How valid and useful is a locally-developed frailty tool for joint decision-making by patients, families and clinicians?

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I declare that the work presented in *How valid and useful is a locally-developed frailty tool for joint decision-making by patients, families and clinicians?* is, to the best of my knowledge and belief, original and my own work, except as acknowledged in the text and reference pages.

Signed: ____ Date: _______________

Abstract

How valid and useful is a locally-developed frailty tool for joint decision-making by patients, families and clinicians?

There are increasing numbers of elderly patients in New Zealand hospitals. An ageing population coupled with increasing financial constraints has heralded concern about future management and sustainability of the health system. Another dimension of this issue is the growing concern with how elderly patients are managed and treated in the end stages of their lives and whether the "bio-medicalisation" of the ageing process has now become routine. The context of an ageing population, limited finances, and an emerging bio-ethical field concerning elderly medical treatment, has created a need to understand what frailty looks like, how it can be measured, and whether this knowledge can help clinicians and patients arrive at informed treatment decisions. A frailty tool, Frail CHeC, was developed at a regional hospital. It aims to provide a quick method of assessing patients for frailty that is easily understood by clinicians and patients. Research was conducted to determine whether the Frail CHeC tool was valid and useable for patients, and clinicians.

This thesis used a quantitative research approach by way of a descriptive survey method. Twelve clinicians were recruited to participate in the study. They conducted 60 Frail CHeC assessments between them. Each Frail CHeC tool had a survey that was completed by the clinician and the patient at the conclusion of the assessment. Results of the Frail CHeC tool and the accompanying survey were summarised and descriptive and inferential statistics were calculated.

The results of the Frail CHeC assessment were stratified across age bands and gender and compared to established frailty tools.

Both patients and clinicians had favourable views on the Frail CHeC tool. Views were assessed using a Likert scale of 1-5 with one representing strongly disagree and five representing strongly agree. The mean score for whether the Frail CHeC tool results were a good representation of the patient's level of frailty and health were 4.48 for clinicians and 4.24 for patients. The mean score for whether the assessment was a good use of time was 4.39 for clinicians and 4.13 for patients. The mean time to complete the Frail CHeC assessment was 33 minutes with doctors completing the assessment quicker than other professional groups.

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Chapter One - Introduction

This thesis explores the concept of frailty and evaluates the effectiveness of a clinical tool designed to measure frailty and explain it to patients. This chapter begins with a description of the background forces that are prompting the need to understand frailty and what its prevalence means to the individual and the broader health system. The chapter concludes with an examination of frailty's definition and a description of the clinical tool being evaluated.

Background

In 1521, Spanish Conquistador, Ponce De Leon was shot by a poison-tipped arrow while searching for the fabled fountain of youth. Rather than finding a magical spring with curative powers to halt the ageing process he died a few days later, succumbing to the poisonous sap of the Manchineel tree (Mother Nature Network, 2014). Despite De Leon's auspicious demise, over five hundred years later the search continues for a magic elixir to halt the ageing process (Ryff, 1989). The islands of Sardinia in the Mediterranean and Okinawa in the Sea of Japan are fabled for having more centenarians per capita than any other geographic area. Researchers have pinpointed that diet, exercise, family contact and genetics are the key factors in the islanders longevity (Buettner, 2005), hardly a magic and secretive combination, yet physical decline and eventual death may lead to uncertainty, confusion, and faith placed in instant cures. A survey conducted in 2005 indicated that Baby Boomers believed that diet and exercise were the best interventions to ensure longevity and yet they were more likely to drink water and take vitamins (Thornhill, 2005). Over those surveyed, 25% reported that they ate a balanced diet and 21% stated they exercised regularly compared to 50% who took vitamins and 44% who drank regular water (Thornhill, 2005). Further, a 2007 analysis of prescription drug data reported 88% of Americans over the age of 60 are on at least one prescription drug and 37% are on at least five (Gu, Dillon & Burt, 2010).

This research undertaken by Gu et al. (2010) appears to support the idea that the ageing process continues, and the fabled fountain of youth remains unfound, but instead eldery years are being extended through careful medication management. A new ethical field, *the biomedicalization of ageing*, has developed to consider the impact of extending elderly years through intensive medication regimes and a plethora of clinical interventions (Kaufman, Shim, & Russ, 2004).

This discussion considers the desire for extending life and the search for interventions to support this aim, may lead to looking for an extension in years at all costs, regardless of how disabilities may curtail happiness (Kaufman, Shim, & Russ, 2004). Thus the debate becomes less about how to prolong life, and more about how to define meaning and happiness in the remaining years. Carol Ryff (1989) notes:

> As the aged population grows ever larger, there is increased awareness that Ponce de Leon may have missed the point. Instead of searching for the fountain of youth, which would have arrested human experience in an incomplete, unfinished form, a greater quest would have been to discover the richness and rewards of life lived fully to the end. (p. 35)

This quote places value on the richness and rewards of life rather than a simple extension of years. This in turn leads to a need to define the loss of function during elderly life and understand what makes its profile distinct from other common diseases such as chronic disease and cancer. Frailty has become an increasingly popular term to describe this state (Hogan, 2007). The definition of frailty, how it can be measured and what it means to shared decision-making are explored below, but the context that signifies its importance must be understood first. There are three main forces in the current context that form the reference points for this discussion: the ageing of the population; the financial pressures on the healthcare system; and the growing discomfort with what a modern death is like.

Ageing Population

The demographics of New Zealand are changing as a result of declining fertility rates, and increased life expectancy. The proportion of the population who are over 65 is projected to more than double from the 12.4% in 2006 to 25% in 2051 (Statistics New Zealand, 2007). Other member countries of the Organisation for Economic Co-operation and Development (OECD) are facing similar or greater challenges. The OECD reported in 2011 that all member countries had seen an increase in their elderly populations over the last 30 years, both in terms of absolute numbers and as a percentage of the overall population (OECD, 2011). Japan was at the far end of the spectrum, and reported in a 2012 census that 24% of its population was over 65 years old (OECD, 2014). Remarkably, it has been forecast that 50% of Japanese born in 2007 will live to be at least 107 years old (Christensen, Doblhammer, Rau, & Vaupel, 2009). The reasons behind the ageing population are more complex than the emergence of the “baby boomer” population after the Second World War when there was a steep increase in fertility rates, followed by a long slow decline in these rates to below replacement levels. Unquestionably the baby boomer group is evident as statistical population group, but the ageing of the population had commenced before the emergence of the baby boomer cohort and will continue after it (Statistics New Zealand, 2000). Further, the ageing of the population has been described as a global trait which can be seen in countries without clear baby boomer populations and whose key determinants are increasing life expectancy and declining fertility rates (Lutz, Sanderson, & Scherbov, 2008).

Another key trait of ageing population is how the over 65 cohort is also undergoing its own demographic transformation. In 1951, most elderly New Zealanders were between 65 and 74 years old with only 30% of the over 65 cohort recorded as over 74 years old. By 2051 this figure is expected to increase to 60%. This has critical ramifications for health planning as a growing number of New Zealanders enter the stages of their lives where they have the most interactions with the healthcare system. A recent cohort study in New Zealand found that 42% of those over 80 years old had a hospital admission over the last 12 months (Kerse, 2014).

Financial Pressures in Health

In the context of health spending, the proportion of the population who are over 65 is significant. In 2004, the New Zealand Treasury reported that health spending on the over 65 year old group in New Zealand was five times greater than the under 65 group. (New Zealand Treasury, 2004). They also note that health spending becomes more pronounced at either end of the age spectrum. The average 30 year old consumes $900 worth of health per annum compared to the average 90 year old who consumers $16,000 (New Zealand Treasury, 2004). Despite this knowledge, the New Zealand treasury argues that demographic trends and specifically the ageing of the population is less of an influence on future health spending than non-demographic factors such as rising incomes and access to new technology (New Zealand Treasury, 2010). They argue that health is a labour-intensive market where employee wages form the biggest expenditure. In this context the overall cost of health is extremely sensitive to the wages spent on the people who deliver it (New Zealand Treasury, 2012). They also note, that a rise in access to new technology coupled with an increase in consumer expectations could influence future health spending (New Zealand Treasury, 2012). There are a greater number of interventions that can be performed and a wider range of people who might benefit. Thus the Treasury's position is that the reach of the health service and the wages of those who work on it will drive the majority of the rise in future health spending.

Although the population is ageing, the Treasury dampens the effect by assuming that more people will be in a healthier state in their old age and free from disability and disease (New Zealand Treasury, 2004). This position maintains that it is not the fact that the human population is ageing but how it is ageing that is important. It's not the absolute numbers of 80 year olds in the population, but the number of 80 year olds in poor health that is the factor. Christensen et al. (2009) argue that people are not just living longer, but they are living longer without severe disability. This is echoed by Cutler, Ghosh, and Landrum (2013) who analysed deaths in the US from 1991 to 2009 to ascertain the length of time patients suffered through profound disability prior to their death. They concluded that there was evidence of "compressed morbidity", that patients' deaths were proceeded by shorter periods of disability.

Regardless of the source of past and future constraints on health spending it is clear the Treasury expects health spending to grow dramatically. The Treasury note that as a percentage of Gross Domestic Product (GDP) health spending has increased from 3.1% in 1951 to 6.9% in 2011. Their long-term projections show this increasing to 11.1% of GDP by 2060 (New Zealand Treasury, 2012). In 2015 health spending was 21% of total government expenditures (New Zealand Treasury, 2012). Assuming taxation rates, and therefore government income, remain steady, health expenditure can only increase if spending on other services diminishes. This spurs an intense debate over which services bring greater value to the public (New Zealand Treasury, 2012). Alternatively, to keep health expenditures at current levels would require a re-organisation of how health is delivered and where funding should be concentrated (New Zealand Treasury, 2012). The role of prevention rather than curing in the healthcare system becomes an important characteristic of this debate (Matheson, 2009). Some argue the unsustainability of the current health model should shift spending from the curative to the preventative end of the spectrum (Morgan & Simmons, 2009).

Despite the Treasury discounting the ageing population as a major factor in future health spending growth, it is clear that continued financial constraints will put the current health system under scrutiny. Spending on elderly health dwarfs that of younger New Zealanders, and if New Zealand healthcare is expected to delivery more with the same funding, consideration will need to be given to the relative value derived and the population benefit of spending on elderly health. (Morgan & Simmons, 2009).

A Modern Death

As more New Zealanders join the elderly age cohorts, more are faced with critical decisions about their final years. Not surprisingly, most New Zealanders will die when they are over 65. Eighty-seven percent of New Zealanders will pass away when they are over 65 (Statistics New Zealand, 2013). A substantial portion of these elderly deaths will be accompanied by an intensive use of the health care system. In the United States, 1 in every 5 people will die using Intensive Care Unit (ICU) services (Angus et al., 2004). Even for those Americans who avoid an ICU admission, 50% can expect a visit to the Emergency Department in the last 30 days of their life. Of these, 77% were admitted to hospital and 68% of those admissions died while in hospital (Smith et al., 2012). This is driven in part by the rise in interventions that can be used to prolong life, particularly at the end-stage. This in turn has led to a new debate about what is appropriate treatment that serves to prolong a meaningful life, and what is less effective and serves to prolong suffering, pain and discomfort (Kaufman, 2009).

Of late, there has been a dearth of books published on managing the death experience (LaPointe, 2015). Gwande (2014) argues that people continue to chase the hopeless fantasy of immortality and patients and doctors have been trained to expect a treatment option at all stages. He states that people are deeply uncomfortable with pushing the notion of saying enough is enough. Patients and families find it difficult to decline treatments even if the benefits are small, particularly if the patient is near the end of life (Kaufman, 2009). Doctors are uncomfortable with the role of being ethicists and struggle with how to convey treatment options to patients and family particularly in a rushed hospital setting (Olthuis, Leget, Grypdonck, 2014).

For populations facing terminal illness there is the palliative approach that helps transition from aggressive curative treatment to palliative care. Palliative care offers an effective option for patients at a time when aggressive treatment may be doing more harm than good, although there is some debate on how best to manage the transition (Schofield et al, 2006). This comes on the basis that an end point, even if somewhat nebulous in its exact date, is at least a certainty and there is a path to follow when treatment is no longer working effectively and may be causing undue suffering (Murray, Kendall, Boyd, & Sheikh, 2013). However, with older patients who have not been diagnosed with a terminal illness, but are in declining health, it is not as clear when to transition treatment to a more conservative approach (Kaufman, 2009). The end date is less certain, even if it is clear that every setback results in increased frailty and dependence.

This reasoning has led to the proposal of four theoretical end-of-life trajectories, sudden death, cancer, organ-failure and frailty to depict the decline in function as patients approach death (Lunney, Lynn, & Hogan 2002). Lunney et al. (2002) propose that the level of function declines steeply for sudden death and cancer, and is punctuated by a series of repeating declines for the organ-failure group. For the frail group the level of function is low from the start and declines slowly until death. Lunney, Lynn, Foley, Lipson, & Guralnik (2003) measured these concepts by recording the decline in Activities of Daily Living (ADL) for these groups. They noted that the frail group were significantly more likely than the other 3 trajectories to be ADL dependent in the last monthly of life.

Predicting decline, and future outcomes for frail patients is complex and uncertain. Whereas cancer and organ-failure patients have a disease trajectory that has a pitched decline where palliative options can be explored, frail patients have less certain outcomes (Lunney et al., 2003). Their future is one of lessening reserve and a gradual decline in quality of life, function and activities of daily living. In these circumstances it is profoundly difficult for clinicians, patients and their families to know which treatment options should be explored to ensure a meaningful life is maintained, that promotes quality over quantity of the remaining years (Moorhouse & Mallery, 2012).

Further, frail patients have different goals for the last stages of their lives than cancer patients. Kendall et al. (2014) conducted 828 in-depth interviews with patients suffering from cancer, organ failure and frailty. They concluded that frail patients had a different perspective on dying and feared loss of independence, increased dementia or rest home placement more than they did dying. Thus the experiences of the frail group, both in terms of recorded functional decline and personal outlook is different to that of other groups. This should have implications for how the frail group is treated, particularly in the last stages. However the first issue is understanding how to define and measure frailty.

Frailty

The increasing number of elder people in the population, the financial pressures on the health care system and the concern with how death is managed by the healthcare system have all contributed to a need to understand and define the condition of individuals as they lose function and approach their final years. Since the 1980s, frailty has gained popularity in medical literature as a term to describe this state (Hogan, 2007). Attempts have been made to define it in terms of loss of function, lessened reserve, and susceptibility to poor health outcomes (Fried, Ferrucci, Darer, Williamson, & Anderson, 2004). Although clinicians claim to have an instinctive understanding of what frailty looks like, there is no formal agreement of its definition (Sternberg, Schwartz, Karunananthan, Bergman, & Clarfield, 2011). This lack of clarity has allowed a wide variety of measurement tools to be developed each attempting to measure a different element of frailty (Sternberg et al., 2011). Some attempt to measure the prevalence of frailty in the population while others attempt to measure frailty as a prognostic indicator of future disability and death. There are also some that attempt to measure frailty to prompt discussions with patients and family about suitable treatment options and untangle what treatment is appropriate for the patient given their circumstances (Moorhouse & Mallery, 2012). Part of the problem is the lack of understanding of how frail a patient is, and what that means for future quality of life and the likelihood of meeting success with hospital interventions (Amblàs-Novellas et al., 2015; Moorhouse & Mallery, 2012).

To meet this need, a frailty tool has been developed within a regional District Health Board (DHB) in New Zealand that aims to be simple to administer, easily understood by clinicians, patients and families, clinically valid, and ultimately an aide that helps patients make informed decisions. Research is needed to establish whether this tool can have these desired impacts. It attempts to fuse existing clinically-proven assessments in one easy to use form that is simple for patients and families to understand.

Tool Description

The tool was developed by a physician at a New Zealand DHB. It attempts to measure frailty across twelve domains. These are, frailty (more precisely, a clinician's impression of frailty) cognition, mood, gait/mobility, falls, sight and hearing, continence, co-morbidity, medication, nutrition, performance and domicile. Where possible each category is assessed by using an established and published clinical tool. For example the nutrition assessment uses the Mini Nutritional Assessment which has been used in over 450 published studies (Nestlé Nutrition Institute, 2013). The results of each assessment are stratified across four categories ranging from healthy to severely frail. Once all twelve assessments are complete, the results are drawn by hand on a radar plot. This forms a pictorial representation of a person’s frailty and is shared with the patient and their family. The frailty tool was given a working title of Frail CHeC. A description and discussion of the assessments that underpin the Frail CHeC are discussed in the literature review in chapter two. The complete Frail CHeC tool is shown in appendix A.

Research Question

How valid and useful is a locally-developed frailty tool for joint decision-making by patients, families and clinicians?

Research Aims

Answering this question requires meeting the following two research aims:

1. How useful is the tool deemed to be by patients, families and clinicians for aiding communication and joint decision-making?

2. Does the frailty tool match individual clinical judgement?

Significance of Research

An increasing proportion of the population are elderly (Statistics New Zealand, 2007). There has also been an expansion in the number of treatment options available for patients which are influenced by the complex relationship of consumerism, and biotechnology (Conrad, 2005). However, many of these treatments come with increased risk and may offer only limited improvements to health outcomes and quality of life (Kaufman, Shim, & Russ, 2004) Given the constraints in funding and the growing dissatisfaction with how people are treated in their end stages, it is essential that the public is involved with the debate. Physicians offer treatment options and encourage patients and families to decide on what course of action to take, but the patient’s knowledge of their position on a frailty index might influence their decisions. Further, attempting communication with patients and families on this issue is complex and can involve assessments that are burdensome to administer, and often produce results which are confusing to patients and families (Amblàs-Novellas et al., 2015). A tool that is easy to administer, clinically valid, and easy to interpret for patients and families is an important first step to solving the problem of how to tackle the growing number of patients who present to hospital in an advanced state of frailty with no clear plan of care.

Researcher's Interest

The researcher works in the field of quality improvement. Projects that are developed by the Ministry, the Health Quality and Safety Commission or by the local DHB tend to have a focus around the New Zealand Triple Aim, namely, what is best for the individual, the population and the system (Health Quality & Safety Commission, 2011). From conversations held with doctors, nurses and allied health professionals it became clear that they did not think the current treatment of the frail elderly in the hospital met these objectives. From a quality improvement perspective, the researcher became interested in how to improve the situation, but discussions with a physician led to an opportunity to conduct meaningful research in this field as well.

Summary

Given the number of people who are in advanced ages, it is essential that frailty is understood and recognised. Age on its own is a poor predictor of health and disability. The average 80 year old female in New Zealand will live 9.8 years (Statistics New Zealand, 2013). Limited assumptions can be made about the efficacy and utility of a treatment based on someone's age. In contrast to age, frailty offers a classification for determining an individual's vulnerability to stressors. Given the financial constraints of the health care system and the scrutiny that comes with it, it is essential that frailty is easily identified. This is vital from the point of view of policy-makers and clinicians who are faced with the difficult decisions about which treatment options should be funded or pursued, but also from a public view point as the merits of medical interventions may be questioned when frailty is a personal matter and quality of life is highly valued.

When Ponce de Leon was looking for the fountain of youth, he may have been imagining arresting the ageing process and preserving youth or even re-moving the signs of ageing. The fountain of youth remains elusive. Although the human lifespan has beene extended considerably, the gains have been made by adding on years at the elderly end. The steep sudden drop in functional decline before death which was once common has become a relatively rare occurrence, because of the increasing number of medical interventions and treatment. Thus the majority of the populatio will need to be able to recognise frailty in ourselves and family. Only then can informed decisions about treatment be made. This is not necessarily about withdrawing treatment, but more about appropriate treatment selection and choosing what is best aligned with the patient's wishes and what will bring the greatest benefit with the smallest risk.

The locally developed frailty tool, offers an opportunity to measure frailty in a manner that is quick to administer and intuitive for patients and families. This research attempts to measure to what degree those aims are successful.

Thesis Structure

Chapter one introduced the background forces that are shaping the need to understand frailty. These are the ageing population, the financial constraints in healthcare, and the emerging ethical fields that look at treatment and interventions on elderly patients. The Frail CHeC tool was introduced and briefly described.

Chapter two reviews the literature that is pertinent to this thesis. After the search strategy is described, five areas of focus are explored. These are frailty definition and clinical meaning, published frailty tools, the influence of these tools on clinical decision-making, research that underpins the Frail CHeC tool, and formatting and layout of health tools.

Chapter three describes the methodology used in this thesis. The chapter begins by describing the research design which includes sections on the method and purpose. This is followed by explanations of the data collection process, the participants in the research, the sampling technique, and the development of the survey to measure the Frail CHeC tool's impact. The chapter concludes with an exploration of reliability and validity, and cultural and ethical considerations.

Chapter four displays the results of the research in two parts. The first part displays the results of the Frail CHeC tool and how it measured frailty. The second part shows the results of the survey tool designed to measure the Frail CHeC tool's effectiveness.

Chapter five discusses the results displayed in chapter four. It follows the same format as chapter four and interprets the results of the Frail CHeC tool first, followed by the results of the embedded survey. The results are considered alongside the research reviewed in chapter two.

Chapter six summarises the main findings of the thesis and draws conclusions. Limitations of the research are listed and recommendations for further research are described.

Chapter 2 - Literature Review

Introduction

The ageing population, the constraints on government spending in health and the growing discussion about the efficacy and appropriateness of treatment on end-stage patients has created a climate where frailty needs to be understood and measured. Taking this context and applying it to frailty leads to five distinct areas to explore in the literature review. The first focuses on the research about frailty's definition and meaning in a clinical setting. The second part explores frailty tools that have been developed to measure frailty. This includes a discussion on how successful these tools have been as prognostic indicators of changes in a patient's health circumstances. The third part looks at what impact measuring frailty has had with clinical decision-making and discussions with patients and their families. Within this section is a discussion on patient-perceived quality of life and its relationship with death and decline. The fourth part examines the research that underpins the individual assessments of the Frail CHeC tool. The fifth and final part investigates the research on the formatting, layout and wording of clinical assessments designed to be understood by patients.

Search Strategy

All searches were conducted using the online databases Google Scholar, PubMed and the Primo search function of the researcher's academic institution. For the first component, the terms frailty, frail, definition, term, models, paradigms and criteria were searched. For the second part frailty, frail, tools, measures, measurements, outcomes, prognosis was employed. For the third section frailty, frail, decision, shared decision-making, consult, quality of life, self-reported, life satisfaction and discuss were used. In this instance, the Scopus database was also searched. The fourth section used the published title of the assessments with quotation marks to retrieve research based on that particular assessment method. The fifth section used health literacy, pictorial, pictures, decision-aids as search terms. The consultant physician who developed the frailty tool concept, also had a list of articles on frailty measurement. In all instances, once an article was deemed appropriate, its reference lists was perused for further literature. This latter technique proved to be the most fruitful, as reference lists contained similar entries to each other which reinforced their importance.

Frailty Definition and Meaning

Hogan (2007), describes the rise in use of the term “frailty” in medical literature. He traces the history of the term starting with the Hippocratic tradition, noting that in the historical context frailty has been described as a general loss of function and energy as one ages (Hogan, 2007). In this meaning, there is a close match with how the term is used today, to describe the depletion of reserves as people age, and the increased vulnerability to disease and adverse outcomes. These adverse outcomes include falls, disability, rest home placement, hospitalisation and mortality, (Fried et al., 2001; Hogan, 2007). However, Hogan (2007) notes that at the start of the term’s rise in popularity in the medical literature, it was initially used as a proxy for disability. As the term has matured in its definition, it has been argued that although disability is intertwined with frailty, and disability can lead to frailty and vice versa, the presence of one does not necessary mean the presence of the other (Fried et al.,2004; Hogan, 2007). As the meaning of frailty broadened to be more than just disability, the physical depiction was initially one dimensional. Sternberg et al., (2011) evokes the image of a stooped, thin, vulnerable, elderly person as the abiding concept of what frailty looks like to both the layman and initially to the clinician. This view considers frailty to be a combination of advanced age, under-nourishment and fragility. Nutritional status and weight can be components of what is used to describe frailty, but there is now the idea of the “fat frail” or a group of seniors who are overweight, but still showing the clinical markers of frailty (Roubenoff, 2004).

As frailty grew to include more than just disability and more than just one particular physical representation of the individual, it became clear that there was a lack of a standard criteria to describe it (Fried, 2004). One of the most widely used descriptions is that developed by Fried et al. (2001) which views frailty as a syndrome or a disease Fried surveyed geriatricians working in an academic setting and asked them to describe the main factors of frailty. The responses were grouped and five categories were created: weight-loss; grip strength; walking time; physical activity; and exhaustion. The presence of three or more of these criteria indicated frailty and the presence of one or two of the criteria indicated a pre-frail state (Fried et al., 2001). The simplicity of this definition, and the lack of ambiguity around the criteria has contributed to its popularity. A search in Google Scholar revealed that Fried’s 2001 paper had been referenced 5,434 times. Although this definition filled a requirement to start the debate around what frailty looked like and how it could be measured, since the publication there have been some arguing for a more encompassing definition that seeks to measure beyond physical attributes. De Witte et al., (2013) provides a background and overview of this debate, as a preface to their justification for a frailty measure that calculates, psychosocial, social and environmental factors. Fried argued that her criteria only attempted to measure one view of frailty, and there may be different versions (Fried, 2004). This led Hogan (2007) to list frailty sub-types, which include cognitive, dynamic & static, global & intrinsic, physical, physiologic, psychosocial, and primary & secondary (p. 768). Thus the clinical view of frailty has widened to include many different aspects of health and there is considerable debate about what should be included in a meaningful measure.

Adding to the complexity of the debate, researchers have begun to argue for genetic and environmental factors that lead to a pre-disposition towards developing frailty later in life. For example Sayer, Syddall, Gilbody, Dennison and Cooper (2004) argue that birth weight is a factor in the development of sarcopenia (the loss of muscle strength and mass) in later years. Looking at a cohort born in the 1930s in Hertfordshire, they showed that those with low birth weights were more likely to have a reduced grip strength in old age. They concluded that the development of sarcopenia has its origins in early life. In another study using univariate analysis and led by Sayer on the same cohort, they argued that the polymorphism of the IGF2 gene was associated with diminished grip-strength in later years, thus promoting the view that frailty has its origins before birth (Sayer et al., 2002). Both research papers came from the Medical Research Council Lifecourse Epidemiology Unit (MRCLEU) in Southampton, United Kingdom. The unit's work posits that early influences such as birth weight and nutrition, result in less than peak attainment in muscle strength. This gap may be small at peak levels, but as they start to decline the gap becomes increasingly large (MRCLEU, 2014).

However, sarcopenia represents only one precise physical manifestation of frailty. Strawbridge, Shema, Balfour, Higby, and Kaplan (1998) in their Alameda County cohort study tracked individuals over a 31 year period (1965-1994) and at the conclusion of the study measured them against 4 domains: physical function, nutrition, cognition and sensory. The presence of deficits in two or more of the domains was defined as frailty. They identified a particular set of socio-economic factors and the presence of chronic conditions in early life to be risk factors for the development of frailty (as they defined it) in later life. While this debate about the contributing factors is interesting, in some sense it distracts from the importance of frailty definition.

Returning to the crux of the issue, there remains a debate about the individual components (or ingredients) that comprise frailty in the literature, both in terms of their relative weighting or indeed whether they should be there at all. Despite this debate, there remains broad agreement that frailty represents a state of lessened-reserve where individuals are susceptible to adverse outcomes. Hogan, (2007) offers a good summary of this concurrence:

> “There has now evolved a general agreement that frailty is a syndrome encountered in older individuals that is marked by increased vulnerability to stressors owing to impairments in multiple, inter-related systems that lead to a decline in homeostatic reserve and resilience” (p. 767)

Thus the agreement is around the vulnerability component, but the debate continues around what the multiple impairments are. Despite the agreement on the broad definition of frailty amongst clinicians, there exists considerable ambiguity around its elements. The lack of agreement amongst academics on what the term frailty means, has allowed a number of frailty tools to be developed each measuring a slightly different version of frailty. A review of the main tools used for assessing frailty follows in the next section.

Frailty Tools

According to Sternberg et al. (2011), a “clinically usable definition of frailty would help physicians screen their patients for frailty and allow for stratification according to risk level before cancer treatment, coronary angiography, or surgery” (p. 2129). The debate around the definition of frailty has obvious consequences for the tools that have developed to measure it. Fried et al.’s (2001) popular definition provides a useful starting point for this discussion. Although agreed to be useful from an academic viewpoint it has been suggested that it is impractical to use in a clinical setting (Hogan, 2007; Sternberg et al., 2011). To meet this clinical need, frailty tools have been developed. They range from simple prognostic indicators, such as the timed walking test, to the Complex Geriatric Assessment (CGA) that take hours to administer. For the purpose of this section of the literature review four tools will be examined:

- The Gait Speed Test (GS)
- The Frailty Index (FI)

- The Edmonton Frailty Scale (EFS)
- The Clinical Frailty Scale (CFS)

The Gait Speed Test

There have been a variety of simple tests developed which measure how long it takes an individual to travel a short distance. These typically range from ten foot (2.44 metres) to six metres and tend to use less than one metre per second as the cut point for determining frail or non-frail populations (Abellan van Kan et al., 2009). Using this as a criteria, has been shown to be an indicator of a patient's likelihood of remaining independent at home and free of disability (Abellan van Kan et al., 2009). These tests are useful as prognostic indicators and are simple to administer, but the research does not appear to promote useful discussions with patients and their families about what frailty looks like and what course future treatment might take.

The Frailty Index

Rockwood and Mitnitski, (2007) proposed looking a frailty in a different manner to Fried's phenotype description. Their FI looks at frailty as an accumulation of deficits that does not necessarily signal a disease state. In this model, measuring frailty is a matter of counting up the number of deficits an individual has and using this to categorise an individual on a risk state spectrum. Rockwood and Mitnitski (2007) propose listing the items in a CGA, They debate whether each item should be accorded a different weight, but in the interest of making the tool generalizable and simple to administer they conclude that keeping the value of each item is the best approach. Although there are many items that comprise the CGA in comparison to Fried's five item measure, in subsequent research Rockwood argues that this additional complexity provides greater sensitivity when measuring risks of adverse outcomes (Rockwood, Andrew, & Mitnitski, 2007). The FI has proven to be a popular method of measuring the index method of frailty which can be contrasted to the phenotype view. However, the researchers admit that the number of fields in the index make it a lengthy tool to administer. The research does not appear to support it being simple to administer, and applicable to time-pressed clinical environments. Hii, Lainchbury and Bridgman (2015) note that existing frailty tools are time consuming and difficult to administer.

The Edmonton Frail Scale

The EFS purports to be simple to administer. It is a simple scoring system that considers frailty as being comprised of nine functions, cognition, continence, functional independence, functional performance, general health status, medication use, mood, nutrition and social support (Rolfson, Majumdar, Tsuyuki, Tahir, & Rockwood, 2006). Each domain is scored using a 0, 1 and 2 point system. The total score represents the relative frailty risk. The researchers attempted to create a tool that could be applied easily and not be exclusively the domain of geriatricians. They tested the tool by having a lay research assistant with no formal medical training administer the tool. The results of the EFS were correlated against a Geriatrician's Clinical Impression of Frailty (GCIF). The GCIF was formed by embedding a questionnaire for the geriatricians to answer at the conclusion of the CGA. The GCIF was shown to have a statistically significant correlation with the EFS. The authors also note that the tool took less than 5 minutes to administer and was well received by the assessor and by patients. (Rolfson et al., 2006).   The EFS appears to be more useable than the FI on the basis that it is simple to administer. However, there was no data supporting the claim that it was well received by the assessors and patients. Further, being well received by patients may not indicate specifically that it was a useful aid in communication.

Clinical Frailty Scale

The CFS is a simple 7-point scale for assessing frailty. It was developed as a component of the Canadian Study of Health and Aging and was led by Rockwood. Partly as a response to myriad of complicated clinical tools already in existence, the CFS aimed to create a simple to administer tool for clinicians to assess frailty (Rockwood et al., 2005). Patients are categorised as very fit, well, managing well, vulnerable, mildly frail, moderately frail and severely frail. The descriptions that accompany each category make it simple to administer. The CFS has been shown to be correlated with the more in-depth FI and a good predictor of death or entry into an institution (Rockwood et al., 2005). In this sense, the CFS is an extremely simple tool that does aid with future planning to some degree. However, no research could be found linking the results of the CFS with meaningful discussions with patients about their continuing care and what choices needed to be made.

The range of frailty tools that have been proposed and tested, is in some way an indication of the level of debate around how to measure frailty (Rockwood et al., 2005). It is worth noting that these tools serve mostly as prognostic markers to understand the likelihood of death or institutionalisation in frail populations. Pilotto (2012) measured frailty scores using a variety of frailty instruments for 2,033 patients over the age of 65 and found all to be strong predictors of mortality. Despite this, there remains considerable debate about which tool is right for the clinical setting (Rockwood et al., 2005). There is also concern that some of the existing tools are complex and require geriatrician knowledge to administer. Thus, although clinicians recognise the importance of measuring frailty, they have concerns about whether there is an appropriate tool that can be applied easily in a clinical setting without geriatrician support (Hii et al., 2015). In this instance frailty assessments may be made purely on clinical judgement rather than a proven objective tool. Hii et al., (2015) measured frailty using the EFS tool in a group of 47 inpatients on a cardiology ward and compared the EFS results to cardiologists using a quick end of the bed categorisation of frail or non-frail. Although they found no correlation between the quick end of the bed assessment and the recorded EFS score, the research drew replies from geriatricians. Hubbard and Story (2015) expressed concern that end of the bed assessments of frailty were dangerously inaccurate and withdrawing treatment as a consequence of these quick appraisals was an ethically-fraught paradigm. Understanding frailty and the consequences for future treatment decisions is a challenging subject. From a patient perspective, limited research was found linking patient perceptions of their health and helping them understand what the future might hold. What was found, is reviewed in the next section.

Frailty and clinical decision-making

The literature search revealed a few articles on identifying frail patients and helping them make decisions about future treatment. Swidler (2013), examines the impact of frailty on decisions regarding continuing with dialysis in End Stage Renal Disease (ESRD) patients. He notes that, “Dialysis has become routine practice in the current environment of procedure driven medical care and biomedicalization of aging, which has made it challenging for patients, families, and health professionals to make true choices” (Swidler, 2013, p. 1421). He notes that shared-decision making with patients and clinicians is the key to making informed decisions about the continued pursuit of dialysis and stresses that physicians and family members might have a different view than patients as to what treatment options should be pursued (Swidler, 2013).

In the New Zealand context, Gudex et al., (2013) showed that frailty was a factor in whether patients chose to undergo cardiac surgery. Patients were determined to be either not frail, have some features of frailty, or severely frail. The not frail group chose to have surgery 84.1% of the time. The group with some features of frailty opted for surgery 64.6% of the time. The frail group only chose surgery in 8.3% of the cases. This research appears to show a link between frailty status and patient's decisions for surgery. However frail patients who declined surgery were generally thought to be unsuitable candidates for surgery by clinicians, thus it is not clear that the evaluation and presentation of a patient's frail condition was a factor in their decision-making. This research did not suggest patients were engaged to consider their frailty status.

The Palliative and Therapeutic Harmonization model (PATH) comes from Canada and does attempts to engage with frail patients and their care-givers over three, hour long sessions and help them reach thoughtful and informed decisions about treatment options (Moorhouse & Mallery, 2012). The PATH tool attempts to be more than prognostic and initiate discussions with patients and family about treatment options. (Moorhouse & Mallery, 2012). This research attempts to measure frailty in a manner that is more meaningful than just prognosis. However the research noted that they relied on three hour long consultations to achieve their results. Considerable time is needed to perform the assessments and considerable time is needed to explain the complicated results. No research could be found showing the PATH tool in use in a more time-pressed clinical environment such as a ward environment or a one-to-one session in a clinic or in the community.

Moorhouse and Mallery (2012) do however attempt to consider the patient's views on their health status as a factor in what decisions should be made. Revenig et al. (2015) examined the complex inter-play between patient's self-assessment of their health, surgeon judgement of the patient's health and objective frailty measures. When patients and surgeons were asked to mark on a visual analogue scale the ability of the patient to withstand surgery, patients tended to value their robustness higher than surgeons. Surgeons were also more likely to mark a patient as frail if the patient was older, but the patient's own assessments were independent of age (Revenig et al., 2015).

This mismatch becomes critically important in the context of the emerging ethical fields of treatment and the aging population. Estes and Binney (1989) popularised the term "biomedicalization of aging", in their seminal exploration of the policy implications and ethical dilemmas facing health care. Since this publication Kaufman has been active in exploring this field and has questioned whether medical interventions have artificially extended life and how treatment options have become the default choice regardless of age (Kaufman et al., 2009). In a qualitative study Kaufman, Shim and Russ (2006) interviewed clinicians and patients and discovered that patient decisions were largely based on the normalisation of using technology on an older population rather than a reflection of patient views.

Critical to this debate is the juxtaposition between patient and clinician views on what the patient's health looks like. Discrepancies between patient and clinician views can have repercussions for how clinicians view a patient's life satisfaction. In a survey of 82 ventilator-assisted patients and 273 physically well clinicians, Bach, Campagnolo and Hoeman (1991) reported that 12.5% of the ventilator group reported dissatisfaction compared to 9% of the clinician group. Further, the clinicians consistently under-reported how satisfied they thought the ventilated groups to be.

The debate in the research on how to define and measure frailty and the emerging ethical fields dedicated towards grappling with the complex interplay between patient choice and frailty status set the context for the fourth part of the literature review, and examination of the research underpinning the Frail CHeC tool.

Research underpinning Frail CHeC

The Frail CHeC tool is comprised of twelve individual assessments. Seven of these assessments are associated with published tools. These are the Clinical Frailty Scale (CFS), General Practitioner Assessment of Cognition (GPCOG), the Geriatric Depression Scale (GDS), the Charlson Comorbidity Index (CCI), the Medication Related Falls Risk Assessment Tool (MRFRAT), the Mini Nutrition Assessment (MNA) and the Modified Rankin Scale (MRS). The CFS was reviewed above. The remaining six are reviewed briefly below.

GPCOG

The GPCOG was designed in Australia by Brodaty et al. (2002) to serve as a screening tool for General Practitioners (GPs) for assessing dementia. It uses a 5 item questionnaire on patients and a further 6 items for an informant who knows the patient and can describe their current cognition. The tool was tested by GPs on patients over 75 years old and compared to results of the more established and comprehensive Mini-Mental State Examination (MMSE). The GPCOG was shown to as effective as a dementia screen as the MMSE that took longer to administer (Brodaty et al., 2002). It has since been proven in other international contexts and has consistently shown to be a quick and accurate cognition screen (Ebell, 2009).

GDS

The GDS was developed by Yesavage et al. (1983). It was originally a 30 item questionnaire and was proved to be as sensitive as established depression screening tools such as the Hamilton Rating Scale for Depression and the Zung Self-Rating Depression Scale (Yesavage et al., 1983). Since then, shorter versions of the tool have been developed, including a GDS15 and a GDS4. Both the GDS15 and GDS4 have been shown to be good predictors of geriatric depression (Pomeroy, Clark, & Philp, 2001).

CCI

The CCI was developed by Charlson, Pompei, Ales, & MacKenzie, (1987) as a method of classifying diseases to calculate a prognostic risk of mortality. A list of relevant diseases were created and patients are assessed for which diseases they have. The total list contributes towards a CCI score. Since its development it has become was one of the main methods of measuring co-morbidity. A Google Scholar search reveals that the original article has been cited over 18,000 times.

MRFRAT

The MRFRAT tool was developed by the health board where this research takes place. It aims to identify which medications contribute towards the risk of falls in the elderly (Anonymous, 2015). In the case of Frail CHeC, the MRFRAT tool serves as a screening tool for establishing the medication burden on the patient being assessed. The increasing number of medications that are taken by the elderly has been shown to be a contributing factor to adverse outcomes (Gnjidic et al., 2012)

MNA

The MNA was developed by Nestlé Corporation in conjunction with geriatricians from several countries. It aims to be a quick screen to assess patients who are at risk for malnutrition. It has been validated in a series of studies since its creation and has been used in over 450 published articles (Nestlé Nutrition Institute, 2013). Malnutrition in the elderly and in particular the frail elderly has been studied by Brownie (2006) who considers the trigger points and consequences of malnutrition in the elderly.

MRS

The MRS was developed by Dr John Rankin in Scotland in 1957 as a method of measuring and categorising the level of disability and dependency in patients who have suffered a stroke (Rankin, 1957). It has since become a durable and consistently used tool in clinical settings. In the context of the Frail CHeC, it serves as a disability measure. Although disability and frailty have historically been used inter-changeably (Hogan, 2007), they have been shown to be independent and differing terms in the current clinical environment (Fried et al., 2004).

Formatting and Layout of Clinical Tools

Many of the clinical assessment methods reviewed above have been established in clinical practice. Recently the manner in which these frailty tools, and other tools in healthcare, interface with patients is becoming increasingly important. The previous method of designing assessments with a purely clinician view has given away to a design experience that includes patient views and garners their input into the final product (Bate & Robert, 2006).

Intertwined with these dynamics is the emerging field of health literacy. The complexities of the health care system and its accompanying jargon can confuse patients. This confusion can lead to adverse outcomes. Those with low health literacy have been shown to have worse health outcomes such as increased hospitalisations and reduced immunisation uptake (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011). This suggests that assessments that are complicated, and whose results are not clear to patients, may struggle to influence patient choices if health literacy is low.

To counter the effect of low health literacy decision-aids have been created to simplify the choices put forward to patients. Often patients have a preference for these simplified tools. Goodyear-Smith (2008) surveyed 100 patients in a primary care setting in New Zealand to ascertain which method they preferred for displaying the risks of cardiovascular treatment.   The majority of respondents preferred the use of graphs, as opposed to written risks in relative or absolute form. O'Connor, Llewellyn-Thomas, and Flood (2004) provide a summary of the benefits of decision aids for patients when faced with difficult decisions where risks and benefits must be weighed. They conclude that decision aids can be beneficial in a wide variety of settings and suggest that barriers to their widespread use are removed.

Summary

Frailty, disability and comorbidity have become popular terms for defining vulnerable older adults (Fried et al, 2004). Identifying the level of frailty in older patients is useful for understanding what lies ahead in terms of adverse events and mortality (Romero-Ortuno, O'Shea & Kenny 2011). Consequently frailty index tools have been developed to measure the level of frailty in population segments. There is some debate about which is the most appropriate tool and which segments should be included in a frailty index (De Witte, 2013). However, there is a lack of research relating the adoption of successful frailty index tools to improve communication between clinicians and patients and family. These tools have been proven to accurately measure frailty, but no research was found to link frailty identification to changed decision-making by clinicians and patients and their families. Further, the literature search did not reveal any research conducted on this specific topic in a New Zealand context. The Frail CHeC tool is comprised of established assessments that have been proven in a variety of settings. The changing landscape of clinical tool development, particularly in regards to health literacy, patient co-design and visual decision aids provides the backdrop for the Frail CHeC testing. The next chapter explores the methodology used to measure the effectiveness of the Frail CHeC tool.

Chapter 3 - Methodology

Introduction:

The literature review chapter identified a lack of research supporting the benefits of rapid clinic assessment tools to help clinicians, patients and families understand what frailty looks like. A local tool has been developed that aims to meet this need. Evaluating the effectiveness of the tool requires understanding how clinicians, patients and families viewed the experience and what can be learned from comparing the results of the assessment with what is already known about the patient. This chapter will outline an explanation of the methodology used and a rationale for why this approach was chosen. Next, detail will be provided on the development and modification of the survey tool used for the research project. The chapter concludes with a description of the data analysis and a discussion about ethical and cultural considerations.

Research Design

This research project used a quantitative research approach by way of a descriptive survey method. To understand the choice of this approach it is useful to consider the approach in three parts: the quantitative method, the survey strategy and the descriptive purpose. Each part will be examined in turn below, accompanied with advantages and disadvantages.

Quantitative Method

Methodology in research can be broadly classified as either quantitative, qualitative or a mix of both methods (Saunders, Lewis, & Thornhill, 2007). On a simple level, the quantitative method looks to describe a research method that attempts to analyse and display numerical data. (Saunders et al., 2007). It attempts to answer a specific question in a quantifiable way. Qualitative methods attempt to analyse or display data that is not in a numerical form. This method attempts to measure the experience of participants or to understand and define what phenomena look like (Creswell & Clark, 2011). Combining both methods has been an increasingly popular approach in health research (Creswell & Clark, 2011). The quantitative method was chosen because the results of the frailty tool assessments were in numerical format which lent itself to statistical analysis.

Survey method

The survey method is widespread in health studies and offers a framework for measuring data in a standardised form normally through questionnaires or interviews (Kelley, Clark, Brown, & Sitzia, 2003). This method was preferred as it allowed collection of a large amount of data in a limited period (Saunders et al., 2007). The survey method is a good match for the quantitative method as it allows data to be analysed using a mixture of descriptive and inferential statistics (Saunders et al., 2007). Embedding a survey within the frailty tool assessment, allows data to be collected that is relevant to that particular frailty assessment. The disadvantages of this technique is that survey fatigue may be a factor. Even before the advent of internet technologies that made surveys simple to administer, survey fatigue was a documented concern (Steeh, 1981). Since then, a surge in the use of internet tools have made survey fatigue a growing issue (Saunders et al., 2007). To lessen this effect, a minimum of ten clinicians were recruited to the study so each participant was not required to fill in a large number of assessments and surveys. More information on the survey tool itself can be found below and in Appendix B.

Descriptive Purpose

The descriptive approach was chosen as it aims to observe and gather data on a segment of the population. Descriptive research attempts to understand and describe the characteristics of what is observed and the prevalence of phenomena in a manner that seeks to add more knowledge to what is known about the areas under study (Saunders et al., 2007; Kelly et al., 2003). In this research, the researcher was attempting to understand what patient and clinician experiences were like with a new frailty assessment tool. As the period under study was short, it was not possible to measure whether patients whose frailty scores reached a certain threshold had different outcomes.

Although the justification for the frailty tool's existence is evident from the literature review, proving the tool's effectiveness and clinical validity needed to be undertaken without creating a complex, and lengthy research process. In this sense, this research attempts to understand *prima facie* whether the tool is effective and valid. This approach is supported by the work of Don Berwick who argues that health care needs to move in the direction of small-scale testing so issues are uncovered early on in a process, and improvements can be gradual and sustained. (Berwick, 2010). This philosophy of discovering and refining a tool's worth before embedding it into practice is the cornerstone of the New Zealand government's Improving Together programme targeted at health and education, and social development practitioners, (New Zealand Government, 2015).

Data Collection

Considering the importance of small-scale testing, it was determined that the best approach was to test the frailty tool in a variety of settings with a mixture of health professionals. Each frailty tool assessment was carried out by a health care professional (Clinician) in a community or hospital setting. The Clinicians were recruited to participate in the survey and their consent was obtained. Clinicians gained consent from elderly patients to be assessed using the Frail CHeC tool during a routine consultation with their patient. At the commencement of the Frail CHeC assessment Clinicians asked patients to record their quality of life on a visual analogue scale. The scale displayed a 1 to 10 rating and used faces to indicate levels of happiness. The scale was 100mm long which allowed the author of this research to measure which point the patient had marked and create a value out of 100. The Frail CHeC tool was then carried out using the twelve individual components. The results of each component were stratified as blue (4 points), green (3 points), orange (2 points) and red (1 point). The colours used signified a range from non-frail (blue) to severely frail (red). This was drawn by the Clinician on the front sheet of the Frail CHeC tool to demonstrate to the patient what their overall frailty score looked like. Patients and Clinicians then responded to questionnaires about their experiences with the Frail CHeC tool. After each question in the survey there was a space provided to gather qualitative data. Each health professional had the opportunity to write in comments pertaining to each individual question. . The health professional took a note of the patient's National Health Index (NHI) number, and how long the assessment took to compete.

The results of the survey and the frailty tool assessment were entered into Excel by the researcher, with a National Health Index identifying the patient. NHIs were matched with the patient management system to record gender and age.

Participants:

For this research, participants took two forms: Clinicians and patients. A description of each group follows.

Clinicians

The frailty tool was tested by clinicians who worked with elder patients in the hospital and in the community. They were a mixture of Doctors, Registered Nurses and Allied Health professionals. In the hospital, staff were recruited from the rehabilitation and stroke units and from clinical nurse specialist roles that operate between the hospital and the community. In the community, staff were recruited from community-based teams that target older people's health. A group was formed to discuss the frailty tool, learn how it was to be administered and consent to gathering data. The inclusion criteria for clinicians were being a registered health professional, having regular contact with elderly patients in the community or hospital setting, the ability to use all the components of the Frail CHeC tool, and providing consent to participate. In the health care system under study, there were four main programmes that involved clinicians interacting with elderly people. These were the rehabilitation unit, the elderly home assessment team, and two elderly outreach programmes. All clinicans who worked in these teams were invited to a meeting to discuss the Frail CHeC tool. As a result twelve clinicians were recruited to participate in the clinical component.

Patients

Although the word "patient" is used, it is important to note that many of the consumer participants were not patients, and were residing in their own home at the time of the assessment. The term patient is preferred for simplicity and clarity. Patients were selected by the clinical professionals when they were working with them as part of their scheduled visits. During these scheduled visits, the clinician asked if they wanted to undergo a frailty assessment using the frailty tool. At this stage, they were given an information sheet and a consent form and asked to fill in a survey upon completion of the frailty tool assessment.

The inclusion criteria for patients was suspected by clinician to be frail, the ability to understand the results of the Frail CHeC tool, and consent. Those whom the clinician deemed to be cognitively impaired to a degree that did not enable them to understand the results were not asked to participate. Ultimately, the aim is for the tool to allow for frank discussion about their current state of health. If this was deemed not to benefit the patient, the clinician did not proceed.

Sampling

The approach employed to gain clinician and patient participation was convenience sampling. Convenience sampling is a non-randomised approach and relies on gathering data through participants who are accessible at the time of the research and meet the inclusion criteria (Kumar, 2014). Convenience sampling was preferred because it is not currently known how many frail patients there are in the local population. Despite the need to measure and understand frailty and the number of frailty tools at the disposal of health care professionals there is not one common tool used in the local population. Therefore the total frail population is unknown. Given also the short time frame that this research project was in operation, it was also necessary to gather data using all available resources. From the point of view of determining a suitable sample size, 200 was targeted, on the basis of having each Clinician complete twenty Frail CHeC tools over a three month period.

Survey tool development

Each question posed to patients and clinicians was framed on a Likert-scale ranging from strongly disagree to strongly agree. The full list of questions can be found in Appendix B. The questions were adapted from the United Kingdom's Improvement Academy (2014) who surveyed clinician views on a newly developed frailty tool untitled Electronic Frailty Index (eFI).

The researcher considered whether the Frail CHeC tool and the survey tool should be completed with paper or by computer. Although a computer-based assessment would save researcher time, operating with a paper assessment allowed the assessors to undertake assessments in a variety of locations where access to computers might have been an issue. Moreover, ascertaining the views of patients on the tool's results necessitated showing the results in a diagrammatic form. This forms a key part of the intended benefits of the Frail CHeC tool and is supported by Berkman et al. (2011), Goodyear-Smith (2008) and O'Connor et al. (2004) as reviewed in the fifth section of chapter two. From a testing point of view there is also justification for trialling a paper over an electronic version. Walker Takayama & Landay (2002) found that using a paper version is equally effective for testing usability as an electronic version and therefore the decision of which medium to use should be governed by appropriateness and ease of implementation.

The survey was tested prior to the data gathering phase. Testing revealed that the last question of the survey, question 8, was not relevant to answer for every Frail CHeC tool that was administered. This question was dropped for the data gathering phase. Also dropped was the outcomes question of the survey which asked clinicians to rate what their clinical response to the patient would be. This was taken from the eFI survey which was undertaken on doctors. Since the Frail CHeC tool was being used on a wider range of Clinicians, this question was deemed inappropriate.   In other aspects, the survey tool remained the same.

Reliability and validity

Reliability and validity are considered twin threats to the integrity of quantitative research (Creswell, 2008; Kumar, 2014; Saunders et al., 2007). There are a number of categories of reliability that can affect research (Saunders et al., 2007). The most relevant concern to this project is the issue of participant bias. Since the clinician group was formed early to discuss the issue of frailty and how it could be measured, they had already invested a significant amount of time into the project before they began testing the tool and documenting their views on its effectiveness. It is not known whether this knowledge would drive potential bias. The group was tasked with how to identify and measure frailty, so it is hoped that their answers represent an honest appraisal of the frailty tool, and whether it meets their needs. Failure to give honest feedback would be a lost opportunity to develop a unique frailty tool in its infancy. This point was emphasised during the training the clinical participants received on how to undertake a frailty tool assessment. Clinicians were encouraged to provide accurate and honest feedback on the tool to ensure the research would provide data on what changes should be made.

Given the short period of time this project was gathering data, in was not feasible to check for internal validity. Note however, this research's purpose was to ascertain content validity and inform the subsequent development of the tool.   Patrick et al. (2011) describe content validity as "…the extent to which an instrument measures the important aspects of concepts developers or users purport it to assess" (p. 978). Once the tool has been accepted by clinicians and patients, it could be checked for validity by having clinicians testing the same patient in the same setting to compare results. The Frail CHeC tool itself is mostly a composite of established elderly assessment tools that have been published and checked for validity in a variety of settings.

Data analysis

To understand how the data were analysed it is worth re-visiting the original aims of the study. The following table provides a summary of how each aim was measured through data analysis:

Research Question: How valid and useful is a locally-developed frailty tool for joint decision-making by patients, families and clinicians?
Aims:

1. *How useful is the tool deemed to be by patients, families and clinicians for aiding communication and joint decision-making?*
2. *Does the frailty tool match individual clinical judgement?*

The first aim was measured in several ways. First, the responses from the Clinician and patient survey was summarised and data tables were produced with descriptive statistics. Second, the three patient questions could be compared with the first three questions of the clinician survey, as they were similar in content. This allowed an aggregate total for the three questions to be created for the clinician and patient survey and the mean calculated for comparative purposes.

The third element to this aim was the evaluation of the Frail CHeC tools assessment. This involved analysing the results of the Frail CHeC assessments, the time taken to complete the tool, and examining the relationship between the quality of life scores and the overall frailty score. This latter measure was compared using correlation coefficients.

The second aim was originally planned to be measured by comparing the overall Frail CHeC score with another validated clinical tool, the InteRAI assessment. However, during the data gathering phase, it became apparent that the InteRAI assessment did not contain an overall score that would allow a comparison with the Frail CHeC score. Instead, this aim was measured by examining question five of the clinician survey, *the results of the frailty tool assessment are a good representation of this person's frailty*.

Ethical Considerations

Research was approved by EIT and the local DHB. Participants were given an information sheet which explained the research process and their rights prior to asking for their consent. Participants could withdraw their participation at any time and they were instructed that it would not affect their future health care. They were informed that their participation was confidential and no material identifying them would be published in the research. Consent forms with patient names and NHIs were stored in a locked filing cabinet in a locked office. Patients' names were not needed for analysis. However, NHI numbers were needed for cross-reference with the local patient-management system. Once information was inputted electronically, it was stored on a password protected laptop. The EIT research and ethics approval is shown in appendix C.

The major consideration for ethics was the welfare of the patient participants. The need to ensure robust protocols for dealing with the elderly in research is well-documented (Buckwalter et al., 2009; Harris & Dyson, 2001; McMurdo et al., 2011). Most of the concerns relate to failure to recruit enough elderly to research studies which creates a bias in data collection (McMurdo et al., 2011). In the case of this research, the Frail CHeC tool was targeted on an older population so the risk of excluding elderly views is negated. Another concern listed by Harris & Dyson (2001) and McMurdo et al. (2011) is that elderly patients may not understand the consent process or feel as though they have no choice but to participate. In this research, the data gathering was conducted by clinicians not by the researcher. Clinicians who worked on the research were trained to work with elderly patients. They therefore only elected to proceed with the assessment if they felt it would benefit the patient. Patients who suffered severe cognition problems were excluded. Patients needed to have sufficient cognitive ability to understand the questions that comprised the Frail CHeC tool and the post-tool questions in the survey.

Cultural considerations

It was not possible within the parameters of this research to measure differences in ethnicity. However, the original group of clinical participants did discuss how the tool could be modified to fit the Maori model of health care. The underlying questions could remain the same, (or translated into Te Reo) but the pictorial of health could be modified to Te Whare Tapa Whā, Te Wheke, or Te Pae Mahutonga for example (provided other dimensions were added – e.g. spiritual and family). The consultant physician who developed the Frail CHeC tool consulted the Maori Health Unit of the hospital under study to inform them of the tool and the supporting research. These were only preliminary discussions, however. The aim of the research is to trial the tool in a variety of settings to see what patients and staff feel about its use and what the results of the assessments show.

Summary

In this chapter the rationale for choosing a quantitative, descriptive survey design was described. Details were provided on the recruitment process for clinicians and staff. The data collection was explained including how consent was obtained from staff and patients, how the Frail CHeC tool was administered, and how the survey results were collected and inputted. A description of how the data was gathered and analysed was provided. This provides the framework and setting for the next chapter which displays the results of the Frail CHeC tool and the accompanying survey.

Chapter 4 - Results

Introduction:

In the previous chapter, the methodology and approach for undertaking the research was described. In this chapter the results of the survey and the Frail CHeC tool are presented. As discussed in the previous chapter, there are two main segments to the results, those that pertain to the Frail CHeC tool and those that pertain to the survey tool. Results are presented under these two main headings below.

Frailty Assessment Results

Sixty Frail CHeC assessments were completed during the data gathering period from October 8th, 2015 to February 9th, 2016. As table 4.1 below shows, the bulk of the assessments were undertaken during November, December and January.

Month	Frail CHeC Assessments Completed
October 2015	7
November 2015	12
December 2015	25
January 2016	11
February 2016	5
Total	**60**

Table 4.1: Frail CHeC Assessments Completed by Month

Age of Sample

The table below summarises the ages of the patients who underwent the Frail CHeC assessment.

Age	Number of Patients	% of Total	Mean Frail CHeC Score
60-69	1	1.7%	34.0
70-79	12	20.0%	34.0
80-89	30	50.0%	32.1
90-99	17	28.3%	32.1
Total	**60**	**100%**	**32**

Table 4.2: Age profile of patients who underwent the Frail CHeC assessment.

The mean age of patients was 84.4 years old and the median age was 86. The range of ages was 69-99 years old. Half the sample were in the 80-89 year old category. One patient was in the 60-69 year category. This patient was 69 years old. The large majority (78.3%) of patients in the sample where over 80 years old.

Gender of Sample

Table 4.3 summarises the gender of the patients who underwent the Frail CHeC assessment.

Age	Number of Patients	% of Total	Mean Frail CHeC Score
Female	40	66.6%	32.2
Male	20	33.3%	33.2
Total	**60**	**100%**	**32**

Table 4.3: Gender of patients who underwent the Frail CHeC assessment.

The majority of patients were female (66.6%). Females scored lower on the Frail CHeC overall score. A lower score indicates increasing frailty.

Distribution of Scores

There were twelve assessments that comprised the Frail CHeC tool. Each assessment was categorised on a scale from 1 to 4, with one being the most frail and four being the least frail. Using this scale, the minimum possible score was twelve (1 point per assessment) and the maximum possible score was 48 (4 points per assessment).

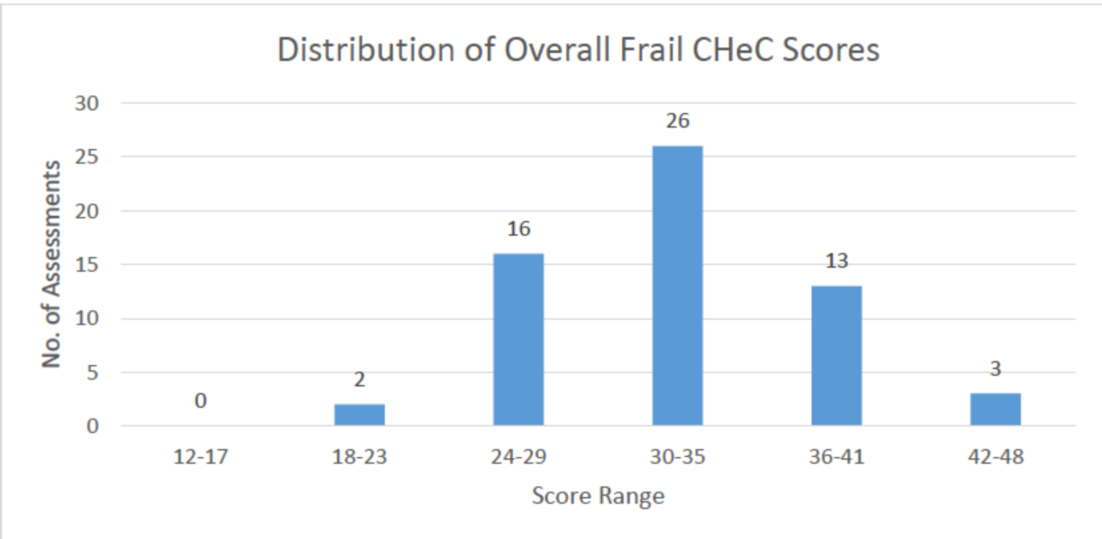

Figure 4.1: Distribution of overall Frail CHeC scores

Twenty-six patients scored 30-35 on the Frail CHeC Tool. No patients scored 12-17 and only two patients had scores in the 18-23 range. Sixteen patients scored in the 24-29 range and twenty six in the 30-35 range. Thirteen patients scored between 36-41 and only three scored 42-48

The table below shows how the results appeared across the different categories of frailty that comprised the tool and ratings within each category.

	1 Red	2 Orange	3 Green	4 Blue	**Total**
Frailty	13	22	13	12	**60**
Cognition	0	30	20	10	**60**
Mood	2	21	3	34	**60**
Mobility	4	7	32	17	**60**
Falls	15	24	0	21	**60**
Sight & Hearing	3	15	27	15	**60**
Continence	0	4	26	30	**60**
Comorbidity	6	12	32	10	**60**
Medication	18	17	19	6	**60**
Nutrition	21	19	19	1	**60**
Performance	9	45	3	3	**60**
Domicile	0	4	39	17	**60**

Table 4.4: Stratification of Frail CHeC scores

Table 4.4 shows where the scores fell across the twelve individual assessments, stratified by the four categories. The scores were not evenly distributed across the twelve assessments, with some assessments scoring more towards red and some more towards blue. As mentioned in Chapter 3, there were no patients who suffered from severe cognitive impairment (red). Nutrition and medication assessments scored regularly in the red category with twenty-one, and eighteen patients respectively. Of the 60 patients who were assessed for continence 56 (93%) scored in green or blue. For the mood assessments, 49 (82%) of patients scored blue or green.

Patient Survey Results

The results of the patient component of the survey that followed the Frail CHeC assessment are displayed in figure 4.2 below. The survey followed a Likert scale with each question having five possible responses, strongly agree, agree, neutral, disagree and strongly disagree.

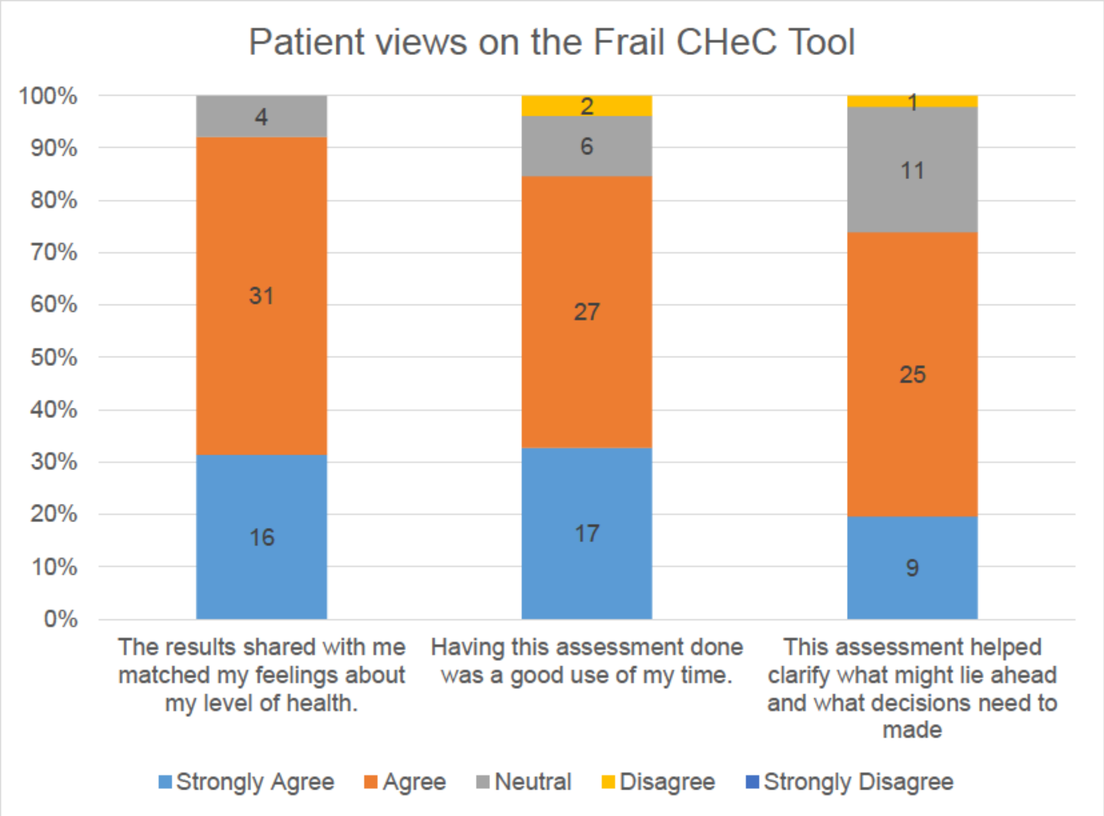

Figure 4.2: Results of the patient component of the survey

After assigning each potential response a number ranging from one to five, with one representing *strongly disagree* and five representing *strongly agree* the following averages were calculated. Although 60 Frail CHeC tools were completed, not all surveys were undertaken and in some cases not all questions were answered.

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total	Mean	Mode	% Agree
Q1a The results shared with me matched my feelings about my level of health.	16	31	4	0	0	51	4.24	4	92%
Q1b Having this assessment done was a good use of my time.	17	27	6	2	0	52	4.13	4	85%
Q1c This assessment helped clarify what might lie ahead and what decisions need to made	9	25	11	1	0	46	3.91	4	74%

Table 4.5: Patient survey results with statistics

The vast majority of patients (92%) either agreed or strongly agreed with the first question. The mean response rate was 4.24 and the mode was 4 out of a maximum of five. Eighty-six percent of patients either strongly agreed or agreed with the second question. The mean answer was 4.13 and the mode again was four. The third question had less agreement that the first two with 74% of patients either agreeing or strongly agreeing. There were 11 patients who put a neutral response to this question (24%). Although the mode answer to this question was 4 matching the response to the other two questions, the mean score was 3.91.

Clinician Survey Results

The results of the clinician survey are displayed in figure 4.3 below.

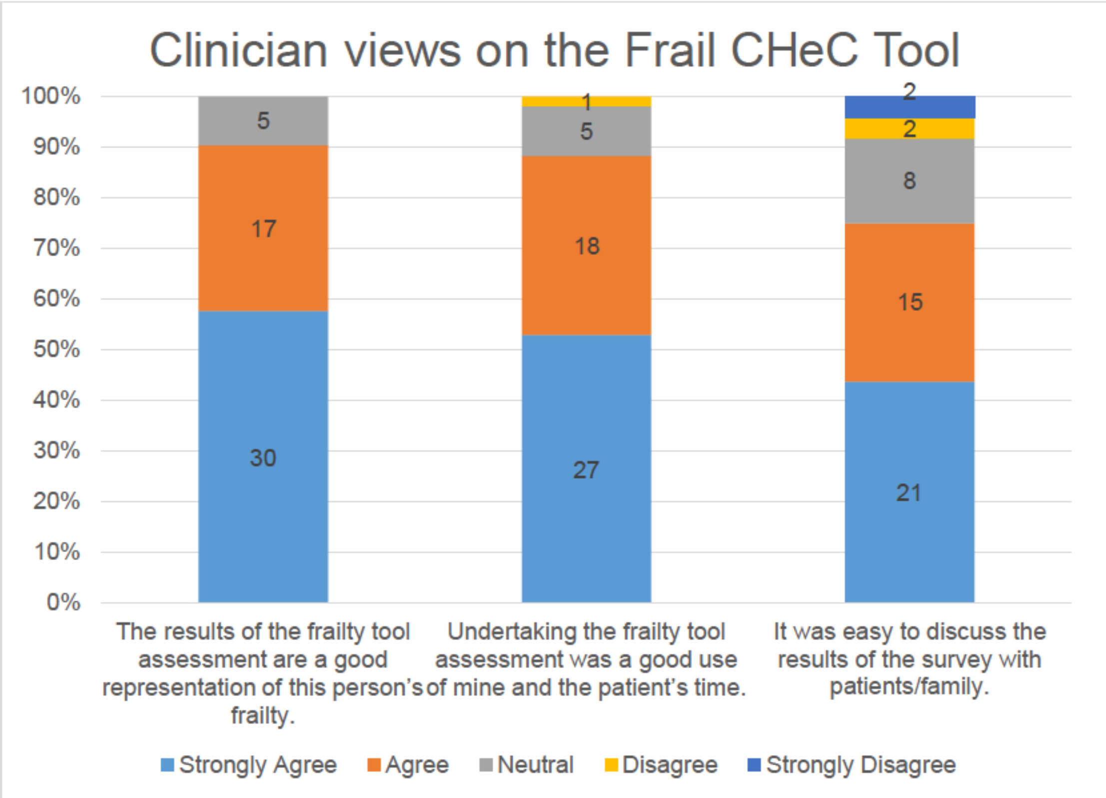

Figure 4.3: Results of the clinician component of the survey

Similarly to the patient survey, the responses were assigned numbers to allow averages to be created. Again, some completed Frail CHeC tools were returned without surveys and some were returned without every question answered.

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total	Mean	Mode	% agree
Q2a I am familiar with this patient, their history and their current level of health.	13	18	13	7	1	52	3.67	4	60%
Q2b The results of the frailty tool assessment are a good representation of this person's frailty.	30	17	5	0	0	52	4.48	5	90%
Q2c Undertaking the frailty tool assessment was a good use of mine and the patient's time.	27	18	5	1	0	51	4.39	5	88%
Q2d It was easy to discuss the results of the survey with patients/family.	21	15	8	2	2	48	4.06	5	75%

Table 4.6: Clinician survey results with statistics

Most clinicians (60%) had some familiarity with the patient before completing the assessment. The majority of clinicians (90%) agreed that the Frail CHeC tool provided a good representation of the patient's level of frailty and that undertaking the assessment was a good use of their and the patient's time (88%).

Using question 2a as a filter, table 4.7 shows that when clinician views are stratified according to how well they knew the patient, the satisfaction scores remain stable. Familiarity with the patient is defined as strongly agree or agree, somewhat familiar is defined as neutral, and not familiar is defined as strongly disagree or disagree.

	Familiar with patient (Q2a=Strongly Agree and Agree)	**Somewhat familiar with patient** (Q2a =Neutral)	**Not familiar with patient** (Q2a = Strongly Disagree and Disagree)
Q2b The results of the frailty tool assessment are a good representation of this person's frailty.	90% Strongly Agree and Agree	100% Strongly Agree and Agree	88% Strongly Agree and Agree
Q2c Undertaking the frailty tool assessment was a good use of mine and the patient's time.	87% Strongly Agree and Agree	100% Strongly Agree and Agree	88% Strongly Agree and Agree
Q2d It was easy to discuss the results of the survey with patients/family.	69% Strongly Agree and Agree	82% Strongly Agree and Agree	88% Strongly Agree and Agree

Table 4.7: Clinician familiarity with patient and Frail CHeC satisfaction scores.

The level of agreement with the first two questions (2b and 2c) was high regardless of how familiar with the clinician was with the patient. With the third question (2d), clinicians were more likely to agree, the less familiar they were with the patient.

The same three questions are shown stratified across the professions that undertook the Frail CHeC assessment in table 4.8

	Doctor	**Registered Nurse**	**Allied Health** (Occupational therapists, physiotherapists & pharmacists)
Q2b The results of the frailty tool assessment are a good representation of this person's frailty.	81% Strongly Agree and Agree N=16	97% Strongly Agree and Agree N=29	86% Strongly Agree and Agree N=7
Q2c Undertaking the frailty tool assessment was a good use of mine and the patient's time.	80% Strongly Agree and Agree N=15	97% Strongly Agree and Agree N=29	71% Strongly Agree and Agree N=7
Q2d It was easy to discuss the results of the survey with patients/family.	73% Strongly Agree and Agree N=15	74% Strongly Agree and Agree N=27	71% Strongly Agree and Agree N=7

Table 4.8: Clinician profession and Frail CHeC satisfaction scores.

In this instance, although views were still positive across the three professional groups, there was variation between the groups.

Clinicians were also asked to record how long it took to complete the Frail CHeC assessment. This does not include the survey component that clinicians and patients completed at the conclusion of the assessment.

<20 min	**20-29 min**	**30-39 min**	**40-49 min**	**50 + min**	**Not recorded**	**Mean**	**Median**	**Mode**
8	18	5	15	7	7	33 min	30 min	20 min

Table 4.9: Time to complete Frail CHeC assessments

Each Frail CHeC assessment took between 12 and 95 minutes to administer. The mean time was 33 minutes, the median was 30 minutes and the mode time was 20 minutes. The time taken per Frail CHeC assessment varied depending on who the assessor was.

Assessor	Number of Assessments completed	Mean Time to complete assessment
Assessor 1	1	25
Assessor 2	1	20
Assessor 3	5	42
Assessor 4	2	40
Assessor 5	1	50
Assessor 6	1	60
Assessor 7	4	33
Assessor 8	7	21
Assessor 9	11	40
Assessor 10	8	16
Assessor 11	11	37
Assessor 12	1	20

Table 4.9: Time to complete Frail CHeC assessments by assessor

The range mean time to complete the Frail CHeC assessment was 16 to 60 minutes. Those who completed ten or more Frail CHeC assessments averaged 37 to 40 minutes to complete their assessments.

Table 4.10 shows the time taken to complete Frail CHeC assessments by profession.

Profession	Number of Assessments completed	Mean Time to complete assessment
Doctor	16	18
Registered Nurse	30	39
Allied Health (Occupational therapists, physiotherapists & pharmacists)	7	37

Table 4.10: Time taken to complete Frail CHeC assessments by profession

Registered nurses and allied health professionals took over twice as long to complete the Frail CHeC assessments as doctors.

Comparisons Between Clinician and Patient Survey Results

There are two questions within both surveys that allow for direct comparisons. The mean score of the questions that can be compared are shown in table 4.11:

Category	Patient Question	Patient Mean	Clinician Question	Clinician Mean
Matching of own views on patient health	The results shared with me matched my feelings about my level of health.	4.24	The results of the frailty tool assessment are a good representation of this person's frailty.	4.48
Agreement on value of tool with regards to time	Having this assessment done was a good use of my time.	4.13	Undertaking the frailty tool assessment was a good use of mine and the patient's time.	4.39

Table 4.11: Comparison of patient and clinician views

Clinicians and patients both highly rated the ability of the Frail CHeC tool to match their views on the patient's (their) level of health. They also, to a lesser degree, considered the Frail CHeC tool to be a good use of their time. In both questions, clinician views were more favourable than patient's.

Qualitative Data

Although there was space for comments on each Frail CHeC tool, very few assessments were returned with comments. A total of 26 comments were received across the 60 returned assessments. Four themes were identified after the comments were reviewed. The first theme concerned comments that were used to clarify the circumstances of the patient. For example one comment noted that the assessment was "done in a rehab ward some areas are likely to improve: nutrition, frailty". The second theme involved comments that helped explain why the assessment took a long time to complete. For example, one clinician noted that there were "lots of distractions which is why it took so long". The third theme related to comments on the Frail CHeC tool and its components. For example, one clinician noted that the "Medication tool seems to be about capturing falls risks". This suggests that they view poly-pharmacy to be more than simply the burden of medication on falls specifically. The fourth theme concerned comments relating to discussions that the Frail CHeC tool provoked. Some of these comments related to patients feeling clearer about their state of health. For example, one clinician noted that the patient said the Frail CHeC tool "clarifies overall picture". Another noted that the client said it "Help know what is going on. Encouraging". Table 4.12: shows the frequency of the four themes and example comments.

Theme	Number of Comments	Examples
Comments used to clarify circumstances of patient	4	• Done in rehab ward some areas are likely to improve: nutrition, frailty • Patient d/c before able to ask questions
Comments used to explain time taken	3	• 60 min to do assessment plus 20 min in ECA later • Assessment took 15 minutes, but led to a 45 minute discussion • lots of distractions which is why it took so long
Comments on the Frail CHeC tool and its components	6	• Overall a fairly good representation of his frailty. However, he looked too good on his sensory (this is subjective – he didn't think it influenced his lifestyle, but clearly it did) • Medication Tool seems to be about capturing falls risks.
Comments about the discussions with patients and families as a result of the Frail CHeC assessment	12	• Client said: "clarifies overall picture" • Client said: "Encouraging, Makes me think I am better than I felt I was" • Client said: "Help know what is going on. Encouraging" • Discussion quite useful because she felt she was more robust than she actually was. • Discussing results with her was not particularly useful. Good discussion with family about components of the results. Overall pretty well represented by the tool.

Table 4.12: Clinician comments on Frail CHeC tool

Quality of Life and Overall Frailty Score

As discussed in the methodology chapter, patients were asked to rate their quality of life before undertaking the assessment. The results of this rating are shown in comparison to the overall Frail CHeC score in figure 4.4.

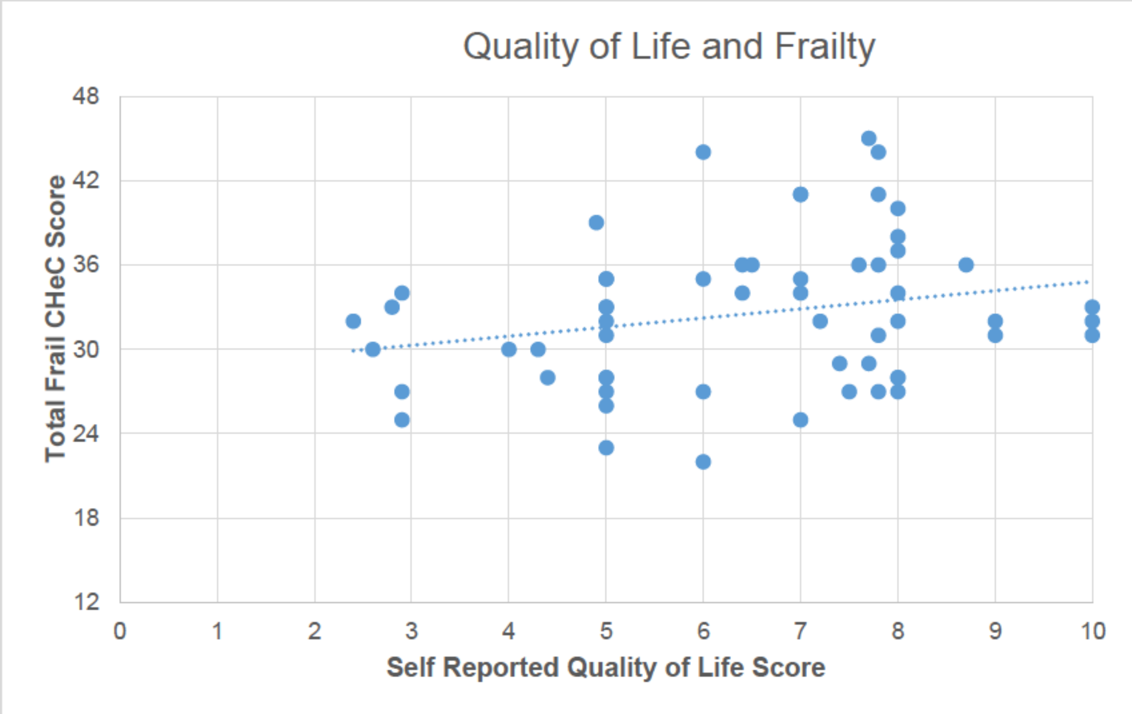

Figure 4.4: Quality of life scores and overall Frail CHeC scores

There is a week positive relationship between self-reported quality of life and overall frailty scores ($r=0.239$, $n=51$, $p< 0.05$).

Summary

This chapter presented the results of the Frail CHeC tool. The results were shown by time, gender, and age. A breakdown of the individual assessments of the Frail CHeC tool was also presented. The time taken to complete the Frail CHeC assessments was displayed with averages based on the individual assessor. Patient and clinician views of the Frail CHeC tool were shown and comments by clinicians on the tool were displayed. The chapter concluded by displaying the results of the self-reported quality of life scores and comparing them to the overall Frail CHeC scores. Interpretation of these results follows in Chapter 5 –Discussion.

Chapter 5 – Analysis and Discussion

Introduction:

The previous chapter presented the results of the Frail CHeC assessment and the accompanying survey. This chapter will follow the same format and discuss the frailty tool assessments first and the survey results second. The first section focuses on the number of Frail CHeC assessments undertaken, the gender and age profile of patients who were assessed, and the frailty scores in terms of individual components and overall score. The second section looks at patient and clinician views on the tool and time taken to complete a Frail CHeC assessment. The third section discusses the correlation between patient self-reported quality of life and overall Frail CHeC scores.

Frail CHeC Assessment Results

This section examines the results of the Frail CHeC assessment. It is comprised of number of assessments, patient age, patient gender, overall Frail CHeC scores, and component scores of the Frail CHeC tool.

Number of Frail CHeC Assessments

Table 4.1 *Frail CHeC Assessments Completed by Month* shows which months during the study period the assessments were undertaken. The original objective of the study was to gain 200 assessments. This was calculated on the basis of recruiting 20 clinicians to undertake 10 assessments each. In the end, only 12 assessors could be recruited and they undertook an average of only five assessments each. It became apparent early in the data gathering phase that assessments were being completed at a lower rate than anticipated. For this reason the data gathering was expanded until the beginning of February, 2016. This allowed for 60 assessments to be completed. Thirty assessments has been shown to be a minimum number for statistical analysis (Saunders et al., 2007; Creswell, 2008) Expanding to 60 to left a buffer in case of errors in the assessments and data collection and to allow for greater confidence in analysis.

Patient Age and Gender

Table 4.2 *Age profile of patients who underwent the Frail CHeC assessment* shows how patient ages were split across four different age bands. The age profiles of the participants who underwent the assessment is different to that of the New Zealand population as a whole. There was one patient in the 60-69 year old age band, who was 69 years old. Even with the exclusion of this group there are stark differences between the sample and the New Zealand population. Twenty percent of the sample was in the 70-79 year old age band, compared to 63% of the New Zealand population over 70. The trend was reversed for the older age bands with 50% of the sample in the 80-89 age group compared to 31% of the New Zealand population over 70. The 90-99 age group was 28% of the sample versus 6% for the population (Statistics New Zealand, 2013b). These differences may reflect the need for clinicians to choose patients who they suspected of frailty to undertake the Frail CHeC assessment. Although age on its own does not cause frailty, and there are plenty of older individuals who never become frail, rates of frailty do increase with age (Mitnitski, Graham, Mogilner, & Rockwood, 2002; Rockwood & Mitnitski, 2007). In the case of this research frailty scores were the same for the 60-69 (Frail CHeC score=34, n=1) and the 70-79 year old group (Frail CHeC score=34, n=12), although the sample size in the first group is too small to draw any conclusions. The Frail CHeC scores decreased (indicative of increasing frailty) with the 80-89 year old group (Frail CHeC score=32.1, n=30) and then remained the same for the 90-99 year old group (Frail CHeC score=32.1, n=17). Although there is some indication that the Frail CHeC tool reported increasing frailty with age, insufficient patient numbers may be preventing these figures from appearing more pronounced.

The mean age of patient participants was 84.6 years old. The Edmonton Frail Scale (EFS) was described in chapter two. It reported a mean age of 80.4 years old (Rolfson et al., 2006). In an analysis of a variety of frailty instruments Pilotto et al. (2012) measured frailty scores for 2,033 patients over the age of 65. The mean age for these patients was 79.8 (Pilotto et al., 2012). The reason for the difference in age may be because published research on frailty tools attempts to measure frailty across a spectrum ranging from pre-frail or non-frail through to frail and severely frail. This research asked the clinician to undertake assessments on patients who they thought might be in a frail state. Given the relationship between age and frailty scores it is plausible that clinicians were biased towards selecting older patients. The purpose of the research, was not to define non-frail and frail populations. The purpose was to establish how valid and useable the tool was for a frail population. Therefore, for this research it is appropriate to analyse the use of the tool in frail only groups.

Two thirds of the sample size was female. In the EFS research, the sample was 53% female (Rolfson et al., 2006). Again, this may be a consequence of sampling that excluded patients that were non frail to mildly frail. The Clinical Frailty Scale (CFS) reported that the percentage of woman in the sample increased with frailty. On the frail end of the seven category CFS scale, categories five, six and seven are defined as mildly frail, moderately frail and severely frail. These had reported female populations of 64.6%, 68.6%, and 80.4% respectively (Rockwood et al., 2005). The overall Frail CHeC score was similar for males (33.2 and females (32.2). Rolfson et al. (2006) found gender was not associated with frailty.

Distribution of Overall Frail CHeC Scores

Figure 4.1, *Distribution of overall Frail CHeC scores* graphs the range of the overall frailty scores. The overall frailty scores followed a normal distribution, similar to what Rolfson et al., (2006) discovered in their analysis of the EFS. Rolfson et al., (2006) also found that asking geriatricians to evaluate a *clinical impression of frailty* on patients to be normally distributed. Having normally distributed data is evidence that the tool's measurement of scores are not biased towards producing abnormally high or low scores. However, more work is needed to establish how the tool performs with a larger dataset that includes frail and non-frail participants.

Components of the Frail CHeC Tool

As displayed in Table 4.4, *Stratification of Frail CHeC scores,* some of the individual categories, produce higher red scores than others. A red score indicates the highest level of frailty for that individual category. For example, 30% of all patients surveyed scored red for medication use, and 35% of all patients scored red for nutrition. Both the nutrition and medication components of the Frail CHeC tool are based on existing published tools. The nutrition screen has been used in over 450 different publications (Nestlé Nutrition Institute, 2013). Although it uses only three categories, compared to the four necessary to comprise the red, orange, green and blue categories, it was deemed prudent to keep to three categories to match published research. This meant that the green category was dropped and hence a potential bias towards lower scores in this category was created. However, there is research that supports low nutritional status with elderly and frail populations. Brownie (2006) reports that 5-10% of elderly adults living at home and 35 to 65% of hospitalised patients are malnourished.

Medication use and frailty was also documented by Rolfson et al. (2006). Analysing their EFS they found that the average patient used 5.4 medications. They also recorded that medications were more strongly associated with their overall frailty score than age. (Rolfson, 2006). Although the medication tool is established in the health board in which the research was undertaken, it does not have its own categorisation. Therefore, the lack of patients who were deemed to be blue in this category, could either be a reflection of the number of patients on medications associated with frailty, or a need to re-consider the categorisation of this assessment. This may also be true of other categories that show an imbalance in the distribution of scores across the four categories. For example, in the performance category, 45 assessments were classified as orange which represents 75% of all the assessments.

Survey Results

This section will discuss the patients' views on the Frail CHeC tool, clinician views on the tool, time taken to complete tool, and correlations between self-reported quality of life and overall frailty scores.

Patient Views on Frail CHeC Tool

Although the distribution of scores may suggest the need for changes to the various cut points across the frailty categories, the patient views on the tool were consistently positive. Figure 4.2, *Results of the patient component of the survey* shows the results of the three questions patients were asked about the assessment experience.

Question 1a, "*The results shared with me matched my feeling about my level of health"* showed 16 respondents strongly agree, and 31 respondents agree. Combined these form 92% of the responses. The remaining 8% is formed of neutral responses. No respondents either disagreed or strongly disagreed with the statement.

Similarly, question 1b "*Having the assessment done was a good use of my time"* had 17 patients strongly agree and 27 patients agree for a combined total of 85%. In this case there were two patients who disagreed with the statement. One of these patients had a note stating that the patient's partner took value from the assessment, but the patient themselves did not: "Discussing results with her was not particularly useful. Good discussion with family about components of the results".

Overall patient's views were favourable. This is an important finding, considering that the views of healthcare users or patients are becoming an important building block for determining the future course of healthcare delivery and for evaluating the effectiveness of established programmes (Bate & Robert, 2006). In the case of the

Frail CHeC tool being researched, the purpose of determining patient views holds an additional level of importance. The purported power of the tool was to take complicated health assessments and display them in a manner that makes sense to healthcare users. Given the constraints to healthcare funding (New Zealand Treasury, 2004), the rising number of elderly people (Statistics New Zealand, 2007), and the growing discomfort with how end of life care is handled (Kaufman, 2009), it is vital that patients understand their health status. Totalling up twelve different assessments to give an aggregate score out of forty eight is useful for performing statistical analysis, but the purpose of the Frail CHeC tool was to solicit views of assessed patients after being shown a graphical representation of their health status, not simply to measure their overall frailty score. A visual representation has been shown to be an effective method of communicating with patients. A New Zealand study of cardiovascular treatment and risk, showed that patients preferred pictures to numbers when it came to explaining the risks and benefits of preventative medicine (Goodyear-Smith, 2008). Further, using decision-aids to facilitate shared decision-making, particularly when there are risks which must be considered alongside the benefits, has been shown to be a powerful tool. Decision quality as measured by knowledge of participants, proportion of patients with realistic perceptions of risks and benefits of surgery, low decisional conflict, number of passive participants and number of patients who remain undecided after counselling has been shown to improve after the use of decision-aids (O'Connor, Llewellyn-Thomas, & Flood, 2004).

Health literacy adds another dimension to this discussion. There is growing concern that the complexity of the healthcare system and the bewildering array of choices available to patients are often couched in terms that are difficult to comprehend for the lay user. Healthcare users who have low health literacy rates have been shown to have poorer health outcomes than their high literacy counterparts. Low literacy was associated with increased hospitalisations, and lower vaccine and screening uptake (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011).

Health literacy may also be an issue with the questions used in the survey. Question 2c, "*The assessment helped clarify what might lie ahead and what decisions need to be made"* also had favourable patient views. Nine patients strongly agreed with the statement and 25 agreed with it. This represents a combined total of 74%. Although this represents good support, this question drew a high number of neutral responses. This might call into question the health literacy of the statement itself. The aim of the question was to get an idea of whether being presented with a comprehensive visual representation of frailty might make patients feel better informed and more prepared for decisions. However, the high number of neutral responses might suggest there was either confusion about the question or suggests that patients did not yet feel the assessment could make an impact in these areas.

Staff Views on Frail CHeC Tool:

The staff survey results showed staff views on the Frail CHeC tool were also favourable. Question 2b, "*The results of the frailty tool assessment are a good representation of this person's frailty"* had 30 strongly agree answers and 17 agree answers. This represents a total of 90% of responses. This is a good endorsement of the tool, but also represents support for the aim of whether the tool matches clinical judgement. In 90% of assessments, clinicians felt the tool matched their own judgement of how frail the patient appeared. The EFS was compared to geriatrician views by asking for a geriatrician's impression of frailty alongside the frailty assessments. This was shown to be correlated with the EFS tool (Rolfson, 2006).

Views on question 2c, "Undertaking the frailty tool assessment was a good use of mine and the patient's time" were favourable. On 17 assessments, clinicians strongly agreed with the statement and in 31 cases they agreed with it. This represents a total of 88% in agreement. This is an important finding given the fact that clinicians were asked to undertake assessments in addition to their normal workload and they may have already completed some evaluations that resembled some of the components of the frailty tool.

Question 2d, "It was easy to discuss the results of the survey with patients/family" was well supported but not as strongly the two questions above. Strongly agree answers appeared 21 times and agree answers appeared 15 times for a total agreement of 75%. Some of the comments that appeared alongside these questions might explain why there were eight neutral replies and two each from strongly disagree and agree. Some text suggested that the patient was not able to be asked the questions. For example, "*patient d/c (discharged) before able to ask questions*", and "*not applicable*" were written next to two responses. In other cases, the text suggested agreement with the statement, but the answer was recorded as neutral. For example, one assessor wrote that the patient said "*helpful discussion, but not sure why!*" but the answer was recorded as neutral. In another case the text was recorded with (client said) "*clarifies overall picture*" but again the answer was marked as neutral. The framing of question 2d may be causing confusion. A patient's frailty may be a complex subject that is not "easy" to discuss. This question may have benefitted from being re-worded to ascertain whether the Frail CHeC tool helped make the health discussions “easier” rather than “easy”.

Clinician views remained favourable on the tool regardless of their level of familiarity with the patient. Clinicians who were familiar with the patient before undertaking the assessment, reported favourable views on questions 2b (90%). These clinicians would have some background knowledge of the patient’s health status, and confirmed that the Frail CHeC tool provided a good representation of the patient’s frailty. This provides a good endorsement of the Frail CHeC’s ability to provide an accurate picture of a patient’s level of health. Clinicians who were somewhat familiar and not familiar with the patient still viewed the ability of the tool to provide an accurate picture positively (100% and 88%).

Clinicians also reported favourable views across the three professional groups, doctors, registered nurses and allied health professionals. Doctors reported 81% agreement for question 2b, 80% for question 2c, and 73% for questions 2d. For the same questions, agreement rates were 97%, 97% and 74% respectively for nurses and 86%, 71% and 71% respectively for allied health professionals. The slightly lower rates for allied health professionals may be a consequence of the small sample size (n=7).

Time Taken to Complete Frail CHeC Assessments

The range of time taken to complete the Frail CHeC tool was 15 to 95 minutes. The mean time was 33 minutes and the mode time was 20 minutes. Both the EFS (Rolfson et al., 2006) and CFS scale (Rockwood et al., 2005) have been shown to be brief and effective tools. However, no research was found linking these tools with patient and clinician decisions. Frailty tools that have been shown to influence decision-making have involved longer sessions. Moorhouse & Mallery (2012) reported on using the PATH model to work with patients and families over three, one hour long sessions. Results of the Frail CHeC tool suggest that it can be undertaken quickly in a variety of settings, by a variety of professionals and may help patients understand their health and what future treatment decisions may need to be made. Doctors managed to complete the tool quicker than RNs and allied health professionals. This may be a consequence of using doctors who were specialists in elder health and assessments versus RNs and allied health professionals who had less exposure to these tools.

Quality of Life and Overall Frailty Score

Figure 4.4, *Quality of life scores and overall Frail CHeC scores* shows the weak correlation between the patient's self-reported quality of life score and the overall frailty score. This represents an important discovery. The aim of the tool is to illuminate the concept of frailty and ensure patients and clinicians agree what it looks like with a view to being informed for joint decisions. The emerging ethical field of biomedicalisation of ageing create a context where patients and clinicians may feel the default option is to treat regardless of the level of frailty of the patient (Kaufman et al., 2009) However, caution is needed when proceeding with discussions with frail patients in light of the fact that many still place high value on their quality of life. Scoring higher on the frailty index does not mean patients perceptions of their quality of life diminishes. Bach, Campagnolo and Hoeman (1991) reported that dissatisfaction scores for ventilator-assisted patients were only 12.5%. It is the researcher's view that in the context of declining funds, and concerns with how a growing elderly population is treated at the end-stage, decisions are still made jointly and consideration is given to how a patient views their quality of life alongside the results of frailty or other health assessments.

Summary

This chapter discussed the results of the Frail CHeC tool assessment with regards to overall scores, gender and age profiles, and the distribution of scores across the 12 individual assessments that comprised the tool. The next section looked at patient and clinician views of tool which were shown to be largely favourable. Time taken to assess using the tool was shown to be brief although there was variety across the three professional groups. This chapter concluded with discussion on the weak correlation between patient self-reported quality of life scores and overall Frail CHeC score. The next chapter will summarise the research, discuss its limitations and recommend other research that is needed in this area.

Chapter 6 – Conclusion and Recommendations

Introduction:

The previous chapter analysed the results of the Frail CHeC assessment and the accompanying survey. This chapter will be comprised of three sections. The first section will summarise the findings of the Frail CHeC tool and the embedded survey. The next section will state limitations of the research. The final section will examine opportunities for further research.

Summary

The story of Ponce de Leon dying while looking for the fabled fountain of youth sets the scene for the literature that underpins frailty. The search for a magic elixir to halt the ageing process and restore youth may have been unsuccessful, but the elderly years have been extended through careful medication management and surgical interventions. Those people who undergo these processes, but who gradually lose function have been described as frail. Chapter one showed how this process is made acute by the ageing population, the constraints on healthcare funding and the growing discomfort with how people are treated in the end stages of their lives. Chapter one provided a brief introduction to the term frailty and the methods of its measurement. The Frail CHeC tool was introduced at this point. The 12 individual assessments that comprise the tool were briefly described and how the patient's health is mapped across these 12 domains was depicted. The aim of the research was to understand how valid and useful the Frail CHeC tool was for patients and clinicians.

Chapter two reviewed the literature that was pertinent to the research. This included a look at definition of the term frailty and how this has matured in recent years. The next section looked at the frailty tools that have been developed to measure frailty. The third section reviewed literature published on frailty and clinical decision-making. This included a more in-depth look at the research published on the biomedicalisation of ageing, and how patient and clinician views on quality of life are and important part of this research field. The fourth section provided more detail on the research that underpins some of the 12 assessments of the Frail CHeC tool. The fifth section reviewed literature published on health literacy and pictorial aids to decision-making. These were described in relation to what the Frail CHeC tool attempts to accomplish, namely improve patient understanding of frailty without the use of complex medical jargon.

Chapter three outlined the methodological approach used to measure the validity of the Frail CHeC tool. The quantitative method by way of survey methodology was described. The survey tool that was embedded in every Frail CHeC tool was illustrated and justified.

Chapter four showed the results of the Frail CHeC tool and the accompanying survey. Frail CHeC scores were shown in relation to age, gender and across the 12 assessments that comprised the overall tool. Profiles were shown of the sample in terms of time period of the research and age and gender. Patient and clinician views of the Frail CHeC tool were shown to be favourable across a variety of questions pertaining to the tool. Clinician views on the tool remained favourable regardless of the clinician's familiarity with the patient and what professional group the clinician belonged to. Patient's self-reported quality of life scores were shown to have a weak correlation with overall Frail CHeC scores.

Chapter five examined the results shown in chapter 4 and linked them back to what was reviewed in the literature in chapter 2. In particular, the age and gender profiles, and overall frailty scores were compared with the Edmonton Frail Scale and the Clinical Frailty Scale. The results of the favourable patient and staff views were discussed and put in context with the literature reviewed in chapter two. Patient views on the tool were discussed in the context of patient-centred design and the importance of simplified tools to help patients make informed decisions. The chapter concluded with a look at the importance of considering patient quality of life alongside health assessment measurements.

Limitations

The size of the sample was a limitation in gathering trends in the Frail CHeC tool. While 30 assessments is sufficient for some statistical analysis, understanding trends in age, and frailty scores would require a larger sample size. Attempting to measure just frail populations, instead of all the population over 65 years old meant the tool could not be tested to see if it could measure a non-frail or pre-frail state. Asking clinicians to answer the same questions for each Frail CHeC assessment may have contributed to survey fatigue. In hindsight, a better method may have been to interview clinicians after they have undertaken several Frail CHeC assessments to ascertain their views on the tool and its applicability. The tool was not tested for inter-rater reliability. Therefore it is not certain that different professionals will attain the same results for the same patient. The four categories of each of the 12 assessments (blue, green, orange and red) may not have been applied consistently in the development of the Frail CHeC tool. As a consequence, it is difficult to ascertain whether trends in a particular assessment are the results of trends in the population or an inherent bias in the tool. The Frail CHeC tool purports to aid clinicians and patients to make informed decisions about the patient's health, however measuring outcomes during the short study period was not possible. Further, the question geared towards this area, may have been misunderstood by patients.

Conclusion

The aim of the research was to establish whether the Frail CHeC tool was valid and useful for joint-decision making. The testing of the Frail CHeC tool revealed that it can be considered valid and useful for patients and clinicians on the basis that their views on the tool were favourable. Clinician and patient views on the ability of the Frail CHeC tool to accurately map a patient's level of health were also favourable. Although the time taken to assess patients using the tool varied between assessors, the tool was implemented quickly by doctors and by some other health professionals. The design and layout of the Frail CHeC tool including the use of visual aids is supported by literature and represents a good method of engaging with patients in a non-technical manner. Qualitative and quantitative feedback supports the idea that patients and clinicians may find it useful as an aide to decision-making. However, whether the Frail CHeC tool can improve or enhance joint decision-making requires further research.

Recommendations

The Frail CHeC tool has been shown to have favourable views by clinicians and patients. However, there are opportunities to strengthen the tool and subsbantiate it with more robust research. For example, work could be undertaken to ensure the four categories are applied consistently across the 12 assessments. This may take the form of having a standardised approach for each of the four coloured categories so that when any of the 12 assessments are undertaken the colour grading is consistent. Next, the tool should be tested for inter-rater reliability. Once this has been established, the tool should be applied in a hospital setting measuring a variety of people over 65 years old (including pre-frail patients) to test whether it can predict adverse outcomes. This could take the form of an assessment undertaken prior to elective surgery. Work should then be undertaken to understand how the tool can influence patient outcomes or help patients make a more informed decision. Research could also be conducted to determine whether working with the Frail CHeC tool has an impact on clinician's views on frailty. A qualitative approach could be employed to determine clinician's understanding of frailty before and after working with the Frail CHeC tool. This could be measured to ascertain if there are differences in opinion across different professional groups. Finally, the Frail CHeC tool could be tested to see if the results can be replicated in different health care settings.

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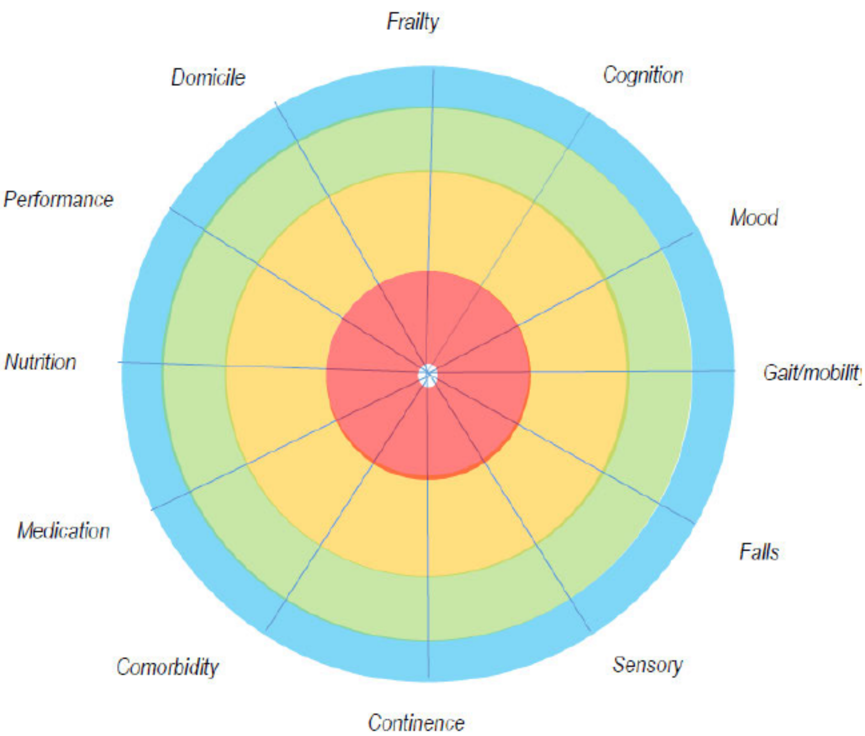
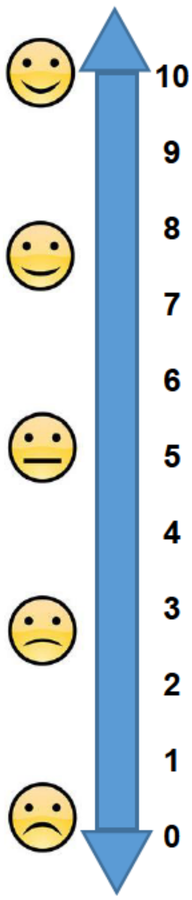
Appendix A – Frail CHeC Assessment Tool

	Screen	Assess				Score
	Blue = 4		Green = 3	Orange = 2	Red = 1	
Frailty	Score 1 to 3	**CFS**	Score 4	Score 5	Score 6 or 7	
Cognition	**GPCOG9 = 9**	**5-8 needs GPCOG15**		≤4 needs MoCA *		
		GPCOG15	GPCOG15 ≥11	<11 needs MoCA *		
		MoCA	Score 25 to30	15 to 24	≤ 14	
Mood	**GDS4 = 0**	**GDS15**	GDS15 0 to 4	5 to 9	≥ 10	
Gait/mobility	Independent		With aid	Supervised	Dependent	
Falls	Nil in last year			1 or 2	≥ 3	
Sight & hearing	Healthy		Mild deficit	Moderate	Severe	
Continence	Continent		Self manages	Requires assistance	Incontinent & Dependent	
Comorbidity	Nil	**Charlson**	Score 1 or 2	3 to 5	≥ 6	
Medication	Nil	**MRFRAT**	Score 1 or 2	3 and 4	≥ 5	
Nutrition	MNA 12 to 14	**MNA**		8 to 11	0 to 7	
Performance	Score 0	**MRS**	Score 1	2 or 3	4 or 5	
Domicile	Home no support		Home + support	Rest home	HLOC	





Frailty Assessment
Tool: Clinical Frailty Scale (CFS)

			Yes	
1	Very Fit	People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.		Blue
2	Well	People who have no active disease symptoms but are less fit than category 1. Often, they exercise or are very active occasionally, e.g. seasonally.		Blue
3	Managing Well	People whose medical problems are well controlled, but are not regularly active beyond routine walking.		Blue
4	Vulnerable	While not dependent on others for daily help, often symptoms limit activities. A common complaint is being "slowed up", and/or being tired during the day.		Green
5	Mildly Frail	These people often have more evident slowing, and need help in high order IADLs (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.		Orange
6	Moderately Frail	People need help with all outside activities and with keeping house. Inside, they often have problems with stairs and need help with bathing and might need minimal assistance (cuing, standby) with dressing.		Red
7	Severely Frail	Completely dependent for personal care, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).		Red

Cognition Assessment
Tool: GPCOG

"I am going to give you a name and address. After I have said it, I want you to repeat it. Remember this name and address because I am going to ask you to tell me it again in a few minutes: John Brown, 42 West Street, Mayfair" (Allow a maximum of four attempts but do not score yet)	
	Correct
What is the date? (exact only)	
Please mark in all the numbers to indicate the hours of a clock (correct spacing required)	
Please mark in hands to show 10 minutes past eleven o'clock (11:10)	
Can you tell me something that happened in the news recently? (recently=in the last week)	
What was the name and address I asked you to remember?	
John	
Brown	
42	
West (St.)	
Mayfair	
Total	**/9**

2: GPCOG Informant Interview: Ask the informant: "Compared to a few years ago, …"	Don't know or N/A	**No**
Does the patient have more trouble remembering things that have happened recently?		
Does he or she have more trouble recalling conversations a few days later?		
When speaking, does the patient have more difficulty in finding the right word, or tend to use the wrong word more often?		
Is the patient less able to manage money and financial affairs (e.g., paying bills, budgeting)?		
Is the patient less able to manage his or her medication independently?		
Does the patient need more assistance with transport (either private or public)?		
Total		**/6**
Total 1 & 2		**/15**

GPCOG9 =9	GPCOG15 ≥11	GPCOG15 ≤10
		Proceed to MoCA
Blue	**Green**	**Orange**

Mood Assessment

Tool: Geriatric Depression Scale: (GDS- 4)
Geriatric Depression Scale Short From (GDS-15)

			Score
Are you basically satisfied with your life?	Yes	No (1)	
Do you feel your life is empty?	Yes (1)	No	
Are you afraid that something bad is going to happen to you?	Yes (1)	No	
Do you feel happy most of the time?	Yes	No (1)	
Total (out of 4)			

Have you dropped many of your activities and interests?	Yes (1)	No	
Do you often get bored?	Yes (1)	No	
Are you in good spirits most of the time?	Yes	No (1)	
Do you often feel helpless?	Yes (1)	No	
Do you prefer to stay at home, rather than going out and doing new things?	Yes (1)	No	
Do you feel you have more problems with memory than most?	Yes (1)	No	
Do you think it is wonderful to be alive now?	Yes	No (1)	
Do you feel pretty worthless the way you are now?	Yes (1)	No	
Do you feel full of energy?	Yes	No (1)	
Do you feel that your situation is hopeless?	Yes (1)	No	
Do you think that most people are better off than you are?	Yes (1)	No	
Total (out of 15)			

GDS4 = 0	GDS15 0 - 4	GDS15 5 - 9	GDS15≥10
Blue	Green	Orange	Red

Sight & Hearing

		Yes	
Do you have good sight & hearing?			Blue
If not, does sight and or hearing affect your lifestyle	Mildly?		Green
	Moderately?		Orange
	Severely?		Red

Comorbidity Assessment

Tool: Charlson Comorbidity Index (CCI)

Disease	Score	Present
Myocardial infarction (history, not ECG changes only)	1	
Congestive heart failure	1	
Peripheral disease (includes aortic aneurysm >= 6 cm	1	
Cerebrovascular disease: CVA with mild or no residua or TIA	1	
Dementia	1	
Chronic pulmonary disease	1	
Connective tissue disease	1	
Peptic ulcer disease	1	
Mild liver disease (without portal hypertension, inlcudes chronic hepatitis)	1	
Diabetes without end-organ damage (excludes diet-controlled alone)	1	
Hemiplegia	2	
Moderate or severe renal disease	2	
Diabetes with end-organ damage (retinopathy, neuropathy,nephropathy, or brittle diabetes)	2	
Tumor without metastasis (exclude if > 5 y from diagnosis)	2	
Leukemia (acute or chronic)	2	
Lymphoma	2	
Moderate or severe liver disease	3	
Metastatic solid tumor	6	
AIDS (not just HIV positive)	6	
Total		

CCI = 0	CCI 1 - 2	CCI 3 - 5	CCI ≥6
Blue	Green	Orange	Red

Medication Assessment

Tool: Medication Related Falls Risk Assessment Tool (MRFRAT)

	Score Per Medicine	Score
Hypnosedatives (antipsychotics, benzodiazepines, zopiclone, antihistamines)	2	
Antidepressants (All antidepressant classes)	2	
Anticholinergics (procyclidine, solifenacin, oxybutynin, benztropine, orphenadrine)	1	
	Score Per Classification	
Antihypertensives (diuretics, alpha-blockers only)	1	
Digoxin	1	
Antiepileptics	1	
≥ 6 long-term oral medications	2	
Female	1	
Total		

MRFRAT = 0	1 & 2	3 & 4	≥5
Blue	Green	Orange	Red

Nutrition Assessment
Tool: Mini Nutrition Assessment (MNA)

	Score
Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing of swallowing difficulties? **0**-severe decrease **1**-moderate decrease **2**-no decrease	
Weight loss during the last 3 months? **0**-weight loss > 3kg **1**-does not know **2**-weight loss between 1 and 3 kg **3**-no weight loss	
Mobility? **0**-bed or chair bound **1**-able to get out of bed/chair but does not go out **2**-goes out	
Has suffered psychological stress or acute disease in the past 3 months? **0**-yes **2**-no	
Neuropsychological problems? **0**-severe dementia or depression **1**-mild dementia **2**-no psychological problems	
F1 - Body Mass Index (BMI) (weight in kg)/(height in m)^2 **0**-BMI <19 **1**-BMI 19 to less than 21 **2**-BMI 21 to less than 23 **3**-BMI 23 or greater	
If BMI not available, replace question F1 with question F2.	
F2 - Calf circumference (CC) in cm **0**–CC less than 31 **3**–CC 31 or greater	
Total	

MNA 12 - 14		MNA 8 - 11	MNA 0 - 7
Blue	Green	Orange	Red

Performance Assessment
Tool: Modified Ranking Scale (MRS)

	Score
No symptoms at all	0
No significant disability despite symptoms; able to carry out all usual duties and activities	1
Slight disability; unable to carry out all previous activities, but able to look after own affairs without assistance	2
Moderate disability; requiring some help, but able to walk without assistance	3
Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assisatnce	4
Severe disability; bedridden, incontinent and requiring constant nursing care and attention	5

MRS = 0	MRS 1	MRS 2&3	MRS 4&5
Blue	Green	Orange	Red

Appendix B – Survey Tool

Clinican Component	
Question	**Response**
1. Profession of assessor	
2. Date of assessment	dd / mm / yy
3. Time taken to complete assessment	mins
4. I am familiar with this patient, their history and their current level of health. Comments:	Response Scale Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree, Do Not Know 1 2 3 4 5 N
5. The results of the frailty tool assessment are a good representation of this person's frailty. Comments:	Response Scale Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree, Do Not Know 1 2 3 4 5 N
6. Undertaking the frailty tool assessment was a good use of mine and the patient's time. Comments:	Response Scale Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree, Do Not Know 1 2 3 4 5 N
7. It was easy to discuss the results of the survey with patients/family. Comments:	Response Scale Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree, Do Not Know 1 2 3 4 5 N
8. It would be useful if frailty tool assessment results were routinely available on the patient record Comments:	Response Scale Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree, Do Not Know 1 2 3 4 5 N

What is your clinical response to this patient? Tick all that apply	
None	
Self-management	
Single condition review	
Medication review	
Care and support planning	
Community referrals	
District nurse support	
GP appointment	
Refer for additional formal assessments for a particular domain (e.g. mood, cognition etc)	
End-of-life care	
Advanced Care Planning	
Care Home Provision	
Rehabilitation	
Care Package Provision	
Other Please specify:	

Patient Component	
Question	**Response**
1. The results shared with me matched my feelings about my level of health.	Response Scale Strongly Disagree 1, Disagree 2, Neutral 3, Agree 4, Strongly Agree 5, Do Not Know N
2. Having this assessment done was a good use of my time.	Response Scale Strongly Disagree 1, Disagree 2, Neutral 3, Agree 4, Strongly Agree 5, Do Not Know N
3. This assessment helped clarify what might lie ahead and what decisions need to made.	Response Scale Strongly Disagree 1, Disagree 2, Neutral 3, Agree 4, Strongly Agree 5, Do Not Know N

Appendix C – EIT Research and Ethics Approval

EIT
EASTERN INSTITUTE OF TECHNOLOGY
TE AHO A MĀUI

Reference Number 28/15

9 September 2015

Ben Duffus
Masterate Student
C/- School of Health and Sport Science
EIT

Dear Ben

Thank you for responding to the Reviewers comments and undertaking further revision to your application and documentation, as requested.

Your revised documents have been accepted and I am pleased to inform you that your research project *"Frailty Tool Pilot Assessment"* is approved.

You are reminded that should the proposal change in any significant way, then you must inform the Committee. Please quote the above reference number on all correspondence to the Committee.

The Committee wishes you well for the project.

Yours sincerely

Jeanette Fifield
Secretary – Research Ethics & Approvals Committee

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