situated as it is and why this conceptualisation is appropriate to answering the research question. This will now be discussed in relation to this research.

Realist/essentialist versus relativist/constructionist epistemologies

The purpose of this continuum is to conceptualise how the researcher understands the data and how they should interpret the findings (Braun & Clarke, 2022). The researcher in this study has adopted a position closest to critical realism in which they assume that the language is a simple reflection of articulated meanings and experiences. By adhering to this, the researcher adopts a unidirectional understanding of the relationship between language and communicated experience (Byrne, 2022).

The researcher has aimed to capture truth and reality as expressed within the dataset of participants that have experienced using the COTS.

Experiential versus critical orientation to data

An experiential orientation to understanding data prioritises the investigation of how a given phenomenon may be experienced by the participant whereas a critical orientation appreciates and analyses discourse as if it were constitutive of the participants personal state (Byrne, 2022). An experiential approach was the most appropriate in this study as the researcher did not seek to make claims about the social construct of the research topic. The research question aimed to examine the impact of the COTS to participants which required the researcher to prioritise participants own accounts of their experience including an appreciation of their thoughts and feelings as a reflection of their internal state.

Inductive vs deductive approach

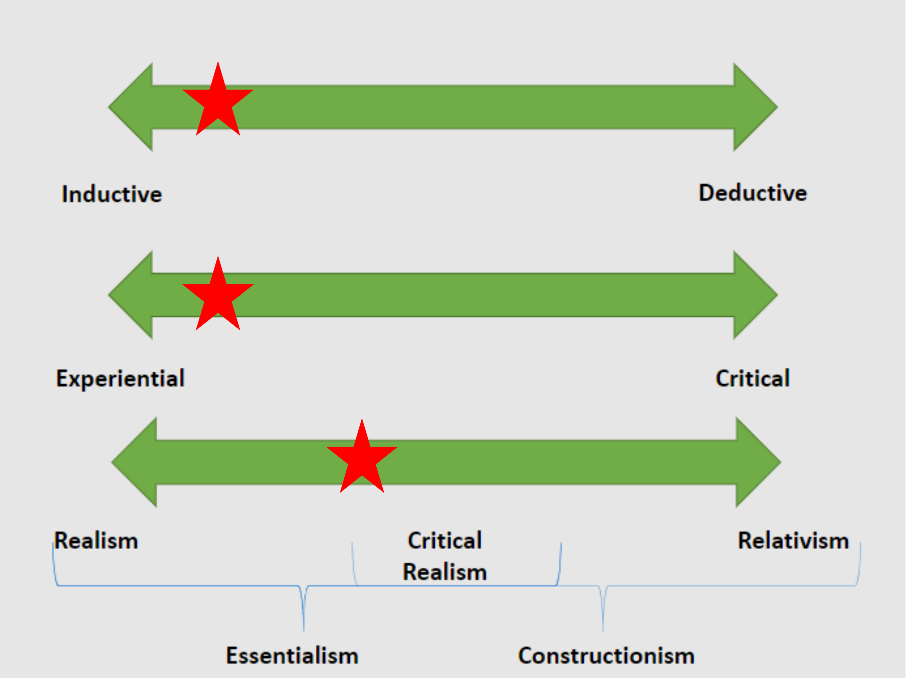
This approach refers to the thinking about coding from an inductive or deductive framework i.e., working from a bottom-up approach by working with the explicit things that participants are saying, or a theoretical orientation to the data in which pre-determined questions are driving the analysis (Byrne, 2022). The researcher in this study adopted an inductive or 'data-driven' approach to produce codes that were solely reflective of the content of the data and free from any pre-conceived theory or conceptual frameworks. In this case, the data was open coded to best represent meaning as communicated by the participants using the COTS.

Semantic versus latent coding of data

Semantic and latent coding are two different ways in which the researcher can code and develop themes within the data. Semantic coding is a way of identifying codes through the explicit or surface meanings of the data whereas latent coding capture underlying themes and assumptions which requires a more interpretative orientation (Byrne, 2022). The researcher in this study has utilised semantic coding and has therefore not examined the data beyond what a participant has said or written. The production of semantic coding and theme development by the researcher in this study is a form of descriptive analysis and is aimed at solely presenting the data content as explicitly communicated by the participants.

Figure 13

Researchers conceptual and design thinking based on the continuum of reflexive thematic analysis



3.9 Overview of study design

Table 4 provides an overview of the chosen research study design, approach to data collection methods and theoretical underpinning of the study.

Table 4

Table showing an overview of chosen research design.

Thesis title	What is the impact of a Community Orthopaedic Triage Service in the management of hip and knee osteoarthritis in the New Zealand public health system?
Aims	To explore the impact of a COTS to patients with knee or hip OA in the Bay of Plenty. To explore the impact of a COTS to the BOPDHB as an organisation. To explore the impact of the COTS to orthopaedic services. To explore the impact of the COTS to GPs in primary care.

Theoretical worldview	**Ontology** *What is reality?*	Reality is constantly re-negotiated, debated in light of its usefulness in unpredictable situations
	Epistemology *How can I know reality?*	The best method is one that solves problems.
	Theoretical perspective *Which approach do you use to know something?*	Pragmatism.
Methodology *How do we know the world, or gain knowledge of it?*	**Evaluation methodology:** the methods and techniques used to measure the performance, effectiveness, quality, or impact of various interventions, services, programs, and policies (Powell, 2006).	
Methods *A series of steps, or collection of methods, taken to acquire knowledge*	**Part one - retrospective data analysis**: utilised an electronic database at the BOPDHB to retrospectively report on outcome variables from APP led and orthopaedic assessments including demographics including patient age, ethnicity and body area, referral volumes, time waited for an appointment, referral intake, outcome of assessment and conversion rate to surgery. **Part two – Semi structured interviews:** prospectively collected data in the form of semi-structured interviews from four distinct subgroups to explore the impact of the COTS to patients and stakeholders.	
Data analysis	**Reflexive thematic analysis** with the goal of identifying patterns of meaning within the data (Braun & Clarke, 2022).	

3.10 Part 1: Retrospective clinical audit

3.10.1 Aim

The aim of part one of this research study was to assess the impact of the COTS on patient flow, waiting times and patient outcome which included conversion rate to surgery.

3.10.2 Design

A retrospective clinical audit of data collected from the BOPDHB of patients assessed in the COTS and patients assessed in orthopaedic outpatients. The data was retrieved in three discrete subsections: COTS data, orthopaedic data and pre-COTS orthopaedic data. For the purpose of this research, a 12-month time period has been determined for extraction of the COTS and orthopaedic data from 1st September 2020 to 1st

September 2021. The pre-COTS data has been extracted for a 12-month time period from 1st July 2017 to 1st July 2018.

3.10.3 Inclusion criteria

All patients with primary hip or knee OA that have been assessed by an APP or an orthopaedic surgeon have been included for analysis.

3.10.4 Exclusion criteria

The exclusion criteria included those patients referred for consideration of revision arthroplasty, post-surgical complications, arthroplasty for the management for other conditions (e.g., tumours) and patient request. Patients that were already listed for a joint replacement were excluded from the data at the request of orthopaedics.

3.10.5 Data collection

The BOPDHB maintains an electronic database that records all patient activity including information for audit and evaluation. The data in the database is collected from the patient at the time of their initial assessment and inputted into the electronic database by administration staff. An independent data support analyst then collated the data for analysis from the electronic database. Since this data was collected over a defined time period, the sample size was subject to the number of patients who were assessed in the service within that chosen period. Data variables that have been extracted from the DHB database include:

Referral volumes
Patient age
Ethnicity
Body area
Time waited for an appointment
Geographical intake of referrals
Outcome of assessment: Physiotherapy, First Specialist Appointment (FSA), Activity with Arthritis (AWA) community rehabilitation programme, chronic pain team, return to GP or other
Conversion rate to surgery

Once the data was collected, it was de-identified and forwarded to the primary investigator for analysis.

3.10.6 Data analysis

Due to the pre-determined data variables collected by the BOBDHB, a quantitative analysis approach was limited to descriptive statistics, means, standard deviations (SD) and 95% confidence intervals (CI) to assess the outcome data. Analysis of variance (ANOVA) was performed for waiting times between groups. The results are presented in chapter four.

3.11 Part 2: Semi structured interviews

3.11.1 Aim

The aim of part two of this research study was to understand the impact of a physiotherapy-led orthopaedic triage service to the patient, the BOPDHB and its stakeholders via qualitative means.

3.11.2 Design

Semi structured interviews were conducted in parallel with the quantitative data collection over a 12-month period from September 2020 to September 2021. Interviews as a method assumes that the participant perspective can be meaningful towards the success of the project (Dickinson et al., 2015). Understanding these factors is significant in advising clinical and organisational processes that promote high value healthcare. Using semi structured interviews adds a significant contribution to the quantitative data as it adds depth, ensuring that the perspective of the patient and stakeholders are considered. One on one interviews were chosen as they offer a deep personalised insight into the participants story which may not be extracted in a larger group format (DeJonckheere & Vaughn, 2019).

3.11.3 Participants

Participants for the interviews were recruited in four distinct subgroups via criterion-based purposive sampling. Purposeful sampling is a widely recognised sampling methods in qualitative research methods for the identification of information rich cases specific to the area of interest (Palinkas et al., 2013). In a deliberate effort to make the sample representative of the target population for subgroups one and two, it included purposive sampling of specific criterion including gender, ethnicity and age (Taherdoost, 2016). Recent literature in thematic analysis has moved away from the term data saturation when determining the appropriateness of a sample size (Braun & Clarke, 2022). To mesh with the aims of the study, the researcher utilised information richness when determining how many interviews would be sufficient. Therefore, the researcher initially set a range of three to five interviews per group to capture the richness of the data set. At the end of the data collection, a total of 17 participants were included for data analysis and the demographics of participants for each subgroup are represented in Table 5.

Table 5

Table representing number of participants in each subgroup

Subgroup	Participant	Code	Description/role	Gender	Ethnicity
1	1	S1P1	COTS patient	Male	NZ European
1	2	S1P2	COTS patient	Male	NZ European
1	3	S1P3	COTS patient	Female	NZ European
1	4	S1P4	COTS patient	Male	Māori
1	5	S1P5	COTS patient	Male	Māori
2	1	S2P1	Orthopaedic patient	Female	Māori
2	2	S2P2	Orthopaedic patient	Female	NZ European
2	3	S2P3	Orthopaedic patient	Male	NZ European
2	4	S2P4	Orthopaedic patient	Female	NZ European
3	1	S3P1	COTS Physiotherapist, working clinically	Female	European
3	2	S3P2	Physiotherapy manager, non-clinical	Female	NZ European
3	3	S3P3	Executive director of Allied Health – Physiotherapist, non-clinical	Female	European
3	4	S3P4	Physiotherapy manager, non-clinical	Female	NZ European
3	5	S3P5	Orthopaedic surgeon	Male	NZ European
4	1	S4P1	GP	Female	European
4	2	S4P2	GP	Male	NZ European
4	3	S4P3	GP	Female	European
Total	17				

Note: *NZ – New Zealand

3.11.4 Exclusion criteria

It is important to note that the primary researcher was working as an APP within the COTS at the time of the data collection. Given the primary researcher's current and ongoing role in the area that is the focus of the research, the study has excluded those participants who were assessed by the researcher (DeJonckheere & Vaughn, 2019). This reduced the potential for a power imbalance between the researcher and the participant. Patients who could not speak or read English were also excluded from the study.

3.11.5 Consideration of participants identified as Māori

The involvement of Māori participants in New Zealand health-related research is critical. In research, there are several approaches to Māori research that must be considered in the early phases (The Health Research Council of New Zealand, 2010). Although this research is not Māori centred or Kaupapa Māori, it included Māori participants, and this has been carefully considered. Prior to the data collection, the primary researcher discussed this research with Māori health services at the BOPDHB during locality assessment which included the most appropriate way to recruit and interview participants who identify as Māori. Early consultation occurred to ensure that the research practices were acceptable and appropriate, that the research outcomes contribute to Māori health and wellbeing as much as possible and maintain or enhance mana (an individual's prestige) (The Health Research Council of New Zealand, 2010). The primary researcher has also adhered to guidelines written by the Health Research Council of New Zealand (2010) in the involvement of Māori participants, exercising Manaakitanga (the process of showing respect) at all times.

As the entry into this pathway requires an initial primary health care consultation, the primary researcher acknowledges there may be inequity for Māori participants gaining access into this service. As previously stated, the development of the current COTS model was pre-determined prior to the commencement of this research, and it is not within the scope of this research to amend the structure of the pathway. However, the primary researcher has used this research to highlight any issues with inequity and access and has provided recommendations for potential change.

3.11.6 Recruitment process

Subgroups 1 and 2: Participants who fit the inclusion criteria to be interviewed were identified by orthopaedic administration staff and their information was forwarded to the primary researcher. Within 72 hours following their APP or orthopaedic appointment, the primary researcher made initial contact with the participant regarding the research study via telephone. Interested patients were provided with relevant information via an information leaflet (Appendix B) and verbally by the researcher. This included: the reason they were selected to be interviewed, the purpose of the study and details on what the interview will involve including length of time (DeJonckheere & Vaughn, 2019). In addition, the researcher followed the required ethical principles and informed the participant that withdrawal from the interview would be permissible at any time, participation was voluntary, and information gathered would remain anonymous. The participant was then given opportunity to ask any relevant questions and allowed 48 hours to process the information. After 48 hours, participants were contacted again and given another opportunity to ask any questions. If they were willing to participate, an interview was arranged within two months of their initial appointment at a time and location that was convenient for the participant.

Subgroup 3: Participants in subgroup three were purposefully selected by the primary researcher as important stakeholders in the development of the APP led triage service. Potential interview participants were sent an explanatory invitation by email, with participant information by the primary researcher who sought locality approval and ethical clearance regarding the appropriateness for this recruitment process (Appendix F). Information in the invitation email included: the reason they were selected to be interviewed, the purpose of the study and details on what the interview involved including the length of time and format of questions (DeJonckheere & Vaughn, 2019). In addition, the potential interview participant was informed that withdrawal from the interview would be permissible at any time, participation was voluntary, and information gathered would remain anonymous. If they were willing to participate, then an interview was arranged at a time and location convenient for the participant. The primary researcher did not have a professional, managerial, or operational responsibility for the participants recruited. This was to minimise any conflict of interest or power relationship.

Subgroup 4: Participants in subgroup four were purposefully selected by the primary researcher as GPs within the Bay of Plenty region. Potential interview participants were sent an explanatory invitation by email (Appendix G) via their individual practice manager. Information in the invitation email included: the reason they were selected to be interviewed, the purpose of the study and details on what the interview involved including length of time (DeJonckheere & Vaughn, 2019). In addition, the potential interview participant was informed that withdrawal from the interview would be permissible at any time, participation was voluntary, and information gathered would remain anonymous. If they were willing to participate, then an interview was arranged at a time and location convenient for the participant.

3.11.7 Pre-assumption interview

Reflexivity has been defined by Alvesson (2002) as ‘an effort to reflect on how the researcher is located in a particular social, political, cultural and linguistic context’ (p.179). Therefore, prior to any participant interviews, the primary researcher herself underwent a pre-assumption interview by an independent researcher from Auckland University of Technology (AUT). Focusing on oneself can highlight any assumptions, biases and values that are subconsciously present before the interviews take place (McNair, Taft, & Hegarty, 2008). This process also helped the primary researcher prepare for her role in the interviewing of study participants and improve the rigour of the data collection.

Within the pre-assumption interview, the researcher was strongly encouraged to continue their reflective practice in the form of a reflective diary. The researcher ensured that she allowed time immediately following each interview to complete a reflective diary. The researcher reflected on what went well, areas of improvement and how this would impact the following interview. This helped the researcher improve their interview skills as well as giving them time to reflect on the interview as a whole.

3.11.8 Insider/outsider research perspective

Literature on qualitative research has discussed the concept of insider and outsider perspective when studying a research population (Aburn, Gott, & Hoare, 2022). The literature has described researching people you know or having a similar background to the community being researched as being an insider. This is described in a variety of settings and can also refer to the researcher being a member of an organisation in which the research is being undertaken (Dwyer & Buckle, 2009). An outsider perspective refers to the researcher who enquires from perspectives outside of the community (Dwyer & Buckle, 2009). There are advantages and disadvantages to both approaches documented in the literature. The researcher in this study acknowledges that she approached the interviews from the perspective of an insider, due to her clinical position within the COTS team. Adams and Neville (2020) discuss how health professionals are ideally positioned to both contribute and lead programme evaluation activities including interviews due to their unique position to become embedded in the research. Other advantages of being an insider include being more economical, may be easier to gain acceptance from participants and not seen as a stranger when conducting interviews (Dwyer & Buckle, 2009). The researcher also acknowledges some disadvantages to working as an insider including the possibility of role conflicts, a potential for reliance on participants who they are comfortable with and not always being acknowledged as the researcher by colleagues.

3.11.9 Data Collection

Prior to conducting the interviews, the primary researcher gained written informed consent from the participant via an approved consent form. Following the interviews, the consent forms were stored in a locked filing cabinet at AUT. Semi structured interviews were conducted by the primary researcher in order to allow the use of contextually relevant terminology. The interview questions were designed specifically for each subgroup and therefore differ slightly. The interview questions for subgroup one and two are based on work done by Waters, Edmondston, Yates, and Gucciardi (2016) and Fennelly et al. (2020). The interviews for subgroup three are based on work done by Wiles and Milanese (2016). Since the primary researcher was working in the triage service whilst conducting the interviews, there may have been some potential risks with interviewing senior management. In order to account for this, the primary researcher promoted the equal participation in the research process, minimising the distance of research-participant relationships (Karnieli-Miller, Strier, & Pessach, 2008). The interview questions for subgroup one to four can be seen as Appendix H, I, J and K.

Beginning the interview: Before the commencement of the semi structured interview, the primary researcher started with general conversation to break the ice and develop rapport. The primary researcher introduced herself and explained why she is interested in the interview topic. The interview then started with a broad explanation of the study and a description of the interview agenda (DeJonckheere & Vaughn, 2019). The digital recorder was checked that is it working, and the need for the use of an audio recorder was explained to the participant.

Interviewer stance: In order to minimise bias from the interviews, the primary researcher used the same format of questions in each interview for each subgroup. The interviewer was aware of a potential power imbalance and adopted a relaxed, friendly attitude in order to ease discomfort. The interviewer engaged in active listening; ‘attentive, empathic, non-judgmental, listening in order to invite, and engender talk’ (DeJonckheere & Vaughn, 2019).

Continuing the interview: The goal of the interview was to encourage the participant to share as much information as possible in his or her own words (DeJonckheere & Vaughn, 2019). Follow up questions were used along with core questions to encourage people to keep talking. The questions were asked in the same sequence for each participant and for each subgroup.

Finishing the interview: At the end of the interview, the primary researcher thanked the participant for their contribution and stopped the audio recording. The participant was then informed that once the data has been transcribed, they will be a given an opportunity to review and revise their data before it is analysed. Immediately following the interview, the interviewer reflected on the process and content (DeJonckheere & Vaughn, 2019).

The data was then transcribed by the primary researcher onto a word document to assist with the familiarisation process and then further analysed.

3.11.10 Data analysis

After the completion of the interview, the data was uploaded and saved on a password protected computer. Audio recordings of the interviews were transcribed by the primary researcher into an electronic written format. Data from the interviews has been analysed using reflexive thematic analysis as informed by Braun and Clarke (2006). This process suggests a series of phases in which the data is analysed which include familiarisation, coding, searching and reviewing prior to naming and defining (Braun & Clarke, 2006). A summary of the different phases can be seen in Table 3.

Once transcribed, the researcher reviewed the data to allow for familiarisation of the data set. The researcher then carried out inductive informed coding at a semantic level. Examples of inductive coding can be seen in Appendix Q, T and U and an example of collating codes in Appendix V. Sub themes followed by themes were then established from these codes by clustering codes together to identify candidate topics. Examples of creating subthemes can be seen in Appendix R and S. The researcher consulted with her supervisors to test the development of relevant themes throughout the analytic process to reference her assumptions. These themes were reviewed and finalised and have been written up as part of the final analysis and presented in chapter 4.3. An early thematic map can be seen in Appendix X and the final thematic map in Figure 18.

Table 6

The different phases of thematic analysis

Phase	Description of process
Familiarisation	Transcribing the data, reading and re-reading the data, noting down initial ideas
Generating initial codes	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code
Searching for themes	Collating codes into potential themes, gathering all data relevant into each theme
Reviewing potential themes	Checking if the codes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic map of analysis
Defining and naming themes	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme
Producing a report	Final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back to the analysis of the research question and literature, producing a scholarly report of the analysis.

Note: This table was produced by Brawn and Clark in 2006, detailing the different phases of thematic analysis. From “Using thematic analysis in psychology” by Braun and Clarke (2006). *Qualitative Research in Psychology, 3*(2), p87.

The quantitative and qualitative data analysis has been woven together in the final analysis. The quantitative data has been positioned beside the qualitative data and overlapping areas compared for agreement or contrast. Areas compared have been integrated into Chapter 5 discussion and recommendations for future practice have been made.

3.12 Ethical Considerations

Prior to the collection of data, ethical approval was sought. The research application was approved by the Auckland University of Technology Ethics Committee on 21st October 2020: AUTEC Reference number 20/36 (Appendix A).

Chapter 4 Results

4.1 Introduction

This chapter presents the results from part one and part two of the study. Following this, the results from both parts will be woven together in the final discussion.

4.2 Part 1: Retrospective clinical audit

This section presents the results for the quantitative data only. The BOPDHB collects data on the clinical assessments it provides to patients for audit and evaluation type projects. It broadly encompasses information about the people it services, the type of assessment and their outcomes. After the raw data is collected from the COTS it is inputted into a DHB derived dashboard whereas the orthopaedic data is recoded solely in its raw form in an excel spreadsheet. For the purpose of this research and to keep the data sets comparable, the raw COTS data was also used in this analysis. The data collected in the COTS and the orthopaedic service were collected and inputted separately by different administration staff. As the data variables were already set by the DHB prior to the data collection, the primary researcher used pre-determined data for all three groups. The data is presented in two subsections: COTS results and orthopaedic results. The orthopaedic results include data collected pre-COTS implementation and data collected during COTS implementation and is clearly differentiated. Data from all groups are then presented together in the final results section.

For the purpose of this research, a 12-month time period has been determined for extraction of the COTS and Ortho data from 1st September 2020 to 1st September 2021. The pre-COTS data has been extracted during a 12-month time period from 1st July 2017 to 1st July 2018. This time period was chosen as it was this was when the primary researcher was initially undertaking an evaluation of the orthopaedic hip and knee service, meaning the data was readily available and already being used for analysis. It is important to recognise that the 2020-2021 data collection occurred during the COVID-19 pandemic in which there was significant pressures on the health system, the local DHB and delivery of outpatient services. There were significant challenges to collecting data during the pandemic and this will be discussed in the final chapter of this thesis.

4.2.1 COTS results

Six hundred and seventy-six patients were assessed in the COTS with hip or knee OA between September 2020 and September 2021. Of these, 379 (56%) patients had knee joint OA and 297 (46%) had hip joint OA. The monthly referral numbers are represented in the Table 4.

Table 7

Number of patients referred to the COTS with hip or knee joint OA

	Knee joint OA		**Hip joint OA**			
Month	**No.**	**%**	**No.**	**%**	**Total**	**%**
September 2020	22	6	16	5	38	6
October 2020	19	5	9	9	28	4
November 2020	16	4	13	10	29	4
December 2020	11	3	17	9	28	4
January 2021	27	7	15	14	42	6
February 2021*	45	12	37	28	82	12
March 2021	53	14	46	33	99	15
April 2021	28	7	25	18	53	8
May 2021	37	10	18	19	55	8
June 2021	37	10	31	23	68	10
July 2021	56	15	41	33	97	14
August 2021**	28	7	29	19	57	8
Total	379	100	297	100	676	100

Note: *COVID-19 alert level two, **COVID-19 alert level four

The mean age for patients referred to the COTS with knee joint OA was 66.7 years (SD:12.56). The mean age for patients referred with hip joint OA was 67.6 years (SD:12.5). The overall mean age was 67.1 years (SD:11.99). The most prevalent age group referred to the COTS was between 60-69 years for patients with knee joint OA and 70-79 years for patients with hip joint OA. This is represented in Table 5.

Table 8

Age of patients referred into the COTS with hip or knee joint OA

	Knee joint OA		Hip joint OA	
Patient age group (years)	**No.**	**%**	**No.**	**%**
90-99	2	1	3	1
80-89	42	11	45	15
70-79	116	31	107	36
60-69	131	35	69	23
50-59	61	16	51	17
40-49	17	4	15	5
30-39	5	1	3	1
20-29	4	1	2	1
10-19	1	0	2	1
Total	379	100	297	100

Of the patients referred for assessment in the COTS, 149 (22%) patients were reported as Māori, 6 (1%) were reported as Pasifika and 521 (77%) as other. This is represented in Table 6.

Table 9

Ethnicity of participants referred to the COTS with hip or knee joint OA

	Knee joint OA		Hip joint OA	
Ethnicity	**No.**	**%**	**No.**	**%**
Māori	88	23	61	21
Pasifika	4	1	2	1
Other	287	76	234	78
Total	379	100	297	100

Of the patients assessed in COTS, 185 (27%) were referred from Tauranga, 80 (12%) from Te Puke and 154 (23%) from Whakatane. These locations represent the 3 major clinic locations. Although most patients were seen close to the clinic locations, patients are also captured from further afield. A further breakdown of referral location can be seen in Table 7.

Table 10

Geographical location of patients referred to the COTS with hip or knee joint OA

	Knee joint OA		Hip joint OA			
Geographical area	**No.**	**%**	**No.**	**%**	**Total**	**%**
Katikati	1	0	2	1	3	0
Tauranga*	104	27	81	27	185	27
Papamoa	74	20	57	19	131	19
Te Puke*	40	11	40	13	80	12
Whakatane*	85	22	69	23	154	23
Opotiki	42	11	23	8	65	10
Kawarau	31	8	23	8	54	8
Rotorua	0	0	2	1	2	0
Other	2	1	0	0	2	0
Total	379	100	297	100	676	100

Note: *Location of the COTS clinics

The mean wait time to be seen in the COTS was 37.34 days (SD:32.87) (CI 34.7-39.99). The median wait time was 24 days. The shortest wait time was five days, and the longest wait time was 175 days. The mean wait times per month are represented in Table 8 including a breakdown of individual wait times for knee and hip joint.

Table 11

Mean number of wait days to be assessed in the COTS with hip or knee joint OA

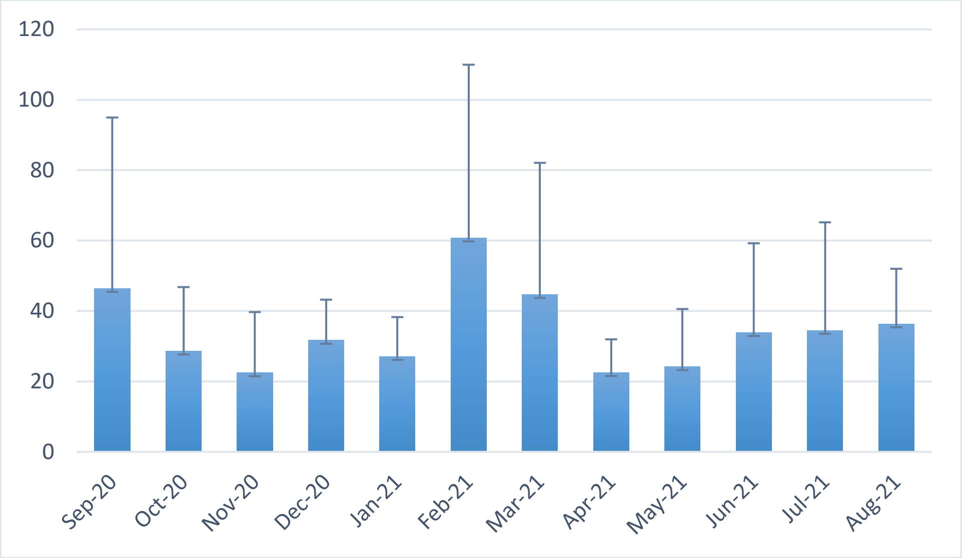
	Mean number of wait days					
Month	**Knee joint OA**		**Hip joint OA**		**Overall**	
September 2020	46.45	(SD:48.52)	34.79	(SD:34.13)	41.92	(SD:43.34)
October 2020	28.64	(SD:18.16)	19.88	(SD:9.07)	25.45	(SD:15.94)
November 2020	22.47	(SD:17.24)	23.91	(SD:20.03)	23.11	(SD:18.17)
December 2020	31.70	(SD:11.53)	34.40	(SD:13.72)	33.32	(SD:12.70)
January 2021	27.13	(SD:11.15)	22.14	(SD:13.38)	25.29	(SD:12.09)
February 2021*	60.78	(SD:49.19)	67.97	(SD:50.76)	64.22	(SD:49.71)
March 2021	44.72	(SD:37.36)	50.36	(SD:38.70)	47.45	(SD:37.91)
April 2021	22.54	(SD:9.41)	26.52	(SD:13.34)	24.40	(SD:11.56)
May 2021	24.21	(SD:16.36)	28.50	(SD:18.29)	25.73	(SD:17.01)
June 2021	33.91	(SD:25.34)	22.08	(SD:8.04)	28.72	(SD:20.45)
July 2021	34.52	(SD:30.68)	35.81	(SD:37.65)	35.05	(SD:33.50)
August 2021**	36.36	(SD:15.63)	44.26	(SD:29.95)	40.14	(SD:21.92)

Note: *COVID-19 alert level two, **COVID-19 alert level four

The mean wait time per month for patients with knee joint OA assessed in the COTS is represented in Figure 12.

Figure 14

Graph representing mean waiting times in the COTS for patients with knee joint OA

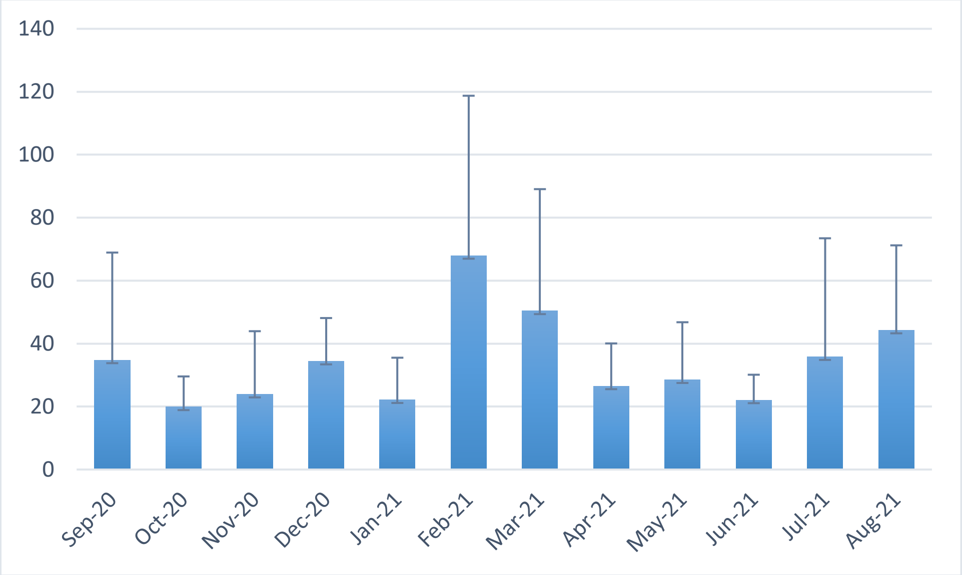


Error bar representing SD.

The mean wait time per month for patients with hip joint OA assessed in the COTS is represented in Figure 13.

Figure 15

Graph representing mean waiting times in the COTS for patients with hip joint OA

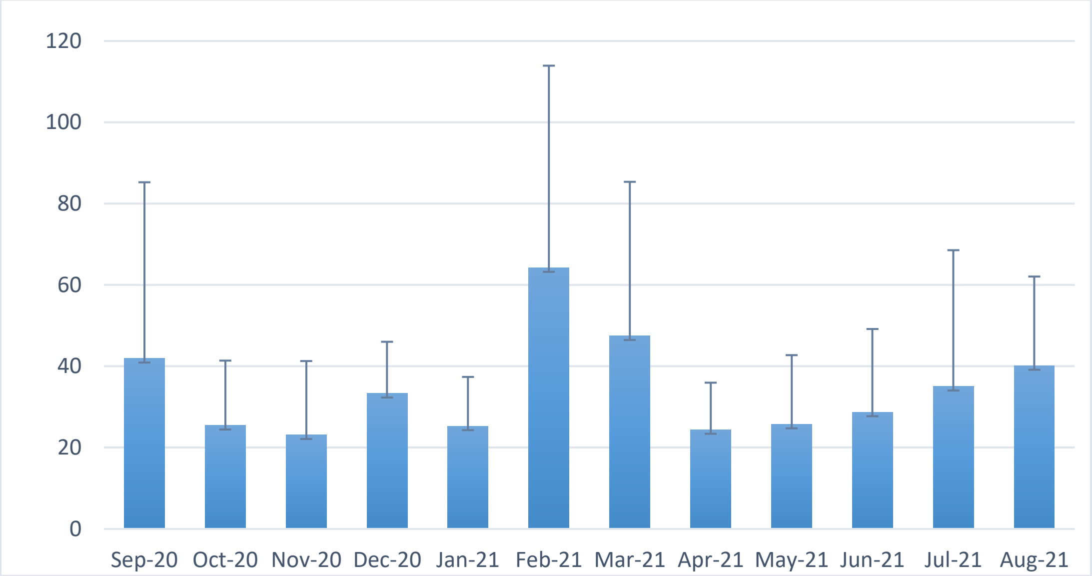


Error bar representing SD.

The overall mean wait time per month for patients with knee and hip joint OA assessed in the COTS is represented in Figure 14.

Figure 16

Graph representing overall mean waiting times in the COTS for patients with hip or knee joint OA



Error bar representing SD.

Outcome of COTS assessment

From the 676 patients who presented to COTS for assessment, 193 patients (29%) did not need any further intervention and were referred back to their GP for ongoing management. From the 676 patients, 178 patients (26%) were referred onto orthopaedics for further investigation and/or surgical opinion. Two hundred and fifty patients (37%) were referred for conservative management which included either a referral to an allied health team at the BOPDHB or to Activity with Arthritis (AWA), a community rehabilitation programme. The outcome not recorded suggest the outcome had not been entered at the time of the data analysis. A further breakdown of this can be seen in Table 9.

Table 12

Outcome of COTS assessments

	Knee joint OA		Hip joint OA			
Outcome of COTS assessment	**No**	**%**	**No**	**%**	**No.**	**%**
Referred back to GP/referrer	114	30	79	27	193	29
Refer to orthopaedics	84	22	94	32	178	26
Refer surgical services	11	3	13	4	24	4
Refer to allied health services	92	24	73	25	165	24
Refer to another service	1	0	0	0	1	0
Refer AWA	59	16	26	9	85	13
Refer DHB education class	1	0	0	0	1	0
Refer to radiology	0	0	1	0	1	0
Refer to pain team	1	0	1	0	2	0
Referred elsewhere	1	0	0	0	1	0
Refer medical services	0	0	1	0	1	0
Treatment complete	0	0	1	0	1	0
Unseen no referral	1	0	0	0	1	0
Not recorded	13	3	8	3	21	3
Deceased	1	0	0	0	1	0
DNA	0	0	0	0	0	0
Total	379	100	297	100	676	100

Note: AWA (Activity With Arthritis), DHB (District Health Board), DNA (Did Not Attend)

Of the 178 patients referred from COTS into orthopaedics, 133 had received their FSA at the time of the data analysis. There were 45 patients yet to receive an FSA at the time of the data analysis and this accounts for the reduction in number of patients analysed in Table 10. Of the 133 patients who had been assessed in orthopaedics at the time of the data analysis, 107 (80%) were appropriate for orthopaedic input including being listed for surgery, receiving a corticosteroid injection, or referred for further investigation. Of patients who had already received their orthopaedic FSA, 17 (13%) were then referred for conservative management including referral back to GP, for physiotherapy, referral to the pain team or referral to AWA. Eight patients (6%) referred for FSA from COTS failed to meet surgical threshold on surgical prioritisation scoring. This is represented in Table 10.

Table 13

Outcome of patients FSA after being referred to orthopaedics by the COTS

Outcome of FSA	**No.**	**%**
Listed for surgery*	87	65
Corticosteroid injection*	16	12
Further investigation*	4	3
Discharge to GP	13	10
Referred to pain team	1	1
AWA	1	1
Physiotherapy	1	1
Didn’t meet scoring threshold	8	6
Not medically fit	1	1
DNA	1	1
Total	133	100

Note: AWA (Activity With Arthritis), GP (General Practitioner), *appropriate for orthopaedic input

Summary

Over a 12-month period from 1st September 2020 to 1st September 2021, 676 patients with hip or knee joint OA were assessed in the COTS. Of these, 193 patients (29%) were referred back to their GP, 178 (26%) were referred to orthopaedics and 250 (37%) were referred for conservative management. Of the 178 patients who progressed to orthopaedics for an FSA, 45 patients were yet to receive an appointment at the time of the data analysis. Of the 133 patients who had completed an FSA at the time of the data analysis, 80% were appropriate for orthopaedic intervention including being placed on the inpatient treatment list for surgery, received a corticosteroid injection or were referred for further investigation.

4.2.2 Orthopaedic results

The following data is presented to show the flow of patients through the BOPDHB orthopaedic service before and during the instigation of the COTS. The data before COTS will be referred to as pre-COTS and the data collected during COTS will be referred to as during COTS. At the commencement of the data collection there were ten orthopaedic surgeons working in the orthopaedic team including one head of orthopaedics. All surgeons delivered their clinics from the outpatient department at Tauranga or Whakatane hospital.

Before the implementation of the COTS (July 2017 to July 2018), 1271 patients were assessed in orthopaedics with hip or knee joint OA. Of these, 585 (46%) were patients with knee joint OA and 686 (54%) were patients with hip joint OA. During the implementation of the COTS (September 2020 to September 2021), 1362 patients were assessed in the orthopaedics with hip or knee joint OA. Of these, 689 (51%) were patients with knee joint OA and 673 (49%) were patients with hip joint OA. This is represented in Table 11.

Table 14

Number of patients seen in orthopaedics with hip or knee joint OA

	Pre-COTS		**During COTS**	
Presenting problem	**No.**	**%**	**No.**	**%**
Lower limb knee joint	585	46	689	51
Lower limb hip joint	686	54	673	49
Total	1271	100	1362	100

A monthly breakdown of referral numbers for patients with hip or knee OA seen in orthopaedics can be seen in Table 12.

Table 15

Number of patients seen in orthopaedics per month with hip or knee joint OA

	Pre-COTS 2017-18				**During COTS 2020-21**			
Month	**Knee**	**Hip**	**Total**	**%**	**Knee**	**Hip**	**Total**	**%**
September	44	39	83	7	65	64	129	9
October	65	52	117	9	50	50	100	7
November	67	79	146	11	53	67	120	9
December	40	32	72	6	64	58	122	9
January	45	40	85	7	61	57	118	9
February	55	45	100	8	58*	70*	128*	9
March	71	49	120	9	73	72	145	11
April	54	49	103	8	57	36	93	7
May	72	52	124	10	48	61	109	8
June	55	48	103	8	70	55	125	9
July	52	46	98	8	42	43	85	6
August	66	54	120	9	48**	40**	88**	6
Total	585	686	1271	100	689	673	1362	100

Note: *COVID-19 alert level two, **COVID-19 alert level four

The mean age for patients referred into orthopaedics pre-COTS with knee joint OA was 73.2 years (SD:10.55) and with hip joint OA was 71.9 years (SD:12.93). The overall mean age for patients referred to orthopaedics with hip or knee joint OA pre-COTS was 72.6(SD:11.72) years. A breakdown of age groups assessed in orthopaedics pre-COTS can be seen in Table 13.

Table 16

Age distribution of patients referred into orthopaedics pre-COTS with hip or knee joint OA

	Pre-COTS 2017-18			
	Knee joint OA		**Hip joint OA**	
Patient age group (years)	**No.**	**%**	**No.**	**%**
90-99	31	5	28	5
80-89	170	25	141	24
70-79	237	35	216	36
60-69	170	25	119	20
50-59	53	8	55	9
40-49	15	2	16	3
30-39	1	0	15	3
20-29	0	0	4	1
10-19	0	0	0	0
Total	677	100	594	100

The mean age for patients referred into orthopaedics during COTS with knee joint OA was 70.5 years (SD:9.83) and with hip joint OA was 69.7 years (SD:12.66). The overall mean age for patients referred to orthopaedics with hip or knee joint OA during COTS was 70.1 years (SD:11.32). Of the patients referred into orthopaedics pre and during COTS implementation, the most prevalent age group was between 70-79 years for both hip and knee joint OA. A breakdown of age groups assessed in orthopaedics during COTS can be seen in Table 14.

Table 17

Age distribution of patients referred into orthopaedics during COTS with hip or knee joint OA

	During COTS 2020-21			
	Knee joint OA		**Hip joint OA**	
Patient age group (years)	**No.**	**%**	**No.**	**%**
90-99	8	1	12	2
80-89	120	17	131	19
70-79	255	37	231	34
60-69	218	32	172	26
50-59	69	10	83	12
40-49	17	2	28	4
30-39	0	0	7	1
20-29	2	0	5	1
10-19	0	0	4	1
Total	689	100	673	100

Of the patients presenting for assessment in orthopaedics pre-COTS, 227 (18%) patients were reported as Māori, 10 (1%) were reported as Pasifika and 1034 (81%) as other. This is represented in Table 15.

Table 18

Ethnicity of patients seen in orthopaedics pre-COTS with hip or knee joint OA

	Knee joint OA		**Hip joint OA**	
Ethnicity	**No.**	**%**	**No.**	**%**
Māori	110	16	117	20
Pasifika	10	1	0	0
Other	567	83	468	80
Total	687	100	585	100

Of the patients presenting for assessment in orthopaedics during COTS, 217 (16%) patients were reported as Māori, 9 (1%) were reported as Pasifika and 1136 (83%) as other. This is represented in Table 16.

Table 19

Ethnicity of patients seen in orthopaedics during COTS with hip or knee joint OA

	Knee Joint OA		Hip Joint OA	
Ethnicity	**No.**	**%**	**No.**	**%**
Māori	105	15	112	17
Pasifika	5	1	4	1
Other	579	84	557	83
Total	689	100	673	100

The mean wait time for patients to be seen in orthopaedics pre-COTS was 87.74 days (SD:27.75). A month-by-month breakdown of wait times is represented in Table 17.

Table 20

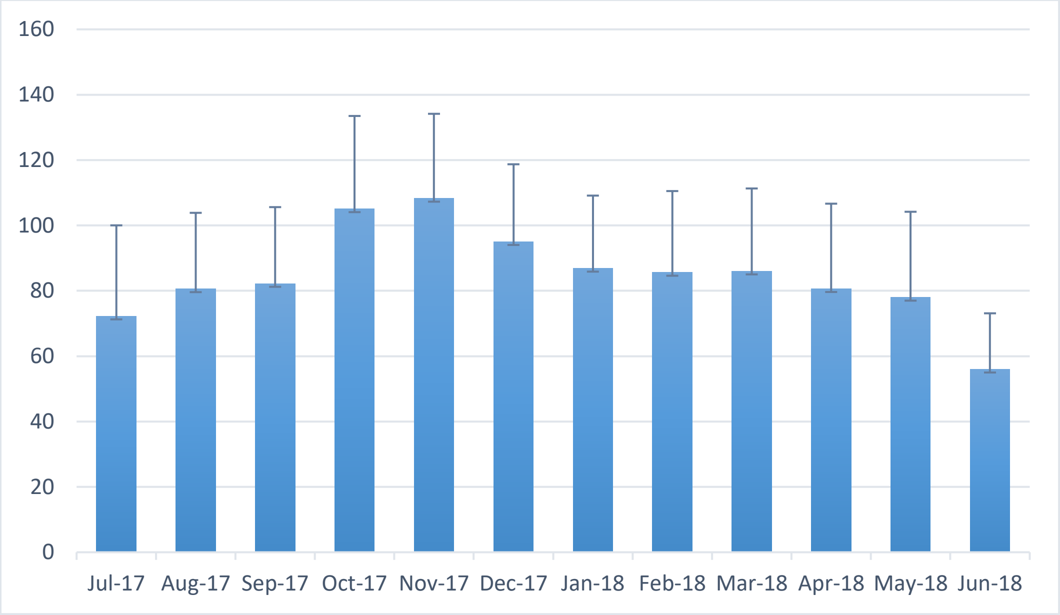
Mean number of wait days to be seen in orthopaedics with hip or knee joint OA pre-COTS

Month	Mean number of wait days					
	Knee joint OA		Hip joint OA		Overall	
July 2017	71.57	(SD:31.54)	72.97	(SD:23.64)	72.27	(SD:27.76)
August 2017	82.17	(SD:22.21)	78.78	(SD:24.53)	80.59	(SD:23.28)
September 2017	81.94	(SD:21.32)	82.47	(SD:25.63)	82.22	(SD:23.39)
October 2017	105.33	(SD:29.15)	104.76	(SD:27.88)	105.07	(SD:28.43)
November 2017	113.29	(SD:26.56)	104.11	(SD:24.74)	108.27	(SD:25.89)
December 2017	90.86	(SD:26.63)	100.88	(SD:17.65)	95.03	(SD:23.69)
January 2018	85.90	(SD:24.61)	88.02	(SD:19.36)	86.87	(SD:22.26)
February 2018	87.58	(SD:26.75)	83.32	(SD:22.68)	85.61	(SD:24.91)
March 2018	86.41	(SD:21.66)	85.45	(SD:30.22)	86.03	(SD:25.29)
April 2018	79.35	(SD:27.83)	81.95	(SD:24.27)	80.64	(SD:26.02)
May 2018	79.35	(26.47)	81.95	(SD:26.15)	77.99	(SD:26.2)
June 2018	62.75	(9.67)	49.25	(SD:21.65)	56	(SD:17.12)

A month-by-month breakdown of wait times for patients with hip or knee joint OA assessed in orthopaedics pre-COTS is represented in Figure 15.

Figure 17

Graph representing mean waiting times for patients with hip or knee OA assessed in orthopaedics pre-COTS



The mean wait time for patients referred into orthopaedics during the COTS project with hip joint OA was 156.44 days (SD:56.42), whereas the mean wait time for patients with knee joint OA was 158.96 days (SD:56.0). A month-by-month breakdown of wait times is represented in Table 18.

Table 21

Mean number of wait days to be seen in orthopaedics with hip or knee joint OA during COTS

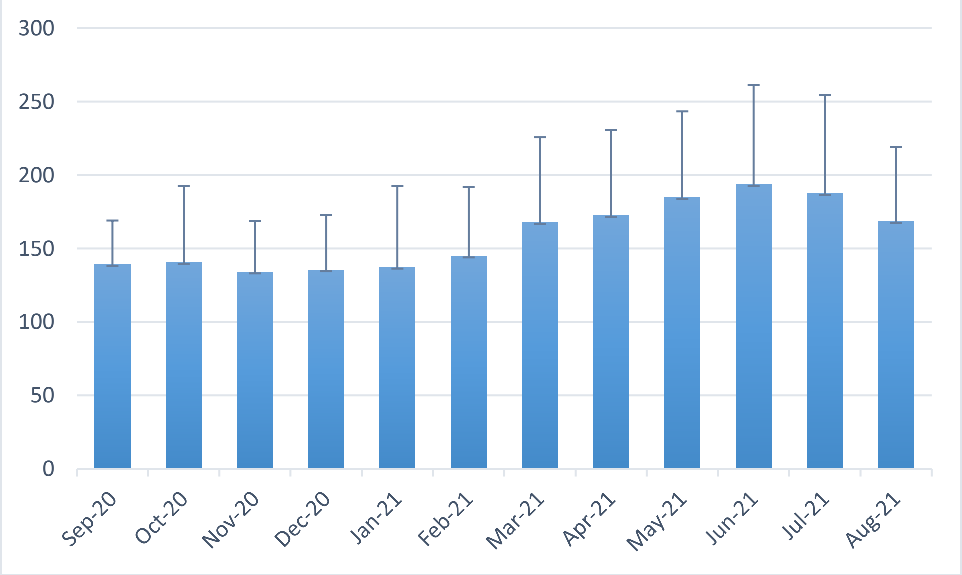
Month	Mean number of wait days					
	Knee joint OA		Hip joint OA		Overall	
September 2020	137.69	(SD:28.29)	140.42	(SD:31.80)	139.05	(SD:29.99)
October 2020	140.02	(SD:26.84)	114.08	(SD:68.80)	140.55	(SD:51.96)
November 2020	135.52	(SD:32.43)	132.92	(SD:36.68)	134.07	(SD:34.75)
December 2020	132.92	(SD:40.18)	138.62	(SD:33.83)	135.50	(SD:37.24)
January 2021	133.62	(SD:52.48)	140.17	(SD:59.46)	137.32	(SD:55.16)
February 2021*	146.12	(SD:51.28)	143.97	(SD:43.19)	144.95	(SD:46.85)
March 2021	165.98	(SD:51.62)	169.76	(SD:63.87)	167.86	(SD:57.86)
April 2021	168.05	(SD:61.78)	179.02	(SD:52.75)	172.30	(SD:58.40)
May 2021	196.62	(SD:56.02)	175.16	(SD:59.51)	184.61	(SD:58.71)
June 2021	197.11	(SD:71.58)	192.85	(SD:62.67)	193.70	(SD:67.65)
July 2021	194.14	(SD:62.85)	180.65	(SD:71.21)	187.32	(SD:67.15)
August 2021**	168.85	(SD:54.33)	167.65	(SD:46.95)	168.31	(SD:50.82)

Note: *COVID-19 alert level two, **COVID-19 alert level four

A month-by-month breakdown of wait times for patients with hip or knee joint OA assessed in orthopaedics during COTS is represented in Figure 16.

Figure 18

Graph representing mean waiting times for patients with hip or knee joint OA assessed in orthopaedics during COTS



The overall mean wait time to be seen in orthopaedics pre-COTS was 87.74 days and during COTS 157.71 days. The SD, CI, median, shortest, and longest wait times for both groups are represented in Table 19.

Table 22

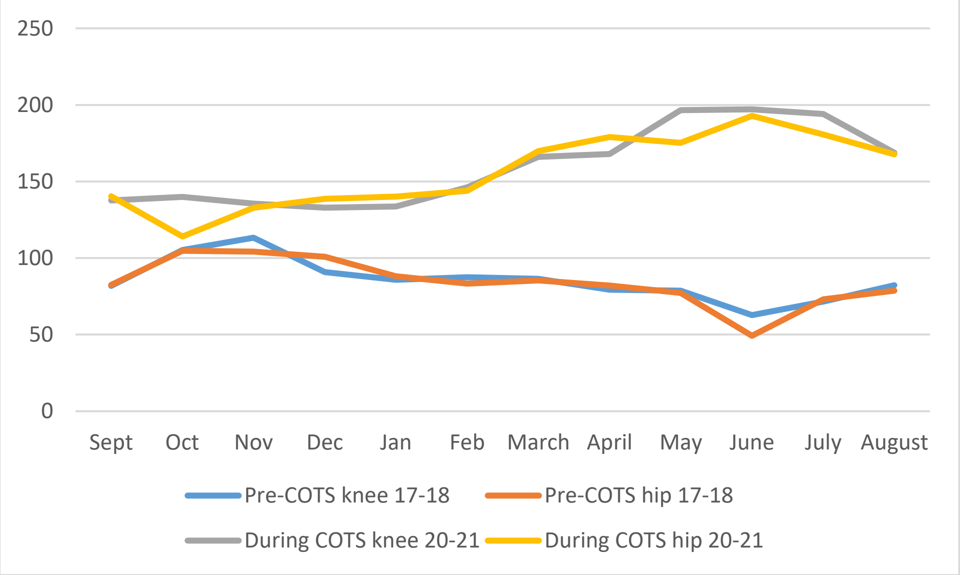
Table representing orthopaedic overall mean wait time, SD and CI

	Overall mean	SD	CI	Median	Shortest wait	Longest wait
Pre-COTS 2017-18	87.74	27.75	86.05 - 89.44	86	4	163
During COTS 2020-21	157.71	56.21	154.72 - 160.7	153	9	537

A line graph representing the pre and during COTS monthly wait time data for orthopaedics is represented in Figure 17.

Figure 19

Line graph representing mean waiting times for pre-COTS and during COTS orthopaedic groups



Of the patients assessed in orthopaedics during COTS, 424 (37%) were placed on the inpatient treatment list for surgery at the time of their appointment. There were 140 patients (12%) who were discharged back to their GP with no intervention following their FSA. There were 292 patients (25%) who received an ongoing follow up for their FSA. A further breakdown of patient outcomes can be seen in Table 20.

Table 23

Table representing outcome of patients assessed in orthopaedics during COTS

Outcome of FSA	No.	%
Inpatient treatment list	424	37
Diagnostic review	185	16
Ongoing follow up	36	3
Outpatient follow up	292	25
AWA Physio programme	3	0
SOS follow up at patient choice	42	4
Discharge to GP/referrer	140	12
HIA not medically fit	1	0
DNA – discharged	4	0
DNA - reappoint	21	2
Patient cancel COVID-19	1	0
Total	1149	100

Note: AWA (Activity with Arthritis), DNA (Did not attend), FSA (First Specialist Appointment)

Summary

Before the implementation of the COTS (July 2017 to July 2018), 1271 patients were assessed in orthopaedics with hip or knee joint OA. During the implementation of the COTS (September 2020 to September 2021), 1362 patients were assessed in orthopaedics with hip or knee joint OA. Of the patients assessed in orthopaedics during COTS, 424 (37%) were placed on the inpatient treatment list for surgery at the time of their appointment. There were 140 patients (12%) discharged back to their GP with no intervention. There were 291 patients (25%) that received an ongoing follow up. No pre-COTS outcome data was able available for comparison and limits the research findings.

4.2.3 All results

Results demonstrate that the COTS saw 49-52% of the volume of patients referred to orthopaedic outpatients within a 12-month time period with 676 seen in COTS compared to 1271 seen in orthopaedics pre-COTS and 1362 in orthopaedics during COTS.

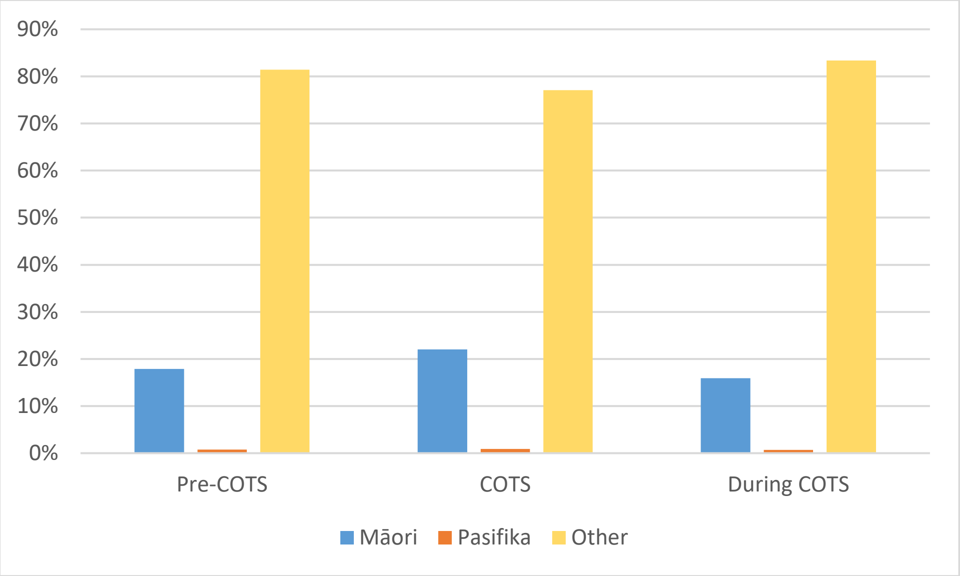
The overall mean age for patients referred to orthopaedics pre-COTS (72.6 years) was higher than both the overall mean age for patients referred to orthopaedics during

COTS (70.1 years) and patients referred to COTS (67.1 years). The mean age of patients referred into COTS was lower than both orthopaedic groups. In most groups, the most common patient age presenting for assessment was between 70-79 years for both hip and knee joint OA. The exception to this was knee joint OA in the COTS group in which the most common age was between 60-69 years.

There was a higher percentage of patients reported as Māori seen in the COTS (22%) compared to those seen in orthopaedics pre-COTS (18%). There was a slight decrease in the percentage of patients reported as Māori pre-COTS (18%) to during COTS (16%). In both the COTS and during COTS orthopaedic groups, patients who were reported as Māori mostly presented with knee joint OA as opposed to orthopaedics pre-COTS when they mostly presented with hip joint OA.

Figure 20

Bar graph representing ethnicity for pre-COTS, COTS and during COTS

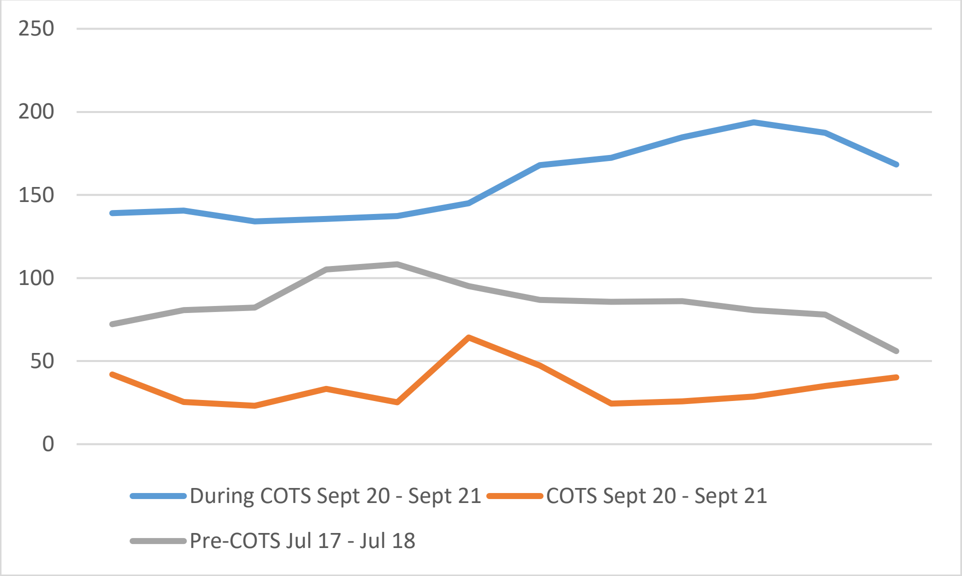


The majority of patients seen in the COTS were referred from the Western Bay of Plenty accounting for 59% of referrals, as opposed to the Eastern Bay of Plenty which accounted for 40% of referrals.

There was 79% increase in wait time in orthopaedics pre-COTS to during COTS where the wait time increased from an average of 87.74 days to be seen to an average of 157.9 days. The mean wait time to be seen in the COTS was 37.34 days. The longest average wait time to be seen in COTS is less than the shortest average wait time to be seen in orthopaedics. Analysis of variance (ANOVA) comparing the 3 groups shows statistically significant difference (p-value<0.0001) in mean waiting times across the 3 groups. Two-way comparisons show statistically significant difference between each pair of data (p<0.001 with Bonferroni adjustment for multiple comparisons).

Figure 21

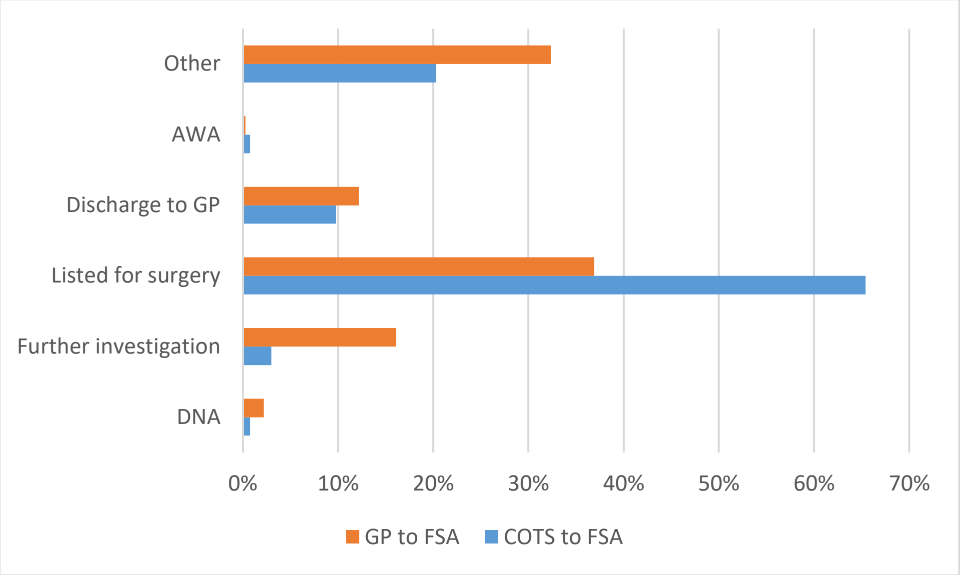
Line graph representing mean waiting times for pre-COTS, COTS and during COTS orthopaedic groups



Of the patients referred for an orthopaedic FSA from COTS, 80% received appropriate orthopaedic management including further imaging, waitlisted for surgery or joint injection. Of the patients who were referred directly to orthopaedics from their GP, 37% were immediately listed for surgery whereas 65% of COTS patients were listed for surgery following their FSA.

Figure 22

Bar graph representing FSA outcomes of COTS referrals and GP referrals.

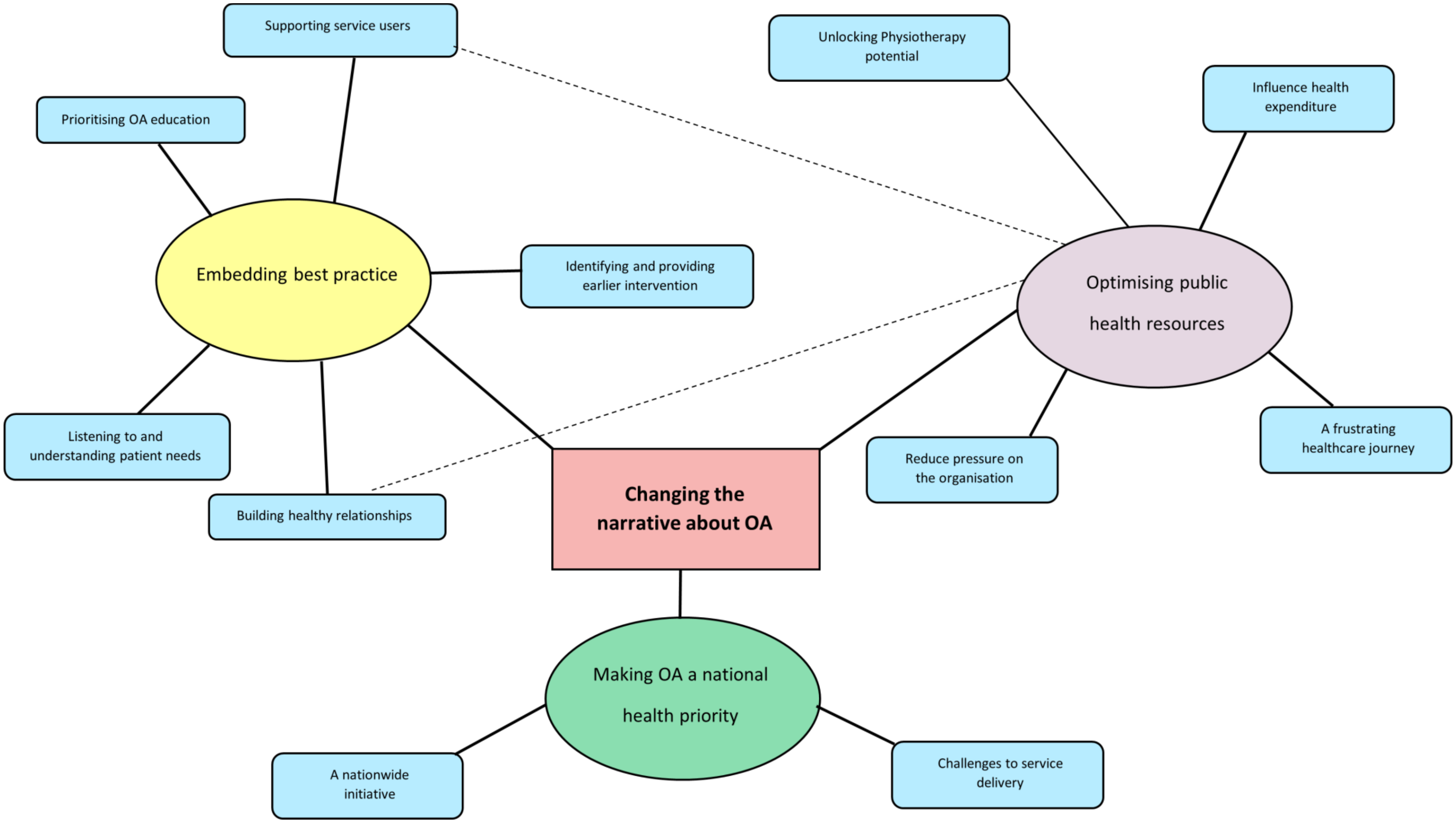


4.3 Semi structured interviews

Data analysis of the interviews using reflexive thematic analysis resulted in one central organising concept which gave rise to three key themes (Figure 18). The central organising concept embedded in the data was ‘Changing the narrative about OA care delivery in the New Zealand public health system’. This concept is entwined within the three main themes. The first theme, ‘Making OA a national health priority’, encompasses the current discrepancy in OA models of care throughout the country and participants’ thoughts on how a COTS may impact upon the delivery of an OA health model on a national scale. The second theme ‘Optimisation of public health resources’, refers to participants’ views on the impact of the COTS service to health expenditure, the evolving APP workforce, and a pressured orthopaedic system. Finally, the third theme ‘Embedding best practice’, describes the thoughts of participants on the role of the COTS in being able to deliver evidence-based recommendations that are most suitable for patients with OA. The raw data to support each subtheme can be found in Appendix Y. A detailed exploration into each of the themes will now be presented.

Figure 23

Thematic map of theme and subthemes

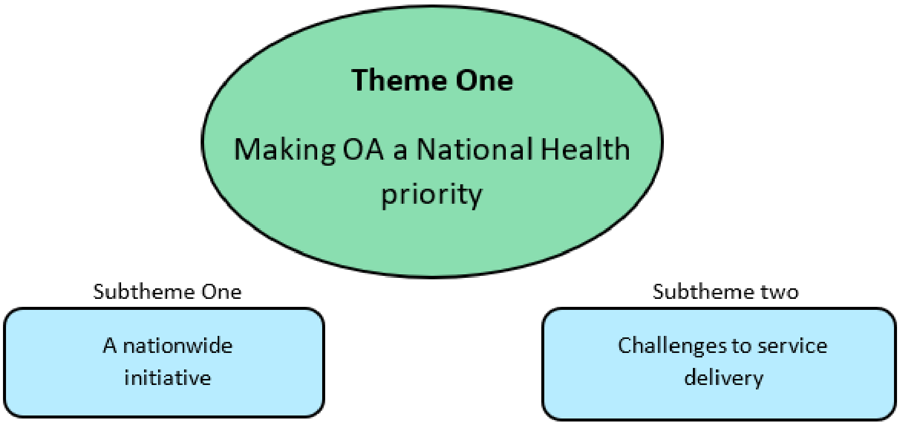


4.3.1 Theme one: Making OA a national health priority

The first theme 'making OA a national health priority' has given rise to participants' views on the current lack of consistency within New Zealand regarding OA pathways and the potential impact of the COTS on managing this challenge. This theme considers participants' general consensus on the failings of the current health system in the treatment and management of OA and recognises the need for consistency in management and decision-making moving forwards. This is highlighted in the two subthemes as seen in Figure 19. The first subtheme 'a nationwide change' reveals participants' views on the lack of consistency across DHBs in New Zealand and explores the potential of the COTS to make a national impact. In the second subtheme 'challenges to service delivery', participants describe their view on the current lack of priority given to OA as a chronic health condition in the New Zealand health system. This will now be discussed in depth.

Figure 24

Theme One – Making OA a National Health Priority



Subtheme One: A nationwide change initiative

The first subtheme, a nationwide initiative, refers to participants' views on the nationwide discrepancy in OA management pathways amongst DHBs in New Zealand. The impact of these discrepancies was recognised by patients, clinicians and GPs alike. As previously discussed, patients referred into the New Zealand public health system must meet a certain criterion to be accepted for a First Specialist Appointment (FSA). If they get accepted to be seen and are a suitable candidate for surgical intervention, they are then scored again by the orthopaedic surgeon using the clinical priority system to see if they meet surgical threshold (The Ministry of Health, 2007). When asked about their experience of triaging patients with OA in this way, participants highlighted the inequity in the present threshold system. Participant one in subgroup three, a physiotherapist working in the public system highlighted the obvious nationwide discrepancy in getting accepted into orthopaedic services as well as reaching thresholds for surgery. They describe how meeting the threshold for surgery is inconsistent, with it often based solely on where the patient lives. Due to this they feel that the likelihood of getting the most appropriate treatment is based on luck rather than on their clinical need. Participant five, an orthopaedic surgeon in subgroup three, also identifies how the inequity of access is a well conversed topic amongst the orthopaedic community on a national scale. He identifies that it is an area of ongoing significance amongst DHBs in New Zealand and has a direct impact on patients accessing appropriate management options:

> *'And there's an inconsistency around the DHBs around the country. We know that because it's been represented at our conferences as to how many patients, how many are accepted in different regions and its, you know you might have 25% in one condition and others are 80%.'* ***(S3 P5)***

This inconsistency in acceptance criteria is also something that is recognised by GPs working in primary care who are referring into the public health system. Participant three in subgroup four who regularly refers patients via the orthopaedic pathway, expresses their frustration in the lack of communication if a patient does not reach threshold to be seen. They identified that because the threshold for accessing care is often variable and unpredictable, it makes referrals into secondary care more difficult and time consuming. Participants involved in the implementation of the COTS discussed their thoughts on the potential impact of COTS to the delivery of orthopaedic services around New Zealand. The COTS pathway accepts referrals through lower threshold criteria whilst utilising allied health professionals as an alternative pathway for the orthopaedic service. Participants all identified that having a model such as the COTS that is be applied across all DHBs could potentially reduce inequity of access and standardise the delivery of care for patients with OA. There was a general consensus that the implementation of a COTS has the potential to provide a general framework as an alternative way of working for other DHBs. Participants attributed equitable access as a key driver to a national change. However, in order to achieve this, participants involved in this model identified it would require a greater initiative from the Ministry of Health (MoH) to achieve change on a much larger scale:

> *'I think it's a really good pathway, but I think there needs to be some major reinvention, overhaul of the system to make it easier rather than each DHB going through this massive effort and energy to do the same thing.'* ***(S3 P2)***

In contrast, there was also some concern about the necessity of the COTS to the public system workflow. Previous literature on orthopaedic triage services has identified the impact of these models on reducing referral volumes into secondary care. However, due to the COTS lowering the threshold of access criteria, participant five, an orthopaedic surgeon in subgroup three, was concerned at how the COTS could potentially negatively impact on already growing workloads by increasing referral volumes and orthopaedic waiting times. They showed concern at not being able to cope with another referral pathway for patients to enter secondary care. As previously discussed, the New Zealand health system is a complex network of organisations, each having a specific role in delivering health services to the people of New Zealand. Participant three, a surgeon in subgroup five, was hesitant on a national roll out of this model, highlighting it may not be the most appropriate pathway to apply for the New Zealand way of working due to the differing health models and funding between primary and secondary care:

> *'Well, the potential for attracting new patients that you wouldn't have had otherwise and for unloading the primary health service at the expense of loading us…some of them will then find their way through to us potentially that we wouldn't have seen before and that we still may not need to see so we could have actually attracting more work and not actually achieving one of the gains.'* ***(S3 P5)***

There were similar concerns from GPs in subgroup four. Participants voiced concern about the impact of another pathway to accessing appropriate patient care and felt that having an alternative way of working may hinder the flow of patients into secondary care. They referred to the COTS becoming a substitute for the orthopaedic pathway ultimately increasing the wait time to be seen.

In summary, participants identified the nationwide discrepancy in OA management pathways amongst DHBs in New Zealand and how there was a need for a nationwide change to improve access and reduce inequity. Although some identified the COTS has the potential to improve access for patients entering the public health system, there was some concern as to the repercussions of this on the workflow of the orthopaedic workforce.

Subtheme two: Challenges to service delivery

The second subtheme, challenges to service delivery, highlights participants view on the current lack of OA service provision in the New Zealand health system. Although it has been identified that 20% of adults in New Zealand will consult with their GP regarding a musculoskeletal problem at some point during their lifetime, New Zealand health strategies fail to acknowledge musculoskeletal conditions in their health priorities (Taylor et al., 2004). Participants seeking help for their OA in the primary care system have identified that there is currently a low significance placed on OA as a long-term chronic condition. Participant two in subgroup three acknowledges how there was a lack of core treatment offered by their GP and felt unsupported in their care. Due to this, he felt uncertain about what the future holds for him. This was also further emphasised by participant two in subgroup two. When actively seeking help for their OA, they felt that their symptoms were downgraded and felt let down by the current system. They talk about how they must *'put up with it'*, suggesting getting access to the right care is a challenge and consequently must accept their pain:

> *'(Not bad enough) for even going on the waiting list or even seeing anybody. So, I just put up with it'* ***(S2 P2)***

There were several comments on how the current structure of the health system formed barriers to accessing the appropriate treatment for their condition. As ACC buy services from private hospitals, patients receive access to privately funded specialist care and typically experience shorter wait times. Although this is beneficial for patients receiving care under ACC, it creates an inequity between individuals seeking treatment for non-injury related conditions through the public system. Participant one in subgroup one, a patient using the health system, talks about using both the ACC and public system in the management of their knee pain. He describes the confusion of navigating different health models for the same condition and how the treatment offered in private and public systems can often differ, making access to the right care at the right time challenging for service users. Participant three, a physiotherapist in subgroup three, describes the challenges to service delivery from a different lens. As previously discussed, private physiotherapy funded by ACC makes up a substantial component of the physiotherapy services offered in New Zealand (Reid & Larmer, 2007). However, since the majority of OA is of insidious onset, individuals in New Zealand living with OA are not eligible for ACC subsidised physiotherapy. Although publicly funded physiotherapy can be accessed with the DHB, participant three in subgroup three acknowledges the treatment for OA can differ between health providers and provides a challenge in streamlining best practice. Due to the private funding model under ACC, she describes a culture of over-treating in patients accessing care for OA, with a reduced emphasis on empowering the patient to independently manage their condition.

With respect to other challenges, participants described their lack of confidence in the public health system after they had had an appointment in orthopaedics. When asked about this in depth, participants seen in the orthopaedic pathway attributed this to lack of information, resources, and lacking a clear management plan around their condition following their appointment. After not meeting the threshold for a joint replacement, participant two in subgroup one attributes this to the lack of surgical resources in the public system. She feels frustrated that she cannot access what she needs and demonstrates the wider impact the outcome of her appointment may have on her general well-being and her ability to continue working. Participant two in subgroup three reinforces that the current orthopaedic system only has so much to offer. He acknowledges the significant pressures on the orthopaedic system and that he must make do with the outcome of his appointment. He demonstrates that the current orthopaedic system is doing its best to provide services to its population but there are ongoing challenges to getting the right person signposted to the right care:

> *'To me, it hasn't met my needs totally and it would be nice if there was a way forward to meet my needs but if that's all the system has got then I have to accept it'* ***(S2 P3)***

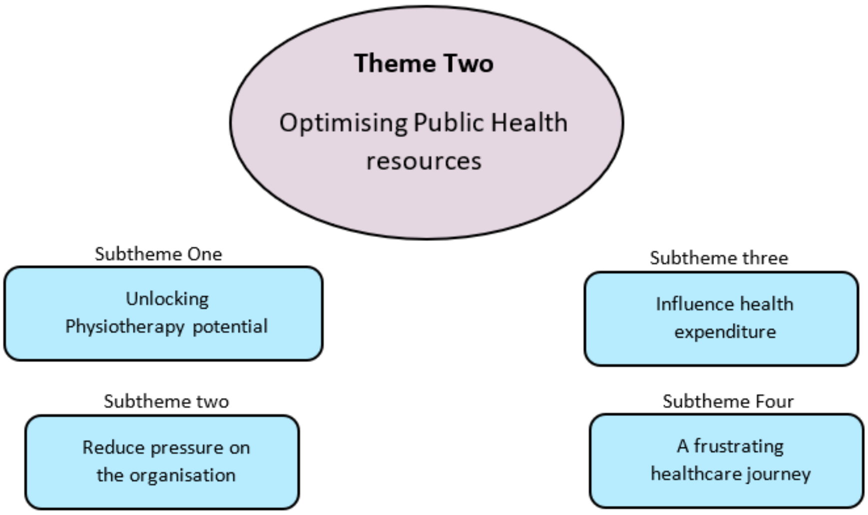
In summary, there are significant challenges to the service delivery for patients with OA in the public health system. Participants have attributed this to the low significance placed on OA as a health condition, lack of management plans and dichotomous health systems. Participants have identified that embedding an orthopaedic triage service amongst DHBs could improve equitable access to secondary care services but due to the siloed health boards, needs to be driven from a national scale.

4.3.2 Theme two: Optimisation of public health resources

Theme two 'optimisation of public health resources' encompasses participant views on the potential impact of the COTS directly to the public health system, its staff and its resources. This is demonstrated in the four key subthemes as seen in Figure 20: unlocking physiotherapy potential, influencing health expenditure, reducing the pressure on the system and a frustrating healthcare journey.

Figure 25

Theme Two – Optimising Public Health Resources



Subtheme One: Unlocking physiotherapy potential

The subtheme unlocking physiotherapy potential, gives rise to participants' views on the impact of the COTS on the evolving APP role in New Zealand and how it directly impacts on the physiotherapy profession including ongoing education. One of the key goals of New Zealand Better, Sooner, More Convenient Care draws attention to freeing up highly trained health professionals to focus on the most complex patient and utilising other health disciplines in managing simpler tasks that would otherwise have been done by a doctor (The Ministry of Health, 2011a). When asked about the impact of the COTS in helping to improve inconsistencies and the delivery of orthopaedic services in this way, participants were mostly confident about the skillset of DHB physiotherapists working in these roles. Although physiotherapists are not routinely used in this capacity in the New Zealand health system, participants felt that physiotherapists in the COTS were well equipped to deal with chronic musculoskeletal disorders and due to their training, have the skills to deliver appropriate assessments for the New Zealand population. One physiotherapy manager involved in the implementation of the pathway showed confidence in the ability of the staff delivering first specialist appointments reporting them as competent and working with the APP scope of practice. This was further emphasised by a physiotherapist working in the triage service. They identified that physiotherapists are skilled autonomous practitioners, and the COTS gives them the platform to showcase their ability without the need for orthopaedic oversight:

> *'it's quite a brave step to stand there and say actually we are competent to do this, and we have the skill set to do this without you needing to walk us through every assessment'* ***(S3 P1)***

Another participant involved in developing the project also acknowledged the ability of the COTS physiotherapists to make clinical decisions on who is appropriate for joint replacement surgery. Considering most of the physiotherapy workforce are based in the private sector and the design of the ACC system, most physiotherapists in New Zealand are accustomed to treating acute injuries. Participant three, a physiotherapy manager in subgroup two, acknowledged the difference in the skillset of physiotherapists working between private and public providers and the importance of recognising these differing skills when designing new models of care.

As previously identified in chapter one, there has been a wealth of literature on the ability of APPs to successfully triage orthopaedic patients into surgical and non-surgical pathways, with positive results in clinical effectiveness and diagnostic concordance with orthopaedic surgeons. Despite this, participants highlighted there is currently a lack of clarity around APP title amongst DHBs in New Zealand and is an area of ongoing consultation with the Physiotherapy Board of New Zealand. Due to this, there are a lack of frameworks available on the clinical training required to work in such capacity.

This was an area of considerable discussion by participants, who expressed their apprehension in the lack of pathways for clinical development. This was brought to light particularly by an orthopaedic surgeon, who expressed their concern about the experience of physiotherapists in New Zealand to take on the responsibility of triage roles and acknowledges the lack of formal training in this area:

> *'one advantage that we have in orthopaedics is that our training and our experience we've seen tens of thousands of patients and have gained confidence and have tests at our disposals and to be fair we would be less questioned by other people if we make a bad decision or a wrong decision. It's always going to take longer for a physiotherapist to do that because the training is different, they may not have the backup of a whole bunch of investigations. Maybe potentially be more open to criticism. And have to be more thorough.'* ***(S3 P5)***

Due to the lack of clarity on the APP roles within the public health system, and most of the physiotherapy workforce being based in ACC, there was also concern by participants about the New Zealand public being accepting of physiotherapists to work in an orthopaedic triage capacity. Participants identified that APPs working in this way is a new concept for the New Zealand public and felt it may not be readily accepted. A participant involved in the development of COTS emphasised this, describing the potential for resistance from service users. They describe how the service user might feel 'palmed off', emphasising how the patient may feel the COTS is of lower value compared to seeing an orthopaedic surgeon. However, patients who had been through the new system expressed confidence in the ability of the physiotherapist to deliver orthopaedic assessments. Patients identified that the most important aspect of the appointment was that they received the right care in a timely manner and meeting their health needs. They attributed their satisfaction to effective communication skills and clinical competency of the assessing physiotherapist. Three out of four participants seen in the triage service made direct comment on seeing a physiotherapist rather than an orthopaedic surgeon. Participants felt that if they received the appropriate treatment, they didn't have preference as to which professional they saw:

> *'But it didn't make any difference to me (who she saw), the lady was explaining everything, and she was very good. So, I didn't feel like I was missing out on anything from not seeing a Dr at this point.'* ***(S1 P3)***

There were also several comments made regarding the impact of the COTS in raising the physiotherapy profile and changing the way the general public view the profession. Having physiotherapists delivering musculoskeletal appointments in this manner is not a new concept internationally but is a novel pathway for participants journeying through the New Zealand public health system. Participants discussed the role of the COTS in endorsing this model by educating the general public on physiotherapists clinical capability and shifting professional boundaries. One participant advocating for the service discusses the importance of the COTS in this way, discussing how the COTS can raise the knowledge around what physiotherapists offer and their professional identity. Two other participants also identify the impact of the COTS on raising the profile of physiotherapy but were mindful of how this is communicated to the public. Due to the complexity of the ACC and public health system, there is a perception from some participants on the role of a physiotherapist in treating acute injuries and providing hands on passive treatment. There is a limited knowledge within the general population of the role of a specialist physiotherapist to work in this advanced capacity. For this model to be willingly accepted, participants discussed the need for ongoing communication to service users on the appropriateness and efficiencies of working in this way. Physiotherapy managers were mindful of implementing an innovative service without wider communication to the public, and acknowledged how the messaging around the new model of care was essential in building trust with patients.

Finally, there was some concern from participants that expanding a triage model may highlight workforce issues within the physiotherapy profession. Due to the lack of formal academic training pathways in New Zealand into APP roles, participants were mindful of the model heavily relies on overseas trained practitioners and the impact of the service to be sustainable in the longer term. When discussing the impact of the COTS service to recruitment processes, physiotherapy managers were aware they might need to formalise in house training programmes in order to elevate physiotherapists into these roles. Two managers discussed the lack of training as a barrier to the ability of the model to expand or be replicated in other areas of New Zealand:

> *'Because we are looking for a really high end very experienced highly skilled clinicians, for a model that is new to New Zealand, not new*

> *overseas but certainly in the current climate where we can't readily get clinicians from overseas yeah, we might have some difficulty.'* ***(S3 P3)***

In summary, participants felt the COTS has the potential to impact on the future direction of the physiotherapy profession including developing advanced practitioner education pathways, shifting professional boundaries, raising the physiotherapy profile and setting the standard for OA care. However, there were also concerns regarding the sustainability of the model and its ability to expand due to the lack of professionals trained at this level and the current use of overseas trained clinicians.

Subtheme two: Reduce pressure on the organisation

Participants across all subgroups discussed the impact of the COTS on having the potential to reduce the pressure on the health system. The impact of this was discussed in several different contexts. In the first instance, participants highlighted how important it was for accessing services closer to home. The BOPDHB has prioritised receiving care closer to home in their 10 year Strategic Health Plan (Bay of Plenty District Health Board, 2017). They have specifically identified the need to develop a smart, fully integrated system to conveniently deliver care closer to where people live, learn, work and play (Bay of Plenty District Health Board, 2017). This will enable families to have their health care needs addressed in a timelier manner, closer to home. Participants who accessed an appointment via the COTS recognised that having an orthopaedic pathway where patients can be seen in a community-based clinic can reduce the pressure directly to the hospital and its facilities by reducing the foot traffic through the hospital. Another participant further emphasised this, describing how hospital care should be prioritised for acute cases and the role of community driven services freeing up hospital resource:

> *'I can understand being in the hospital if you've got life threatening things happening because they've got everything they need there but for these sorts of things I don't think it's critical.'* ***(S1 P4)***

In addition to reducing pressure directly to the hospital by being out in the community, participants also highlighted the impact of COTS on reducing pressure to GPs working in primary care. Participants were mindful that GPs are often the first point of contact for patients in pain, and they would also benefit from a response service for patients with musculoskeletal pathology. One service user identified how busy his GP was and how having a service such as the COTS could reduce the pressure on their workload thus leaving appointments for patients with other medical concerns. One patient also addressed the skill set of their GP, and how often musculoskeletal assessment is not an area of their expertise. They felt that they had limited time with them and felt having an assessment with the COTS took the pressure off their GP to assess their knee joint:

> *'that's their job to do that you know because its where they (Physio) has their eyes, whereas a GP is sort of whizz in you get a ten-minute appointment and then ah can't talk anymore I've gotta go now, you've gotta go so there's a difference'* ***(S2 P4)***

Previous report have identified the impact of orthopaedic triage services specifically in regards to orthopaedic workload (The Ministry of Health, 2011b). It has shown APP led services can increase availability of an orthopaedic surgeon specifically for patients referred for consideration of total hip and knee joint replacements. Studies have also suggested that APP models of care can reduce the load by removing inappropriate referrals from surgeons' waiting list. Participants recognised the importance of freeing up surgeons in this way and highlighted the potential impact of the COTS directly to the orthopaedic team. Two participants highlighted that having a triage service has the potential to positively impact the demand on the orthopaedic team by reducing the number of patients that they have to see in clinic and taking the pressure off the surgeons:

> *'It's just like I said less pressure on the guys at the top who are actually doing the knee replacements and things like that, the surgeons. It frees up a lot more of their time hopefully. And you know even if 1 or 2 out of 10 are like me it still takes it off the surgeons having to you know take up their time, no it's a good system.'* ***(S1 P4)***

The current design of the COTS allows GPs in primary care to refer to either the COTS or orthopaedics. Due to this, one participant, a physiotherapy manager, was less optimistic about the direct impact of the COTS to orthopaedic workflow. They felt that COTS may not have a direct positive impact to the flow of patients to orthopaedics due to having to points of access to orthopaedics. This was also recognised by an orthopaedic surgeon. They articulate that they have not noticed a direct impact to the orthopaedic workforce on the coal face:

> *'In actual fact we haven't really experienced a great impact, that may be able to be demonstrated to us in terms of numbers, but there is not a perception out there that it's made a great difference to our job so far.'* ***(S3 P5)***

In summary, participants were positive about the impact of the COTS to provide orthopaedic services closer to home and reduce the pressure directly to the flow of patients through the hospital doors. Although there is potential for the COTS to impact on the orthopaedic workflow, benefits of this may be limited due to the design of the service within the New Zealand health system.

Subtheme three: Influencing health expenditure

There were mixed views on the impact of the COTS to influence health expenditure. Health expenditure was discussed by participants in two parts: expenditure to the DHB and expenditure to the patient. Literature identified in chapter one has suggested there are high-cost benefits to the implementation of physiotherapy led orthopaedic triages services based in secondary care. Although having an APP assessment prior to an orthopaedic assessment has been shown to increase costs, it is offset by the triage of inappropriate referrals to conservative management pathways. An orthopaedic surgeon identified the impact of the physiotherapist in being able to improve service delivery through better allocation of clinical resource and improving cost-effectiveness. They felt having clinicians working in secondary care could assist with screening patients onto the most appropriate clinical pathway prior to them reaching orthopaedics by providing expertise and resources in the form of a gatekeeping role.

> *'The most powerful point in getting the right service to the right patients in a cost-effective way is this gatekeeper role. That's where the rubber meets the road. That's where you need your expertise and your resource.'* ***(S3 P5)***

Another participant involved in the implementation of the service was optimistic the new service would improve resource allocation through more appropriate spending and cost efficiencies. Aligning with the DHB strategic plan of freeing up specially trained professionals to see only the most complex cases, there was a general consensus from COTS service users that implementing the model where physiotherapists undertake orthopaedic consults could free up surgical time and reduce cost. One participant identified that physiotherapy assessments would be cheaper than seeing an orthopaedic surgeon and contribute to cost savings.

Making healthcare more accessible to its population is an area of ongoing importance to the BOPDHB. With most outpatient services being delivered from Tauranga and Whakatane hospitals, there is often a significant period of travel for patients to attend appointments. With the increase in cost of living and lack of public transport, accessing healthcare can be difficult for patients living rurally. The locality of the COTS clinics was an area of significance for participants who had received an appointment. Two service users highlighted the direct financial impact of having clinics closer to their home. Making access to appointments cheaper and easier including improved parking had a positive impact on the patient experience.

However, other participants were less optimistic about the service being able to save the DHB money in the longer term. They attributed this to several reasons including increased administration time, cost of project management, increased number of physiotherapists, increasing resources, and referral demand. Although they acknowledged it was an improved journey for the patient with the potential to improve outcomes, there was consensus that it would not be cost saving to the DHB:

> *'It's an improved service, I firmly believe that, how cost effective it is truthfully in terms of numbers and final outcome and what it costs, I don't know I haven't seen that data. So any sort of major expansion of COTS that is costing a lot of money from our perspective carefully needs to be balanced against the elephant in the room which is we can't provide the basics.'* ***(S3 P5)***

In summary, participants were optimistic of the COTS to influence health expenditure by substituting Doctors with physiotherapists and reducing travel time for patients. However, due to the resource needed to establish the project and the likelihood of potential expansion, there was some concern as to the impact of the COTS to improve cost effectiveness at the BOPDHB.

Subtheme four: A frustrating healthcare journey

Participants using the health service described their frustration throughout multiple stages of their healthcare journey. They expressed this in various ways including its lack of structure, inequitable access, and discordance. Several service users referred to orthopaedics as a ‘game’ and described their frustration in having to play the system in order to meet their needs. When initially attending an FSA, patients are required to fill out an impact on life questionnaire to rate the impact of their pain of their ability to carry out their activities of daily living. One participant who was seen in orthopaedics describes her experience of this, and watching another service user ‘stretch the truth’ regarding her answers to be able to make the surgical list. Other service users who had been through the orthopaedic system were frustrated at the inconsistent messaging within their appointment. As previously discussed, patients eligible for joint replacement surgery must meet a threshold score in order to be listed for surgery. One participant was left confused by the discordance between the surgeon and the points system, when they were told they needed surgery but didn’t meet the threshold:

> *‘It’s quite confusing where the surgeon says to you I think this surgery would be the best thing for you and then when they input all the data it comes back oh no you don’t qualify.’* ***(S2 P3)***

Finally, due to the lack of resources within the hospital system, there are no longer routine follow ups for patients following their FSA. This results in patients often being discharged from orthopaedics if they don’t meet surgical threshold. If the patient is unhappy with their outcome or wants a further review, it would require the patient to re-present to their GP and a re-referral back into the system. Participants made comment about the lack of follow up in the system and the frustration on re-entering the public pathway in the management of their OA. They talked about the amount of effort and cost of having to be seen again by their GP and the further waiting time before being able to see the surgeon.

> *‘It would be nice to know that there was somewhere you could go without the rigmarole of having to go through your doctor and then back through the specialist’* ***(S2 P3)***

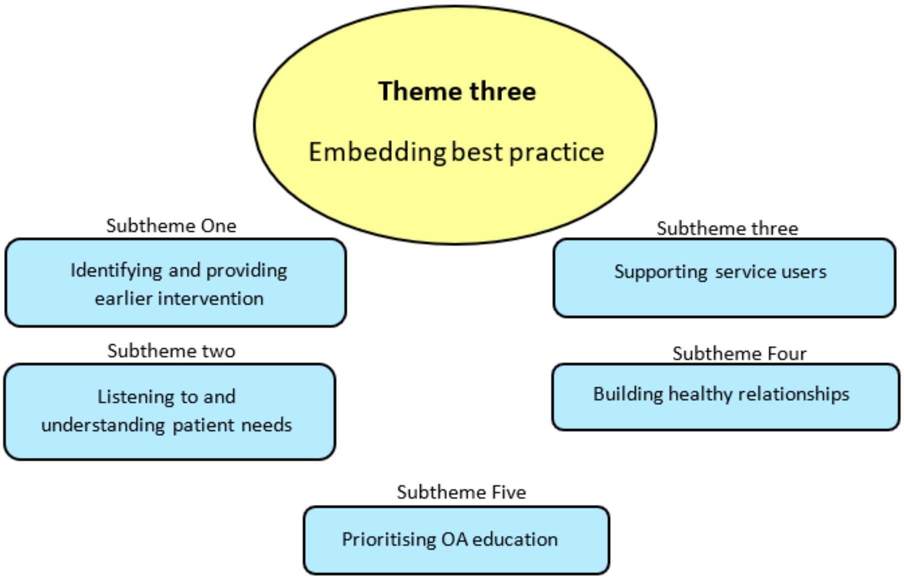
In summary, even though patients may not fully understand the system, they were clear with expressing their frustration in their journey including lack of follow up, discordance and the lack of structure. They referred to accessing care in the public health system as a game and having to play it in order to meet their needs.

4.3.3 Theme three: Embedding best practice

Theme three 'Embedding best practice', reflects the participants general consensus on the contribution of the COTS in being able to deliver evidence-based practice as recommended for patients with OA. This is represented in five distinct subthemes as seen in Figure 21: identifying and providing earlier intervention, listening to and understanding patient needs, supporting service users, building healthy relationships and prioritising OA education. Participants have highlighted the impact of an evolving COTS service from both a personal and health care delivery standpoint.

Figure 26

Theme Three – Embedding Best Practice



Subtheme one: Identifying and providing earlier intervention

There was a mutual understanding about the benefit of early intervention between both patients and health professionals across all subgroups. The importance of an earlier intervention takes on two aspects within the data: being seen earlier within the OA disease process and receiving an earlier appointment following a referral from the GP. Primary care professionals serve on the front lines of healthcare, and they are the first point of contact with the New Zealand healthcare system. That means they are often the first to see early signs of chronic disease, and other health concerns. They endeavor to ensure patients get the right care, in the right setting, by the most appropriate provider, and in a manner consistent with the patient's desires and values. When asked about their triage appointments, patients emphasised the importance of not leaving it too long before seeking help about their joint pain. They described the positive impact of the COTS in providing earlier care, which included improving their clinical outcome whilst benefiting the health system. One patient who was seen in the COTS highlighted the impact of their assessment in getting access to earlier intervention and the possibility of reducing their need for surgery in the longer term. They recognised how their situation could be applied to others in a similar situation and how it is an appropriate system for people to access who are suffering with joint pain:

> *'I would say probably for people that would come in here a lot earlier to try and stop it getting as bad as I let it get probably. Well in terms of like I know a lot of people that would have come in here years ago and probably have been able to do something more you know before you get to the stage of replacement.'* ***(S1 P5)***

A major health focus in New Zealand is empowering people to stay healthy in the community for longer. This involves 'identifying problems earlier, when they can most effectively be addressed' (The Ministry of Health, 2011a). The impact of earlier intervention is also recognised by GPs referring into the COTS service. One GP provided an example of the importance of having access to an orthopaedic opinion earlier in the disease process from having experienced the negative effects of waiting on a patient's general wellbeing. He describes how if not seen in a timely manner, patients suffering with joint pain can be susceptible to developing other co-morbidities, chronic pain behaviours and worsening symptoms. Stakeholders were also aware of the importance of focusing on patients being able to access earlier intervention in line with national health policy. There was a consensus that health care models should be moving towards prevention and earlier intervention rather than providing treatment at the end of the disease process. One physiotherapy manager highlighted the impact the COTS could have in this space and how it aligns with directive from the MoH:

> *'It will promote well-being and wellness approaches and prevention and early intervention which is actually really specifically addressing what the Health and Disability review is asking us to do.'* ***(S3 P3)***

Other participants also described how they feel the implementation of the COTS has the potential to impact on earlier access for patients with musculoskeletal conditions across all areas of the health system including acute services and primary care. Two GPs described multiple benefits of earlier intervention including reducing the need for strong analgesia, reducing the number of visits to the emergency department and improving early musculoskeletal management:

Once OA is well established and a patient is debilitated with pain and reduced function, a surgical review with an orthopaedic surgeon is warranted. Driven by the MoH, DHBs aim to meet a target whereby a patient is seen by an orthopaedic surgeon within 4 months of referral from their GP. Patients using the health service made comment about this wait time and how they feel it has a direct link to their health outcomes. There was a consensus that not having to wait as long and getting an earlier appointment following initial referral was an area of significance in their health journey, and something they felt strongly about. Participants who had been seen in the COTS service highlighted their satisfaction in the responsiveness of the waiting times opposed to those that had been through the orthopaedic pathway:

> *'Not very long actually, from the time the Doctor, I was seen at the GP and she sort of said you will hear and next minute, I expected months with what's going on, but it was more like weeks rather than months. And they just rang up and said there was an appointment and would I like it.'* ***(S1 P3)***

The responsiveness of the COTS service and the potential impact this has to patients' long term health outcomes was also an area of important discussion to stakeholders. The narrative around this positive impact included reducing the need for re-referral into the system, improving access to appropriate health pathways, improved communication and preventing functional decline. Two GPs using the COTS system were satisfied that the COTS was appropriate in getting patients seen in a timely manner thus preventing a reduction in mobility and a loss of independence:

> *'I think definitely good from the waiting list point of view that's been really good, for me as well seeing things moving you know that this person is hanging around potentially deteriorating, particularly for the older people you know their mobility getting worse while they're waiting for something to happen I think that's a benefit.'* ***(S4 P1)***

There was also discussion from physiotherapy management about the ability of the COTS to assess patients in a timely manner and how this aligns with the strategic priorities of providing the right care, at the right time, by the most appropriate provider. They attributed this to getting the patients on the most appropriate treatment pathway via a detailed clinical assessment and a clearly communicated management plan:

> *'I think on the positive side they will love the fact they're having an intervention way sooner. Erm, and hopefully if they are put on the correct pathway they have better long-term outcome.'* ***(S3 P4)***

In summary, there was a strong consensus from participants on the significance of identifying and providing earlier intervention in improving the short- and long-term outcomes for patients with OA. This was discussed on two accounts including patients being seen earlier within the OA disease process and receiving an earlier appointment following a referral from the GP. Patients and referring GPs were satisfied with the impact of the COTS in this space.

Subtheme two: Listening to and understanding patient needs

The second subtheme encompasses the impact of the COTS service in listening to and understanding patient needs. Previous literature as discussed in chapter one confirms that patients with common musculoskeletal conditions such as OA often feel that their GP doesn't take their problem seriously as the GP tends to prioritise other health conditions. Participants living with hip or knee pain strongly emphasised the importance of being listened to and taken seriously about their osteoarthritis. When patients with OA are listened to, they feel understood and subsequently their needs are met. When speaking to their GP about their joint pain, two participants felt that they were not being listened to and their condition of OA often overlooked:

> *'When I went to my first GP you know he didn't really seem to care that, well I felt like he didn't really seem to care that much…. that's what I thought well if he didn't take me seriously 2 years ago then*

> *why would I bother going back you know I may as well be crawling on my hands and knees when I go back there.'* ***(S2 P2)***

Participants recognised the impact of having someone who could listen to their needs regarding their OA. They described being listened to and understood as one of the most important components of an appointment. One participant who attended orthopaedics identified the role of a mentor in OA management, and having someone specialised in arthritis other than an orthopaedic surgeon that they could talk to. When asked about the impact of the COTS to support this role, an orthopaedic surgeon highlighted the ability of the service to provide an enhanced experience to a service user with OA in the public health system. They attributed the improvement to having more time to spend with the patient, active listening skills, providing appropriate advice and management options. They compared this support role within COTS to orthopaedics and emphasised how the new service would be superior pathway for many people who didn't require surgical intervention.

Other participants who had journeyed through the COTS, described their experience of seeing a physiotherapist in the triage role and the impact of the assessment on their OA care. When asked about meeting their individual needs, participants described a holistic person-centred approach during their COTS assessment which included providing them with reassurance, listening to their needs and making shared decisions about their care:

> *'(She) explained, everything's been well explained to me. Options, I was given options. Yeah but I felt it was it definitely, she sort of made it my choice.'* ***(S1 P5)***

This was also reinforced by GPs who had received feedback from their patients. There was a consensus that the COTS was effective at establishing the most suitable management options for patients with OA via thorough clinical assessments. There was positive feedback from GPs using the COTS including its ability to meet the needs of the local community and supporting patients in navigating to the most appropriate management pathway.

In summary, most participants advocated that the COTS was a positive experience in listening and understanding the needs of the patient with OA. They attributed this to having more time to spend with the patient, active listening, prioritising their OA and taking them seriously.

Subtheme three: Supporting service users

The third subtheme refers to participants' thoughts on the impact of the COTS service in being able to provide support to service users which include both GPs and patients alike. With the expected increase in prevalence of musculoskeletal conditions, the public expectations and demands on GPs is set to rise. Although not all, many GPs have limited training and interest to deal with musculoskeletal complaints effectively. There was a consensus from GPs referring into the COTS that it provided them with an additional way of providing support for their musculoskeletal patients. This included assisting with further diagnosis and clinical decision making around musculoskeletal management plans for their patients:

> *'I think as a GP it's really hard because you're sitting there any someone is talking to you about how awful things are for them and you want to have a solution. So having a referral like that is a great option. I think it's fantastic I think it should be available for, you know, I think, we having allied health involved in assessment of areas where they're really skilled is really appropriate.'* ***(S4 P1)***

Physiotherapy managers also recognised the additional support provided by COTS and the impact the service could have on both patients and providers. They acknowledged the skills of the physiotherapist in being able to provide support to patients on a number of levels. One manager discussed the attributes of physiotherapists in being able to support the whole person through effective communication and being able to have a wider well-being conversation about managing their OA.

Having support in their OA management was particularly important to participants. Patients who had seen a physiotherapist in the COTS service also felt supported in their OA management plan as opposed to a patient who was seen in orthopaedics. The patient who was seen in COTS addressed the benefits of being referred to community rehabilitation programmes in which there would be ongoing support throughout their whole journey whereas the patients journeying through the orthopaedic system described their disappointment in the lack of assistance after being discharged following their FSA. As well as providing support directly for their OA, participants also described the impact of the COTS in being able to provide patients with support in navigating the complexities of the public health system. As previously described, the New Zealand public health system is a complex network of organisations. Due to this, patients often find it difficult to know how and when to enter and require support in getting timely and appropriate intervention. One physiotherapy manager and one GP were positive that the COTS would help guide patients to the most appropriate intervention for their needs and support them in having a positive experience:

> *'Because it's nice for us as well to say look patients have had a really good experience with this you know, this is why I'm sending you this way it's really nice. Rather than sending it into the abyss of the hospital system and not knowing what happens.'* ***(S4 P1)***

In summary, participants felt the COTS could provide support in the management of patients with OA. There was positive feedback that the COTS could provide GPs with additional support including assisting with further diagnosis and clinical decision making around musculoskeletal pain. Patients journeying through the COTS felt supported in the care they received, and their journey through the health system.

Subtheme four: Building healthy relationships

The fourth subtheme refers to the impact of the COTS service in being able to build and nurture healthy relationships. This was discussed in relation to relationships between physiotherapist and orthopaedic surgeon as well as bridging the relationship between primary and secondary care services. It was recognised by physiotherapy managers that prior to the implementation of the COTS, there was a hierarchical divide between physiotherapy and orthopaedics in which a power imbalance existed:

> *'the relationship or with the whole kind of medical model we were entrenched in that was a problem we were trying to get over the line. So that was a challenge initially in having that kind of parent-child type of relationship.'* ***(S3 P3)***

There was acknowledgment from all physiotherapy managers about the importance of building a strong connection between physiotherapists and orthopaedic surgeons moving forwards. There was discussion about how the implementation of the COTS has the potential to directly impact these relationships through shifting hierarchical boundaries, building trust, improving communication streams, and gaining respect.

There was a consensus how the COTS could help improve historically poor relationships between the two departments:

> *'I think continued acceptance from orthopaedics. I think what we will see as I'm hoping this continues to be successful is that we will have, an increase in relationships with consultants.'* ***(S3 P4)***

There was also discussion in from participants regarding the COTS being able to build relationships between primary and secondary care. Participants referred to the COTS in bridging the gap between services and improving patient access to secondary care services that they otherwise wouldn't have been able to. One GP was hopeful that having the new service would improve management options for patients by improving the access to services that they would normally be declined from.

In summary, participants identified the importance of having strong relationships between physiotherapy and orthopaedics and the impact of the COTS in shifting hierarchical boundaries, building trust, improving communication streams, and gaining respect.

Subtheme five: Prioritising OA education

The final subtheme reflects the general agreement that participants identified a need for further education regarding OA. As identified in chapter one, the discrepancy between the evidence-based guidelines and clinical practice suggests problems with the implementation of comprehensive OA guidelines within New Zealand primary care. Without adequate information and early education from health professionals, people do not know what they should and should not do for OA. Consequently, they avoid activity for fear of causing harm. Providing reassurance and clear advice about the value of core treatments in controlling symptoms, may encourage an improvement in condition management. This is highlighted by participants when they were asked about their hip or knee OA. Patients had a lack of understanding and described negative perceptions towards their condition such as feeling their joint is wearing out:

> *'It's getting worn away, it's wearing out.'* ***(S1 P2)***

The lack of OA information and education was an area of concern for participants who had journeyed through the orthopaedic system. This was mainly attributed to the lack of time in their appointment and the focus on surgical intervention. One participant highlighted the impact of a lack of information following their orthopaedic appointment and the importance of education in being able to manage more their OA effectively and feel more empowered:

> *'it's the unknown that is really the hard to accept, you can't accept unknown if it's something in the back of your mind that keeps tugging at you and if you can… I mean information, knowledge is power isn't it and if you've got information, if you've got the knowledge that can then turn into a bit of understanding and if you apply that to your life'* ***(S2 P3)***

As discussed in previous chapters, there are comprehensive guidelines that support core treatment of weight loss, patient education and exercise for lower limb OA. Despite these recommendations, there is evidence that guidelines are underutilised by medical professionals with a low uptake of core nonpharmacological measures in primary care. There was discussion from participants regarding their experience of seeing their GP about their OA. Participants commented on how their GP provided them with little information on managing their condition. When asked about their previous treatment, participants mainly described only receiving analgesia or receiving no treatment at all. Participants who had been seen in the COTS regarding their OA made comment on the value of receiving information about their condition and how this had a positive impact on their outcome. There was a general consensus that being educated about and understanding their OA allowed patients to feel more in control about their condition. Three patients showed satisfaction in the amount of information they received in their COTS appointment and how that equipped them with the tools to continue to self manage:

> *'Yeah no she was really good. She explained everything really well. Did the examinations and everything so yeah no that was good. Yep. She covered everything that you sort of needed to know.'* ***(S1 P4)***

In summary, participants identified the value of OA education in being able to manage their condition. Patients who had been seen in the COTS were satisfied with the amount of information they received and how this positively impacted on their management. Patients highlighted the lack of information available when seeing doctors and attributed this to the lack of time available in their appointment.

Chapter 5 Discussion

5.1 Introduction

This chapter presents the main findings relating to the research question *'What is the impact of a Community Orthopaedic Triage Service in the management of hip and knee osteoarthritis in the New Zealand public health system?'*. This thesis has provided an evaluation of the COTS at the BOPDHB during the period of September 2020 to September 2021 with attention to both quantitative and qualitative data. The quantitative and qualitative data has been analysed and the results from both sections will now be woven together to form the final discussion. The aim of the study was to examine the impact of the COTS to patients, staff, and stakeholders. To the best of our knowledge, this is the first time a New Zealand APP clinic has been established in a community setting independent of a hospital network and offers several potential advantages. The study contributes to a better understanding to the impact of an APP mode of care for hip and knee OA including how it affects experience, waiting times, quality of care and resource use. The findings are discussed in relation to the current literature on evaluations of OA models of care. Following this, the strengths and limitations of this research will be discussed and the implications of the study and contribution to further practice will be considered.

5.2 Impact to patients

The study has reported multiple benefits of the COTS to patients regarding their hip or knee care trajectory. The benefits reported in the literature are multifaceted and will now be discussed in greater depth.

5.2.1 Experience

The aim of this study was to explore the impact of the COTS to patients in order to better understand their experience of their health journey regarding their OA. With the introduction of new care pathways, it is critical to capture the patient's perspective on the care they receive and integrating their voices into the decision making where possible (Carr-Hill, 1992; Dickinson et al., 2015). Measuring patient experience has been reported as a key component in informing healthcare quality (Button et al., 2019). Previous well conducted research evaluating OA triage pathways in Canada and Australia have considered patient perspectives using these models and have found that patients report many positive experiences with an APP model of care (Cavka et al., 2015; Gibbs et al., 2020; Gillis et al., 2014). Consistent with the literature, our findings also reported positive experiences when using the COTS service and being assessed by a physiotherapist. Experiences with orthopaedic services tended to be variable and unpredictable. As seen in previous research, there are multiple factors in our findings that contribute to the overall positive patient experience, and these shall be discussed further.

Increase in patient education

The lack of OA education provided within the current primary care pathway was a concern for patient participants as seen as a subtheme, *prioritising OA education,* arising in theme three. Participants attributed this to the potential lack of understanding regarding the conservative management of OA by some medical professionals. This is consistent with previous literature that has shown GPs have low confidence in OA management including the ability to appropriately diagnose and treat (Briggs et al., 2019). Gillis et al. (2014) found that having opportunities for education and asking questions were a major contributing factor to patients having a positive experience in an APP model of care for OA. Our results also show that education regarding OA during their appointment contributed to the patient having a positive experience. Patient participants expressed value in having the opportunity to ask questions and were grateful for the information and education they received. The present study raises the possibility that an APP model of care in New Zealand can embed best practice on OA management such as providing reassurance and clear advice about the value of core treatments in controlling symptoms and may encourage an improvement in condition management (McAlindon et al., 2014; The National Institute of Clinical Excellence, 2014). Given that only 33% of patients referred to an orthopaedic surgeon for consideration of joint replacement were surgical candidates, (McHugh et al., 2011) and considering the evidence above, the APP model may facilitate in changing the narrative regarding OA through evidence-based education.

Improved communication

Previous research has found that patients attributed their positive experience in a triage pathway to effective communication between patient and therapist (Gibbs et al., 2020). Related to the third theme, patient participants living with hip or knee pain strongly emphasised the importance of being listened to and taken seriously when attending an appointment with a medical professional. When patients with chronic disease are listened to, they feel understood and subsequently their needs are met (Bradshaw, Siddiqui, Greenfield, & Sharma, 2022; Hawker, 2009). Theme three, subtheme two: *listening to and understanding patient needs*, reflects how effective communication can ensure that thoughts, opinions and knowledge are exchanged and the messages that are delivered are received with clarity and purpose. The opportunity to participate in the clinical decision-making was a priority in one of the sub themes arising in our study, highlighting the impact of effective communication directly to the patient’s experience. Engaging in active listening plays an integral part of effective communication and is an important skill in improving patient relationships and building trust (Hawker, 2009). This study supports that the COTS model has the potential to improve communication between patient and provider thus having a positive impact to the patient journey.

Longer assessments

Recent media statements have reported due to a pressured health system and the impact of the COVID-19 pandemic, orthopaedic outpatient departments are currently at capacity in their ability to provide a surgical FSA (Cook, 2022). To improve healthcare access for growing patient populations and maximize resources, healthcare systems leverage shorter appointment lengths to compensate (Swanson, Matulis III, & McCoy, 2022). Limiting the time spent with patients when evaluating health needs may adversely affect quality of care and increase subsequent healthcare resources (Thompson et al., 2016). Findings from this study and previous research (Anderson et al., 2007; Gibbs et al., 2020; Thompson et al., 2016) indicate that ensuring sufficient face to face consultation time may be key to high patient acceptability and improved experience. Additionally, Thompson et al. (2016) linked patients’ quality of care to the length of APP appointments. They reported that facilitating greater clinical discussion and patient involvement can foster patient participation and a more productive clinical relationship with the APP than with the surgeon (Thompson et al., 2016). The current study supports previous literature that having longer orthopaedic assessment facilitated by APPs provides the patient with reassurance and confidence that their OA will be managed appropriately without the need for surgical opinion. This has the potential to lessen the load by freeing up surgeons for more complex cases or increasing time spent in theatre. However, having longer assessments also comes with associated costs. This suggests that although having a triage model of care is not necessarily cost saving at the source, they are potentially cost effective by reducing the intervention and costs further downstream in the patient's journey.

Providing care closer to home

Primary health care strategy in New Zealand has a strong focus on providing comprehensive health services within the local community (King, 2001). Making services easier to access allows people to improve their health, keep them well and co-ordinate ongoing care (King, 2001). In aligning with this, the Bay of Plenty strategic health service plan is committed to develop a smart, fully integrated system to provide care close to where people live, learn, work and play (Bay of Plenty District Health Board, 2017). This involves improving access to care and providing more services in a wide range of community settings that are closer to home. Previous research on APP models of care have shown patients have a superior experience when they attend a community clinic as opposed to a hospital for assessment of their hip or knee pain (Gibbs et al., 2020; Gillis et al., 2014). It has been found that distance is a significant barrier to accessing the most appropriate care (Gillis et al., 2014). Similarly, a subtheme that emerged from the interview data was related to travel distance for care. The COTS model allowed patients to have assessments within their own community without the need for unnecessary travel into the hospital. In line with other literature, patient participants attributed their positive views of the APP model of care to this ease of access and appears to have been a determining factor in their overall experience. This not only aligns with national and local policy but suggests the setting of an appointment may have an influence on the outcome and acceptability of the service.

5.2.2 Time

Early access to care from a health professional with the appropriate clinical assessment skills and knowledge base has been highly regarded in the literature (Gillis et al., 2014). While many strategies have been put in place to try and reduce waiting time across the country, wait times for initial assessments in orthopaedic services in New Zealand remain longer than anticipated (Cook, 2022). Data has shown waiting times for FSAs have trebled since 2020 due to the rising population and the COVID-19 pandemic (Abbott et al., 2022). When a patient waits longer than six months to be seen, there is a risk of significant functional decline (Mahon et al., 2002). This includes important loss of functional mobility and health related quality of life (Morris et al., 2018; Morris et al., 2017). Reduction in wait time for first assessment is a positive outcome demonstrated in the literature for APP models of care managing hip and knee pain when the APP acts as a gatekeeper to orthopaedic services (Aiken et al., 2009; Cavka et al., 2015; Doerr et al., 2012; Farrar et al., 2014). Consistent with these findings, and in line with theme three subtheme two, patient participants discussed how long waiting times can lead to poorer outcomes and a reduction in quality of life. Participants were pleased with the short wait time in the COTS and felt this contributed to their overall positive experience using this pathway. Our study has shown that the average wait time to be seen in COTS was 37 days compared to 156 days in orthopaedics with a statistically significant difference (p-value<0.0001) in mean waiting times across the 3 groups. This supports the work of Gibbs et al. (2020) which shows waiting times are significantly shorter in models of care delivered in the community. When implementing new models of care for OA, organisations should consider the impact of community delivered services as an alternative to hospital delivered models in reducing the wait time to first assessment.

Results of our study have also shown an increase in orthopaedic waiting times during the implementation of COTS. This is contrary to results by Aiken et al. (2009) who have shown the number of patients on orthopaedic waiting lists reduced when implementing a similar model of care. Our results are likely attributed to several factors including the underlying region population growth and the significant reduction in orthopaedic productivity during the COVID-19 pandemic (Bowman, Bolam, & Wright, 2022). It may also be attributed to the design on the COTS, with the two referral point access to orthopaedic assessment rather than the APP acting in a gatekeeping role. However, with its ability to provide much earlier assessments, adoption of a COTS model in a post pandemic health system could assist with facilitating access to the most appropriate intervention in a timelier manner, thus improving the musculoskeletal health of all New Zealanders.

5.2.3 Equity

Recent reports have identified stark inequities in accessing healthcare between Māori and non-Māori communities particularly regarding the onward referral for surgical care (Abbott et al., 2022). The articles of Te Tiriti o Waitangi signed in 1840 have been interpreted and expressed through a set of principles. They provide direction for the wider health care system and provide a framework for how health professionals meet their obligations to the Treaty in their day-to-day work (Waitangi Tribunal, 2019). Identified as one of the founding principles by the 2019 Hauora report, equity in health requires the Crown to commit to achieving equitable health outcomes for Māori (Waitangi Tribunal, 2019). Recent literature has anticipated the APP role to improve the accessibility of healthcare and provide equality and equity of healthcare to Māori populations (Naik, 2021). An exploratory case study by Naik (2021) has reported that participants have identified the need for upskilling of the allied health workforce to meet the healthcare needs and deliver equity within services. Previous literature has also showed the placement of fully funded physiotherapy services within high deprivation areas improved access particularly for minority ethnic groups living in New Zealand (Perry et al., 2015) Additionally, the well conducted evaluation of the MAP has provided evidence of targeted increase in Māori participation in OA programmes of care (Allen and Clark, 2021). Although evaluating equity was not an initial aim of this study, our study has shown that patients who accessed the COTS service for hip and knee pain were reflective of the demographics of the Bay of Plenty region with 22% of patients identifying as Māori. This was also an increase on patients who were seen in orthopaedics with only 16% reported as Māori, lower than the reported population demographics of 25.6%. Having orthopaedic triage clinics located in the community may improve access for Māori through the mitigation of significant financial, cultural, and geographical barriers to accessing care.

Te Tiriti o Waitangi also acknowledges the principle of partnership, which requires the Crown and Māori to work in partnership in the governance, design, delivery, and monitoring of health and disability services (Waitangi Tribunal, 2019). The Treaty of Waitangi acknowledges Māori as Tāngata Whenua and reinforces Māori participation in determining processes for best practice, and partnership with non-Māori with these aspirations in mind (The Health Research Council of New Zealand, 2010). Therefore, it is imperative that further consultation should be sought from Māori health services with respect to co-designing further expansions of this pathway. Further research is also required to explore the impact of the COTS using a Kaupapa Māori evaluative lens.

5.2.4 Access to intervention

MoH policy has recognised that identifying problems earlier in the disease process means they can be managed more effectively (The Ministry of Health, 2011a). To align with this, the Mobility Action Plan (MAP) established in 2015 was designed to respond to specific challenges for patients with mild to moderate OA including the lack of early intervention programmes and increasing demand for health services for musculoskeletal conditions (The Ministry of Health, 2019b). An evaluation of the MAP has reported it is an effective intervention programme for patients with musculoskeletal conditions such as OA. It has shown to increase healthy behaviours, reduce pain, enhance function and can reduce the need for patients to visit secondary care services such as orthopaedics (Allen and Clark, 2021). Alongside this it showed significant improvements in a patients' ability to self-manage their condition. A feasibility study by Gibbs et al. (2020) evaluated the time to commencing non-surgical management pathways such as the MAP for patients who were assessed in an OA care pathway in the community compared to a hospital setting and found waiting times were significantly shorter in community APP models. This aligns with subtheme one of theme three in which patients seen in the COTS recognise the significance of being seen earlier and the increased opportunity to access appropriate management pathways. They also commented on being seen earlier in the disease process with one participant stating they would recommend others to come into the COTS earlier to avoid the potential of joint replacement in the long term. Data from our study has also shown that the average age for patients seen in orthopaedics was 70.1 years whilst patients seen in COTS was 67.1 years. This may suggest that patients are being referred into the COTS earlier than they would be into orthopaedics, thus improving their care trajectory in accessing conservative management pathways. Although evaluating time to access conservative management programmes was not one of the study aims, further research may want to explore the time from being seen in COTS to the time starting the BOPDHB community OA management programme. This would further support the impact of the COTS in getting the patient the most appropriate management at the right time. In addition, further research may wish to consider evaluating the wait time to commencing non-surgical treatment following a COTS appointment and how this may influence patient outcomes.

Research has shown a link between the provision of community health services and increased rates of accessing care (Bindman et al., 1995). A retrospective study by Perry et al. (2015) has shown that people are more likely to attend a fully funded physiotherapy clinic which is located in close proximity to their physical address. Further studies that have investigated factors in non-attendance to physiotherapy appointments have attributed this to additional time requirements for travel and travel costs. They have also suggested that the addition of health facilities into the community has been shown to increase the access to health services for Māori by addressing barriers such as cost, transport, locality and cultural acceptability (Maniapoto & Gribben, 2003). Transport and cost of travel was an area of importance for patients in subgroups one and two, with multiple references to inconvenience of parking, travel time and cost of attending appointments at the hospital. Patients who attended the COTS based in the community had positive experiences in accessing care suggesting the setting of the service may have an influence on the patient's ability to access intervention. Despite this, our results also show that there were low non-attendance rates in both the community COTS (1%) and hospital delivered FSA (2%). As ethnicity of non-attendance was unable to be extracted from the data, further research needs to consider the impact of the COTS specifically to the non-attendance rates for Māori to support the role of the service in improving access specifically for minority groups.

5.2.5 Satisfaction

In evaluating social programmes, research aimed at determining the overall merit, worth or impact derives from its utility from being openly judgement orientated (Powell, 2006). This includes the intrinsic value of the programme and whether it is meeting the needs for those it is intended (Dickinson et al., 2015; Powell, 2006). Previous literature evaluating the acceptability of APP models of care for OA have included satisfaction from the patient's perspective. Using patient satisfaction helps decide whether a programme is sufficiently effective to be continued or replicated (Powell, 2006). Patient satisfaction in previous studies has been evaluated in several ways including surveys, interviews and open-ended questions (Abbott et al., 2019; Aiken et al., 2008; Aiken et al., 2009; Desmeules et al., 2013; Doerr et al., 2012; Gibbs et al., 2020; Kapakoulakis & Collings, 2011). Results from all studies suggest that patients are as satisfied if not more satisfied seeing a physiotherapist than an orthopaedic surgeon regarding their hip or knee OA. This included satisfaction in knowledge, timely access to care and communication (Aiken et al., 2008; Desmeules et al., 2013; Gibbs et al., 2020). Consistent with other APP models of care, patients were satisfied with the care they received with the majority of comments positive. High levels of acceptability were found across the COTS sites during the participant interviews. However, unlike previous literature evaluating satisfaction (Aiken et al., 2008; Aiken et al., 2009; Desmeules et al., 2013; Doerr et al., 2012; Kapakoulakis & Collings, 2011), this study did not undertake a satisfaction survey with participants which limits its findings. However, with clinical expertise in the management of musculoskeletal conditions such as OA, APPs models of care yield high rates of satisfaction from service users.

5.3 Impact on orthopaedics

The current study has highlighted both positive and negative impacts of the COTS directly on the orthopaedic service and workforce. The impacts of the new service will now be discussed in relation to previous literature and national policy.

5.3.1 Right person, right place, right time

The way healthcare is organised and delivered is important to people with OA and influences their health outcomes. The MoH planned care process as detailed in

Chapter one is a system by which New Zealanders can access publicly funded healthcare services in a timely and respectful way (The Ministry of Health, 2016a). Literature has shown a low conversion rate to surgery of 25%-33%, highlighting that the most appropriate patient is not being referred at the most appropriate time, thus creating a delay for the patients who require surgery the most (McHugh et al., 2011; N. Toms, personal communication, February 9, 2023). Previous literature on APP models of care for OA have shown that physiotherapists can triage patients onto the most appropriate surgical or non-surgical pathway, prioritising patients with the greatest need to be seen by a surgeon (Vedanayagam et al., 2021). The COTS has also shown to have impact in this way. Of the patients seen in the COTS, 29% did not need any further intervention and were referred back to their GP for ongoing management, 26% were referred onto orthopaedics for further investigation and/or surgical opinion and 37% were referred for conservative management. Furthermore, interviewees reported that APPs have the skills to differentiate between non-surgical and surgical pathways and facilitate appropriate management options. This shows the COTS has the potential to improve the quality of the patient referred to orthopaedics by referring the right patient to the most appropriate service in a timely manner. Having a triage service such as the COTS in New Zealand could improve the referral process and health status of patients with OA attending the orthopaedic outpatient department by effectively applying the MoH planned care principles.

A well conducted systematic review on OA models of care have shown APPs have high diagnostic concordance and treatment recommendations with orthopaedic surgeons (Button et al., 2019). This includes support for APPs listing patients for THJR (Parfitt et al., 2012). Despite not comparing diagnosis, our study has also found a high conversion rate to surgery in the APP led pathway. Our results have shown that 80% of patients with hip or knee OA assessed in COTS were appropriate for orthopaedic intervention including being placed on the inpatient treatment list for surgery, received a corticosteroid injection or were referred for further investigation. This suggests that APPs working in the COTS are clinically effective, can improve the quality of the patient referred to the orthopaedic surgeon can subsequently improve the surgical conversion rate. This may allow an increase in productivity, potentially improving patient outcomes in the longer term.

5.3.2 Providing an equal playing field

A principle of the New Zealand prioritisation policy from the MoH is to give the patient certainty that they qualify for surgical intervention (The Ministry of Health, 2007). Unfortunately, literature has shown that 30-40% of patients who have been recommended a total joint replacement do not qualify as they don't reach surgical scoring threshold (Gwynne-Jones et al., 2018). This is reflective of our findings in Theme two, subtheme four, *a frustrating healthcare journey*. Participants in several subgroups made commentary on how frustration is a factor throughout multiple stages of the healthcare journey due to the lack of structure, inequitable access, and discordance. A main finding from participants addressed the current inequity in accessing surgery, referring to the surgical threshold scoring as a game. This was in reference to its unpredictability and variation in scoring between surgeons. Due to the lower access criteria for COTS assessment, there was some indication from participants as to the impact of having an orthopaedic triage system in managing this discordance. By having an independent clinician screening patients into orthopaedics may improve the variation in surgical scoring. However, further research is needed to explore whether this model has any direct impact on orthopaedic outcomes.

It is evident that the New Zealand health system lacks a fair method of financing OA. OA is most commonly of insidious onset but a substantial fraction (12%) of the disease arises secondary to joint trauma (Anderson et al., 2011). If a patient has a pre-requisite ACC covered injury to the knee and subsequently develops OA, ACC is likely to cover the costs of a joint replacement however should a person develop OA insidiously, they are either required to fund the operation completely or be referred into the public system. It therefore appears that the New Zealand health system rewards those having suffered an injury more than those who suffer a non-accident related disease (Flood, 2000). Research on OA models of care have suggested that having various health funding models operating within the same system has led to dichotomy within the New Zealand health system in accessing surgery for OA due to a lack of policy framework (Baldwin et al., 2017). To our knowledge, no studies have explored this dichotomy in the management of OA models of care. There was reference to the dichotomous health systems in the participant interviews with both patients and stakeholders commenting on the lack of consistency between organisations, causing inequity in accessing care. Although participants made commentary on the potential of the COTS to have a positive impact on future access to OA care, further research is needed to determine the impact of a COTS in improving health inequity by exploring integration of a public and ACC partnership.

5.3.3 Freeing up surgeons

With a growing unmet need for secondary care consultations, new models of care for OA have focused on utilising APPs to free up surgeon time in outpatient clinics. Previous studies have reported that the implementation of a joint clinic resulted in an improved efficiency in appointment resources by increasing capacity of the orthopaedic department to provide FSAs (Abbott et al., 2019). A systematic review of systematic reviews has shown that APP led triage services can reduce the load on orthopaedic surgeons which resultantly allows more time to perform surgery (Vedanayagam et al., 2021). The results of our study found that only 26% of patients assessed in COTS were referred onto orthopaedics for further investigation and/or surgical opinion, suggesting an APP has the potential over time to reduce the number of patients being seen by the surgeon thus freeing up surgeon time. It also suggested that the COTS had the capacity to deliver an additional 50% in orthopaedic FSAs, targeting the unmet need. However, due to the design of the current COTS during this evaluation, there was also access to orthopaedics via the traditional pathway. Due to this, a further 1362 patients received an FSA in orthopaedics with hip or knee joint OA suggesting an increase in the need for orthopaedic FSA. Interviewees in our study also voiced concern over the impact of the COTS in increasing surgeon workload in an already pressured system. Our findings suggest that having a triage service with two referral entry points has the potential to increase the workload of the surgeons by servicing the unmet need via lower access criteria. For APPs to have impact in freeing up surgeon time, future services should consider a single-entry access point for referrals from primary care. Alongside this, additional surgical resources must be provided to allow the surgeon to shift from clinic into the operating theatre. Therefore, unlike previous literature our study cannot confirm the COTS has true impact in freeing up surgeon time. If a single-entry access point was implemented at the time of this evaluation, the COTS had the potential to see 50% of the FSA for hip and knee OA which could have significant implications to surgical resources.

5.4 Impact to the organisation and its staff

This evaluation has identified potential impacts of the COTS directly to the DHB as an organisation and to its physiotherapy workforce. The potential impacts of the COTS with now be discussed in relation to previous literature and national policy.

5.4.1 Cost

Due to an aging population, increase in incidence of OA and lack of access to care, the financial demand for musculoskeletal care is rising (Deloitte Access Economics, 2018). The planning and delivering of services that meet the needs of future healthcare is critical in reducing the economic burden (The Ministry of Health, 2011a). The New Zealand health strategy supports the development of innovative healthcare roles to meet the needs of the population in a timely and cost-effective manner (The Ministry of Health, 2011a). The musculoskeletal workforce review has identified the impact of APPs to undertake roles traditionally performed by orthopaedic surgeons to assist with fiscal restraints (The Ministry of Health, 2011b). There has been some overseas literature that has suggested APP roles in OA models of care are cost effective although this is difficult to generalise due to variability between pathways (Gwynne-Jones et al., 2018; Ho-Henriksson et al., 2022; Parfitt et al., 2012). These cost savings have been attributed to the reduction in orthopaedic appointments, lower salaries of APP's compared to surgeons, and improved conversion rate to surgery (Gwynne-Jones et al., 2018; Ho-Henriksson et al., 2022; Parfitt et al., 2012). The impact of the COTS on influencing health expenditure was identified in subtheme three of theme two. Interviewees in the current study stated that there were potential cost benefits to the implementation of physiotherapy led orthopaedic triages services. However, there was also concern that the COTS had the potential to increase costs and interviewees attributed this to increase in physiotherapist resources, project support and administration time. Unlike previous literature that has calculated the impact of orthopaedic triage services on cost (Gwynne-Jones et al., 2018) this study has not evaluated the direct cost of an orthopaedic triage service to the public health system. Thus, no conclusions can be drawn as to the potential effectiveness of care or cost benefit of the pathway and neither did we endeavour to capture or measure true costs in this study. Further literature should consider exploring whether the COTS is cost effective.

5.4.2 Utilising physiotherapy at top of scope

There are opportunities in New Zealand to better utilise the skills and expertise of other clinicians for first specialist appointments. New Zealand health documents have identified the importance of training alternative health professionals to free up the time of specialists to manage the more complex patients (The Ministry of Health, 2011b). MoH policy supports the transformational changes through collaboration between varied professionals which fosters co-designing clinical pathways to improve patient access and journey within the public health system (The Ministry of Health, 2011a). Additionally, the musculoskeletal workforce services review has supported the integration of APPs into first contact models due to their expertise in managing musculoskeletal conditions (The Ministry of Health, 2011b). Previous research, conducted in a clinical environment in other high-income countries, has evaluated APPs delivering FSAs and has found this model to be acceptable in their care trajectory (Button et al., 2019). Literature has shown APPs are professionally competent in working in these models including their agreement in treatment recommendations, diagnostic concordance with orthopaedic surgeons and investigative accuracy (Aiken et al., 2008; Décary et al., 2017; Decary et al., 2016; Desmeules et al., 2013; MacKay et al., 2009). This study is consistent with these findings and supports the use of physiotherapists to provide first specialist appointments by patients, staff and stakeholders. Subtheme one, *unlocking physiotherapy potential,* has demonstrated that patients did not have a preference as to which professional they saw as long as they received the appropriate advice and treatment. Additionally, interviewees were more satisfied with the care they received from the APP compared to an orthopaedic surgeon. Positive perceptions of the physiotherapy profession within the COTS could impact future health care delivery by favouring a quicker and wider implementation of APP models of care across the country. This research suggests that APPs have high acceptability in OA models of care from the patient perspective and would be a favourable and safe phenomenon for integration into clinical practice in a New Zealand context.

Other high-income countries that have evaluated OA triage models of care have used the APP title to encompass physiotherapists that have a specialist skillset, post graduate education, and extended clinical experience. These titles have been endorsed by their professional bodies thus forming clear boundaries in scope of practice and providing a structured career pathway for clinicians (Chartered Society of Physiotherapy, 2016). New Zealand physiotherapists currently working in the public sector do not have a clear education framework or career pathway to progress to an APP role. Alongside this, there is a lack of consistent terminology in these roles throughout the public sector, making application and evaluation across health boards problematic. As the Physiotherapy Board of New Zealand places a 'specialist physiotherapist' at the top of scope within the physiotherapy career pathway (The Physiotherapy Board of New Zealand, 2019), the APP titling is not analogous among professional bodies and has potential to cause confusion for service users and stake holders. Interviewees in our study recognise the lack of clarity around the APP title amongst DHBs in New Zealand. Due to this, they recognise a lack of frameworks available on the clinical training required to work in such capacity and interviewees argued that APP roles in New Zealand should be created in terms of professional boundaries. Participants also identified that APPs working in this way is a new concept for the New Zealand public, potentially making initial acceptability difficult. However, participants are hopeful that having a service such as the COTS may impact the future development of the APP role whilst providing a platform to showcase their ability without the need for orthopaedic oversight. The implementation of the COTS may have the potential to impact a cultural and organisational shift, allowing for an improved career pathway and promotion of the physiotherapy profession amongst the New Zealand public. Although the New Zealand Board of Physiotherapy have recently introduced these titles, there has been little uptake, and these findings may facilitate the introduction of these roles into clinical practice. However, research has also suggested that future decisions of APP pathways must have a clear understanding of the APP role, ongoing learning needs and clinical expertise within this structure as the design of these pathways is unlikely to be as simple as substituting surgeon with physiotherapist (Naik, 2021).

5.4.3 Building relationships

Meaningful integration of APP models of care within a multidisciplinary team is a time-consuming and complex undertaking. It requires support and investment from all professionals involved to become successful. Cavka et al. (2015) identified that orthopaedic surgeon engagement was critical to the success of a comprehensive hip and knee service whilst Dawson and Ghazi (2004) and Naik (2021) found the physiotherapists success was dependant on their relationship with the surgeon. The development of a successful and sustainable model of care has been attributed to the inclusion of academics, experienced clinicians, government representatives and hospital management (Cavka et al., 2015). The current study identified the theme *building healthy relationships* from the data, relating to the impact of the COTS service in being able to build and nurture healthy relationships between health disciplines through shifting hierarchical boundaries, building trust, improving communication streams, and gaining respect. However, as discussed by Naik (2021), our study also highlighted some reservations regarding inter-professional barriers with interviewees discussing the potential pushback from orthopaedics regarding jurisdictional control. This highlights the significance of the partnership required between APP and surgeon in ensuring the model is achieving maximum impact to the organisation and its population. Further work is required to understand this clinical relationship and how the skillset of physiotherapist and orthopaedic surgeon are most effectively utilised in a triage capacity.

As previously discussed in chapter one, the role of the APP within the context of the COTS were developed as a reactive need of the organisation. Having this role is in line with previous literature that have utilised the title of APP in triage models of care for OA of the hip and knee (Aiken et al., 2009; Cavka et al., 2015). A survey on the acceptability of advanced practice physiotherapists of patients with musculoskeletal disorders has shown that the perception of physiotherapy professional practice by the population is important as it may facilitate changes to occur in the profession, build trust and improve confidence (Desjardins-Charbonneau, Roy, Thibault, Ciccone, & Desmeules, 2016). Other literature has shown high acceptability of the delegation of medical roles to experienced physiotherapists (Desmeules et al., 2012). Participants in this study highlighted that having the APP designation within the COTS engendered trust from the orthopaedic surgeons due to having quality assurance and minimum standards frameworks. Participants emphasised how this successfully facilitated the integration of the service into clinical practice. The development of trusting clinical relationships and confidence in the APP skill sets is mandatory in ensuring the success and sustainability of this model of care.

5.5 Impact to stakeholders

Stakeholders using the new model of care have identified the potential impacts of the COTS in the primary care workspace. This includes both enablers and barriers to accessing care and providing additional support. This will now be discussed in further detail.

5.5.1 Bridging the gap

New Zealand's health system has been reported as providing highly fragmented, poorly co-ordinated services to service users (Cumming, 2011). This arises because service users receive care from a wide range of professionals working in many provider organisations and often in siloed situations. An ongoing policy challenge has been how to reduce such fragmentation and achieve more integrated and co-ordinated care that provides a smooth transition between primary and secondary health services (Cumming, 2011). In OA management, previous literature has identified that a joint clinic can satisfactorily bridge the gap in care of those with OA in a secondary care setting and received welcome support from GPs in primary care (Abbott et al., 2019). Other research has identified physiotherapists with specialist training are well accepted members of the orthopaedic workforce, enhancing integration between primary and secondary care services (Vedanayagam et al., 2021; Williams, Stotter, Hefford, Warren, & Darlow, 2019). Although funded by secondary care, to the best of our knowledge, our study is the first time an orthopaedic triage service delivered by APPs in New Zealand has provided this model in a community setting. Our data indicated that the COTS was also perceived to bridge the gap in care of those with OA of the hip and knee. Our data has shown that the COTS can impact stakeholders by assisting in navigating the complexities of the public health system through improved communication channels and lower access criteria. The present study raises the possibility that a triage model can improve the care transition from primary to secondary services through the application of a specialist interface assessment service.

5.5.2 Providing support

With the expected increase in prevalence of musculoskeletal conditions, the public expectations and demands on GPs is set to rise (Bishop et al., 2013). Many GPs have limited training and interest to deal with musculoskeletal complaints effectively (Lanyon, Pope, & Croft, 1995). Previous literature has suggested that APPs working in primary care can support GPs in their management of musculoskeletal conditions by generating efficiency across the whole musculoskeletal pathway including diagnostics and secondary care referral (Mercer & Hensman-Crook, 2022). Further literature has shown an OA model of care was enormously valuable and provided welcome support for GPs (Abbott et al., 2019). *Supporting service users*, a subtheme of theme three contributes to the existing knowledge of Abbott et al. (2019) by showing the impact of APPs situated as an interface between primary and secondary care services. This study demonstrates the impact of APPs to a GP in a New Zealand context, which included assisting with further diagnosis and clinical decision making around musculoskeletal management plans for their patients. By providing a triage service which supports GPs and patients alike may assist in changing the narrative regarding long term musculoskeletal disease and improve symptom management. However, previous literature in the Netherlands has identified that implementing an APP model in primary care is challenging, in part, because some GPs appear reluctant to hand over control of elements of patient care to APPs (Pellekooren et al., 2022). To build trust and relationships with GPs, specific training requirements and capabilities for these roles must be established to provide quality assurance prior to implementing these models into primary care.

5.5.3 Adding another hurdle

Despite the advantages of APP models of care for OA, previous literature which has explored GP acceptability have reported some clinicians describing the model as a *‘waste of time and money’* (Gibbs et al., 2020). Although GPs using the COTS did not have such negative views, our study highlighted some concern that the pathway may impact access by merely shifting the waiting list from orthopaedics to COTS, subsequently having no intended benefit to the patient. This is consistent with previous literature on acceptability that found GPs using a similar model described it as a delaying tactic by secondary care to prevent patients from reaching orthopaedics (Abbott et al., 2019). Due to our model having multiple entry points into orthopaedics combined with the pre-determined collection of the quantitative data, it is difficult to determine from our study whether the new model of care adds another barrier to patients accessing a surgical opinion. It would be beneficial to evaluate the waiting time for specialist opinion once a patient had been triaged by the COTS system to quantify whether this pathway has an impact on access. These results would provide confidence to the GPs and further impact the acceptability of the model.

5.6 Impact to New Zealand

It has been identified that the COTS could have national impact through its application of local and national policy. This includes its potential ability to drive change in the current planned care processes and standardise care across the public health landscape. The impact of this will now be discussed.

5.6.1 Driving national health priority

Despite the prevalence and financial burden of the disease, the New Zealand public health system has yet to adopt a national model of care for OA management. The current OA management around the country has been described as fragmented and episodic, with ‘little inter-disciplinary collaboration to support optimal care’ (Baldwin et al., 2017). Key reports around the world identify the management of musculoskeletal disease such as OA as a major health priority (European Action Report, 2017). The Clinical Care Standards for knee OA released in Australia, provide a focus on improving the standardisation of care across the country and have led to several Australian states developing local models of care to guide service delivery (Australian Commission on Safety and Quality in Health Care, 2017; New South Wales Agency for Clinical Innovation, 2012). Research that has evaluated these models of care have shown APPs working in these roles are highly accepted by patients and stakeholders (Gibbs et al., 2020). Interviewees in our study describe how this model may have impact on driving national health priority, increasing the significance placed on OA as a health condition and the ability to formulate individualised management plans.

Considering the global acceptance in OA models of care as a health reform enabler, the findings in this study provide a new understanding of OA models of care and add to the growing body of evidence towards a paradigm shift in OA management in the New Zealand health system.

The burden of COVID-19 has had substantial impact to the public health system including significantly increasing waiting times in accessing planned care. It has affected the ability for surgeons to provide the most appropriate care for their patients. This includes the ability for orthopaedic surgeons to provide timely FSAs for consideration of total joint replacements and conducting the surgery. Media reports have acknowledged that COVID-19 has complicated an already under-resourced and pressured orthopaedic system (Otago Daily Times, 2021). Research has supported that deferring orthopaedic surgery is not the answer and there are significant consequences to delaying intervention (Blackett et al., 2014). Orthopaedic triage models of care such as the COTS may have short- and long-term advantages in assisting with the management of waiting lists in the post pandemic recovery. This includes being able to assist with triaging surgical and non-surgical patients onto the most appropriate management pathways. The MoH should consider these models as a facilitator is managing the excess orthopaedic demand in the post pandemic health system.

As previously identified in chapter one, the recent seismic change in the New Zealand health system has seen a recentralisation of publicly funded health services with a merge of all publicly owned hospitals into a single entity. This new structure has been designed to address access barriers to health services by drawing on expertise from around the country in order to develop more streamlined approaches to service planning and delivery (Tenbensel, Cumming, & Willing, 2023). Several OA national models of care have been developed and implemented in Australia, the UK and Europe with literature showing improved patient outcomes and care delivery, as well as a reduction in the number of patients requiring joint replacement surgery (Abbott et al., 2022). As discussed by participants in this study and by Baldwin et al. (2017) having a national model of care for OA such as the COTS in New Zealand could be a step in the right direction in improving the care for patients without reinventing the wheel in each district. Evaluations of models of care can report on the operational elements of care including what the care components should be as well as how to deliver them. The timeliness of the health reform including the establishment of a new central organisation has the potential to improve consistency across the country on OA models of care through a streamlined national approach.

Establishment of the Māori Health Authority has been created as part of the recent health reform to drive transformational change within the national health system and monitor and improve the health and wellbeing for Māori (The New Zealand Government, 2022c). The reduction of inequities in accessing care is a central policy priority for the restructured system. The lack of co-design in this model of care is an area of weakness of this study due to the service already being delivered prior to the commencement of the research. Co-designing OA models of care such as the COTS is an integral factor to any further expansion or national rollout. The recent health reform may facilitate the integration of health and social services locally, with local Māori and community co-design at the forefront.

However, a key challenge for implementation a national OA model of care under the new health reform is whether it can recruit more APPs to under-served areas particularly in the context of national shortages of allied health professionals (New Zealand Doctor, 2023). In line with the work of Naik (2021) an APP role is effective in improving patient flow and adding value to the clinical and operational demands of health care. Our research highlights the potential benefits of using physiotherapists a top of scope to complete tasks usually done by a medical professional. However, further consideration of the role of the APP needs to be considered to whether this is a sustainable solution for a national rollout. Using experienced physiotherapists with competency-based training is legislatively more straightforward and more sustainable in OA models of care. Utilising experienced physiotherapists working in scope as opposed to APPs should be considered in an expansion of this model.

5.7 Impact of the COVID-19 pandemic

Prior to the COVID-19 pandemic, hospital waiting lists were barely keeping up with the population growth and demand for care (The New Zealand Government, 2011)This has been further exacerbated by the pandemic, with literature reporting the number of people waiting longer than 4 months for treatment has more than trebled since 2020 (Abbott et al., 2022). A substantial proportion of people waiting for elective procedures are those with musculoskeletal problems including OA, which are amongst the greatest cost category to the New Zealand public health system (The New Zealand Government, 2022b). For OA care, the delays experienced from the COVID-19 pandemic have simply compounded what was already a growing problem. The inability to access appropriate care for OA has recently been recognised by government as a growing problem and a new task force has been commissioned in implementing change (Abbott et al., 2022).

The COVID-19 pandemic has also had impact on the delivery of the COTS and orthopaedic services. During the running of the COTS, there was further change to the New Zealand alert levels with the Bay of Plenty moving to alert level two in February 2021 and alert level four in September 2021 (The New Zealand Government, 2022a). These dates are highlighted in the quantitative results tables. The measures put in place by New Zealand government during the COVID-19 pandemic impacted on the way consultations were delivered including a move to virtual consultations where possible. Although level two allowed hospital services working as normally as possible, alert level four allowed only urgent acute care to be conducted in person and a postponement of routine care including elective surgeries such as joint replacements (The New Zealand Government, 2022a). The change in levels during the data collection period impacted on referral numbers due to less patients attending their GP and receiving onward referral. It also impacted on the number of FSA's and COTS assessments being delivered during this time. This has been considered when interpreting results.

The COVID-19 pandemic also influenced the writing of this research study. Although the researcher was able to complete patient interviews prior to lockdowns, precautions were taken to ensure that the researcher adhered to local and national guidelines when meeting patients face to face. The lead researcher was also redeployed into ward-based care during the COVID-19 pandemic which reduced the protected time in the writing of this research. There was uncertainty from the researcher during the COVID-19 pandemic on the completion of the thesis due to increased clinical demands and burnout.

5.8 Implications of study and contribution to future practice

This evaluation suggests that APPs working in a COTS have the potential to positively impact the health system and its users in a number of different capacities. With respect to identifying the advantages and disadvantages of an orthopaedic triage services in New Zealand, this study has implications to patients, healthcare organisations, stakeholders, physiotherapy profession, orthopaedics and ongoing research.

5.8.1 Implications for patients

An orthopaedic triage service in the New Zealand public health system has the potential to impact health care by offering timely access to patients presenting with OA of the hip and knee without comprising quality of care. This service can provide an individual opportunity to access the right clinician with the right skills at the right time, whilst improving their experience. APPs have the ability to triage patients to appropriate surgical and non-surgical interventions and improve optimisation prior to consideration of joint replacement. Working in collaboration with patients and their whanau, an APP working in a triage model of care has the potential to improve quality of life through initiation of suitable self-management strategies for long term conditions thus positively impacting on complex co-morbidities.

5.8.2 Implications for organisations

This study highlights the implications for stakeholders planning to implement an APP model of care for OA. The implementation of an APP model of care for OA can assist with meeting MoH targets and incorporating local and national policy. APPs in triage roles appear to improve patient experience, reduce surgical referrals with improved surgical conversion rates for those referred to orthopaedics. The current study has shown that this model has the potential to deliver significant benefits to patient care as an interface service through reducing unnecessary referrals and identifying and providing earlier intervention. This study has demonstrated that surgeons are now seeing the most appropriate patients in clinic, with an increase from 40% to 80% being converted to surgery. Due to the chronic back log, it is possible this service could cause an increase in referrals but once managed, this model then has the potential to reduce volumes of referrals to orthopaedics and reduce the workloads of surgeons and GPs alike. However, it is important for organisations to consider the specifics of these pathways through a clear purpose and service objective to ensure maximum impact. Successful implementation of an APP model of care for OA must also consider investing in conservative management programmes to support its acceptability.

5.8.3 Implications for the physiotherapy profession

An orthopaedic triage service in the New Zealand health system has the potential to increase the visibility and acceptability of physiotherapists working in extended scope roles. This research has supported physiotherapists working as an extension of the orthopaedic workforce can promote high value healthcare. They have unique skills and are clinically effective at triaging patients with OA onto surgical and non-surgical pathways. Following the approval of the APP scope of practice from the physiotherapy Board of New Zealand in 2022, this model can potentially support and fill these roles by providing career progression opportunities for experienced staff. This study has identified specific training requirements and capabilities for these roles must be established to provide quality assurance to stakeholders prior to implementing these models into clinical practice.

5.8.4 Implications for stakeholders

Despite our study being inconclusive to the impact of this model on cost-effectiveness or reducing the demand on orthopaedics, APPs have the potential to impact surgical waiting lists by improving conversion rate to surgery through the triage of surgical and nonsurgical conditions. For APPs to have impact in reducing demand on orthopaedic clinics, stakeholders must consider providing sufficient resources so surgeons can reallocate their capacity to time in theatre. The success of an APP model of care relies heavily on trusting and collaborative relationships with surgeons, stakeholders, and GPs and this should be facilitated early in the design process. APPs can bridge the gap between primary and secondary care whilst providing an improvement in patient experience, however the exact positioning of the APP within an OA model of care is something that could be developed as recent literature has shown support for APPs in first contact practitioner roles in primary care (Mercer, 2022).

5.8.5 Implications for ongoing research

This study will contribute to the existing knowledge on APP models of care for OA specifically in a New Zealand health context. To our knowledge, it is the first study to explore the impact of an APP model of care for OA based in community clinics. It provides support for the development and implementation of APP triage roles which should be further evaluation in ongoing research to imbed their role as standard practice. There is ongoing need for further robust research to explore the clinical and cost-effectiveness of APP models of care for OA and other musculoskeletal conditions in New Zealand specifically regarding their impact on surgical waiting lists and patient quality of life outcomes.

5.9 Methodological strengths and limitations

This section discusses the methodological strengths of this study and potential limitations, including opportunities for further evaluation.

5.9.1 Strengths

The aim of this study was the evaluate the impact of a Community Orthopaedic Triage Service (COTS) in the management of hip and knee OA in the New Zealand public health system. Evaluation research, which can also be referred to as programme evaluation, is an assessment of the impact or worth of a social programme which takes place in an organisational context (Dickinson et al., 2015). A strength of our study is that it is intended to have real world effect and leads to practical applications for DHBs. Several methodological considerations also add to the strength of this study. One strength includes the data collected via semi-structured interviews, which is reported as an excellent method in both process and outcome evaluation. This is because semi-structured interviews are a powerful tool in understanding the thoughts beliefs and experiences of individuals. They foster engagement in deep conversation, allow flexibility and stimulate new ideas. They are generally highly accepted as a powerful qualitative data collection method and are highly appreciated in the power to unfold the meaning of people’s experiences (Creswell & Creswell, 2017). The use of semi-structured interviews adds depth and detail to this evaluation including its ability to add contextual meaning to the quantitative results.

A further methodological strength of the study is the application of a mixed methods design. The use of a mixed methods study in service evaluations is beneficial as it offsets weakness that are inherent to one study design (Creswell & Plano Clark, 2011). Mixing methods adds richer detail by converging the data to draw more credible conclusions. The concurrent mixed methods design also allowed for a time efficient study by collecting both sets of data at the same time.

The application of semi-structured interviews in this study has provided further strengths to this research. The successful recruitment of a large sample of participants has allowed for information richness on the subject matter from a varied cohort of participants. The researcher acknowledges the success of the participant recruitment to the orthopaedic administration staff on their ability to follow the scheduled recruitment process and achieve a diverse sample of participants for each subgroup. This has added value and validity to the study by ensuring that the participants were reflective of the Bay of Plenty population and of participants actively involved in the development and delivery of the COTS.

A final strength of this study is the objectivity of the quantitative data including waiting times and patient outcomes. This has allowed for a large sample size and helped reduce bias in this study. The large sample size has improved the reliability of the results and allowed for generalizability of findings.

5.9.2 Limitations and opportunities

The role of the primary researcher as a clinician and recognised team member within this service was ethically challenging and potentially impacted the engagement of the interview participants. To manage this, the researcher used an independent administrative staff member to assist with recruitment to avoid the potential for the participants to feel obliged to accept the invitation for interview. Due to the researchers’ position, there was also potential for bias during data collection and analysis. The primary researcher had history and familiarity with the research subject, with potentially less ambiguity in interpretation. To try and manage this, the researcher conducted regular reflections, practiced reflexivity, and sought regular feedback from supervisors and colleagues which provided constructive advice. There is opportunity for further research to explore the impact of the service from a neutral standpoint or by someone situated outside of the organisation to further strengthen the findings of this study.

A further limitation is the low response rate from GPs in the request for interview. Due to time constraints, this only allowed for three instead of the planned four semi structured interviews. There is an ever-increasing demand on GPs in daily practice, and this workload pressure may have limited GP availability and flexibility to participant in our research. In addition, the study included only one orthopaedic surgeon. We acknowledge both limitations may have influenced the research findings. Further research should consider including a larger sample size of both GPs and surgeons to allow for further evaluation from a medical perspective.

The quantitative part of this study was limited by the confines of the pre-determined data collection at the BOPDHB. The data analysed in this study was retrieved from an electronic database that records all patient activity including information for audit and evaluation. The data in the database was collected from the patient at the time of their initial assessment and then inputted into the electronic database by administration staff. Using data that has already been pre-determined limits the ability to answer specific research questions and reduces the ability to perform in depth statistical analysis. Due to the unforeseen limited data availability on the quantitative component of this research, the researcher acknowledges the uneven weighting of the data in this triangulation mixed methods design. To mitigate this in the future, dashboards for quantitative data collection with additional measures could be considered to ensure the impact of the service is further validated. Further research could also consider the use of an embedded/nested mixed methods design to account for the different weighting of the data.

Although semi-structured interviews are often an effective way in collecting qualitative data, there were also some limitations in this research method. It can be challenging for newly established qualitative researchers with a limited amount of training to conduct the interviews. To mitigate the lack of experience as a limitation to this study, the primary researcher completed appropriate courses through Auckland University of Technology (AUT) to assist with interview skill acquisition. Another disadvantage of semi-structured interviews is they are time consuming to conduct, interpret and analyse due to the significant amount of data collected. The primary researcher transcribed and analysed the data without the use of electronic software and despite this being a longer process, it significantly helped with familiarisation of the data and cannot be disregarded.

The researcher also acknowledges the three themes within this study are all written with health professional language whereas some sub-themes are illustrated from a patient perspective only. This could be seen as a limitation to this study. This pattern is likely due to the interview subgroups during the data collection and the clinical positioning of the lead researcher during the data analysis. The researcher did consider splitting the analysis into two groups but felt during the data analysis process, the combining of the data allowed greater pattern recognition and the distinguishing of quality themes. The researcher feels the use of both health professional and patient language between the subthemes and themes exemplifies the meaningful aspects within the data when combining the patient subgroups during the analysis phase.

While this study provides an in-depth evaluation of a new model of care for OA including the perspectives of people who participated in it, interviewees were from a single programme conducted in silo at the BOPDHB and caution needs to be exercised when generalising these results to other health boards and international contexts. It does however offer a template for other organisations to determine the impact of this service to their population. There is opportunity for collaboration between DHBs in this domain and is something that should be explored further.

5.10 Reflections of the researcher

My doctoral experience has been a journey of growth on both a personal and professional level. As a physiotherapist, we are historically entrenched in a profession in which RCTs are perceived as the gold standard level of proof in clinical research. Having only previously undertaken research using a quantitative research paradigm, the development and planning of this study has challenged me to explore other ways of knowing through different philosophical paradigms. Arriving at my chosen methodology was not an easy feat, and I acknowledge that there were many other ways in which this topic could have been explored. I am proud of my efforts to move away from traditional physiotherapy research and being able to highlight the value of incorporating the patient voice into the evaluation of new services through qualitative means. I have been lucky to share my doctoral journey with other students within my professional group, which has been invaluable in navigating the complexities of mixed methods research and the balancing act that is work and academia.

Undertaking research in an area of which I carry out my clinical work was not without its challenges. Firstly, I am aware that this research comes with pre-determined assumptions and my own personal bias regarding the implications of these findings. Using reflexivity, I have tried to reflect on this throughout my journey and use measures to avoid researcher bias. Secondly, the way this research is tied to my clinical practice is highly beneficial and has allowed me to gain a greater insight into the patient experience which I feel has made me better practitioner. However, the balance of clinical work and conducting research in the same context could at times become consuming and it was important to recognise when it was time to turn off the laptop and put on the running shoes.

This research did not come easily. At a time of COVID uncertainty and becoming a first-time mum, there were moments of wondering whether this research would ever come to light. However, as I draw to the conclusion of this study it has provided me with an insight into my own strengths and weakness and I am grateful for the support of my supervisors for being the facilitators in my learning and allowing me to grow on both a personal and professional level. I am hopeful that this research will not only add to the growing evidence for APPs, but to be a steppingstone for other clinicians to be curious, learning to get better at what we do by asking why.

5.11 Recommendations for future practice

The outcomes of this study provide recommendations for the BOPDHB and other organisations looking to implement as OA model of care. The findings from this study indicate the potential positive impact of a COTS to the service user, stakeholders, and staff. To maximise its impact, the DHB needs to:

- Foster meaningful relationships and increased collaboration with orthopaedic surgeons to strengthen the acceptability of the service
- Further support the role of the APP in being able to provide impact to roles traditionally performed by doctors
- Engage with GPs and PHOs to raise the profile of the service to show meaningful impact and embed best practice into primary care
- Engaging people in their OA knowledge and journey to make better, more informed decisions
- Increase quantitative data collection including the impact of the COTS to orthopaedic demand and freeing up surgeon time including time spent in theatre
- Support clinicians in ongoing education through engagement with regulatory bodies and tertiary institutions by providing standardised clinical training for APPs
- Engage with Māori health providers in the co-designing and expansion of the service to ensure equity for Māori
- Enable staff to engage in ongoing research to add to the growing body of evidence in OA models of care in a New Zealand context
- Promote to the MoH these are pragmatic and evidence-based models of care and need to be implemented as soon as possible

5.12 Conclusions

It has been identified that there is strong evidence worldwide to support the role of APPs in the triaging and management of orthopaedic patients with OA. Despite this, New Zealand health systems have yet to implement and evaluate such models of care. With the ever-increasing load on orthopaedics in a post pandemic health system, this research study set in a New Zealand context has evaluated the impact of APP triage models of care to the BOPDHB and its population. It has provided timely and critical data on the impact of APPs in being able to make a significant contribution in the management of OA through the development of extended clinical roles and organisational change.

This evaluation has shown multiple benefits of the COTS to patients regarding their hip or knee OA including improving their care trajectory, experience, satisfaction, and providing access to earlier intervention. Both positive and negative impacts of the COTS directly to the orthopaedic workforce were identified including its ability to reduce inequity in accessing surgery, improving surgical conversion rates, and improving the quality of the patient referred to secondary care. Further work needs to be done on the impact of these models directly to time spent in theatre and freeing up surgeon time for the more complex patient. The COTS has the potential to bridge the gap between primary and secondary care whilst providing support for GPs with limited musculoskeletal knowledge. Care must be taken not to utilise a triage model as another barrier to accessing services for patients with OA. The implementation of the COTS may have the potential to impact a cultural and organisational shift, allowing for an improved career pathway and promotion of the physiotherapy profession amongst the New Zealand public. There is also potential for this model to embed best practice into the public health system by incorporating national policy due to its ability to provide quality musculoskeletal assessment and management to all New Zealanders.

For APP models of care to have maximum impact, this research suggests several recommendations for organisations to consider in their development. This includes the fostering of meaning clinical relationships between health disciplines and organisational bodies. Appropriate education and ongoing professional development for APPs is critical and tertiary institutions must consider investing in continuing education to ensure sustainability of this model. This study has provided an initial evaluation specific to the BOPDHB and its population and further research should consider the impact of this model on a national scale and consider evaluating health related quality of life outcomes.

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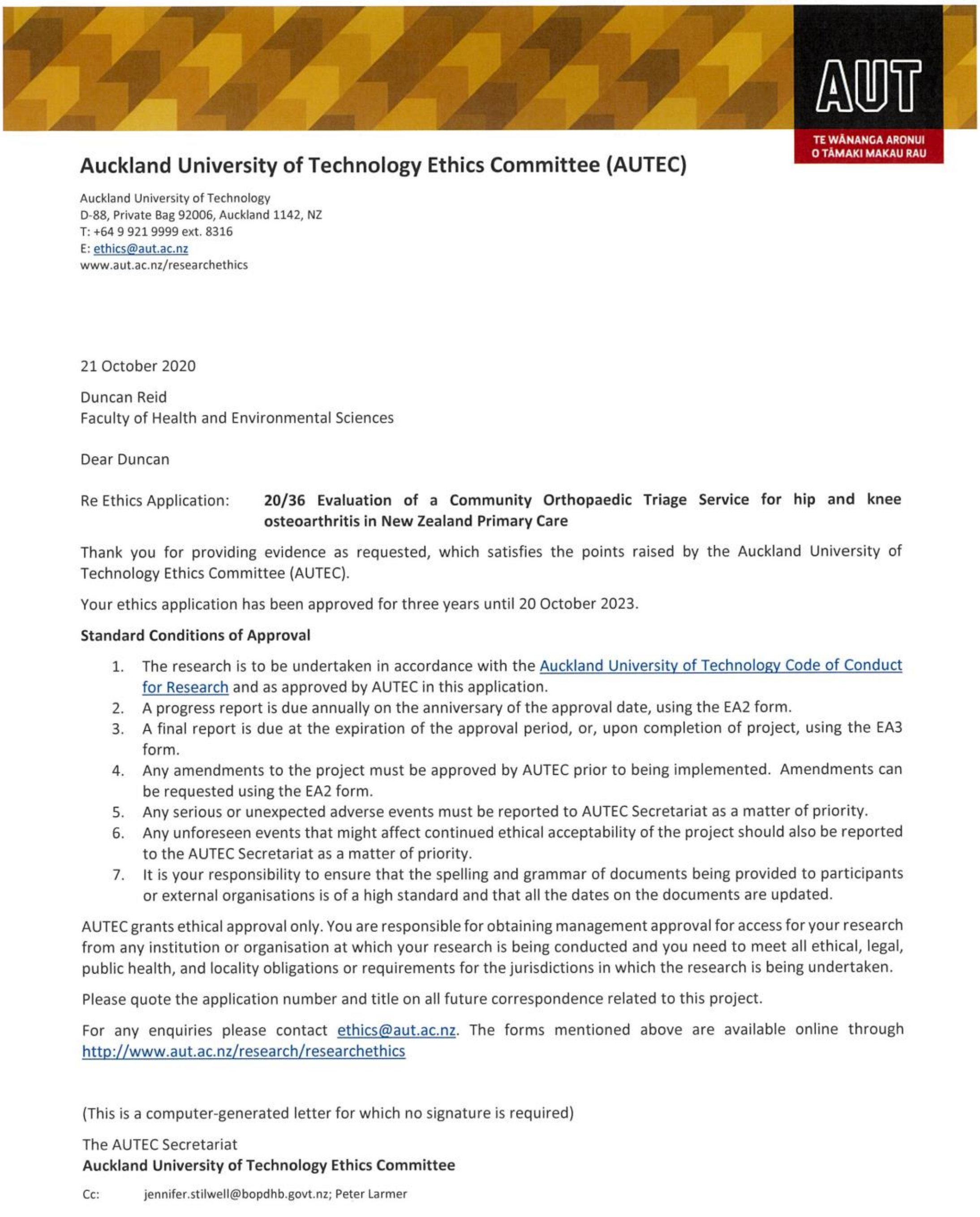
Appendices

Appendix A *Ethics approval letter*



Auckland University of Technology Ethics Committee (AUTEC)

Auckland University of Technology
D-88, Private Bag 92006, Auckland 1142, NZ
T: +64 9 921 9999 ext. 8316
E: ethics@aut.ac.nz
www.aut.ac.nz/researchethics

21 October 2020

Duncan Reid
Faculty of Health and Environmental Sciences

Dear Duncan

Re Ethics Application: **20/36 Evaluation of a Community Orthopaedic Triage Service for hip and knee osteoarthritis in New Zealand Primary Care**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTEC).

Your ethics application has been approved for three years until 20 October 2023.

Standard Conditions of Approval

1. The research is to be undertaken in accordance with the Auckland University of Technology Code of Conduct for Research and as approved by AUTEC in this application.
2. A progress report is due annually on the anniversary of the approval date, using the EA2 form.
3. A final report is due at the expiration of the approval period, or, upon completion of project, using the EA3 form.
4. Any amendments to the project must be approved by AUTEC prior to being implemented. Amendments can be requested using the EA2 form.
5. Any serious or unexpected adverse events must be reported to AUTEC Secretariat as a matter of priority.
6. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the AUTEC Secretariat as a matter of priority.
7. It is your responsibility to ensure that the spelling and grammar of documents being provided to participants or external organisations is of a high standard and that all the dates on the documents are updated.

AUTEC grants ethical approval only. You are responsible for obtaining management approval for access for your research from any institution or organisation at which your research is being conducted and you need to meet all ethical, legal, public health, and locality obligations or requirements for the jurisdictions in which the research is being undertaken.

Please quote the application number and title on all future correspondence related to this project.

For any enquiries please contact ethics@aut.ac.nz. The forms mentioned above are available online through http://www.aut.ac.nz/research/researchethics

(This is a computer-generated letter for which no signature is required)

The AUTEC Secretariat
Auckland University of Technology Ethics Committee

Cc: jennifer.stilwell@bopdhb.govt.nz; Peter Larmer

Appendix B *Participant information sheet for patients – Subgroup one and two*

TE WĀNANGA ARONUI O TĀMAKI MAKAU RAU

Participant Information Sheet – Patient Interviews

Date Information Sheet Produced:

09/08/2020

Project Title

Evaluation of a Community Orthopaedic Triage Service in the New Zealand Public Health System

An Invitation

My name is Jennifer Stilwell and I am a Doctoral student at Auckland University of Technology and a Physiotherapist at Tauranga Hospital. I'm looking to explore the impact of a Community Orthopaedic Triage Service (COTS) for adults suffering with hip and knee Osteoarthritis (OA). In light of increasing demand for Orthopaedic services over the past decade, alternative models of care are being explored to ensure that the same level of care provided is timely, effective, and evidence based. This service has been newly implemented and it is important to understand the current state of Orthopaedic care locally to identify potential gaps and opportunities that may enhance care delivery. The completion of this research will contribute to a Doctoral qualification. Thank you in advance for participating in this study. Whether you chose to participate or not in this study will neither advantage nor disadvantage your care.

What is the purpose of this research?

The Community Orthopaedic Triage Service delivered by Advanced Physiotherapists is a newly established service in the Bay of Plenty District Health Board (BOPDHB) region aimed at improving the journey through the New Zealand public health system for patients with hip and knee Osteoarthritis. Although it is well supported that this model is effective in other overseas health systems, its impact has yet to be researched in a New Zealand context. This study will systematically evaluate the current practice of the Community Orthopaedic Triage Service and Orthopaedic Outpatients. In particular, this study will explore the rate and wait time for patient referrals, patient demographics and symptom characteristics, the outcome of the assessment in terms management, alongside patient and referring practitioner experience.The findings of this research may be used for academic publications and presentations.

How was I identified and why am I being invited to participate in this research?

You have been identified to participate in this study as you have recently been assessed in an Orthopaedic capacity by either a Physiotherapist or an Orthopaedic specialist for your hip or knee pain. Four groups have been invited to participate in this semi- structured interview. Group 1 and 2 includes service users (yourself) and Group 3 and 4 includes Bay of Plenty staff and other stakeholders such as GPs. You will not be considered for this study if you: are under the age of 18 years, do not speak or understand English and are not a New Zealand resident.

How do I agree to participate in this research?

You will be invited to participate in this research by the lead researcher. Your participation in this interview is voluntary (it is your choice). Whether or not you choose to participate or not will have no impact on your health care provision. Prior to the interview, you will be asked to complete a consent form which will be provided with this information sheet. You are able to withdraw from the study at any time prior to the completion of the interview, and you may decline to answer any questions. If you choose to withdraw from the study, then you will be offered the choice between having any data that is identifiable as belonging to you removed or allowing it to continue to be used. However, once the findings have been produced, removal of your data may not be possible.

What will happen in this research?

Participating in research will involve an interview arranged at a time and place convenient to you. This interview will take approximately 45-60 minutes. Your written consent will be recorded on the appropriate consent form and verbally on the tape. The interview questions are designed to evaluate your journey through the orthopaedic system in the Bay of Plenty DHB. It will also enquire about opportunities for improvement and development. The interview will be recorded and transcribed word for word. Following the interview, a draft of the interview will be written up as a report. This will be given to you to confirm that I have accurately noted your responses and check for factual errors. This will provide you with the opportunity to remove anything that you do not wish to disclose. The interview transcript will then be analysed by using thematic analysis.

What are the discomforts and risks?

There are no intended risks and it is not anticipated that any harm will come to you from participating in this research. However, you may experience some discomfort in discussing your recent experience in the Orthopaedic system. Everything that you say will be treated with the highest confidence and all possible steps will be taken to protect your confidentiality. Participation in this research is voluntary and you may withdraw at any time. You can also refuse to answer any questions at any time without consequences. Once a draft of the interview has been written up as a report, you will be given a copy and are free to remove any information you require if this causes any personal discomfort.

What are the benefits?

There are a number of potential benefits of this research including:

Benefits to participants

Having a structured model of care for OA may assist with improving patient outcomes including reducing pain, improving knowledge, improving access to conservative management programmes, co-ordinating care and streamlining access to secondary care services when required. This type of model may assist with ensuring the right patient has access to the right professional at the right time. It has the potential to increase uptake of core treatments for OA in primary care using evidence based guidelines. It also has the potential to reduce inequity been accessing publically funded surgery for total joint arthroplasty.

Benefits to the Researcher

The researcher, who is also a NZ registered physiotherapist, will benefit from gaining a high level of knowledge regarding service evaluation for new models of care. The researcher will also gain skills and experience at performing doctoral level research. These skills will provide the researcher the opportunity to promote best practice within the physiotherapy community regarding OA care and engage in high-level discussion with other medical colleagues involved in the development and evaluation of OA pathways. Your input will also contribute towards the completion of my Doctor of Health Sciences thesis.

Benefits to the DHB

Undertaking this research study will allow the DHB and consumers to review and improve the quality, effectiveness and efficiency of services currently being provided in OA care. It will also provide opportunity to evaluate current practice in orthopaedics. By evaluating an alternative model of care alongside current practice may assist planning and funding services at the DHB in the provision of future services for OA.

Benefits to the wider New Zealand Health System

Results of this research have the potential to benefit people in NZ with OA by allowing other DHBs around NZ to establish a similar model of care. Having a nationwide model of care for the management of OA may provide short and long term benefits for both the NZ health system and its users.

How will my privacy be protected?

All information acquired during this research study will be strictly confidential and your anonymity will be protected at all times. Written data will be stored in locked files and will be available only to the principal researcher. Verbal recordings and interview reports will be kept in password protected computer files. You will not be identified in any published documents or reports. Data will be destroyed after 10 years.

What are the costs of participating in this research?

There are no direct financial costs to particiapting in this researcher. Your time invested into this research will be greatly appreciated. It is estimated that the interview should last no more than 60 minutes.

What opportunity do I have to consider this invitation?

Your choice to participate in this study is voluntary. You may withdraw from this study at any time without reason and will not impact of the quality of the care you receive from this service. You will be given 4-6 weeks to consider this invitation.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Duncan Reid; email: duncan.reid@aut.ac.nz telephone: (09) 9219999 ext. 7806.

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEC, *ethics@aut.ac.nz* , (+649) 921 9999 ext. 6038.

Whom do I contact for further information about this research?

Please keep this Information Sheet and a copy of the Consent Form for your future reference. You are also able to contact the research team as follows:

Jennifer Stilwell

Email: Jennifer.stilwell@bopdhb.govt.nz

Telephone: (07) 5798441

Researcher Contact Details:

Jennifer Stilwell

Email: Jennifer.stilwell@bopdhb.govt.nz

Telephone: (07) 5798441

Project Supervisor Contact Details:

Duncan Reid

Email: duncan.reid@aut.ac.nz

Telephone: (09) 9219999 ext. 7806

Approved by the Auckland University of Technology Ethics Committee on 21st October 2020 AUTEC Reference number 20/36.

Appendix C *Participant information sheet for stakeholders - Subgroup three*

Participant Information Sheet – Stakeholder Interviews

Date Information Sheet Produced:

09/08/2020

Project Title

Evaluation of a Community Orthopaedic Triage Service in the New Zealand Public Health System

An Invitation

My name is Jennifer Stilwell and I am a Doctoral student at Auckland University of Technology and a Physiotherapist at Tauranga Hospital. I'm looking to explore the impact of a Community Orthopaedic Triage Service (COTS) for adults suffering with hip and knee osteoarthritis (OA). In light of increasing demand for Orthopaedic services over the past decade, alternative models of care are being explored to ensure that the same level of care provided is timely, effective, and evidence-based. This service has been newly implemented and it is important to understand the current state of Orthopaedic care locally to identify potential gaps and opportunities that may enhance care delivery. The completion of this research will contribute to a Doctoral qualification. Thank you in advance for participating in this study.

What is the purpose of this research?

The Community Orthopaedic Triage Service delivered by Advanced Physiotherapists is a newly established service in the Bay of Plenty District Health Board (BOPDHB) region aimed at improving the journey through the New Zealand public health system for patients with hip and knee Osteoarthritis. Although it is well supported that this model is effective in other overseas health systems, its acceptability and feasibility have yet to be researched in a New Zealand context. This study will systematically evaluate the current practice of the Community Orthopaedic Triage Service and Orthopaedic Outpatients. In particular, this study will explore the rate and wait time for patient referrals, patient demographics and symptom characteristics, self-perceived function, pain and quality of life, the outcome of the assessment in terms management, alongside patient and referring practitioner satisfaction.The findings of this research may be used for academic publications and presentations.

How was I identified and why am I being invited to participate in this research?

You have been identified to participate in this study as you have been identified as a key stakeholder in the development of the service. Four groups have been invited to participate in this semi- structured interview and you are part of Group 3. Group 1 and 2 includes service users and Group 4 includes other stakeholders.

How do I agree to participate in this research?

You will be invited to participate in this research by the lead researcher. Your participation in this interview is voluntary (it is your choice) and whether or not you choose to participate will neither advantage nor disadvantage you. Prior to the interview, you will be asked to complete a consent form which will be provided with this information sheet. You are able to withdraw from the study at any time prior to the completion of the interview, and you may decline to answer any questions. If you choose to withdraw from the study, then you will be offered the choice between having any data that is identifiable as belonging to you removed or allowing it to continue to be used. However, once the findings have been produced, removal of your data may not be possible.

What will happen in this research?

Participating in research will involve an interview arranged at a time and place convenient to you. This interview will take approximately 45-60 minutes. Your written consent will be recorded on the appropriate consent form and verbally on the tape. The interview questions are designed to evaluate your experience of referring into the Community Orthopaedic Triage Service or Orthopaedics. It will also enquire about opportunities for improvement and development. The interview will be recorded and transcribed word for word. Following the interview, a draft of the interview will be written up as a report. This will be given to you to confirm that I have accurately noted your responses and check for factual errors. This will provide you with the opportunity to remove anything that you do not wish to disclose. The interview transcript will then be analysed by using thematic analysis.

What are the discomforts and risks?

There are no intended risks and it is not anticipated that any harm will come to you from participating in this research. Everything that you say will be treated with the highest confidence and all possible steps will be taken to protect your confidentiality. Participation in this research is voluntary and you may withdraw at any time. You can also refuse to answer any questions at any time without consequences. Once a draft of the interview has been written up as a report, you will be given a copy and are free to remove any information you require if this causes any personal discomfort.

What are the benefits?

There are a number of potential benefits of this research including:

Benefits to participants

Having a structured model of care for OA may assist with improving patient outcomes including reducing pain, improving OA knowledge, improving access to conservative management programmes, co-ordinating OA care and streamlining access to secondary care services when required. This type of model may assist with ensuring the right patient has access to the right professional at the right time. It has the potential to increase uptake of core treatments for OA in primary care using evidence based guidelines. It also has the potential to reduce inequity been accessing publically funded surgery for total joint arthroplasty.

Benefits to the Researcher

The researcher, who is also a NZ registered physiotherapist, will benefit from gaining a high level of knowledge regarding service evaluation for new models of care. The researcher will also gain skills and experience at performing doctoral level research. These skills will provide the researcher the opportunity to promote best practice within the physiotherapy community regarding OA care and engage in high-level discussion with other medical colleagues involved in the development and evaluation of OA pathways. Your input will also contribute towards the completion of my Doctor of Health Sciences thesis.

Benefits to the DHB

Undertaking this research study will allow the DHB and consumers to review and improve the quality, effectiveness and efficiency of services currently being provided in OA care. It will also provide opportunity to evaluate current practice in orthopaedics. By evaluating an alternative model of care alongside current practice may assist planning and funding services at the DHB in the provision of future services for OA.

Benefits to the wider New Zealand Health System

Results of this research have the potential to benefit people in NZ with OA by allowing other DHBs around NZ to establish a similar model of care. Having a nationwide model of care for the management of OA may provide short and long term benefits for both the NZ health system and its users.

How will my privacy be protected?

All necessary steps will be taken to ensure data anonymity is protected following the interviews. Since the interviews will encompass system change, questions will not address any personal information. Data will be collected in a format that cannot be re-identified. Transcripts will not be shared between participants.

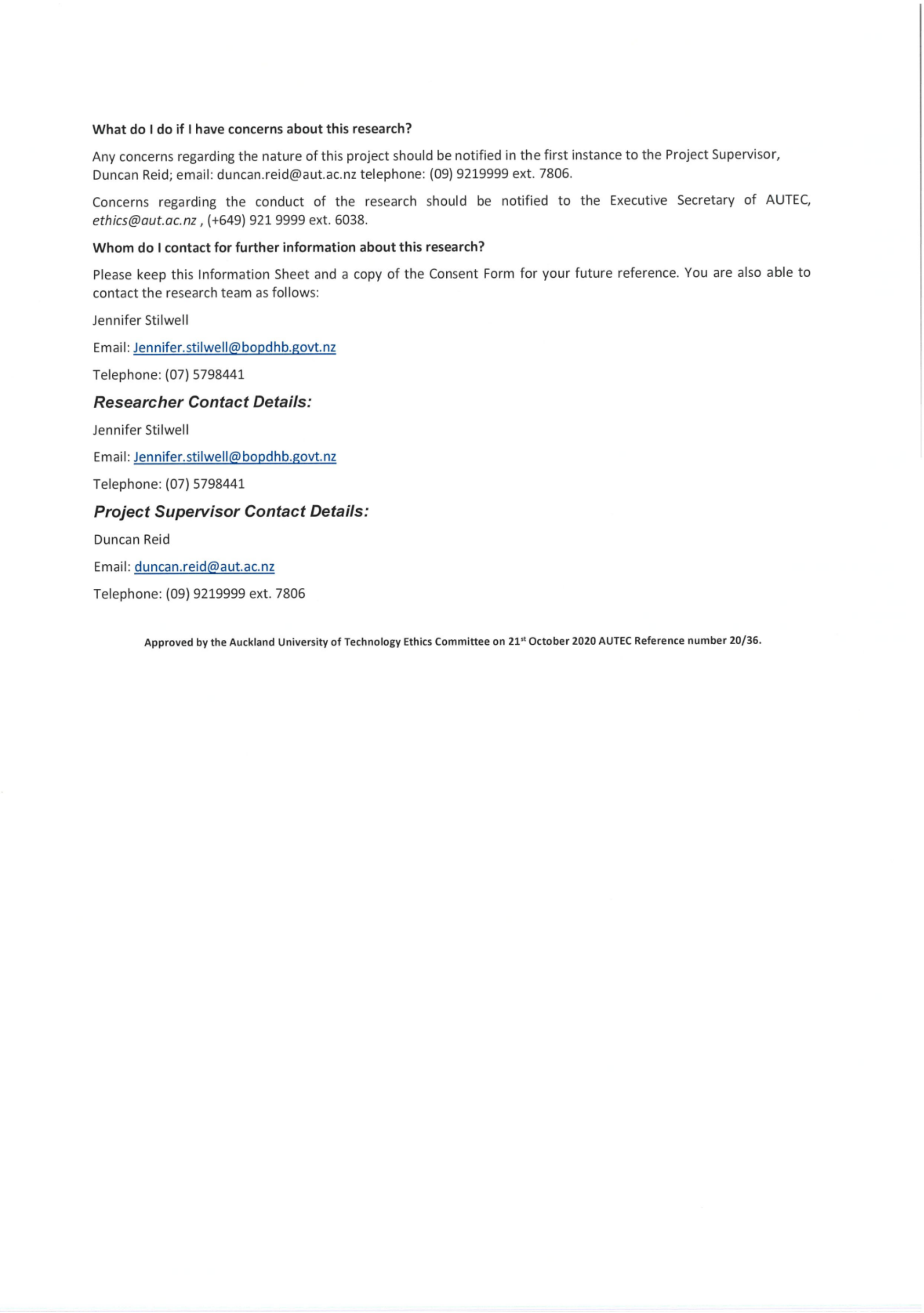
All information acquired during this research study will be strictly confidential and your anonymity will be protected at all times. Written data will be stored in locked files and will be available only to the principal researcher. Verbal recordings and interview reports will be kept in password protected computer files. You will not be identified in any published documents or reports. Data will be destroyed after 10 years.

What are the costs of participating in this research?

There are no direct financial costs to particiapting in this researcher. Your time invested into this research will be greatly appreciated. It is estimated that the interview should last no more than 60 minutes.

What opportunity do I have to consider this invitation?

Your choice to participate in this study is voluntary. You may withdraw from this study at any time without reason. You will be given 4-6 weeks to consider this invitation.



What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Duncan Reid; email: duncan.reid@aut.ac.nz telephone: (09) 9219999 ext. 7806.

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEC, *ethics@aut.ac.nz* , (+649) 921 9999 ext. 6038.

Whom do I contact for further information about this research?

Please keep this Information Sheet and a copy of the Consent Form for your future reference. You are also able to contact the research team as follows:

Jennifer Stilwell

Email: Jennifer.stilwell@bopdhb.govt.nz

Telephone: (07) 5798441

Researcher Contact Details:

Jennifer Stilwell

Email: Jennifer.stilwell@bopdhb.govt.nz

Telephone: (07) 5798441

Project Supervisor Contact Details:

Duncan Reid

Email: duncan.reid@aut.ac.nz

Telephone: (09) 9219999 ext. 7806

Approved by the Auckland University of Technology Ethics Committee on 21st October 2020 AUTEC Reference number 20/36.

Appendix D *Participant information sheet for referring practitioners - Subgroup four*

TE WĀNANGA ARONUI
O TĀMAKI MAKAU RAU

Participant Information Sheet – Referring practitioner Interviews

Date Information Sheet Produced:

09/08/2020

Project Title

Evaluation of a Community Orthopaedic Triage Service in the New Zealand Public Health System

An Invitation

My name is Jennifer Stilwell and I am a Doctoral student at Auckland University of Technology and a Physiotherapist at Tauranga Hospital. I'm looking to explore the impact of a Community Orthopaedic Triage Service (COTS) for adults suffering with hip and knee osteoarthritis (OA). In light of increasing demand for Orthopaedic services over the past decade, alternative models of care are being explored to ensure that the same level of care provided is timely, effective, and evidence-based. This service has been newly implemented and it is important to understand the current state of Orthopaedic care locally to identify potential gaps and opportunities that may enhance care delivery. The completion of this research will contribute to a Doctoral qualification. Thank you in advance for participating in this study.

What is the purpose of this research?

The Community Orthopaedic Triage Service delivered by Advanced Physiotherapists is a newly established service in the Bay of Plenty District Health Board (BOPDHB) region aimed at improving the journey through the New Zealand public health system for patients with hip and knee Osteoarthritis. Although it is well supported that this model is effective in other overseas health systems, its acceptability and feasibility have yet to be researched in a New Zealand context. This study will systematically evaluate the current practice of the Community Orthopaedic Triage Service and Orthopaedic Outpatients. In particular, this study will explore the rate and wait time for patient referrals, patient demographics and symptom characteristics, self-perceived function, pain and quality of life, the outcome of the assessment in terms management, alongside patient and referring practitioner satisfaction.The findings of this research may be used for academic publications and presentations.

How was I identified and why am I being invited to participate in this research?

You have been identified to participate in this study as you have recently referred patients with OA into the Community Orthopaedic Triage Service or directly to Orthopaedics. Four groups have been invited to participate in this semi-structured interview and you are selected in Group 4. Group 1 and 2 includes service users and Group 3 includes other stakeholders from the BOPDHB.

How do I agree to participate in this research?

You will be invited to participate in this research by the lead researcher. Your participation in this interview is voluntary (it is your choice) and whether or not you choose to participate will neither advantage nor disadvantage you. Prior to the interview, you will be asked to complete a consent form which will be provided with this information sheet. You are able to withdraw from the study at any time prior to the completion of the interview, and you may decline to answer any questions. If you choose to withdraw from the study, then you will be offered the choice between having any data that is identifiable as belonging to you removed or allowing it to continue to be used. However, once the findings have been produced, removal of your data may not be possible.

What will happen in this research?

Participating in research will involve an interview arranged at a time and place convenient to you. This interview will take approximately 45-60 minutes. Your written consent will be recorded on the appropriate consent form and verbally on the tape. The interview questions are designed to evaluate your experience of referring into the Community Orthopaedic Triage Service or Orthopaedics. It will also enquire about opportunities for improvement and development. The interview will be recorded and transcribed word for word. Following the interview, a draft of the interview will be written up as a report. This will be given to you to confirm that I have accurately noted your responses and check for factual errors. This will provide you with the opportunity to remove anything that you do not wish to disclose. The interview transcript will then be analysed by using thematic analysis.

What are the discomforts and risks?

There are no intended risks and it is not anticipated that any harm will come to you from participating in this research. Everything that you say will be treated with the highest confidence and all possible steps will be taken to protect your confidentiality. Participation in this research is voluntary and you may withdraw at any time. You can also refuse to answer any questions at any time without consequences. Once a draft of the interview has been written up as a report, you will be given a copy and are free to remove any information you require if this causes any personal discomfort.

What are the benefits?

There are a number of potential benefits of this research including:

Benefits to participants

Having a structured model of care for OA may assist with improving patient outcomes including reducing pain, improving OA knowledge, improving access to conservative management programmes, co-ordinating OA care and streamlining access to secondary care services when required. This type of model may assist with ensuring the right patient has access to the right professional at the right time. It has the potential to increase uptake of core treatments for OA in primary care using evidence based guidelines. It also has the potential to reduce inequity been accessing publically funded surgery for total joint arthroplasty.

Benefits to the Researcher

The researcher, who is also a NZ registered physiotherapist, will benefit from gaining a high level of knowledge regarding service evaluation for new models of care. The researcher will also gain skills and experience at performing doctoral level research. These skills will provide the researcher the opportunity to promote best practice within the physiotherapy community regarding OA care and engage in high-level discussion with other medical colleagues involved in the development and evaluation of OA pathways. Your input will also contribute towards the completion of my Doctor of Health Sciences thesis.

Benefits to the DHB

Undertaking this research study will allow the DHB and consumers to review and improve the quality, effectiveness and efficiency of services currently being provided in OA care. It will also provide opportunity to evaluate current practice in orthopaedics. By evaluating an alternative model of care alongside current practice may assist planning and funding services at the DHB in the provision of future services for OA.

Benefits to the wider New Zealand Health System

Results of this research have the potential to benefit people in NZ with OA by allowing other DHBs around NZ to establish a similar model of care. Having a nationwide model of care for the management of OA may provide short and long term benefits for both the NZ health system and its users.

How will my privacy be protected?

All information acquired during this research study will be strictly confidential and your anonymity will be protected at all times. Written data will be stored in locked files and will be available only to the principal researcher. Verbal recordings and interview reports will be kept in password protected computer files. You will not be identified in any published documents or reports. Data will be destroyed after 10 years.

What are the costs of participating in this research?

There are no direct financial costs to particiapting in this researcher. Your time invested into this research will be greatly appreciated. It is estimated that the interview should last no more than 60 minutes.

What opportunity do I have to consider this invitation?

Your choice to participate in this study is voluntary. You may withdraw from this study at any time without reason. You will be given 4-6 weeks to consider this invitation.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Duncan Reid; email: duncan.reid@aut.ac.nz telephone: (09) 9219999 ext. 7806.

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEC, *ethics@aut.ac.nz* , (+649) 921 9999 ext. 6038.

Whom do I contact for further information about this research?

Please keep this Information Sheet and a copy of the Consent Form for your future reference. You are also able to contact the research team as follows:

Jennifer Stilwell

Email: Jennifer.stilwell@bopdhb.govt.nz

Telephone: (07) 5798441

Researcher Contact Details:

Jennifer Stilwell

Email: Jennifer.stilwell@bopdhb.govt.nz

Telephone: (07) 5798441

Project Supervisor Contact Details:

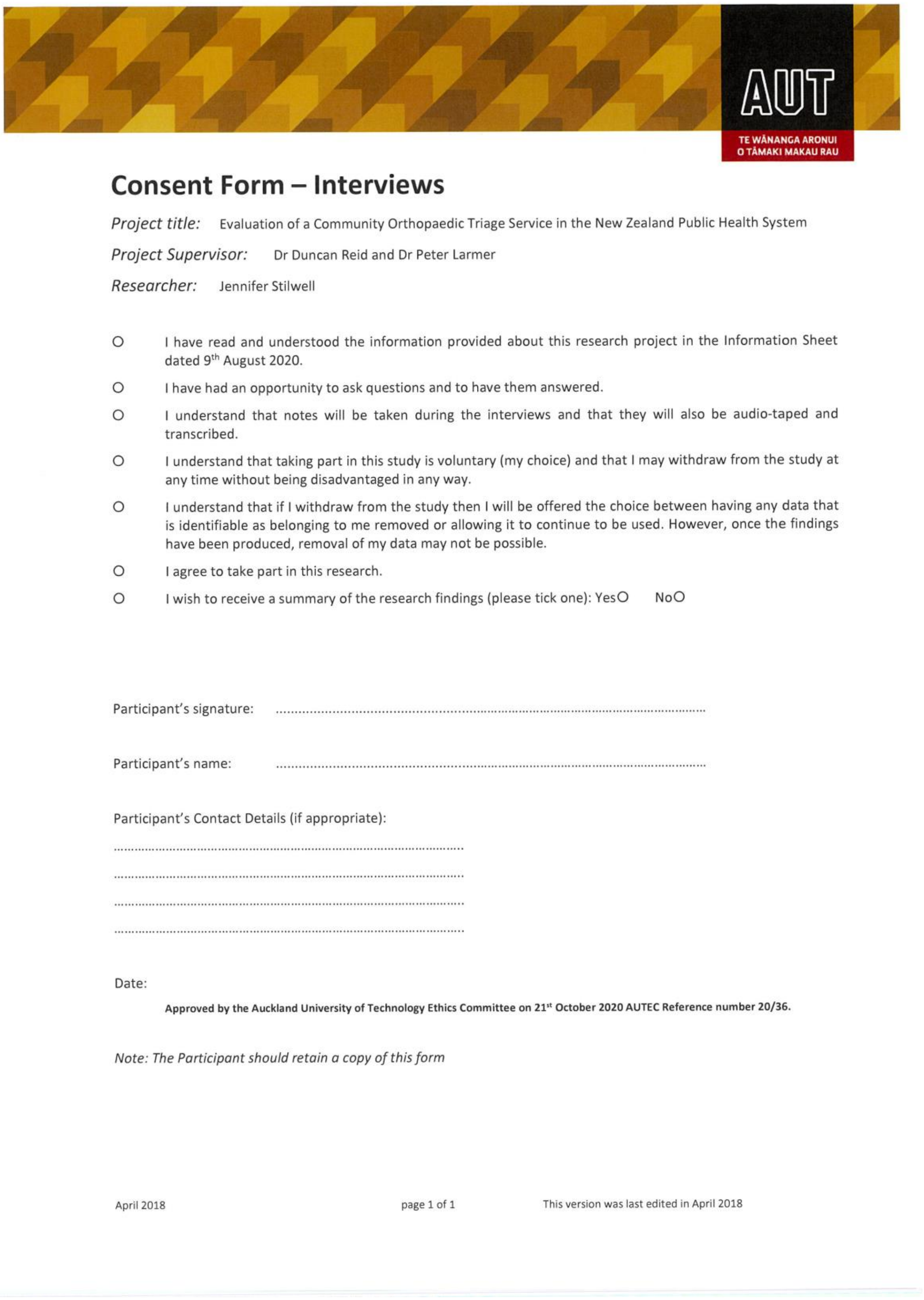
Duncan Reid

Email: duncan.reid@aut.ac.nz

Telephone: (09) 9219999 ext. 7806

Approved by the Auckland University of Technology Ethics Committee on 21st October 2020 AUTEC Reference number 20/36.

Appendix E *Interview consent form for all subgroups*



Consent Form – Interviews

Project title: Evaluation of a Community Orthopaedic Triage Service in the New Zealand Public Health System

Project Supervisor: Dr Duncan Reid and Dr Peter Larmer

Researcher: Jennifer Stilwell

○ I have read and understood the information provided about this research project in the Information Sheet dated 9th August 2020.

○ I have had an opportunity to ask questions and to have them answered.

○ I understand that notes will be taken during the interviews and that they will also be audio-taped and transcribed.

○ I understand that taking part in this study is voluntary (my choice) and that I may withdraw from the study at any time without being disadvantaged in any way.

○ I understand that if I withdraw from the study then I will be offered the choice between having any data that is identifiable as belonging to me removed or allowing it to continue to be used. However, once the findings have been produced, removal of my data may not be possible.

○ I agree to take part in this research.

○ I wish to receive a summary of the research findings (please tick one): Yes○ No○

Participant's signature: ....

Participant's name: ....

Participant's Contact Details (if appropriate):

....

....

....

....

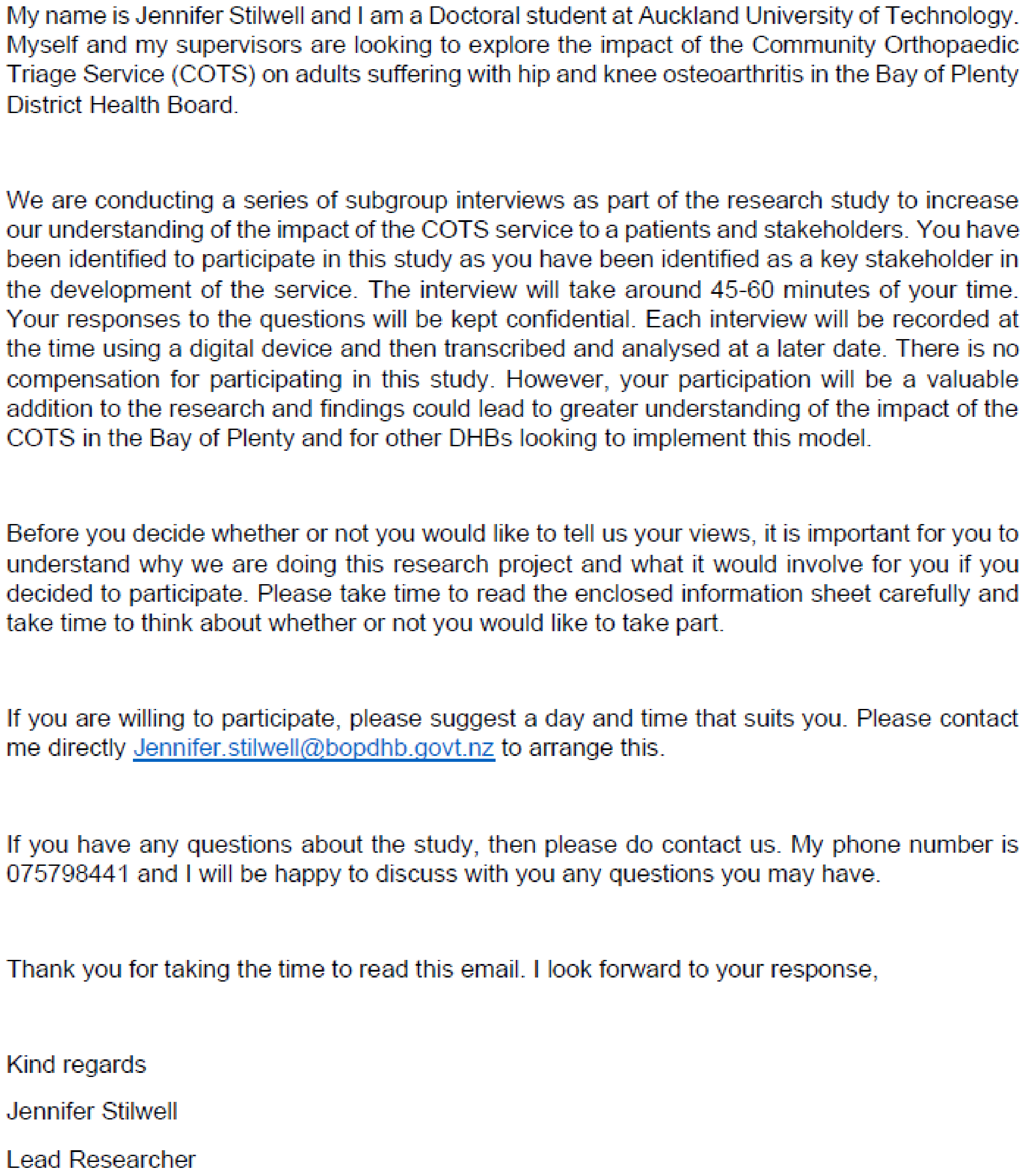
Date:

Approved by the Auckland University of Technology Ethics Committee on 21st October 2020 AUTEC Reference number 20/36.

Note: The Participant should retain a copy of this form

April 2018 page 1 of 1 This version was last edited in April 2018

Appendix F *Invitation email for Subgroup three*



My name is Jennifer Stilwell and I am a Doctoral student at Auckland University of Technology. Myself and my supervisors are looking to explore the impact of the Community Orthopaedic Triage Service (COTS) on adults suffering with hip and knee osteoarthritis in the Bay of Plenty District Health Board.

We are conducting a series of subgroup interviews as part of the research study to increase our understanding of the impact of the COTS service to a patients and stakeholders. You have been identified to participate in this study as you have been identified as a key stakeholder in the development of the service. The interview will take around 45-60 minutes of your time. Your responses to the questions will be kept confidential. Each interview will be recorded at the time using a digital device and then transcribed and analysed at a later date. There is no compensation for participating in this study. However, your participation will be a valuable addition to the research and findings could lead to greater understanding of the impact of the COTS in the Bay of Plenty and for other DHBs looking to implement this model.

Before you decide whether or not you would like to tell us your views, it is important for you to understand why we are doing this research project and what it would involve for you if you decided to participate. Please take time to read the enclosed information sheet carefully and take time to think about whether or not you would like to take part.

If you are willing to participate, please suggest a day and time that suits you. Please contact me directly Jennifer.stilwell@bopdhb.govt.nz to arrange this.

If you have any questions about the study, then please do contact us. My phone number is 075798441 and I will be happy to discuss with you any questions you may have.

Thank you for taking the time to read this email. I look forward to your response,

Kind regards

Jennifer Stilwell

Lead Researcher

Appendix G *Invitation to interview for Subgroup four*

Invitation email – Subgroup 4

Dear GP,

Evaluation of a Community Orthopaedic Triage Service in the New Zealand Health System

My name is Jennifer Stilwell and I am a Doctoral student at Auckland University of Technology. Myself and my supervisors are looking to explore the impact of the Community Orthopaedic Triage Service (COTS) on adults suffering with hip and knee osteoarthritis in the Bay of Plenty District Health Board.

We are conducting a series of subgroup interviews as part of the research study to increase our understanding of the impact of the COTS service to a patients and stakeholders. As a GP referring into the COTS, you are in an ideal position to give us valuable first-hand information from your own perspective. The interview will take around 45-60 minutes of your time. Your responses to the questions will be kept confidential. Each interview will be recorded at the time using a digital device and then transcribed and analysed at a later date. There is no compensation for participating in this study. However, your participation will be a valuable addition to the research and findings could lead to greater understanding of the impact of the COTS in the Bay of Plenty.

Before you decide whether or not you would like to tell us your views, it is important for you to understand why we are doing this research project and what it would involve for you if you decide to participate. Please take time to read the enclosed information sheet carefully and take time to think about whether or not you would like to take part. If you are willing to participate, please suggest a day and time that suits you.

If you have any questions about the study, then please do contact us. My phone number is 075798441 and I will be happy to discuss with you any questions you may have.

Thank you for taking the time to read this email. I look forward to your response,

Kind regards

Jennifer Stilwell

Lead Researcher

Appendix H *Semi structured interview questions for Subgroup one*

Semi structured interview Questions and Prompts

Subgroup 1

We are aware that you have recently had an appointment with a Physiotherapist about your hip or knee OA. We are interested in your journey in the health system and how you found this experience.

A: Clinical Journey

1. What do you understand about your current condition?
2. What has your journey been so far in the management of you hip/knee?
3. What health professionals to date have you seen for your hip or knee OA?
   Prompts: Have you seen anyone else?
4. Prior to this appointment, have you had any experience using the public system for you hip or knee OA?
5. Prior to this appointment, have you seen anyone through the private or AC system about your hip/knee?

B: Appointment and expectations

Your GP referred you to the Community Orthopaedic Triage Service for assessment of your knee/hip: Can you tell me…

6. Approximately how long were you waiting for the appointment?
7. What did you expect from your recent appointment with the Physiotherapist?
   Prompts: Why? Did it meet those expectations? Were you informed about what would happen in the appointment?
8. Can you explain to me what happened in the appointment?
9. What was your experience of this appointment?
   Prompts: Did you get any advice, diagnosis, treatment, investigations?
10. How did you feel about seeing a Physiotherapist?
    Prompt: Why?
11. Would you prefer to see a different professional about your hip or knee pain?
    Prompts: Why?
12. Did the appointment differ to your appointment at your local GP?
    Prompts: What makes it different/the same? Are there any advantages/ disadvantages?

C: Outcome of the appointment

13. How did the appointment either meet your needs or not meet them?
    Prompts: Was it worthwhile?
14. In what way did you find the appointment valuable?
15. What is the plan for the management for your hip/knee pain?
16. Are you confident that your hip/knee pain will be managed following this appointment?
    Prompt: What makes you feel that way? Do you think there will be a positive outcome?
17. What advice would you give about improving the value of this service to the health system?
18. What would you like to see improved in this pathway?

Appendix I *Semi structured interview questions Subgroup two*

Semi structured interview Questions and Prompts

Subgroup 2

We are aware that you have recently had an appointment with an Orthopaedic Specialist about your hip or knee OA. We are interested in your journey in the health system and how you found this experience.

A: Clinical Journey

1 Firstly, can you tell me what you understand about the problem in your hip/knee?

2 Before you saw the specialist recently, can you tell me what experience you have had with your hip/knee?
If this is not their first experience in Orthopaedics – what was their previous experience? How did that make them feel? How did they find the service?

3 What health professionals to date have you seen for your hip or knee OA?
Prompts: Have you seen anyone else?
How did they make you feel?

4 What has been your previous experience of seeing a Physiotherapist about your hip/knee?

B: Appointment and expectations

5 Prior to your appointment, what did you expect to happen?
Prompts: Why? Did it meet those expectations?

6 Approximately how long were you waiting for the appointment?
How did this make you feel?
Do you have any feedback on the time you waited?

7 When you arrived at your appointment, what happened initially?
How did you feel about this?

8 What was your experience of the appointment with the Orthopaedic Doctor?
Prompts: Did you get any advice, diagnosis, treatment, investigations?
How did this make you feel?

9 How did you feel about the amount of time you spent with the Doctor?

10 How did you feel about seeing an orthopaedic specialist?
Prompt: Why?

11 How did this appointment compare to your GP appointment?
Prompts: In what way was it different/the same?

12 Would you have preferred to see a different health professional?
Prompts: Why?

13 In what ways was this appointment different to the one at your local GP?
Prompts: What makes it different/the same? Are there any advantages/ disadvantages?

C: Outcome of the appointment

14 How did the appointment either meet your needs or not meet them?
Prompts: Was it worthwhile?

15 In what ways did you find the appointment valuable?
How did you find this service?

16 From this appointment, what is the plan for the management for your hip/knee pain?

1 Are you confident that your hip/knee pain will be managed?
Prompt: What makes you feel that way? Do you think there will be a positive outcome?
2 What other models of care do you think could be more valuable for people with OA?
3 Overall, how did you find this experience/journey?
4 What is your opinion on the Orthopaedic Service as you have experienced it?

Appendix J *Semi structured interview questions for Subgroup three*

Semi structured interview Questions and Prompts

Subgroup 3

I am aware that you have been involved in the development of the Community Orthopaedic Triage Service (COTS) project at the Bay of Plenty District Health Board (BOPDHB). I am interested in your experience of being involved with the project and how you think this service will impact the DHB and its population.

A: General questions

1 What is your role in the project?
2 How long have you been involved?
3 In your words, can you describe to me what the project involves?
4 How would you describe your experience in the project so far?

B: Now questions

5 As it currently stands, how would you describe the current position of the project?
6 What are the problems the team are currently trying to solve in this project?
Are there any others?
7 In your opinion, which is the most important to solve and why?
8 How do you see this project impacting on the current problems you have identified?
9 In the short term, what do you see as the most important outcomes for the project?
10 How do you think this type of model will impact the DHB?
11 How do you think this type of model will directly impact on patients using the public system?
12 In your opinion, will this model have any impact on other models of care?
13 How does this model impact on care delivery for patient who identify as Maori?
14 From your perspective, what has been the most challenging part of the project so far? And why?

C: Future questions

15 In the long term, what do you think the impact of a successful project will have to the DHB?
16 What do you think the long-term impact will be on the service users?
Prompt: Are these different? Why?
17 What does success look like for you and your team?
18 Moving forwards, what do you see are the major obstacles or impediments to the success of the project?
19 What worries do you have about the project moving forwards?
Prompt: Why?
20 What advice would you give to other DHBs trying to implement this type of project?
21 If you were to start this project again, would you approach it differently? And why?

D: Other

22 Is there anything else that I haven’t asked you that you would like to say?

Appendix K *Semi structured interview questions for Subgroup four*

Semi structured interview Questions and Prompts

Subgroup 4

We are aware that you have been referring patients with hip or knee osteoarthritis to the Community Orthopaedic Triage Service (COTS) at the Bay of Plenty District Health Board (BOPDHB). I am interested in your feedback and of your experience of using the service.

A: Past questions

1 Prior to the implementation of the COTS service, how would you describe the Orthopaedic referral pathway in the Bay of Plenty?
2 How often would you use this referral pathway?
3 What has been your experience of using this pathway?
4 What were the problems with this referral pathway? *Are there any others? Which of these is the most important to solve?*

B: Now questions

1 How long have you been referring into the COTS service?
2 From your perspective, what do you feel is the main purpose of the new pathway?
3 In your words, can you describe to me how you use this referral pathway?
4 Have your referrals changed since the implementation of the new service?
5 How would you characterise the patients you refer into the service?
6 So far, what is your experience of referring patients via this pathway?
7 What feedback do you having regarding the clinical reports generated from the service?
8 What patient feedback have you received about this service?
9 What benefits or effects have you seen so far?
10 What are the problems you have experienced with this new service?
11 In what ways do you feel this service improves the patient journey?
Prompts: Are there any others?

C: Future questions

12 What do you think the impact of this pathway will have to patients?
13 What impact do you think this pathway will have on you as a GP?
14 What impact do you think this pathway could have on the DHB?
Prompt: Why?
15 What worries do you have about the pathway?
Prompt: Why?
16 What do you see as the major obstacles or impediments to the success of the pathway?
17 What could the DHB improve in the implantation of this type of model?

D: Other

18 Is there anything else that I haven't asked you that you would like to say?

Appendix L *Literature review search strategy*

April 2022 Search strategy

AUT LIBRARY via EBSCO

1 - "advanced practic*" OR "extended scope practic*" OR "physiotherap*" - 775670

2 – 1 AND “osteoarthritis” – 51172

6 – 1 AND triage - 12507

3 – 2 AND “triage” – 1605

GOOGLE SCHOLAR
1 - "advanced practice" OR "extended scope practice" OR "physiotherapy" – 894,000

2 – 1 AND ‘osteoarthritis’ – 76,000

2 – 1 AND ‘triage” – 21,100

3 – 1 AND 2 AND “osteoarthritis” – 2,620

Ovid

1 - "advanced practic*" OR "extended scope practic*" OR "physiotherap*" – 15527

2 – Osteoarthritis – 4438

3 – 1 AND 2 - 246

4 – Triage – 147

5 – 2 AND 4 – 3

6 – 3 AND 4 – 2

CINHAL, MEDLINE, SPORTS DISCUSS

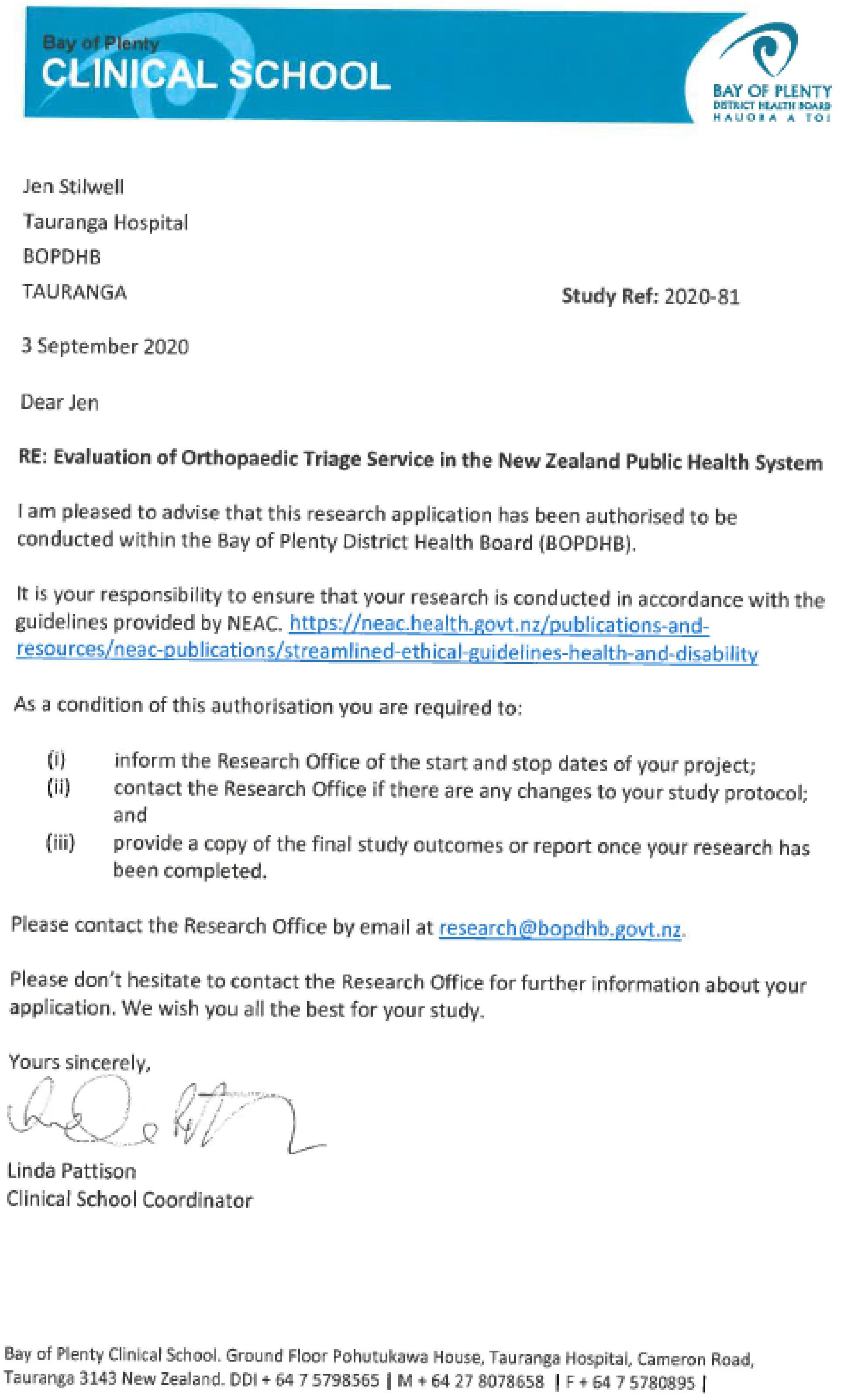
1 - "advanced practic*" OR "extended scope practic*" OR "physiotherap*" – 157189

2 – 1 AND triage – 590

3 – 1 AND osteoarthritis – 4889

4 – 1 AND 2 AND 3 – 15

Appendix M *Bay of Plenty clinical school research approval letter*



Bay of Plenty
CLINICAL SCHOOL

BAY OF PLENTY
DISTRICT HEALTH BOARD
HAUORA A TOI

Jen Stilwell
Tauranga Hospital
BOPDHB
TAURANGA

Study Ref: 2020-81

3 September 2020

Dear Jen

RE: Evaluation of Orthopaedic Triage Service in the New Zealand Public Health System

I am pleased to advise that this research application has been authorised to be conducted within the Bay of Plenty District Health Board (BOPDHB).

It is your responsibility to ensure that your research is conducted in accordance with the guidelines provided by NEAC. https://neac.health.govt.nz/publications-and-resources/neac-publications/streamlined-ethical-guidelines-health-and-disability

As a condition of this authorisation you are required to:

(i) inform the Research Office of the start and stop dates of your project;
(ii) contact the Research Office if there are any changes to your study protocol; and
(iii) provide a copy of the final study outcomes or report once your research has been completed.

Please contact the Research Office by email at research@bopdhb.govt.nz.

Please don't hesitate to contact the Research Office for further information about your application. We wish you all the best for your study.

Yours sincerely,

Linda Pattison
Clinical School Coordinator

Bay of Plenty Clinical School. Ground Floor Pohutukawa House, Tauranga Hospital, Cameron Road, Tauranga 3143 New Zealand. DDI + 64 7 5798565 | M + 64 27 8078658 | F + 64 7 5780895 |

Appendix N *Māori Health Gains and Development research approval letter*

Research Approval Letter
Māori Health Gains & Development

TE TOI
AHORANGI

Jennifer Stilwell
Clinical Lead Physiotherapist
Email: Jennifer.Stitwell@bopdhb.govt.nz
Cc: Charlie.Stratton@bopdhb.govr.nz

3 September 2020

Study Title Name	**Evaluation of a Physiotherapy led triage service in the New Zealand Public Health System**

Tēnā koe Jennifer

Your application has been endorsed by Manukura Executive Director Toi Ora Māori Health Gains and Development on behalf of the 18 iwi of Mai i Ngā Kuri a Whārei ki Tihirau / Bay of Plenty District Health Board.
All health research conducted in New Zealand and within BOPDHB is of relevance to Māori.

As a Treaty partner and a priority population Māori involvement in health research is critical because Māori are disproportionately represented in the majority of health and wellbeing statistics Māori Health Gains and Development recommends you utilise the Guidelines for Researchers on Health Research Involving Māori (2010)[1] to assist you in planning and conducting your research project in a culturally sensitive, safe and responsive way.

Please provide a summary of your research findings and recommendations at the completion of your work to Māori Health Gains and Development by submitting your summary via ZOOM meeting in due course. The summary should include your analysis of the data by ethnicity, age, deprivation with a focus on any Maori Health themes that may be relevant. You may be invited to present your findings in person to BOPDHB Runanga and/or BOPDHB Te Amorangi Kahui Kaumatua Kaunihera (Māori Elders Council).

Nāku noa, nā

Marama Tauranga
Manukura – Executive Director
Toi Ora Māori Health and Gains Development

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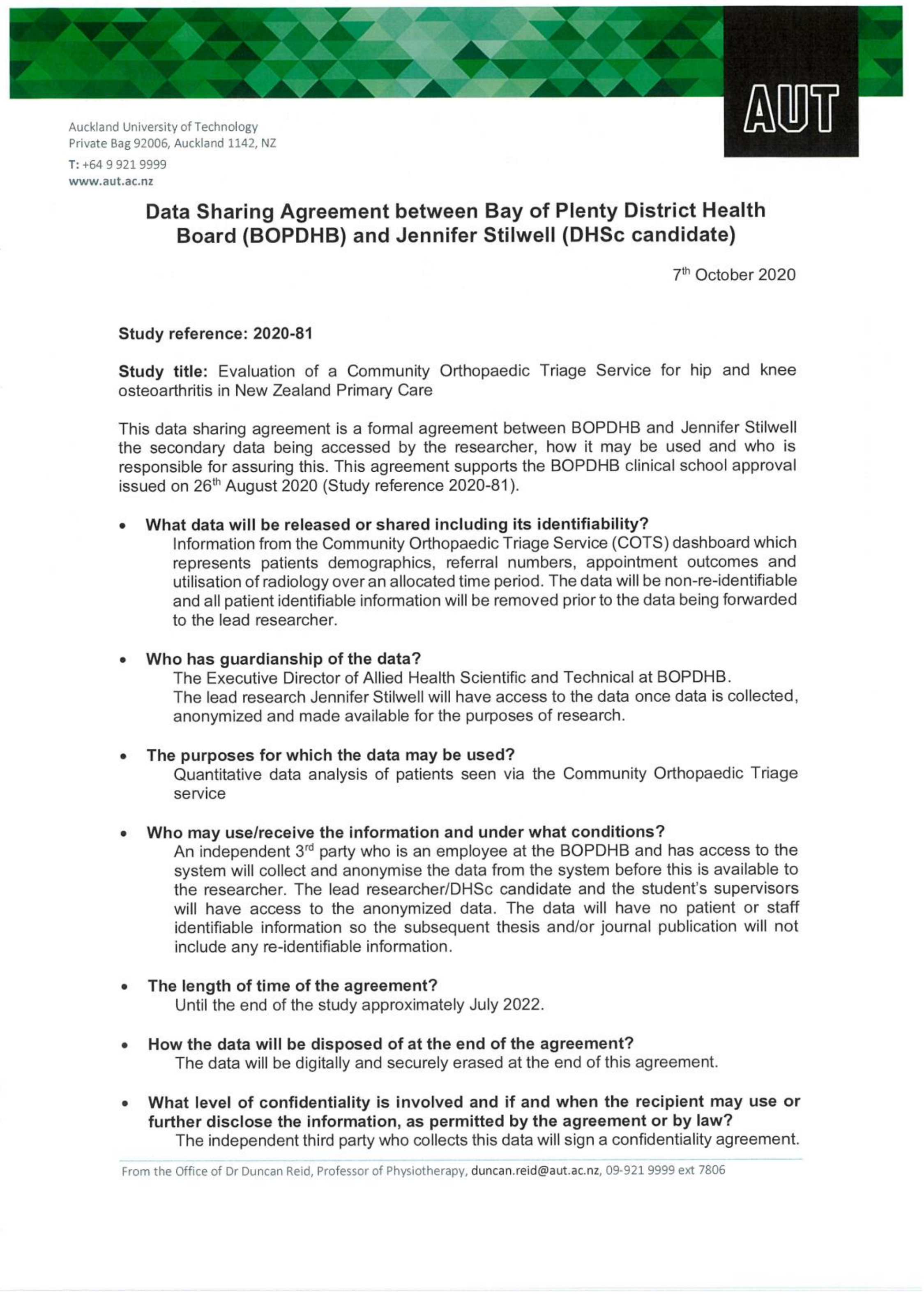
[1] Guidelines for Researchers on Health Research Involving Māori (2010)

BAY OF PLENTY
DISTRICT HEALTH BOARD
HAUORA A TOI

Appendix O *Data sharing agreement*



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Data Sharing Agreement between Bay of Plenty District Health Board (BOPDHB) and Jennifer Stilwell (DHSc candidate)

7th October 2020

Study reference: 2020-81

Study title: Evaluation of a Community Orthopaedic Triage Service for hip and knee osteoarthritis in New Zealand Primary Care

This data sharing agreement is a formal agreement between BOPDHB and Jennifer Stilwell the secondary data being accessed by the researcher, how it may be used and who is responsible for assuring this. This agreement supports the BOPDHB clinical school approval issued on 26th August 2020 (Study reference 2020-81).

- **What data will be released or shared including its identifiability?**
  Information from the Community Orthopaedic Triage Service (COTS) dashboard which represents patients demographics, referral numbers, appointment outcomes and utilisation of radiology over an allocated time period. The data will be non-re-identifiable and all patient identifiable information will be removed prior to the data being forwarded to the lead researcher.
- **Who has guardianship of the data?**
  The Executive Director of Allied Health Scientific and Technical at BOPDHB.
  The lead research Jennifer Stilwell will have access to the data once data is collected, anonymized and made available for the purposes of research.
- **The purposes for which the data may be used?**
  Quantitative data analysis of patients seen via the Community Orthopaedic Triage service
- **Who may use/receive the information and under what conditions?**
  An independent 3rd party who is an employee at the BOPDHB and has access to the system will collect and anonymise the data from the system before this is available to the researcher. The lead researcher/DHSc candidate and the student's supervisors will have access to the anonymized data. The data will have no patient or staff identifiable information so the subsequent thesis and/or journal publication will not include any re-identifiable information.
- **The length of time of the agreement?**
  Until the end of the study approximately July 2022.
- **How the data will be disposed of at the end of the agreement?**
  The data will be digitally and securely erased at the end of this agreement.
- **What level of confidentiality is involved and if and when the recipient may use or further disclose the information, as permitted by the agreement or by law?**
  The independent third party who collects this data will sign a confidentiality agreement.

From the Office of Dr Duncan Reid, Professor of Physiotherapy, duncan.reid@aut.ac.nz, 09-921 9999 ext 7806

Auckland University of Technology
Private Bag 92006, Auckland 1142, NZ
T: +64 9 921 9999
www.aut.ac.nz

- **Appropriate safeguards that the recipient is required to use to prevent unauthorized use or disclosure.**
  Password protected laptop and cloud storage of the data. The laptop will be at the researcher's home in a locked room. The AUT supervisors' devices will be password protected and secure at AUT.

- **Appropriate procedures for the recipient to report any breaches or disclosures they become aware of to the data provider.**
  Any potential breaches will be reported immediately to the Executive Director of Allied Health Scientific and Technical.

- **Procedures around the possible re-identification if necessary.**
  Re-identification of this data, while technically possible will not be required for the analysis of this data which will involve descriptive statistics of the whole data set rather than individual data entries.

I herby agree to adhere to the conditions above outlined in this data sharing agreement, I also agree to comply with all applicable laws including the Privacy Act 2020 and its respective publicly available privacy policies (as may be amended from time to time) in relation to their access to, possession, use and disclosure of the data.

Signed: ______________________________

Name: Jennifer Stilwell

Role: DHSc candidate

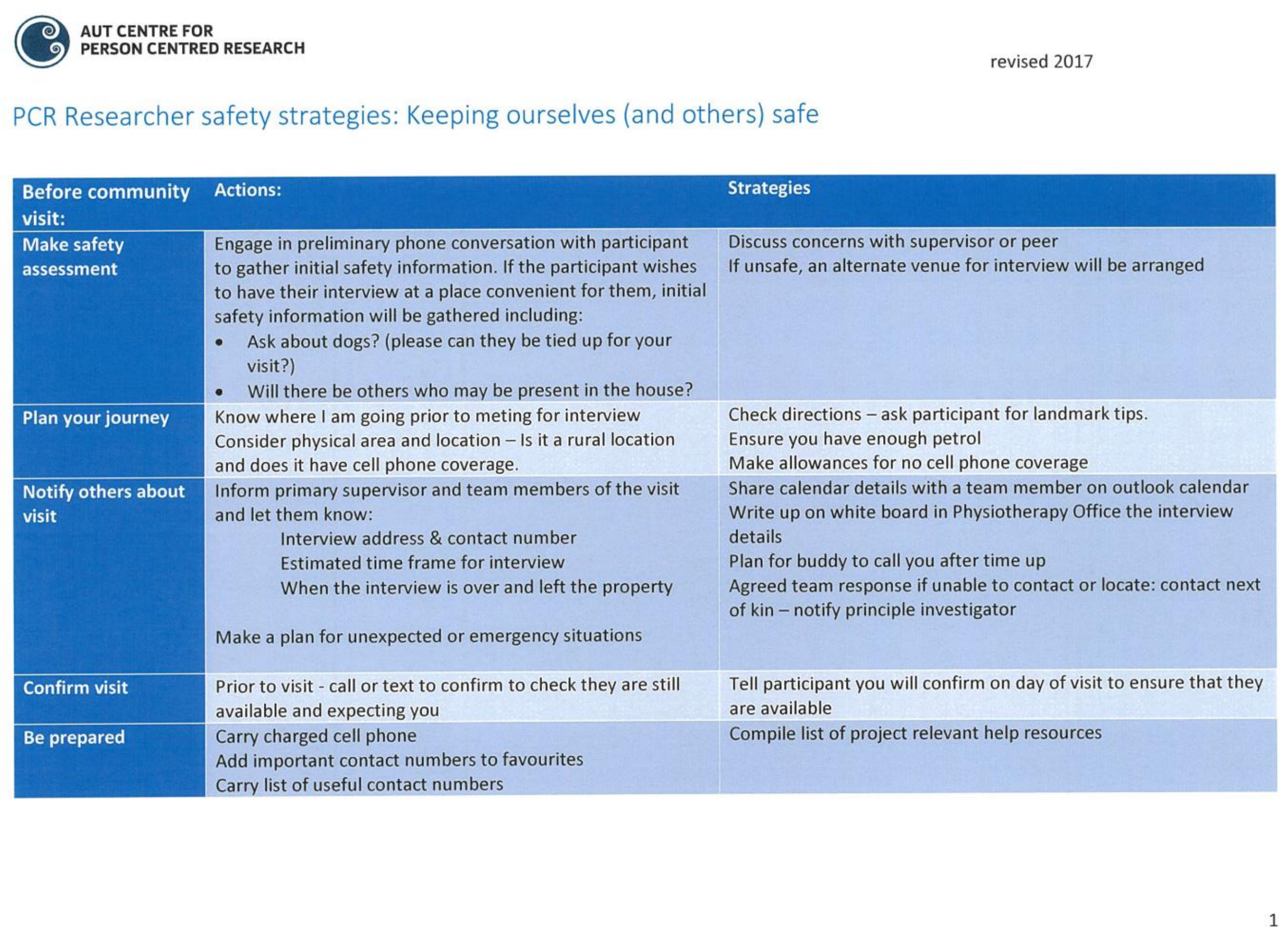
I herby agree to release this secondary data for the purposes of this study provided the conditions and applicable laws above are met.

Signed: Sarah L. Mitchell.

Name: Sarah Mitchell

Role: Executive Director of Allied Health, Scientific & Technical

Appendix P *Researcher safety strategy*



AUT CENTRE FOR
PERSON CENTRED RESEARCH

revised 2017

PCR Researcher safety strategies: Keeping ourselves (and others) safe

Before community visit:	**Actions:**	**Strategies**
Make safety assessment	Engage in preliminary phone conversation with participant to gather initial safety information. If the participant wishes to have their interview at a place convenient for them, initial safety information will be gathered including: • Ask about dogs? (please can they be tied up for your visit?) • Will there be others who may be present in the house?	Discuss concerns with supervisor or peer If unsafe, an alternate venue for interview will be arranged
Plan your journey	Know where I am going prior to meting for interview Consider physical area and location – Is it a rural location and does it have cell phone coverage.	Check directions – ask participant for landmark tips. Ensure you have enough petrol Make allowances for no cell phone coverage
Notify others about visit	Inform primary supervisor and team members of the visit and let them know: Interview address & contact number Estimated time frame for interview When the interview is over and left the property Make a plan for unexpected or emergency situations	Share calendar details with a team member on outlook calendar Write up on white board in Physiotherapy Office the interview details Plan for buddy to call you after time up Agreed team response if unable to contact or locate: contact next of kin – notify principle investigator
Confirm visit	Prior to visit - call or text to confirm to check they are still available and expecting you	Tell participant you will confirm on day of visit to ensure that they are available
Be prepared	Carry charged cell phone Add important contact numbers to favourites Carry list of useful contact numbers	Compile list of project relevant help resources

1

AUT CENTRE FOR PERSON CENTRED RESEARCH

revised 2017

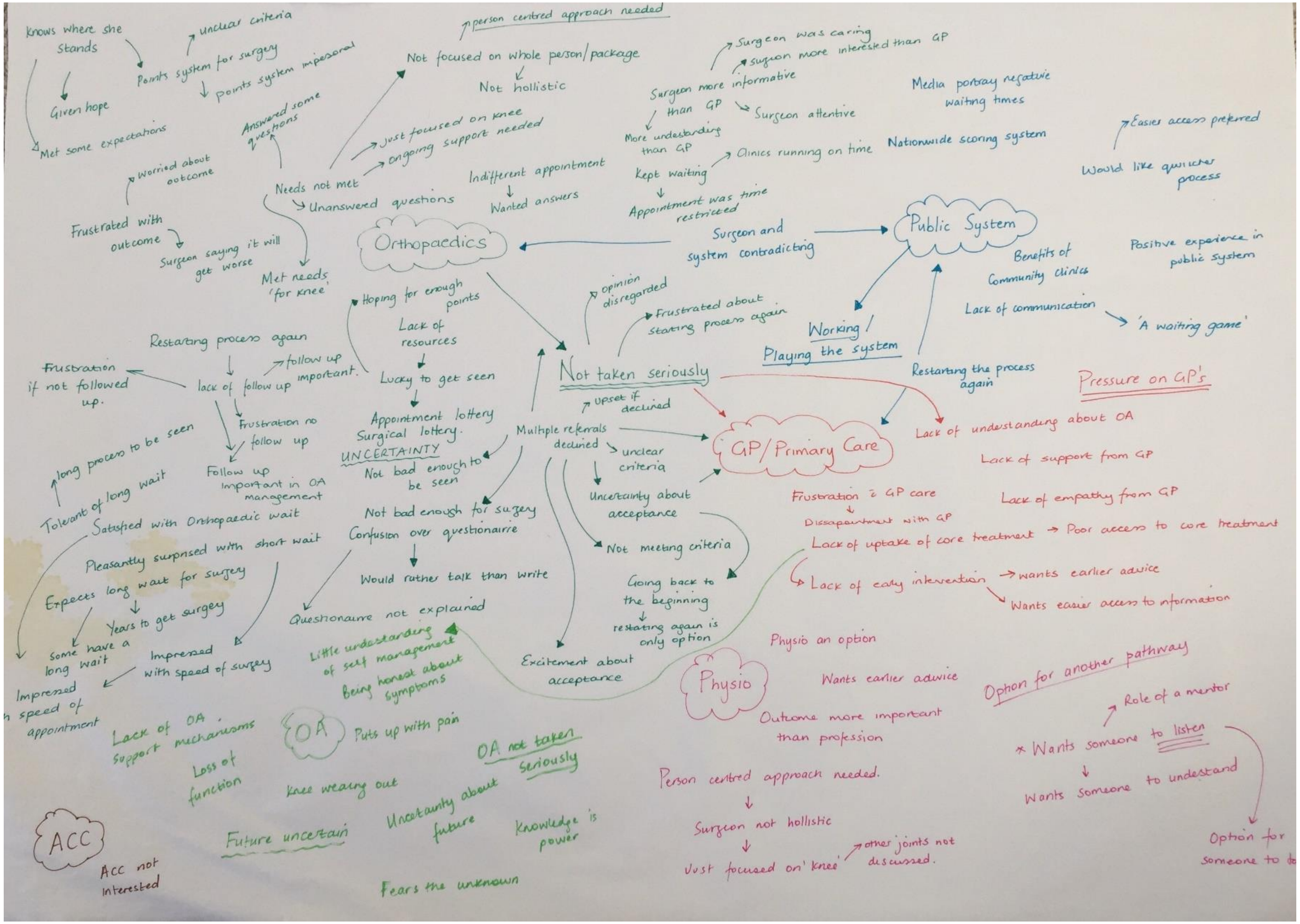
Keeping safe in the community: strategies for keeping safe and dealing with potential threats to safety

During the visit			
Event	Description	Possible immediate action	Strategy for prevention / alleviation
General strategies for being safe at offsite interview locations	Dogs on property	Ask for dogs to be tired up or put in another room while you are there	Enquire about dogs when arranging the interview if the participant asks for the interview to be carried out in their home
	Others taking over the interview	Reiterate the purpose of the visit. And your role as researcher (e.g. not health professional giving advice).	When arranging interview: ask who else will be at home when you visit? make it clear the purpose of the visit, Carry contact details of other avenues for support or information
	Generally feel ill at ease about visit	Bring along a colleague ("trainee") Suggest alternate venue Park car where you can leave quickly, wear easily slipped on shoes. Don't park up a drive way where you can be blocked in. Keep keys and phone close at hand (in your pocket) Remind participant that you have a schedule and that your buddy will be expecting a follow-up call	Ensure you have followed general safety guidelines: e.g. buddy alerted to interview location
	Hesitant participant (Vulnerable)	Carry AUT researcher identification or DHB name badge Take time to introduce yourself fully when you arrive	Prior to visit: Chat with potential participant when arranging the visit to establish early rapport / connections. Call or text prior to arriving to remind and reassure that you will be there shortly
• In an emergency situation: call 111			Always Carry charged cell phone
Perceived/ Threats to physical safety of researcher **If at any time I feel**	Inappropriate language or gestures directed at you or others in your presence	Assess the situation: if offensive, suggest toning down the language	Prior to visit, assess patient's current tone/language via telephone
	Verbal abuse directed at you by participant or other	De-escalation strategies - Don't answer emotion with emotion - Watch tone and volume	De-escalation training

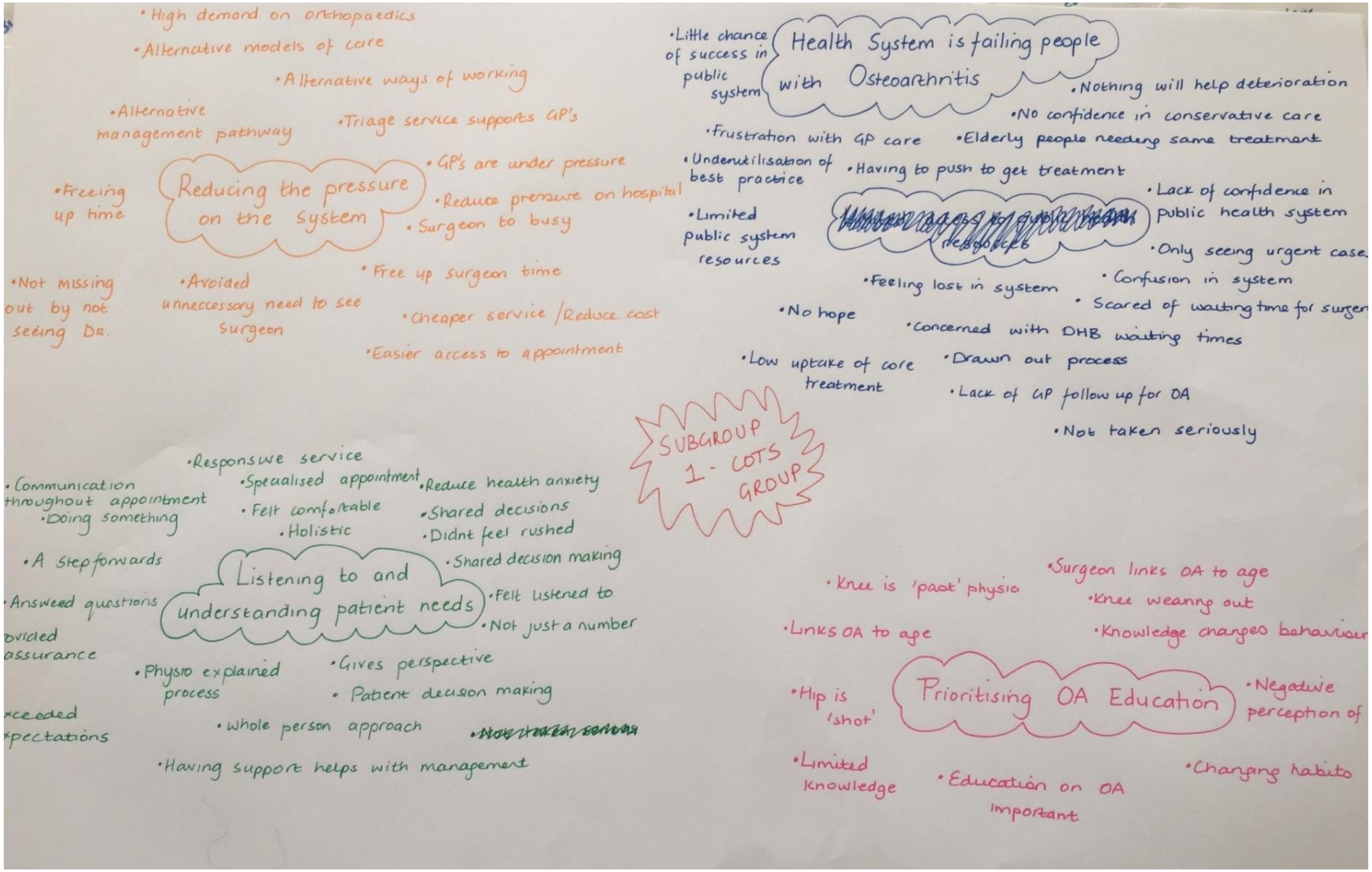
my safety is in jeopardy I will terminate the visit *Report incidents to Supervisor*		- Respond calmly with "I" messages; keep statements matter of fact, simple and direct; keep a physical distance; don't reach out and touch the person; don't suddenly get up from the chair while the person is sitting, don't leave too abruptly	
	Threatening encounter: mates show up	De-escalation language / strategies Suggest rescheduling the interview and leave	Check when scheduling if others will be present. Suggest alternate venue.
	Suspect or observe violence (e.g. raised voices on arrival)	**Trust your instincts** Routine 'property pre-entry check'? **Do not enter property** Call participant: Are you ok? Leave premises if I feel my safety is in jeopardy	
Perceived Threats to safety of participant *Report incidents to Supervisor*	Drugs or weapons on display	Try to understand situation. Weapons: check with participant are they feeling safe or under threat? Do you need to leave?	Ask that weapons /drugs are not on display when you are present. Reschedule visit. Change location of interview
	Concerns about general health	Discuss with participant. Suggest they contact their health professional. Or seek their permission to do so on their behalf.	Interviewer training in situation assessment questioning techniques
	Concerns about welfare	Discuss with participant. (stock questions?) What support systems do they have? Suggest relevant agency for assistance. Seek their permission if you need to contact others on their behalf	Keep updated list of resources relevant to the study population
	Others request information about participant	Standard phrase: "I'm sorry I'm not in a position to talk about that" Direct them to other more appropriate source for that info.	Check who is allowed to be included in the interview
Threats to emotional safety	Emotional display from researcher during research encounter	Rapport building balanced with professionalism. Researcher / participant relationship: Making connections	Recognise the study and researcher-specific factors: - topic matter, personal characteristics

	Emotional response from participant	Assess is this an Emotional release or sign of distress? Is further help needed?	Training in situation assessment questioning techniques Keep updated list of resources relevant to the study population
	Feeling emotionally drained following interview	Debrief with someone Take time between interviews to process and reflect – take a walk. Anticipate potential difficult study topics	Schedule regular debrief sessions with supervisor. Discuss and decide on how many interviews in a set period realistic. Plan for strategies that support conscious engagement in emotional practices that help processing the emotional response.

Appendix Q *Subgroup one – coding*



Appendix R *Subgroup one – Creating subthemes*



- High demand on orthopaedics
- Alternative models of care
- Alternative ways of working
- Alternative management pathway
- Triage service supports GP's
- Freeing up time
- GP's are under pressure
- Reduce pressure on hospital
- Surgeon to busy
- Not missing out by not seeing Dr.
- Avoided unneccessary need to see surgeon
- Free up surgeon time
- Cheaper service / Reduce cost
- Easier access to appointment

Reducing the pressure on the system

- Little chance of success in public system
- Nothing will help deterioration
- No confidence in conservative care
- Frustration with GP care
- Elderly people needing same treatment
- Undenutilisation of best practice
- Having to push to get treatment
- Limited public system resources
- Lack of confidence in public health system
- Only seeing urgent case
- Feeling lost in system
- Confusion in system
- No hope
- Scared of waiting time for surger
- Concerned with DHB waiting times
- Low uptake of core treatment
- Drawn out process
- Lack of GP follow up for OA
- Not taken seriously

Health System is failing people with Osteoarthritis

[redacted] resources

SUBGROUP 1 - LOTS GROUP

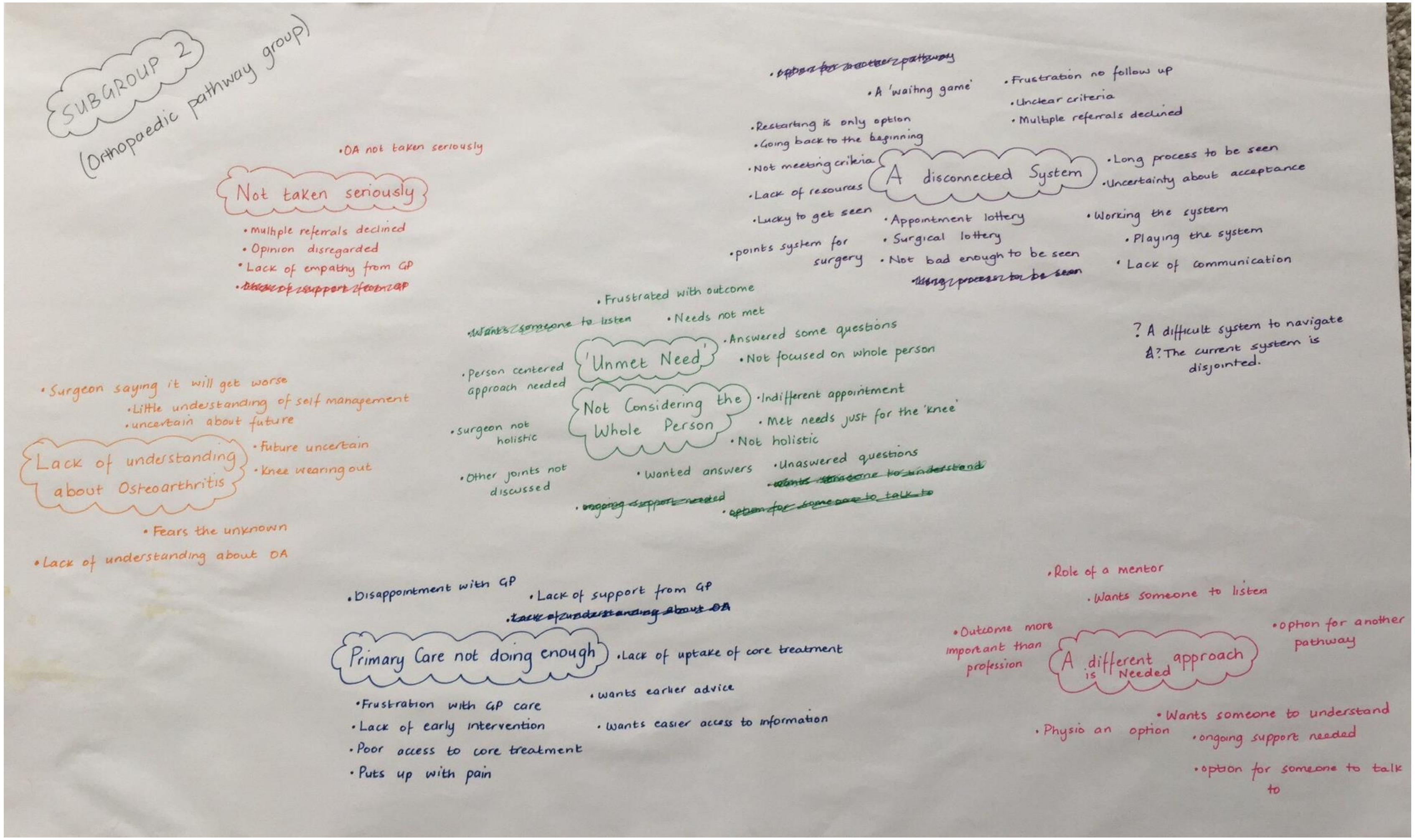
- Responsive service
- Communication throughout appointment
- Specialised appointment
- Reduce health anxiety
- Doing something
- Felt comfortable
- Shared decisions
- Holistic
- Didnt feel rushed
- A step forwards
- Shared decision making
- Answered questions
- Felt listened to
- Not just a number
- ovided assurance
- Physio explained process
- Gives perspective
- Patient decision making
- xceeded xpectations
- Whole person approach
- ~~Not taken seriously~~
- Having support helps with management

Listening to and understanding patient needs

- Knee is 'past' physio
- Surgeon links OA to age
- Knee wearing out
- Links OA to age
- Knowledge changes behaviour
- Hip is 'shot'
- Negative perception of
- Limited knowledge
- Education on OA important
- Changing habits

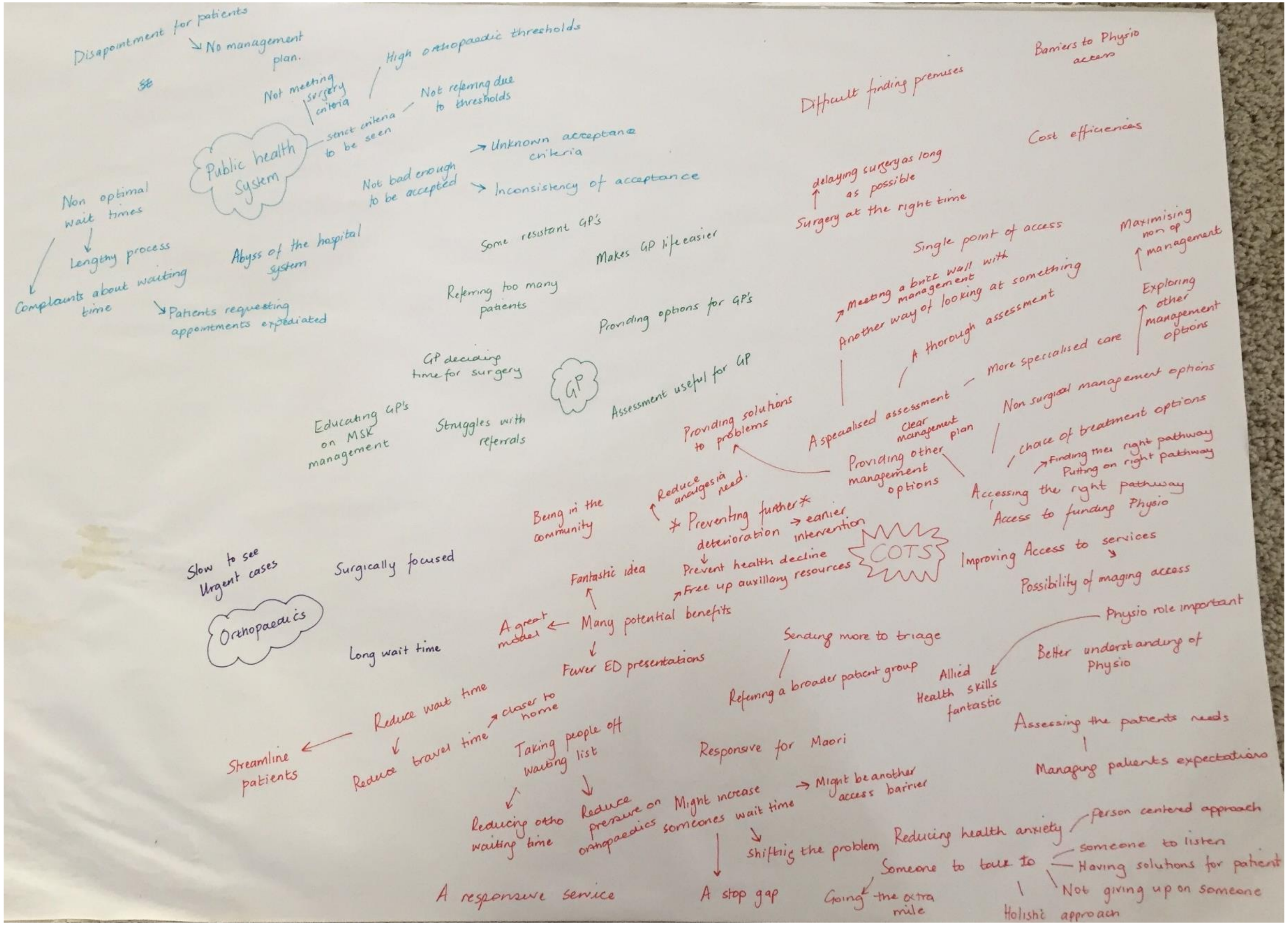
Prioritising OA Education

Appendix S *Subgroup two – creating subthemes*

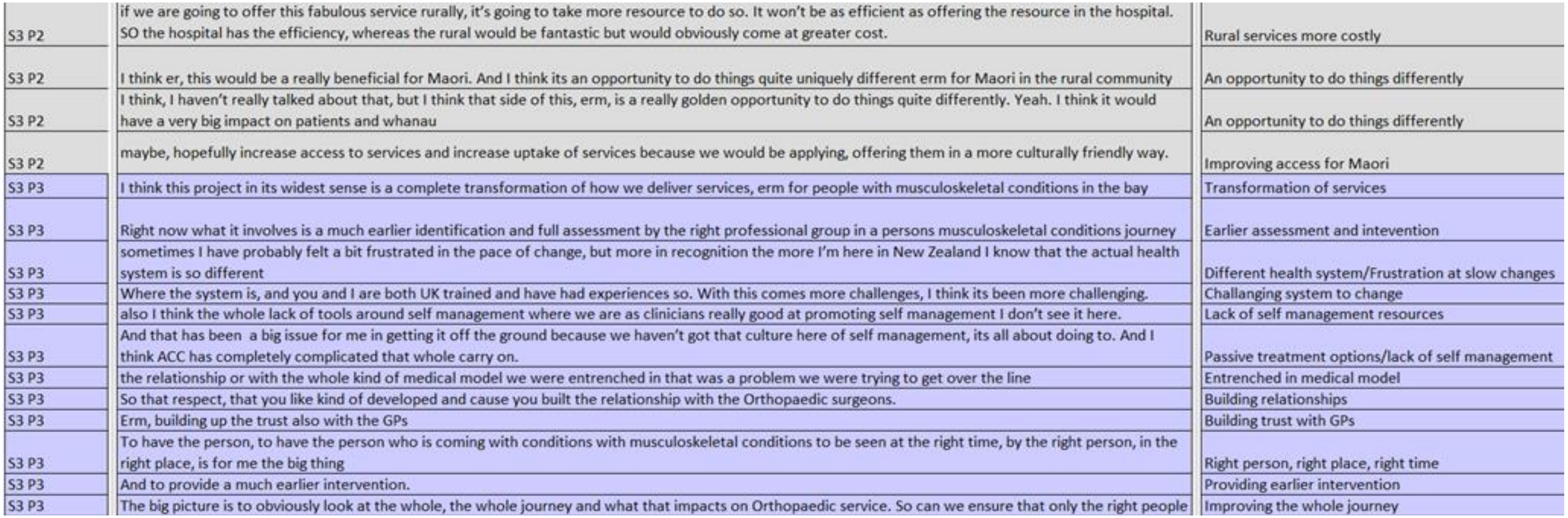


Appendix T *Subtheme three – coding*

Appendix U *Subtheme four - coding*

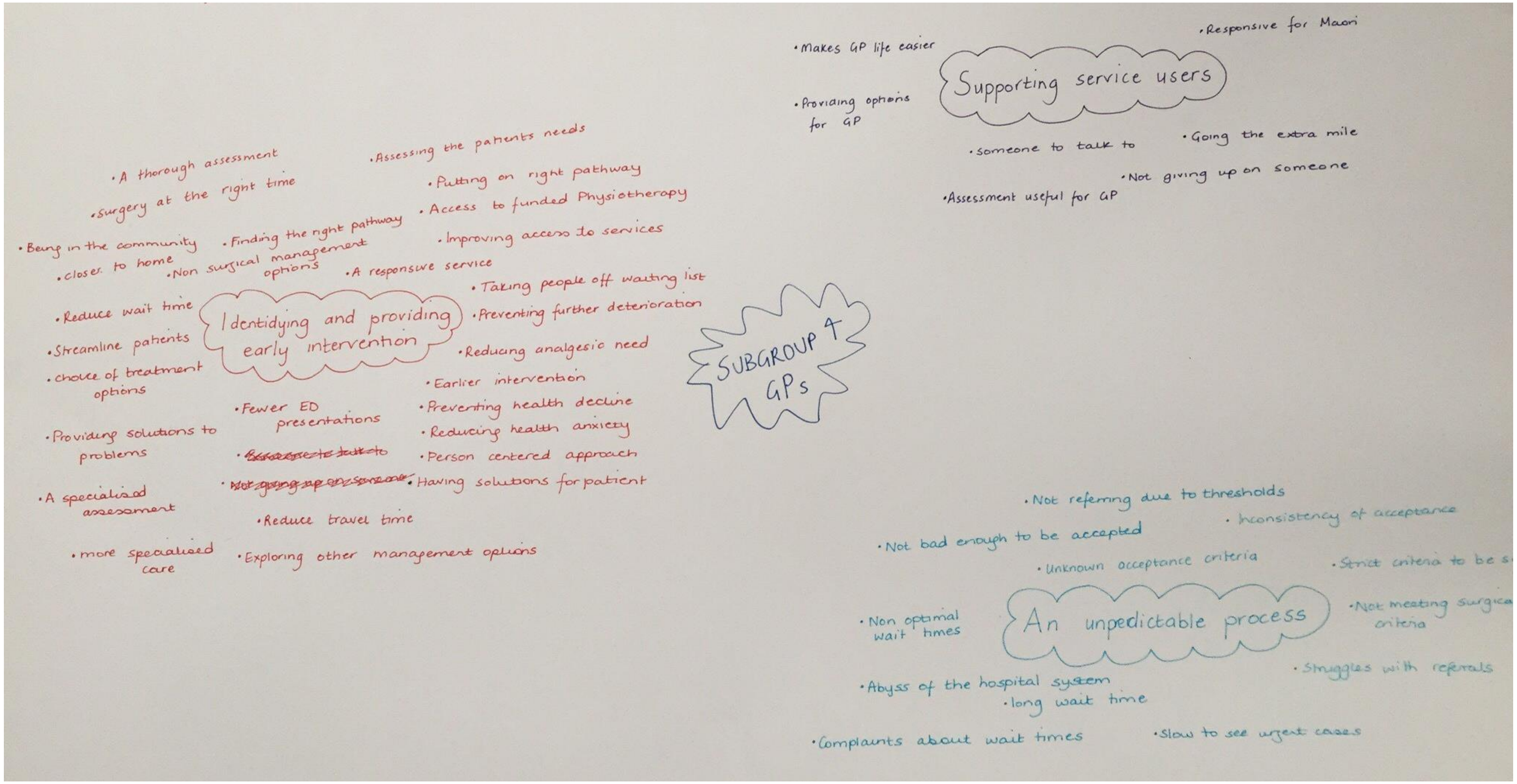


Appendix V *Example of collating codes in excel*

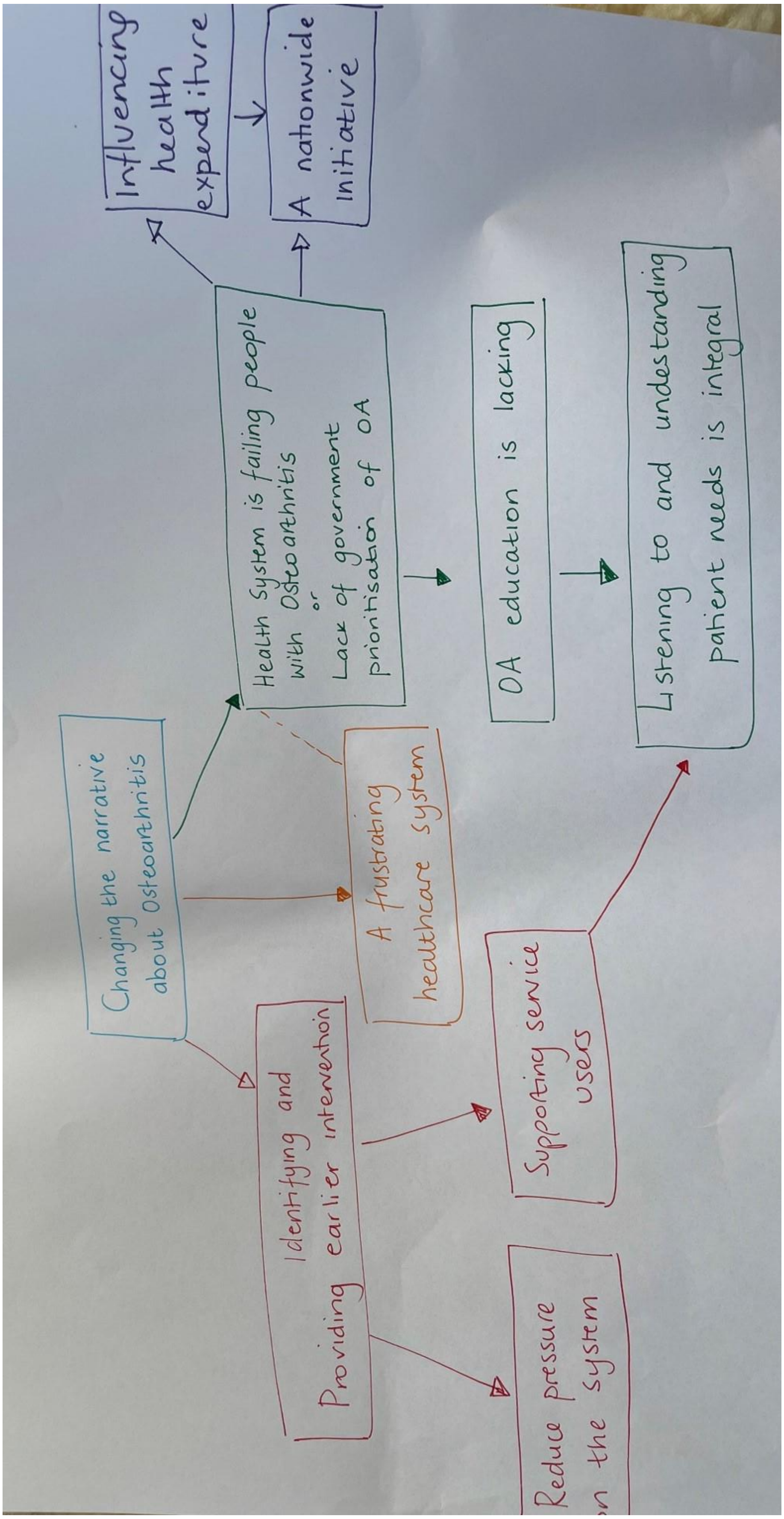


S3 P2	if we are going to offer this fabulous service rurally, it's going to take more resource to do so. It won't be as efficient as offering the resource in the hospital. SO the hospital has the efficiency, whereas the rural would be fantastic but would obviously come at greater cost.	Rural services more costly
S3 P2	I think er, this would be a really beneficial for Maori. And I think its an opportunity to do things quite uniquely different erm for Maori in the rural community	An opportunity to do things differently
S3 P2	I think, I haven't really talked about that, but I think that side of this, erm, is a really golden opportunity to do things quite differently. Yeah. I think it would have a very big impact on patients and whanau	An opportunity to do things differently
S3 P2	maybe, hopefully increase access to services and increase uptake of services because we would be applying, offering them in a more culturally friendly way.	Improving access for Maori
S3 P3	I think this project in its widest sense is a complete transformation of how we deliver services, erm for people with musculoskeletal conditions in the bay	Transformation of services
S3 P3	Right now what it involves is a much earlier identification and full assessment by the right professional group in a persons musculoskeletal conditions journey	Earlier assessment and intevention
S3 P3	sometimes I have probably felt a bit frustrated in the pace of change, but more in recognition the more I'm here in New Zealand I know that the actual health system is so different	Different health system/Frustration at slow changes
S3 P3	Where the system is, and you and I are both UK trained and have had experiences so. With this comes more challenges, I think its been more challenging.	Challanging system to change
S3 P3	also I think the whole lack of tools around self management where we are as clinicians really good at promoting self management I don't see it here.	Lack of self management resources
S3 P3	And that has been a big issue for me in getting it off the ground because we haven't got that culture here of self management, its all about doing to. And I think ACC has completely complicated that whole carry on.	Passive treatment options/lack of self management
S3 P3	the relationship or with the whole kind of medical model we were entrenched in that was a problem we were trying to get over the line	Entrenched in medical model
S3 P3	So that respect, that you like kind of developed and cause you built the relationship with the Orthopaedic surgeons.	Building relationships
S3 P3	Erm, building up the trust also with the GPs	Building trust with GPs
S3 P3	To have the person, to have the person who is coming with conditions with musculoskeletal conditions to be seen at the right time, by the right person, in the right place, is for me the big thing	Right person, right place, right time
S3 P3	And to provide a much earlier intervention.	Providing earlier intervention
S3 P3	The big picture is to obviously look at the whole, the whole journey and what that impacts on Orthopaedic service. So can we ensure that only the right people	Improving the whole journey

Appendix W *Subtheme four – creating subthemes*



Appendix X *Early thematic map*



Appendix Y *Raw data for subthemes*

Sub-theme	**Examples of supporting quotations**	**Participant code**
A nationwide change initiative	*But if you think about the provision of elective surgery, in terms of surgical threshold criteria, we have so much discrepancy throughout the country in terms of what patients meet that threshold. For want of a better word we have postcode lottery when it comes to orthopaedic surgery.*	S3 P1
	Yeah, just knowing again a lot of the time, some people will have severe osteoarthritis or erm certain joint pains and issues that get declined but we don't really get much reason as to why it's just below threshold. And its inconsistent as well.	S4 P3
	Because of the way the DHBs are structured is the DHBs do things differently around the country. So, if the DHBs all did the same thing it would be much easier.	S3 P1
	I hope it just doesn't become a replacement for the orthopaedic waiting list, you know the people who wait a prolonged period of time to see and get assessed by a Senior Physio and then wait a longer time to see and get assessed by an orthopaedic surgeon.	S4 P1
Challenges to service delivery	*No there was no management plan (from the GP). It was just wait and see.*	S2 P3
	That was a very long process because initially the first thing was ACC and that was a cartilage thing and after about 5 or probably more than that years, it was doing its thing again but wasn't ACC	S1 P1
	People go through the ACC model and get told they have x amount of therapy sessions when they actually don't need them and there's no self-management aspect	S3 P3
	Just not enough resources available. You know it's going to cost the system more for me to be not working than if I am able to work and support myself, yeah.' (S2 P1).	S2 P1
Unlocking physiotherapy potential	*I think, again because of the way the health system is in New Zealand, we have ACC and DHB, DHB Physios are much more attuned to chronic ailments and treating arthritis and understanding what gets surgery.*	S3 P2
	there's always potential to have push back from the users. If they're expecting to see an orthopaedic consultant and suddenly, they're seeing the Physio and you know they feel they're getting palmed off.	S3 P4

	Yeah, put it this way, I didn't picture her as a physiotherapist as such over anything else. She was there, she was doing a job.	S1 P1
	6 of 1 and half a dozen of the other. They all know what they're doing.	S1 P2
	it will raise the profile of what allied health, well physio specifically can do about, in terms of our capability to do, and our professional ability to identify and triage musculoskeletal patients.	S3 P3
	if the work is not done to communicate the competence and ability of the triage physios, I think some, I think there will be a lot of people in the community that will still want to see a doctor.	S3 P1
Reduce pressure on the organisation	*From the point of view of our DHBs and that's not just Tauranga, that they cover a huge area and why would you want people driving into city where a hospital is situated if it's not needed. You know why do they need to go to a hospital?*	S1 P3
	Because you know their time is pretty busy too with doctors probably more so than a lot of other people cause they got a hell of a lot of patients to look after.	S1 P4
	If we can reduce down the number of people that are sitting there waiting to be seen to be told they don't need to have an operation, then that frees up their time to actually be able to operate on more people, then that's great.	S3 P1
	Because of the way that our health system is structured and the fact that we have so many consultants here and so little surgical time and the added complication of trauma taking away the surgical time I think that this project although very important for patients and having a massive impact on physiotherapy and very beneficial to physiotherapy I don't know that it will have a lot of impact on orthopaedics.	S3 P2
Influencing health expenditure	*Once again, it's less expense because I imagine the surgeons time are a lot more expensive than the Physios time.*	S1 P4
	Yeah for the simple reason there was cheaper travel, there was no major contact with heaps of people.	S1 P3
	I also worry slightly, wonder slightly but the time we've, we've got a lot of people, when we take in all the admin time and the cost of everybody involved in the project. And the non-clinical people, the clinical people. The cost of the increased Physio, which is fantastic to have more MSK physio, I wonder if it's going to save much money at all.	S3 P2

	I think great if there is a financial benefit, but I think the real benefit will be in patient journey and outcomes. Yeah so, I don't think the DHB is doing this to save money.	S3 P4
A frustrating healthcare journey	*there was another lady there and she must be going for her hip and she was filling in the form for the pain thing and I don't think she was putting it as severe enough and her husband said that if you don't put its severe enough is that you're not going to get it. Probably just stretching the truth a little bit.*	S2 P2
	I was just hoping that I was going to get surgery, because I was thinking if I didn't, I would have to go back to the Dr and start the process all over again.	S2 P2
	I think it would be quite good if they said look, we will see you again in 6 months or 12 months and review you know how things have gone rather than having to start the whole process again. Erm, quite upset and frustrated again.	S2 P1
Identifying and providing earlier intervention	*Be in the system, don't leave it. I think that the sooner we manage any of our health and the quicker we do it the better it is for us and us as a country. You know make it a wellness thing than too late after. You know if it's deteriorated to the extent and you've just kept going, you're going through an operation which you know, none of us want to do if we don't have to. It's the end of the thing not the beginning*	S1 P3
	Get it looked at because if there is a problem there, they can fix it before it gets too bad.	S1 P4
	I think just you know getting people seen earlier in the disease process is going to help as well, like at the moment I've got somebody who has a foot fusion I think it was, this has failed, he's waiting to see somebody, he's waiting four months, his appointment has been cancelled twice, has now developed awful knee hip and lower back pain and is getting worse and worse and is desperate and has been calling me.	S4 P2
	I think hopefully there would then be fewer ED presentations with poorly managed musculoskeletal issues as well for people who are on a 4-6 month waiting period either getting worse or not being well managed.	S4 P1
	The Bay of Plenty has the highest opioid prescribing rate in the country so and early orthopaedic intervention, or early musculoskeletal interventions would probably go some way to culling that down a bit.	S4 P2
	previously I think a patient would have waited months, seen the GP, then waited months to see an orthopaedic surgeon, sat in clinic for ages and had a shortish appointment with a registrar or consultant or a bit of both and been given a brief message as to what was wrong with them.' (S3 P2)	S3 P2

	So wait time is again a big one there, but it's about providing faster intervention. But the right pathway for them so they are not waiting 6 months, don't meet surgical threshold, discharged back to the GP to start a process again.	S3 P4
Listening to and understanding patient needs	*it would be nice for someone who has an understanding, someone in the medical world who may not be the specialist but has enough understanding. They have the ability to perhaps talk to people and even if it's just a bit of assurance and reassurance and perhaps a plan forward. You know this is what you can do this is what you can't do, this I what you should do. This is what we advise you to do. Someone to answer questions, as like a mentor really a guide.*	S2 P3
	for some people, for many people that's a superior experience because they're not looking for surgery they're looking for somebody to listen and advise. Erm and for many patients they will love that. It's what they need. And they will be totally dissatisfied with someone who takes ten minutes who says you don't need an operation goodbye.	S3 P5
	I think it was the fact that it was also, made me feel a little bit happier that you know that obviously you're being listened to from the point of view from my GP and point of view from the DHB.	S1 P3
	I think generally positive, they were positive about the waiting times, they were positive about the thoroughness of the assessment and the two who had been worries about surgery were very positive about kind of the variety of options that were available.	S4 P1
	'I get the feeling that the people in the COTS programme are going the extra mile to make sure they are reaching out to patients who historically would have struggled…. COTS is more proactively reaching out to them in a variety of ways, trying to work with their needs.	S4 P2
Supporting service users	*a lot of my patients have only been my patients for the last 12 months or 11 months and so having another option a way to look at something is quite useful.*	S4 P3
	Yeah, hopefully it will make my life easier in that I won't spend my time writing fairly pointless letters to expedite referrals.	S4 P2
	it's the good conversations that therapists, Physios, are able to have with people that I think doesn't happen if you have that short consultation with your GP. So it's that wider well-being conversation that we can have with individuals which will support their well-being. Which orthopaedic surgeons don't have.	S3 P3
	At the moment yeah, I'm hoping that the process with upping exercises and having to work with somebody not doing it alone, having that support, yes I probably react better and put more into it if I'm not doing things alone.	S1 P3

	it would be nice to know that I was in the system and there was support, more support for ongoing care	S2 P3
	And as part of that assessment, we are then identifying those patients who would benefit from surgical management and those who would not benefit from surgical management would benefit from a non-surgical management pathway. And helping to guide them in what that looks like.	S3 P1
Building healthy relationships	*we are also in a very hierarchical culture of, we've got the doctors and then we've got the rest of you. And I think you guys have done an amazing job on building that relationship with the orthopaedic surgeons because that has totally shifted. We are developing clinical leaders who are not in that parent child relationship. We are shifting that.*	S3 P3
	I think having relationships with the orthopaedic doctors is really important. Having a respected relationship and a trusted relationship with them.	S3 P1
	So I think communication with the GPs. Communication to the public in general. And relationships particularly with the orthopaedic consultants.	S3 P2
	I think opening up the secondary care services to people who wouldn't have been able to access them before.	S4 P1
Prioritising OA education	*Originally I thought it would be a cartilage issue, but he said that's definitely ruled out and not much hope.*	S1 P1
	And they sort of just said we will look at you, it's quite minor it's not huge we will put you on some painkillers	S1 P3
	So she then basically, showed me everything else I needed to see and the reports she came out and explained everything to me.	S1 P3
	I felt she sort of explained a lot of things that, like I say with everything connected and the knees clicking and how I can't put my socks on.	S1 P5