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Diagnostic dysphagia service in the community – a qualitative analysis of the perceived need for Instrumental Assessment in New Zealand's South Island.

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Abstract

AIM: The aim of this study was to gauge the interest of NZL SLPs when proposed with the concept of mobile instrumental assessment units - namely fibreoptic endoscopic evaluation of swallowing (FEES) and Videofluoroscopic swallowing studies (VFSS) - along with assessing the benefits and drawbacks of current mobile instrumental units used in the USA.

INTRO: Dysphagia – swallowing disorders – is a substantial health issue in New Zealand. The cause of dysphagia can be due to a range of neurological or congenital conditions. Dysphagia can be an acute symptom of some illnesses, while it is chronic for others. For accurate diagnosis of dysphagia, an assessment using instrumental tests is required. In New Zealand, these assessments are confined to hospitals and therefore are not always accessible; however, in the USA, mobile instrumental assessment units are utilized to service the dysphagic community.

METHOD: Three target groups were contacted with a survey via email. Qualitative information was gathered via three different surveys. Clinicians who conduct mobile FEES and those who conduct mobile VFSS were contacted in the USA. In NZL, public health SLPs working in the South Island were contacted. Two FEES SLPs responded, three VFSS SLPs responded and 17 NZL SLPs responded.

RESULTS: A total of 22 participants consented to and responded to the surveys. Five primary themes were identified in the FEES group, five were identified in the VFSS group and six were identified in the NZL group. FEES and VFSS participants reported things such as high success rates for patient attendance to assessment, wanting to ensure that instrumental assessment is accessible for both rural communities and patients with limited mobility, working in conjunction with local SLPs to expand availability of instrumental assessment and decreasing wait times for the patient down to only a few days. Drawbacks were not reported by the USA SLPS. In the NZL group, participants reported things such as low regular availability of VFSS, barriers for patients to access instrumental assessment such as distance, mobility and socioeconomic status. When asked about perspectives of mobile assessment units, a majority of SLPs reported feeling positive towards this service and anticipated that should it be available, they would refer to this service. Concerns from NZL participants about this service were primarily centred around logistical implementation of the service in the current public health system.

CONCLUSIONS: There is a clear perceived interest and need from NZL SLPs for a mobile assessment unit, but there is not yet enough empirical evidence to suggest that the outcomes experienced by the FEES and VFSS SLPs in the USA would be experienced in NZL.

List of Figures

List of abbreviations

SLP – Speech and Language Pathologist

SLT – Speech and Language Therapist

NZL – New Zealand

USA – United States of America

VFSS – Videofluoroscopic swallowing study

FEES – Fibreoptic endoscopic evaluation of swallowing

QOL – Quality of life

DHB – District health board

Table of Contents

Chapter 1 - Introduction

Swallowing impairment – dysphagia – is a substantial health issue in New Zealand. Dysphagia can be the result of many chronic or acute neurological conditions or medical conditions. Additionally, congenital conditions and aging may cause dysphagia. Accurate diagnosis of dysphagia requires a trained Speech and Language Pathologist (SLP) and instrumental assessment. Although clinical examination by the SLP can sometimes identify dysphagia, for correct diagnosis and subsequent management, instrumental assessment must be used, otherwise the swallowing disorder may not be treated appropriately. In some instances, as specified by Daniels, Huckabee and Gozdzikowska: "By not understanding the specific nature of the swallowing disorder, management of dysphagia may, in fact, exacerbate the disorder rather than facilitate recovery" (Daniels, Huckabee & Gozdzikowska, 2019, pg. 151).

Accurate diagnosis can be completed by using instrumental assessment, such as Videofluoroscopic Swallowing Study (VFSS) and the Fibreoptic Endoscopic Evaluation of Swallowing (FEES). These are commonly referred to as the 'gold standards' of swallowing assessment (Daniels, Huckabee & Gozdzikowska, 2019; Jo, Park, Min, Park, Kang, Lee & Baek, 2015-2016; Leonard & Kendal, 2019; Seo, Min, Huh, Shin, Ko & Ko, 2021). VFSS and FEES are essential for dysphagia diagnosis and management, but their availability is unknown for many populations in New Zealand. In New Zealand, research on the access to instrumental assessments from either an accessibility or geographical point of view has not yet been investigated. Protocols for managing dysphagia varies between hospitals; however, typically when patients are referred to SLP services whilst admitted to hospital, they will be seen within the hospital environment by a hospital SLP. From here they may undergo instrumental assessments depending on availability of equipment in the hospital.

Should a dysphagic patient be referred to outpatient SLP service, they are often required to transport themselves to the SLP clinic. Where available, SLPs can do home visits, however this is dependent on a range of factors. These factors can be district health board (DHB) protocols, the SLP's caseload, the time required and the assessment that needs to be completed (Waitaha Canterbury, 2022). When doing home visits, SLPs in New Zealand can only do clinical assessments for dysphagic patients as no instrumental assessments can be transported to patient's home environments (Waitaha Canterbury, 2022). This shows the possibility of a large gap in the ability for patients to access instrumental assessments when receiving outpatient appointments – especially for at home health patients. Outpatient appointments for Speech Language Pathology services can take place at home or in clinic. Not all outpatient facilities in New Zealand are guaranteed to have access to instrumental assessment. For patients being seen at home, SLPs are unable to deliver instrumental assessment to patients as this is not currently a service utilized in New Zealand.

Dysphagia in many groups has a strong negative impact on several aspects of life. Quality of life (QOL) in groups such as elderly Parkinson's disease patients is shown to decrease due to the negative impact of dysphagia affecting the patient's enjoyment of meals and attendance at gatherings (Leow, Huckabee, Anderson & Beckert, 2010). This finding indicates that it is essential to diagnose and manage dysphagia in both the community and the hospital setting to improve quality of life and decrease incidences of patients being isolated or having feelings of discomfort in social settings. As Dysphagia can decrease patient quality of life this often impacts a patient's willingness to go out with friends and socialise (Ekberg, Hamdy, Woisard, Wuttge-Hannig & Ortega, 2002). In addition to the impact on quality of life, when left undiagnosed or improperly treated, dysphagia can result in serious health conditions such as malnourishment and aspiration pneumonia (Bomze, Dehom, Lao, Thompson, Lee, Cragoe, Luceno & Crawley, 2021). Furthermore, dysphagia has a strong impact on the cost of hospital admission, often increasing hospital costs upon admission and increasing length of stay (Attrill, White, Murray, Hammond & Doeltgen, 2018). From a quality of life, financial and health point of view, correct diagnosis and appropriate management of dysphagia proves to be essential.

Chapter 2 – Literature Review

2.1 Dysphagia

2.1.1 Causes of dysphagia throughout the lifespan

Dysphagia can develop or become prominent at any stage of a person's life, with variations in causes and symptoms (Roden & Altman, 2013). The literature focusing on the causes of dysphagia identifies a range of both congenital and acquired issues that cause disordered swallowing, beginning from birth and continuing throughout the lifespan. An example of the literature focusing on a range of dysphagia causes is Roden & Altman (2013). Roden & Altman undertook a systematic review using articles from the years 2002 – 2012. Initial searches provided 2511 articles, however once the exclusion criteria were applied, 133 articles were left. Fifty-six additional articles were identified. One hundred and eighty-nine articles were used in this publication and had an age range of birth to individuals 100+ years old. A total of 1,013,392 participants were considered in the systematic review.

Roden & Altman (2013) reported on dysphagia from birth. Dysphagia can be a result of congenital conditions such as myotonic dystrophy, cerebral palsy, genetic disorders and velopharyngeal insufficiency which are present at birth, therefore causing childhood dysphagia and chronic adult dysphagia in some cases (Roden & Altman, 2013). Paediatric dysphagia can also involve overall feeding difficulties such as incomplete or poor lip seal while feeding (Roden & Altman, 2013). Physiological causes of dysphagia are not the only way in which dysphagia can exist in a paediatric population. A guide on paediatric feeding and swallowing published by the New Zealand Speech and Language Therapist association identify that dysphagia can also arise in later childhood from psychosocial and functional factors (Jackson, Helier, Exley, Hamptom-Edwards, Johnston, Keesing & Setchell, 2019). Psychosocial factors are factors that originate in the child's environment and often affect the child at a psychological level, and functional factors are unknown factors that contribute to dysphagic behaviours (Jackson et, al., 2019).

Yan, Jiang, Liu, Deng, Hu, Sun & Lv (2021) ran a prospective randomized controlled trial for 60 patients suffering from dysphagia secondary to traumatic brain injury (TBI). This study highlighted the high likelihood of the development of dysphagia due to TBI. Additionally, this study highlighted that the age of the TBI victims tended to be young, having a mean age of 55.2+/- 5.5 years in the test group and 54.8 +/- six point two years in the control group (Yan et, al., 2021). This study shows the strong link of TBI being a leading cause of dysphagia, particularly in younger age groups.

Arguably the most well-known cause of dysphagia is stroke (Roden & Altman, 2013). Some patients recover from stroke related dysphagia within 14 days (Leder & Espinosa, 2002) while other patients experience chronic dysphagia (Daniels, Huckabee & Gozdzikowska, 2019; Leder & Espinosa, 2002). Stroke can occur at any age, however most stroke patients tend to be in an older age group with a mean age of 68.9 years old in New Zealand (Roden & Altman, 2013; Barker-Collo, Krishnamurthi, Theadom, Jones, Starkey & Feigin, 2019).

Another cause of dysphagia is head and neck cancer. This form of cancer requires treatment that can cause physiological or anatomical changes in patients, resulting in dysphagia (Baijens, Walshe, Aaltonen, Arens, Cordier, Cras, Crevier-Buchman, Curtis, Golusinski, Govender, Eriksen, Hansen, Heathcote, Hess, Hosal, Klussmann, Leemans, MacCarthy, Manduchi, Marie, Nouraei, Parkes, Pflug, Pilz, Regan, Rommel, Schindler, Schols, Speyer, Succo, Wessel, Willemsen, Yilmaz, Clave, 2021). Head and neck cancer patients may undergo radiotherapy which can result in fibrosis, therefore affecting the surrounding tissues in the head/neck, causing dysphagia (Baijens et, al., 2021). Furthermore, surgeries removing or altering key anatomical features of the swallowing mechanism can result in dysphagia due to the disruption of muscle innervation and interaction (Krisciunas, Sokoloff, Stepas & Langmore, 2012; Roe, Carding, Rhys-evans, Newbold, Harrington & Nutting, 2012). Similar to stroke and TBI, head and neck cancer can occur at any point in life and can affect people in a short time span.

Degenerative disorders that affect the function of the central nervous system such as Parkinson's Disease, Motor Neuron Disease and Huntington's disease can lead to dysphagia (Roden & Altman, 2013). These disorders cause swallowing to deteriorate over time (Roden & Altman, 2013). These disorders typically arise later in life other than in rare cases. This cause often affects the muscle innervation required to swallow, therefore causing dysphagia (Roden & Altman, 2013).

Dementia is another form of degenerative disease that causes dysphagia in later life. Dementia is a term that describes a wide range of disorders affecting cognition and executive function (Gale, Acar & Daffner, 2018). Dysphagia in dementia can cause a broad range of issues including difficulties with recognising utensils, food, drink and additional emotional or behavioural issues (Egan, Andrews & Lowit, 2020). Alongside this, muscle function and disordered coordination lead to dysphagia that may cause a number of adverse health outcomes such as malnutrition, dehydration and aspiration pneumonia (Egan, Andrews & Lowit, 2020). Sarcopenia can also lead to dysphagia in elderly patients (Roden & Altman, 2013). Sarcopenia refers to muscle wastage due to aging which leads to muscles not having enough strength or coordination to sufficiently carry out a successful swallow.

Dysphagia of any severity level can be caused by a range of conditions at any time during the lifespan. Some patients are able to recover from an acquired form of dysphagia while others will not. Roden & Altman (2013) identify that the majority of causes of dysphagia are neurologic with only some populations outside of this, such as head and neck cancer, experiencing high prevalence of dysphagia as well.

2.1.2 Prevalence of dysphagia in different aetiologies

Cavellaro, Domiguez, Vernuccio & Barbagallo (2020) estimate that four to 16 percent of the general US population suffer from some form of swallowing disorder. Additionally, another study estimates that up to 20% of the global population suffers from dysphagia (Chilukuri, Odufalu & Hachem, 2018). There are no estimates of percentage of New Zealanders with dysphagia, however given the consistency in the previous prevalence estimations, we may assume that New Zealand has a similar proportion of dysphagic people.

In 2006, a survey completed in New Zealand suggested that 10% of New Zealand children from ages zero to 14 lived with a disability (Craig, Reddington, Adams, Dell, Jack, Oben, Wicken & Simpson, 2013). As previously discussed, congenital conditions and disabilities are a cause of dysphagia in the paediatric population. Roden & Altman (2013) estimate that 99% of children born with cerebral palsy will experience some form of dysphagia, however, this percentage drops to six percent in adults living with cerebral palsy. Children born prematurely are estimated to have a dysphagic prevalence of 50%-91.7% in the first five years of their lives (Roden & Altman, 2013).

The prevalence of dysphagia after stroke is high, however the location and severity of the stroke will affect the type of dysphagia and its severity. Dysphagia is present in approximately 55% of acute stroke patients admitted to the hospital (González-Fernández, Ottenstein, Atanelov & Christian, 2013; Martino, Martin & Black, 2012). Not all patients will recover their swallow, leading to roughly 11-13% of dysphagic stroke patients having chronic dysphagia post stroke (González-Fernández et, al., 2013). Statistics New Zealand report that Māori are 10 times more likely to suffer from stroke compared to Pakeha (Barker-Collo et, al., 2019). Patients that are roughly 69 years old or are of Māori descent are at higher risk of suffering from stroke (Barker-Collo et, al., 2019).

Similarly, traumatic brain injury has a high prevalence of dysphagia in the population with the location and severity of the injury impacting its prevalence in this population. Some sources argue that 60% of severe TBI patients will have dysphagia (Yan et al., 2021). Other sources argue that up to 93% of severe TBI patients suffer from dysphagia in the acute stages (Howle, Baguley & Brown, 2014). Similar to stroke patients, some patients will see a resolution in dysphagic symptoms; however, some will suffer from chronic dysphagia. According to Statistics NZ, the mean age for a TBI patient in New Zealand is 28.1, and men are more likely to experience TBI than women (Barker-Collo et, al., 2019) Additionally, the incidence of Māori and Pasifika male victims of TBI was 1.5 times higher than that of a young Pakeha man (Barker-Collo et, al., 2019).

Head and neck cancer dysphagia prevalence varies depending on the treatment provided to the patient along with the location in which treatment is undertaken. Treatment for head and neck cancer includes radiotherapy, chemoradiotherapy and surgery (García-Peris, Parón, Velasco, de la Cuerda, Camblor, Bretón, Herencia, Verdaguer, Navarro & Clave, 2007). All treatment methods can lead to dysphagia. In surgery, total glossectomy results in high rates of dysphagia as compared to other surgical treatments due to the entire removal of the glossal muscles and therefore significantly compromising the oral phase of swallowing. Chemoradiotherapy has a negative impact on swallowing function and often results in a high prevalence of dysphagia in this population due to the development of fibrosis in the swallowing muscles (García-Peris et al., 2007). Overall, at two-year follow up roughly 45% of patients with head and neck cancer will still suffer from some form of dysphagia, with varying degrees of severity and chronicity (García-Peris et al., 2007; Roden & Altman, 2013).

Degenerative diseases tend to have a high dysphagia prevalence, and some researchers acknowledge that the percentage of patients suffering from dysphagia are likely higher than what is currently reported. For example, Kalf, de Swart, Bloem and Munneke (2012) report that upon objective assessment four out of five Parkinson's patients show symptoms of dysphagia, yet only 33% of patients have a formal diagnosis (Kalf et al., 2012). Throughout the progression of the disease, Suttrup & Warnecke (2015;2016) argue that 80% of late-stage Parkinson's patients will exhibit dysphagia symptoms. Waito, Valenzano, Peladeau-Pigeon and Steele (2017) report that 60-86% of MND (motor neuron disease) patients suffer from some form of dysphagia (Waito et al., 2017). In the case of MND, some researchers believe that all patients will suffer from some form of dysphagia during the course of their disease. Overall, due to the deteriorating nature of degenerative diseases, the true prevalence is unknown however the estimations show that this is a population in which dysphagia is highly prevalent. Furthermore, this population does not recover from dysphagia, instead dysphagic symptoms either remain the same or they worsen over time.

The prevalence of people suffering from dysphagia secondary to dementia has previously been estimated to be at ~45% (Easterling & Robbins, 2008; Horner, Alberts, Dawson & Cook, 1994). Given that the aging population has not only increased, but people are living longer as well, this estimate has the potential to be inaccurate. Therefore, in 2020, Espinosa-Val, Martín-Martínez, Graupera, Arias, Elvira, Cabré, Palomera, Bolívar-Prados, Clavé and Ortega (2020) again reported on dysphagia prevalence in dementia and found that upon clinical examination 32-45% of patients presented with dysphagia. Though this finding is consistent with Horner et al (1994), when instrumental assessment was used, 84-93% of patients in the study with dementia were found to present with dysphagia. Though this is a high percentage it is important to note that dementia dysphagia characteristics can involve additional symptoms such as confusion, decreased awareness and decreased recognition of food/objects. Using instrumental assessment in this case may have exacerbated these symptoms in these individuals, however regardless of this, the evidence suggests that more patients are suffering from dysphagia secondary to dementia in 2020 than in 1994. It is unclear whether this is due to the population living longer and therefore resulting in more severe dysphagia, or whether instrumental assessment allows for more patients to be identified.

Sarcopenia resulting in dysphagia appears to have a relatively high prevalence, however there are inconsistent prevalence estimates between elderly community dwelling residents versus elderly care home residents. The total prevalence of dysphagia secondary to sarcopenia is assumed to be underestimated (Cavarello et, al., 2020). Studies have suggested that the prevalence of elderly patients presenting with dysphagia in hospital secondary to sarcopenia is broad and ranges from 25%-85% of all elderly patients admitted to hospital (Bomze et, al., 2021). A study completed in New Zealand identified that one third of residents in a care facility were on texture modified diets due to suspected dysphagia secondary to sarcopenia (Miles, Liang, Sekula, Broadmore, Owen & Braakhuis, 2020). Hollaar et al (2017) concludes that when looking at the overall research base across the globe, approximately one quarter to one third of elderly hospitalized patients will be dysphagic (Hollaar et, al., 2017).

The prevalence of dysphagia shifts depending on the population, however it is a fair to assume from the literature that dysphagia has high prevalence in populations such as: Stroke, degenerative conditions and in the general elderly population. The literature also suggests that in some populations such as the elderly population and degenerative diseases, the prevalence of dysphagia may be higher than what is reported.

2.1.3 Under identification of dysphagia

Many studies have suggested or reported that dysphagia is often under diagnosed and goes unnoticed in the community (Brates, Molfenter & Thibeault, 2019; Cavarello et al., 2020; Hollaar et al., 2017; Pu, Murry, Wong, Yiu & Chan, 2017). The literature suggests that, in particular, the elderly population often have a high proportion of people suffering from undiagnosed dysphagia secondary to a number of conditions (Cavarello et al., 2020; Hollaar et al., 2017). Hollaar et al (2017) identified that 31% of patients admitted to a Danish hospital with community acquired pneumonia had oropharyngeal dysphagia that was not previously detected. Patients with undetected dysphagia in this study had a 19.23% rate of death within 30 days of admission compared with 1.98% of patients with community acquired pneumonia and no underlying dysphagia. This study showed evidence of patients suffering from dysphagia with no previous diagnosis and evidenced treatment/care, while also having poorer outcomes compared to non-dysphagic patients (Hollaar et al., 2017).

Cavallero et al (2020) further report on the risk of undiagnosed or underestimated dysphagia. This study focuses on the lack of dysphagia diagnoses in the elderly population. This study identifies that the true percentage of community dwelling patients 65 years or over with dysphagia could be anywhere from seven percent to 40% of the population of all over 65-year olds (Cavallero et al., 2020). The true percentage of dysphagic patients in the community is unknown and has an extremely large range as there are several pieces of evidence indicating an under-identification of dysphagia diagnosis.

Miles et al (2020) report that of over 35,000 rest home residents in New Zealand, one third of these residents are on texture modified diets. Texture modified diets are a compensatory approach to dysphagia management. This study reported that not all of these residents on this texture modification had been diagnosed with dysphagia. This suggests that the elderly population in New Zealand are being placed on modified diets without a clear diagnosis of dysphagia, nor are dysphagic patients receiving appropriate dysphagia management (Miles et al., 2020).

The literature suggests that dysphagia – particularly in the elderly population - can go unnoticed and undiagnosed, leading to adverse outcomes for patients. Elderly patients may perhaps be at higher risk of undiagnosed dysphagia due to being in the age groups in which there are more causes of dysphagia present.

2.2 Consequences of dysphagia

2.2.1 Aspiration Pneumonia

Oropharyngeal dysphagia can present in the oral phase of swallowing and/or the pharyngeal phase of swallowing and can lead to aspiration (foreign material falling into the lungs). Food or drink matter entering the airway is called aspiration and can cause serious complications, namely aspiration pneumonia. Pneumonia is an illness in which the lungs become inflamed due to bacteria or a virus (Health Navigator, 2019;2022). Pneumonia that is triggered by aspiration is due to food or drink accumulating in the lungs and resulting in a bacterial infection. In typical swallowing, the airway can protect itself, however in disordered swallowing, the airway does not have sufficient protection and/or it may not have sufficient sensation to detect matter entering the lungs.

Aspiration pneumonia can cause an increase in length of hospital stay, a higher likelihood of aspiration pneumonia reoccurrence, and in some cases, death (Seo et al., 2021). Seo et al (2021) argue that aspiration pneumonia is the leading cause of death in the elderly, citing that the World Health Organization reported that pneumonia was the fourth leading cause of death in 2016 and the third leading cause of death in 2020 (Seo et al., 2021). Al-Khaled, Matthis, Binder, Mudter, Schattschneider, Pulkowski, Strohmaier, Niehoff, Zybur, Eggers, Valdueza, Royl and for Qug (2016) reported similar findings of high mortality rates amongst patients with aspiration pneumonia along with a proportion of these patients reporting increased disabilities upon discharge from hospital, such as inability to walk independently or perform activities of daily living independently (Al-Khaled et al., 2016).

As stated before, many outcomes of aspiration pneumonia can have an end result of death. Tomita, Oeda, Umemura, Kohsaka, Park, Yamamoto, Sugiyama and Sawada (2018) looked into predictors of aspiration pneumonia in patients with Parkinson’s disease using VFSS. Tomita et al (2018) point out that aspiration pneumonia secondary to a known dysphagia is a leading cause of death in patients with

Parkinson’s disease and found in their study that using predictions for aspiration pneumonia may allow for better management of dysphagia and therefore increase life expectancy. Predictions for aspiration pneumonia required the use of VFSS to evaluate.

Overall, the literature shows the extreme outcomes of aspiration pneumonia and its effects on populations who suffer from dysphagia. When dysphagia is left undetected or not managed appropriately, aspiration pneumonia is one of the major consequences. This can lead to many quality of life issues for patients in the acute phase of the illness along with long term effects to health. Alongside this, patients facing aspiration pneumonia face death, with some populations suffering high casualties. The literature on aspiration pneumonia has central focuses on how to decrease the occurrences of aspiration pneumonia in dysphagic populations. Additionally, the literature states that aspiration pneumonia can go undetected due to under identification of dysphagia, therefore resulting in poorer outcomes for patients.

2.2.2 Malnutrition in dysphagic patients

Malnutrition is a condition in which a patient is not receiving the nutrients that they require in order to maintain appropriate body composition, mental function, physical function and positive health outcomes post hospital admission (da Silva Fink, Marcadenti, Rabito & Silva, 2018;2019). Malnutrition has been shown in the literature to negatively affect patients and cause adverse health outcomes. This can impact a patient’s ability to complete activities of daily living along with activities in their social lives. Much of the literature suggests that patients suffering from dysphagia are at an increased risk of developing malnutrition.

Indeed, Bomze et al (2021) identify dysphagia as being a significant risk factor for developing malnutrition in a retrospective study. This finding of malnutrition in dysphagic patients therefore led to increasing healthcare costs and decreasing positive healthcare outcomes for malnourished and dysphagic patients (Bomze et al, 2021; da Silva Fink et al, 2018). This study further identified that a considerable proportion of elderly patients entering hospital are identified as malnourished and subsequently show dysphagic symptoms when undergoing swallowing assessment, yet are not previously diagnosed with dysphagia (Bomze et al, 2021; da Silva Fink et al, 2018). This finding strongly supports that the presence of dysphagia and malnourishment are closely related, but are not always treated/managed while the patient is in hospital care.

Due to the health impacts and associated adverse health outcomes that occur with malnutrition, it is essential to use accurate diagnostic tools for all populations to find any underlying swallowing disorders, especially when dysphagic symptoms are seen. Bomze et al (2021) continue to show that there is a relationship between malnourishment in patients and dysphagic symptoms, however the dysphagic symptoms are not always managed or assessed properly, therefore showing a gap in the assessment of dysphagic patients. Misdiagnosis or lack of diagnosis of dysphagia will result in patients continuing to develop adverse outcomes due to dysphagia such as malnutrition. Patients who are at risk of, or have been diagnosed with malnutrition secondary to post stroke dysphagia have higher rates of readmissions, respiratory infections and mortality when compared to patients with post stroke dysphagia with no suspected secondary malnutrition (Marin, Serra-Prat, Ortega, Audouard Fericgla, Valls, Palomera, Cunillera, Palomeras, Ibàñez & Clavé 2021).

2.2.3 Dysphagic patient quality of life (QOL)

It is widely agreed in the dysphagia literature that swallowing disorders have a negative impact on quality of life of patients both in the community and in the hospital (Ekberg et al, 2002). Quality of life in healthcare is defined by the World Health Organization as: “individuals' perception of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards and concerns” (Martin & Amin, 2008). Ekberg et al (2002) ran a qualitative study evaluating the perception of dysphagia of dysphagic patients. They reported that dysphagia had significant impacts on social and psychological health of elderly patients, and this often had a large impact on subsequent treatment and QOL (Ekberg et al., 2002).

A study completed by Pilz, Passos, Verdonschot, Meijers, Roodenburg, Halmans, Faber, Kremer and Baijens (2020) compared swallow related QOL between myotonic dystrophy type one and healthy participants. Patients with dysphagia were shown to have a considerably lower QOL than healthy participants in this measure (Pilz et al., 2020). Patients who suffer from long term health conditions and subsequent dysphagic symptoms often report feelings of depression and lower quality of life. A study completed by Leow et al (2010) compared SWOL-QOL (swallow related quality of life) results between healthy young participants, healthy elderly participants and elderly participants suffering from idiopathic Parkinson’s disease. Participants suffering from Parkinson’s disease reported lower SWOL-QOL measures compared to participants their own age, indicating that dysphagia secondary to Parkinson’s disease has a negative and measurable impact on quality of life.

2.2.4 Cost of dysphagia

The cost of dysphagia varies from country to country; however, the literature examining cost of dysphagia shows a common theme that patients who are admitted to hospital with dysphagia or develop dysphagia while in hospital lead to increased admission costs. A study conducted by Marin et al (2021) in Catalonia, Spain, analysed the costs associated with stroke patients suffering from dysphagia versus stroke patients who did not suffer from dysphagia. The data used in this study was recorded in Euros, however it is converted to NZD using the exchange rate of 1:1.63. Patients with diagnosed dysphagia had a reported cost of $8570.88 NZD +/- $5403.89 NZD while in the acute phase of hospitalization. This was compared to patients without dysphagia, who had an acute admission cost of $6352.82 NZD +/- $3134.91 NZD. At 12 months post stroke, patients suffering from dysphagia had a mean cost of $18911.84 NZD +/- $19589.03 NZD. At 12 months, patients without dysphagia had a mean cost of $11788.99 NZD +/- $12050.34 NZD. This study shows that patients who suffered from dysphagia had a greater mean cost of care at 12 months post stroke when compared with stroke patients who did not have dysphagia (Marin et al., 2021).

Similarly, Westmark, Melgaard, Rethmeier and Ehlers (2018) retrospectively analysed the cost of hospitalization and social care for geriatric patients with and without dysphagia in Denmark. The data in this study was recorded using Danish Krone but has been converted to NZD using a 0.22:1 conversion rate. They found that geriatric patients with dysphagia cost significantly more to support than patients without dysphagia, with a difference of $5981.05 NZD for hospital level care between the two groups (Westmark et al., 2018). Westmark et al (2018) furthermore found that when social level care was included in this figure, patients with dysphagia cost $10511.18 NZD more to support than non-dysphagic patients.

Attrill et al (2018) completed a systematic review analysing the comparative cost and length of stay between hospital patients with and without dysphagia. Across 11 studies in the USA and Taiwan, the mean cost of hospital stay for a dysphagic patient was $20697.86 NZD. This was 40.36% higher than the admission cost of a patient with a similar aetiology, but no dysphagia. Furthermore, patients that suffer from dysphagia and secondary malnourishment and/or dehydration increase inpatient and outpatient costs further (Marin et, al., 2021).

As a result of these findings, the researchers hypothesized that early identification of dysphagia would reduce the overall cost of dysphagia (Attrill et al., 2018; Marin et al, 2021). When consolidating the information seen in the literature, there is a clear increase in cost associated with caring for dysphagic patients. The literature suggests that this is occurring in both the hospital setting and in social care settings. From this literature, we can assume that early identification of dysphagia may reduce the cost of care for patients. This early identification may be possible with an increase in access to diagnostic equipment.

2.3 Assessment of dysphagia

2.3.1 Typical SLP referral process in New Zealand

In New Zealand, the public can access speech therapy from the ministry of health or the ministry of education through referrals under the public system (Health Navigator, 2022; New Zealand Speech Language Therapists' Association, 2018). Typically, New Zealand residents can access SLP public outpatient services for free, however, there is often a waitlist depending on the service/location. For example, Multiple Sclerosis patients often require SLP input during the course of illness. Patients on the waitlist for treatment for multiple sclerosis within the Canterbury DHB often wait for up to four months for a first specialist outpatient appointment with a GP. From here a referral to SLP must be made, and patients are put on a waitlist for this, therefore causing a long wait time for the patient to access SLP services (Gullery, 2018; Maisey, 2021). Members of the public may also access private speech therapists in order to avoid long waitlists, however this is at the patient's own expense.

2.3.2 Typical clinical assessment process in New Zealand

In New Zealand, how SLPs administer assessment and treatment in both the inpatient and outpatient contexts will vary depending on DHB guidelines, personal preference and workplace guidelines. Speyer, Cordier, Farneti, Nascimento, Pilz, Verin, Walshe and Woisard (2022) ran a systematic review that investigated screening methods and clinical assessments used for patients suspected with dysphagia. The findings showed that groups who are more likely to suffer from dysphagia such as stroke patients, Parkinson's patients and TBI patients typically undergo screening by medical staff, but not SLPs. These screening methods typically consist of observing the patient for signs of 'wet' voice and coughing during drinking water. Should patients appear with any dysphagic symptoms, they are referred to SLP services for further investigation (Waitaha Canterbury, 2022).

Speyer et al (2022) then describe that clinical assessment and examination is completed by the SLP. Typically, this consists of completing a case history with the patient including all previous medical history and any previous swallowing issues/neurological issues. The clinician typically performs a cranial nerve examination, will observe typical anatomy and physiology and trials the patient on food and fluids with varying degrees of thickness and textures. Clinicians then decide whether instrumental assessment is required to further investigate swallowing function and any suspicion of aspiration. Speyer et al (2022) specify that screening methods and clinical assessment have high variability and often change between hospitals and treatment facilities. Additionally, clinical assessment has great variability between clinicians and how clinicians decide to go about assessment between different patient aetiologies.

2.3.3 Instrumental assessment use in dysphagia

Instrumental assessment provides the most accurate information for SLPs to interpret to provide the most representative diagnosis for patients. Instrumental assessment in the SLP context can be defined as a tool that can be used to provide specific information about the swallowing mechanism which cannot be viewed or obtained from a clinical assessment. Research conducted by Langmore, Schatz and Olsen (1988) has evaluated the usefulness of instrumental assessments when compared to using bedside clinical examinations and has shown that instrumental assessments ensure that dysphagia is not over or under diagnosed therefore providing better outcomes for patients (Leder & Espinosa, 2002; Speyer et al., 2022). By patients being correctly diagnosed with dysphagia, this can decrease the likelihood of aspiration pneumonia being an issue in undiagnosed patients and unnecessary referrals for patients who are falsely identified with dysphagia. Bennet et al (2022) examined SLP perception of instrumental assessment use in residential care facilities in Australia and found that 89.7% of clinicians agreed that instrumental assessments should be used and accessed in the diagnostic process for dysphagia. The two instrumental assessments most widely referred to as the 'gold standard' of swallowing assessment are Videofluoroscopic swallowing studies (VFSS) and fibreoptic endoscopic evaluation of swallowing (Daniels, Huckabee & Gozdzikowska, 2019; Jo et al., 2015-2016; Leonard & Kendal, 2019; Seo et al., 2021).

2.3.4 Videofluoroscopic swallowing studies as instrumental assessments

As discussed, VFSS is a tool that is referred to as a 'gold standard' in diagnostic tools for dysphagia (Daniels, Huckabee & Gozdzikowska, 2019; Jo et al., 2015-2016; Seo et al., 2021). Patients requiring VFSS must be taken to a fluoroscopy suite in which a radiologist and SLP are typically the administrators of the assessment (Martin-Harris & Jones, 2008). Fluoroscopy suites are available at only some hospitals and clinics in New Zealand. The assessment involves providing patients with barium covered bolus (food and drink) of different amounts, consistencies and thicknesses. This allows for the SLP to view the barium on the VFSS, and therefore see the interactions of the swallowing structures and the bolus. The bolus is viewed from the time it enters the oral cavity up until it goes into the oesophagus. This allows for disorders at any phase of swallowing to be identified. VFSS allows for the SLP to view any silent aspiration – which is food or drink entering the airway - taking place before, during or after the swallow, which is essential to understanding any dangers to the airway and lungs.

The purpose of VFSS is to use as a diagnostic tool for both evaluating airway protection and to evaluate the effects of compensatory and rehabilitation movements. This instrumental assessment is used in both the outpatient setting and the inpatient setting – however this is subject to availability of VFSS. Researchers use VFSS to evaluate specific biomechanical movements for rehabilitation techniques such as Hasegawa, Nakagawa, Yoshimi, Yamaguchi, Nakane, Ishii, Okumura, Hara, Minakuchi and Tohara (2022). Hasegawa et al (2022) analysed the effects of jaw retraction exercises for dysphagia rehabilitation, however, to properly analyse these movements, VFSS was essential to use in this study. As mentioned before, VFSS is also used to analyse airway protection in clinical settings to ensure that patients are safe to eat and drink (Daniels, Huckabee & Gozdzikowska, 2019; Bartlett, Kenz, Wayment & Thibeault, 2022). VFSS is considered to be an essential component of comprehensive dysphagia assessment, including a clinical examination and corresponding case history, however its availability can be low in some areas and it is not currently a portable form of assessment in New Zealand (Daniels, Huckabee & Gozdzikowska, 2019; Bartlett et, al., 2022). Patients must be taken to VFSS suites, however whether these exist in the hospital patients are admitted to is an issue, therefore being a barrier to using this assessment.

2.3.5 Fibreoptic endoscopic evaluation of swallowing as instrumental assessment

Alongside VFSS, FEES is considered to be another ‘gold standard’ of swallowing assessment (Leonard & Kendall, 2019). FEES is an instrumental assessment that uses a camera scope to view the pharynx using a bird’s eye view. This allows SLPs to view the anatomical structures in the throat before and after the swallow. FEES is an assessment that is completed primarily to detect aspiration as the bolus can be observed in the trachea before or after the swallow should aspiration occur (Bax, McFarlane, Green & Miles, 2014). FEES can be done at the bedside of patients in acute care or in outpatient clinics, and the technology is portable. Though portable, some hospitals and clinicians continue to have minimal access to this assessment due to cost or availability. Patients within hospitals may have increased access to this assessment as it can be brought to bedside, however this technology is not currently supported in New Zealand to be brought to homes for patient assessment.

Some researchers, such as Bax et al (2014), reviewed pneumonia rates for dysphagia in stroke patients and found that SLP led FEEs assessments led to fewer pneumonia admissions of stroke patients. When this assessment was completed, higher rates of dysphagia were identified when FEES was used straight away, which allowed for dysphagia treatment to commence immediately. This prevented incidences of aspiration pneumonia. This finding therefore suggests that FEES can determine dysphagia that cannot be predicted or seen through a bedside examination, which can lead to a decrease in adverse outcomes.

When using FEES, both objective and subjective methods of assessment are used by clinicians. The Penetration-Aspiration scale (PAS) is used to measure any residue in the laryngeal cavity along with any penetration and/or aspiration (Leonard & Kendall, 2019). Additionally, Leonard & Kendall (2019) outline specific situations in which FEES in beneficial – in terms of specificity and sensitivity, FEES and VFSS are similar, therefore showing similar abilities to diagnose penetration and/or aspiration. Additionally, patients are able to be seen at bedside with FEES should mobility be an issue. FEES also has no radiation, which may be an important consideration for some patients - particularly paediatric patients.

2.4 Accessing healthcare services in New Zealand

2.4.1 New Zealand's rural population

No previous studies have been done in New Zealand that look at the accessibility of Speech, Language and swallowing services specifically. However, some studies about access to general healthcare have been completed. In a study using geographical information systems, researchers mapped minimum times for travel to hospitals in New Zealand (Brabyn & Skelly, 2002). This study used 38,000 locations based on NZ census data and mapped the minimum times to 63 hospitals. The 63 hospitals included: thirty six sub-acute hospitals with day-stay level care, 19 secondary hospitals with 24 hour staffed acute and intensive level care units, eight tertiary level hospitals (level I and II) where specialist care is available all day, every day. To access any of these facilities, the mean time to reach care is 17.9 minutes with roughly 167,295 patients spending one hour to access any kind of care. When secondary hospitals and tertiary hospitals are required, the mean time to reach care increases to 25.5 minutes and roughly 383907 patients must now travel over one hour to access care

(Brabyn & Skelly, 2002). When tertiary care is required, the average time to access this care increases to 85.5 minutes and approximately 1,514,964 people must commute over an hour (Brabyn & Skelly, 2002). Using this study assumes that each person has access to a personal vehicle and all road conditions are typical. This therefore makes these figures subject to change. Access to hospital care is highly dependent on the care required, and additional factors will affect the time taken to access care. Additionally, Brabyn & Barnett (2004) analysed the factors that deterred patients from seeking healthcare input in the Waikato region. Healthcare costs, distance, socioeconomic status and ethnicity were all factors that could deter patients from seeking GP advice or care (Brabyn & Barnett, 2004).

A study completed by Whitehead, Pearson, Lawrenson and Atatoa-Carr (2019) analysed spatial disparity in healthcare access based on location in New Zealand's Waikato region. This study suggested that many New Zealanders who live in rural areas and are required to travel a considerable distance to access their closest GP, however few patients accessed their closest GP, but one they feel more comfortable with, therefore suggesting that travel time increases (Whitehead et al., 2019).

In addition, Brabyn & Barnett (2004) undertook a much earlier study in the Waikato region that analysed the factors that deter patients from seeking healthcare input. Healthcare costs, distance, socioeconomic status and ethnicity were all factors that could deter patients from seeking GP advice or care (Brabyn & Barnett, 2004). This study focused on the factors which influenced healthcare access alongside distance, whereas Whitehead et al (2019) focused on the true distance that New Zealanders travel to access healthcare instead of the smallest possible distance (Brabyn & Barnett, 2004; Whitehead et al., 2019). The research indicates that there is a need for healthcare services to be more easily accessed in rural communities.

2.4.2 Māori in New Zealand healthcare

In New Zealand, it is essential to consider Māori in healthcare decision making processes. A study completed by Loschmann & Pearce (2006) stated that Māori have many existing barriers in accessing healthcare due to the lasting impacts of colonization and racism. Alongside this, Michiel-Oosterveer & Kue-Young (2015) looked at the difficulties in accessing healthcare in indigenous communities in Canada. They found that distrust of healthcare professionals combined with living in remote areas decreased accessibility of healthcare for indigenous populations significantly (Michiel-Oosterveer & Kue-Young, 2015). From this study, we can assume that there may be existing parallels between New Zealand's indigenous populations accessing healthcare as well. Cameron, Faatoese, Gillies, Robertson, Huria, Doughty, Whalley, Richards, Troughton, Tikao-Mason, Wells, Sheerin and Pitama (2012) reported that ~16% of all Māori in New Zealand live in rural areas, and of this population, Māori had higher rates of obesity, hypertension and smoking therefore indicating risk factors for a range of health complications.

The literature from both New Zealand and other indigenous communities suggests that many Māori may have a distrust of the healthcare system in New Zealand. The literature further suggests that many Māori also live in rural areas, and as Michiel-Oosterveer & Kue-Young (2015) have shown, indigenous populations in rural areas have decreased access to healthcare. The information consolidated in the literature indicates that increasing access to healthcare for Māori in both urban and rural areas needs to be improved.

Māori are at higher risk of suffering acquired neurological injuries such as stroke and TBI (Barker-Collo et, al., 2019). These acquired neurological injuries have high prevalence of dysphagia, therefore disproportionately putting Māori at an increased risk of suffering from a swallowing disorder. In the mobile study completed by Talukdar & Reddy (2012), they acknowledged that indigenous groups in their study were more hesitant to engage with their services and therefore having locals to provide education on the unit was particularly helpful. This suggests that the indigenous people of New Zealand may also have hesitancy with engaging in healthcare after large events such as stroke and TBI, and therefore may be at an increased risk of long-term adverse health outcomes secondary to dysphagia.

2.4.3 Mobile healthcare services

A range of disciplines are utilizing mobile healthcare services worldwide. These services have been part of studies that indicate their usefulness in the community, and it has been suggested that these mobile services have increased access to healthcare for many populations. A study undertaken in India was able to show the effectiveness of a mobile gastroenterology van equipped with endoscopy units for assessment (Talukdar & Reddy, 2012). This study was unique as it was not only attempting to increase access to healthcare in rural populations, but it did so in a third world country. Talukdar & Reddy (2012) found that patients in rural areas had significantly increased access to gastrointestinal assessment when a mobile unit was introduced. This mobile unit allowed for patients who did not have time, money or transport to access gastrointestinal healthcare services to access instrumental assessment where they otherwise would not have. Additionally, important findings that required ongoing assessment or treatment was found in 72% of participants in this study. This shows the high proportions that may exist in isolated communities who may not otherwise have access to diagnostic services. Patients reported high rates of satisfaction with the service and discussed that they enjoyed having the service brought to them.

Additionally, a pilot study completed in Southern Italy looked at the effects of a mobile mammogram and cardiovascular program. This study found that both at risk and not at-risk populations for breast cancer and cardiovascular illnesses benefited from this mobile screening program (Marino, Rienzo, Serra, Marino, Ricciotti, Mazzariello, Leonetti, Ceraldi, Casamassimi, Capocelli, Martone & Caracciolo, 2020). This screening program allowed for patients who wouldn’t normally be able to access this service to access it easily whether they lived in a rural area or had other issues such as mobility which may have otherwise prevented them from accessing this service (Marino et al., 2020). Thirty-four-point nine percent of patients in this cohort had benign lesions found in this screening program and three point one percent of patients showed lesions that were suspected of malignancy. All participants in this cohort were young and healthy individuals with no suspicion of lesions, therefore highlighting how essential availability of diagnostic equipment is for people who would not otherwise travel for assessments. This study did not report on patient satisfaction; however, it did hypothesize that the implementation of mobile units in healthcare may have a positive impact in decreasing costs for significant health issues requiring hospital admissions. Furthermore, Levy, McGlynn, Hill, Zhang, Korzeniewski, Foster, Criswell, O'Brien, Dawood, Baird and Shanley (2021) completed a study in Detroit analysing the effectiveness of community access of a mobile testing station for COVID-19. This study found that communities in urban areas who were disadvantaged – particularly in regards to socioeconomic status – had increased access to healthcare, when a mobile service was offered (Levy et al., 2021).

The literature shows a strong relationship between an increase in access to healthcare for disadvantaged or rural patients and the implementation of a mobile unit (Levy et al., 2021; Marino et al., 2020; Talukdar & Reddy, 2012). The mobile units appraised in the literature are for specific assessments, therefore indicating that the implementation of a mobile unit specifically for VFSS or FEES would likely have successes that are similar to that of other mobile units. To the authors knowledge, at the time of writing, there are no studies on mobile instrumental assessment units for SLP practice.

2.4.4 Mobile instrumental assessment units

Much of the literature focusing on dysphagia assessment states that using VFSS in the diagnostic process has improved clinical outcomes for patients and decreased adverse outcomes (Daniels, Huckabee & Godzikazawa, 2019; Seo et al, 2021; Tomita et al, 2018), however there is no literature referencing its portability. Birchall, Bennett, Lawson, Cotton and Vogel (2022) looked into SLP clinician perspectives on how timely assessment for dysphagia would affect practice in residential care facilities. This study asked general questions regarding FEES in these facilities, however they also asked specific questions regarding mobile FEES in these facilities as well. Eighty-six-point three percent of participants responded that they believed that there were advantages to providing mobile FEES in residential care facilities. One hundred percent of these participants who agreed with establishing mobile FEES responded that one of the advantages of mobile FEES was eliminating travelling for patients (Birchall et, al., 2022). Furthermore, this study found that 93.1% of clinicians wanted research to be done in mobile FEES units for residential care facilities.

Though the majority of the participants in this study were in support of mobile FEES and its research and establishment, there were issues raised by 57.9% of participants. Issues such as ability for this service to be integrated into a multidisciplinary team approach and the cost of the resources required for this kind of service. Though the overall idea was supported by clinicians, their perception was to research areas of mobile FEES in combination with mobile VFSS (Birchall et, al., 2022). This study has indicated the further research required into mobile healthcare and instrumental assessment for swallowing disorders. Other than this single study, no other research about mobile instrumental assessment implementation or potential implementation has been found by the author at the time of writing.

Chapter 3 – Research Questions and hypotheses

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1. What is the perceived need for a mobile instrumental assessment unit in rural areas of New Zealand's South Island? Specifically, within a one-month period, approximately how many patients would be potentially referred for this service, if it were made available?
2. What is the response of Speech and Language Pathologists in New Zealand's South Island when proposed with the concept of mobile instrumental assessment?
3. What groups of people do New Zealand Speech and Language Pathologists believe will benefit most from a mobile unit?
4. What are the populations served by mobile units in the United States of America?
5. What have the successes of mobile units been in the USA?
6. What have the drawbacks of mobile units been in the USA?

Null hypothesis: There are no clear benefits to the implementation of mobile instrumental assessment units in New Zealand's South Island.

Alternative hypothesis: There is a strong and clear perceived need for implementation of mobile instrumental assessment units in New Zealand's South Island.

Chapter 4 -Methods and Research Design

4.1 Participants

There were three target groups of participants for this study. Speech and Language Pathologists (SLPs) from hospitals across the South Island were prospectively recruited for participation in a Qualtrics survey. This was done through inviting SLPs from email addresses that were publicly sourced from hospitals around the South Island. Additionally, Speech and Language Pathologists from the USA who work with mobile videofluoroscopy units and/or mobile fibreoptic endoscopic evaluation of swallowing units were prospectively recruited for a Qualtrics survey. This was done through a google search of ‘mobile MBS’, ‘mobile VFSS’ “VFSS Van’ and “MBS Van’ along with ‘mobile FEES’ and ‘FEES Van’. Email addresses from mobile VFSS websites and mobile FEES websites were obtained via publicly available information. All participants were contacted via email to take part in the project. Participants were selected using convenience sampling. No inducements were offered to participants who chose to be part of this research. The survey was provided via email to every participant. Participants were predominantly female and all were SLPs working in the health sector in either NZ or the USA.

4.2 Sample size

A minimum of ten participants were looked to be recruited for the NZ SLP group. As there are ~350 SLPs working in New Zealand, this minimum threshold was likely to be achieved. Eleven emails were sent to SLPs in the South Island across 4 DHBs. A minimum of three participants were aimed to be recruited for the USA mobile VFSS SLP group and three participants for the mobile FEES SLP group. Currently there are ~10 USA SLPs working in MBS vans and ~10 SLPs working in FEEs vans, therefore the minimum threshold was not as likely to be achieved. In this case, the limitation will be acknowledged, and the study will proceed. Nine VFSS companies were contacted via email and 13 FEES companies were contacted via email. The sample size of each group should provide appropriate qualitative evidence that will lead to sufficient data being collected. Should very few participants be recruited for the study, the survey may be sent out again in August/September to attempt to allow more participants to submit survey responses.

17 responses were received for the NZ SLP group. The NZL SLP survey was reopened for an additional two weeks to ensure that the minimum threshold was achieved for this group as only seven responses were initially received. Three responses were collected for the VFSS SLP group and two responses were collected for the FEES SLP group.

4.3 Procedures

Ethical approval for this study was submitted on the 26th of April 2022. The human ethics committee at the University of Canterbury approved this study on the 19th of May 2022 and confirmed that Māori consultation is not required for this research project. An amendment was requested on seventh July 2022 to expand the USA participants to include FEES as well as to adapt some survey questions provided. The amendment was approved on 18th July 2022.

A google search for SLPs working in DHBs in the South Island was conducted to find email addresses of SLPs. A google search for SLPs working with MBS/VFSS and/or FEES units in the USA was conducted and email addresses were obtained by viewing websites and gaining publicly accessible emails. All SLPs were sent an information sheet with an initial email and invitation to participate. Emails were sent separately to the participants in each of the three groups with the link to the survey to the relevant group. In this email was also details about the opening time of the survey and the closing time of it alongside the passcode to gain access to the survey. The initial email contained the Qualtrics survey should the SLP choose to participate. A consent form was shown on the first page of the survey and consent was assumed if the participant continued through into the survey and filled out the questions. Participant's submitted responses were deemed consent given to participate in the study. Should a participant not submit survey responses, this was viewed as withdrawing from the study, and thus was not considered part of the dataset. Participants were informed that they only need to provide information that they feel comfortable sharing. Additionally, participants were informed that their survey responses would be anonymized and any identifying information would be removed. SLPs did not need to identify any personal information other than if they belong to the 'NZ', 'USA VFSS' or 'USA FEES' group. SLPs were given three weeks to complete the survey. The survey was reopened for an additional two weeks for the NZL participants to meet the minimum survey response goal. Māori consultation was sought before the data collection component of this research project, and was not required as per the ethics approval.

Once a participant survey was completed, the data were recorded online in Qualtrics. After the survey was closed, all data were copied to three separate excel documents and sorted based on the three different participant groups. These documents were then categorized based on the participant group and stored in a OneDrive cloud for researchers to access. All survey results were read, and identifying information was removed. If participants filled out the survey more than once, Qualtrics flags the response. These survey responses were used only if they contributed additional information or requested an amendment to the initial information provided.

4.4 Survey Instrument

The online survey platform Qualtrics was used to create surveys for the three groups of participants. This allowed for the researchers to ask a range of questions while providing participants the option to respond using the essay format. This meant that participants could write as little or as much as they chose. Participants required a password to enter into the survey to ensure that the participants who were chosen were filling out the survey and no one else. Questions for the three participant groups are contained in Appendix A. The survey was divided into three sections for the American SLPs and five sections for New Zealand SLPs. All responses were in essay format.

American SLP questions:	**New Zealand SLP questions:**
Motivation: This section consisted of questions about why these SLPs wanted to get involved in mobile instrumental assessment. Questions regarding the van impact on community and personal motivations were contained in this section.	**VFSS:** This section consisted of questions surrounding current access to VFSS in both their own hospital and whether it is part of their assessment battery.
Daily tasks: This section consisted of questions surrounding the logistics of having and using a mobile instrumental van. Questions regarding protocols, caseload and prioritizing patients were contained in this section.	**FEES**: This section consisted of questions surrounding current access to FEES in both their own hospital and whether it is part of their assessment battery.
Operational: This section consisted of questions regarding liabilities, overheads, insurance and healthcare models. Additional questions surrounding cost and research purposes were also asked.	**Logistics:** This section consisted of what assessments are used, how they are accessed and the ways in which assessments are undertaken.
	Resourcing: This section consisted of what current caseloads are like along with what the SLP would do with unlimited time and resources and how this was different to their current practice.
	Mobile VFSS: This section gauges the SLPs current understanding of mobile videofluoroscopy and its use in the USA.

4.5 Outcome measurement

As this was a qualitative study, the outcome measurement was the responses provided by the NZ SLPs and USA SLPs. Quotations were included from each group along with key ideas that were seen across the results. Key themes and topics were grouped and analysed. Inter-rater reliability was used to ensure that measures are standard across more than one researcher. The other rater for this was SLT research assistant Maxine. Both researchers analysed and selected key themes from the results. The researchers then compared their results and recorded a percentage of agreement. The key variable used as an outcome measurement was the perspectives of each group. Alongside this, another key variable on the topic was the benefits and drawbacks of mobile units.

4.6 Statistical analysis

Statistical analyses were completed by identifying patterns in the data collected. The data was reported on, and analysed any patterns that emerged from the results.

Chapter 5 - Results

A total of 22 participants consented to and responded to the surveys. Of all surveys sent out, there was a 51.5% response rate for returning completed surveys. Four participants across the three groups partially completed surveys; these results were excluded from the results section. Seventeen of the respondents were Speech Language Pathologists who are currently practicing in NZ and five were Speech Language Pathologists who are currently practicing in the USA. No demographic information about the participants was collected to ensure the results were anonymous. Inter-rater reliability was used and a 95% of agreement was found between the head researcher and a research assistant. The agreement was found between picking out main themes and comparing the themes between the two SLTs.

5.1 USA FEES clinician surveys completed

Three participants from the USA responded to the FEES survey. Two respondents answered all 23 questions. One participant responded to the survey, however the survey was incomplete with only five out of twenty-three questions were answered. This survey was not included in the results. Five main themes were apparent in the survey responses.

5.1.1 *Motivation*

A key theme seen in the responses was the motivation for establishing a mobile FEES service. Respondents reported feeling a need to establish an instrumental assessment service that can cater to patients who have difficulty accessing VFSS. One respondent reported seeing a need for this kind of service in their geographical area. One hundred percent of clinicians reported that mobile FEES was a necessary service as some patients cannot fit or tolerate sitting in the VFSS suite in the hospital. The service was also reported by clinicians to be a cost-effective alternative to typical assessment methods. One FEES clinician reported: "*I worked in a skilled nursing facility which had difficulty accessing an instrumental swallow study. Instrumentals are necessary in order to determine the cause of a patient's dysphagia, if there is in fact aspiration/penetration, residual and to have a complete individualized therapy plan for that patient. I saw a need in many facilities across XXX for this service. It's difficulty for many patients to mobilize to be transferred to a hospital for MBS (or even to the radiology suite if in a hospital). Some patients do not fit. Also FEES is great for trach and vent patients to assess secretions. Finally, I enjoy performing FEES to provide this service to many people*." (US FEES P1). Additionally, the second respondent reported "*I felt this was needed as most of my patients are not easily transported and transportation alone is an additional cost. Additionally, even my patients that I see in the hospital cannot always tolerate sitting in a c-chair for a VFSS, so this provides them with an additional option.*" (US FEES P2).

5.1.2 *Patients serviced*

A second theme that came up in the survey responses was features of the patients serviced. Many of the responses were focused on the patients requiring the service instead of a specific motivation. "*Transportation seems to be the limiting factor for almost all of my patients, whether because of cost or their physical inability to do so. I see numerous stroke patients with hemiparesis impacting their mobility as well as a large dementia population that does not do well when encountering unfamiliar environments.*" (US FEES P2). Patients that had difficulty mobilizing often utilized this service and are seen at bedside either in the hospital, skilled nursing facilities or at home. The majority of these patients suffer from: stroke, dementia, Parkinson's disease, tracheostomy/mechanical ventilation, head and neck cancer and anterior cervical discectomy and fusion (ACDF). This service benefitted patients who have mobility issues, transportation issues, complex medical issues and require a lot of equipment and patients who cannot cope with changes in environment. The patients serviced by some FEES SLPs aren't prevalent in any specific socioeconomic status whereas other FEES SLPs encounter a predominantly low socioeconomic status clientele. One SLP has said that indigenous populations are not often encountered in their work.

5.1.3 *FEES Administration*

A third theme seen in the responses was the process of the FEES administration. All responses reported that patients are referred to the service via a written physician's order. From here, patients are seen within roughly two-three days with more rural locations being seen in up to seven days. Again, this was consistent across all responses. The procedure lead up was dependent on the SLP completing the FEES. The treating SLP is always asked to attend, with telehealth being an option for some. Generally, the SLP explains the assessment and procedure. Whilst the assessment is being completed, different consistencies of food and drink are trialled and sometimes voicing is assessed as well. The procedure itself takes on average six to twelve minutes. The FEES SLP then writes a report to send to the referring physician and community SLP. Once the report is finished, the FEES SLP does not follow up with the client.

5.1.4 *Logistics*

A fourth theme seen in the responses was the logistical components of the FEES companies. All of the respondents reported that they ran their company out of a personal vehicle with company equipment that is unloaded and loaded into the car when needed. "*My company does not utilize a van. I carry my supplies and FEES equipment on a folding cart that all fits in my personal car. Once I get to a facility, I wheel the cart in to complete the FEES bedside. I felt this was needed as most of my patients are not easily transported and transportation alone is an additional cost. Additionally, even my patients that I see in the hospital cannot always tolerate sitting in a c-chair for a VFSS, so this provides them with an additional option.*" (US FEES P2). One SLP reported that they complete one to eight cases per day while the other SLP reported that there are two SLPs working at their company and four to six cases are completed per day. One SLP reported that no overnight stays take place whereas the other will complete overnight stays if the distance is four or more hours away. If this is done, patients will be grouped in the same location to minimise SLP travel. Ninety to one hundred percent of patients attend the assessment; however, the willingness of a patient is the determining factor of whether an assessment takes place. Patient prioritization depends on the company as some do not know details of patients whereas the others do. Typically, the prioritization will be done solely based on location unless the SLP knows of any emergency FEES that must be completed. SLPs park at the FEES location and unload the equipment required for the assessment. The FEES companies are used only for clinical practice and are not associated with any other services or companies.

5.1.5 *Overheads*

The fifth and last theme seen in the responses was the overheads required in establishing the mobile FEES business. The requirements for starting the company involved achieving FEES competency, obtaining equipment and writing procedures and policies, acquiring contracts, and marketing to organizations. The use of the van involves acquiring malpractice insurance, gas, car insurance, car maintenance, supplies, scope maintenance and money is required for doing overnight trips. The assessment itself costs $350 per FEES however this appeared to vary and was not a set figure. This service was considered both a private and public health service.

5.2 USA VFSS clinicians surveys completed

Four participants from the USA responded to the VFSS survey. Three respondents answered all 23 questions. A fourth respondent submitted a survey response, however none of the 23 questions were answered so this was not included in the results. Five themes were identified in the survey responses.

5.2.1 *Motivation*

The first theme identified was the motivation for the establishment of a VFSS van. SLPs reported that there is a lack of instrumental assessment for correct diagnosis and correct treatment. "*If I would not allow a standard for myself, I would not implement that standard for another person*". (US VF P1). Timely, comprehensive and affordable dysphagia assessment and a reduction of cost to both patients and facilities were strong motivators for a lot of SLPS. Additionally, accessibility to rural communities and avoiding non-ambulance rides were motivators for SLPs. One SLP took inspiration from other successful VFSS vans that had already been implemented. SLPs reported that the VFSS van created a link between community and clinical facilities along with helping underserviced communities. Barriers for low socioeconomic status communities such as time, geographic factors and trust could be overcome using the van. Other vulnerable communities and populations such as people of colour, people experiencing homelessness/poverty, the uninsured and veterans are provided with service where they may otherwise struggle to access service.

5.2.2 *Patients serviced*

The second theme identified was the features of patients that are provided service by VFSS vans. Patients supported by VFSS vans typically are patients in nursing homes, skilled nursing facilities, home health patients, patients with difficulty being transported, patients with difficulty accessing transport and paediatric patients whose parents can remain home with the child while assessment is taking place. "*Everyone but particularly nursing home and home health patients. however we do find that peds also do well since mom and caregivers can come. All of these patients listed have problems when transported and having to wait in waiting rooms. A big day for a nursing home patient is 30 minutes in a wheel chair, trying to get a ped into a hospital setting or outpatient setting is nearly impossible*." (US VF P1). The cause of dysphagia assessment tends to be patients suffering from dementia, stroke, TBI, COVID, respiratory failure and Parkinson's disease patients. "*Large population of neurological DX i.e. CVA, PD, TBI and dementia/Alzheimers. 300-400 patients a* *month, with 40% Home health, 50% long term care facilities, and 10% rehab hospitals/outpatient clinics. Fifty-two percent are identified with Esophageal disorders. In 2021, 80-90% of those who aspirated were silent aspirators*". (US VS P3)

5.2.3 *Impact of VFSS*

The third theme seen in the VFSS van results was the impact of VFSS vans on the community it services. Reportedly, hospitals are grateful for VFSS van access. "*The hospitals are busy and are grateful for my service relieving some of their load"* (US VF P2). One SLP reported that a survey was sent out to local SLPS "*In a questionnaire/survey, we asked local SLP's "if mobile units were not available to come to your facility to see you patients or to see home health patients would you be able to get an MBSS completed on your patient i a timely manner or evaluated at all?" 23% said YES, 83% said NO, and .01 said IDK.*" (US VF P3). Additionally, some VFSS van SLPs believed that the treating SLP is provided information that allows them to be more productive and begin treatment faster. "*We encourage all treating SLPs to be present on the mobile clinic during the study. The company's SLP is only one that conducts the study but we do this with input from the treating SLP. We also like to collaborate before and after the study regarding the best outcome for the patient."* (US VF P3). The use of the van allows a more comprehensive and personalized service to patients. Patients with limited access to care – whether it be due to barriers such as socioeconomic status, cost, trust or overall mobility – are able to access assessments due to this service, therefore making more populations reachable. Some VFSS van SLPs also report that having the van can increase SLP service visibility. Some SLPs are asked about what their van is, it increases referrals via word of mouth and having the van allows the SLP to educate families therefore increases visibility.

5.2.4 *VFSS administration*

A third theme seen in the responses was the protocol for completing a VFSS. A referral from the local SLP along with a written order from a physician is required to complete the VFSS for two out of three participants. The VFSS SLP requests input from the local SLP before and after the study is completed. In some vans, the local SLP is invited to be present at the study. When study is done, each SLP has described a different protocol. One SLP follows the Logemann protocol and uses different food textures and fluid thicknesses. Another SLP uses previous experience at a hospital job combined with research articles to inform their protocol. A third SLP completes the VFSS as tolerated by the patient. Again, different food textures and fluid thicknesses are trialled with compensation modalities trialled as necessary. This SLP finishes the study on a successful liquid trial. From this, all respondents write a report to the referring SLP/physician and recommend treatment options for rehab and compensatory approaches. None of the SLPs follow up directly with the patient.

5.2.5 *Logistics*

A fourth theme identified in the responses was the logistics involved in the VFSS van use. One SLP reported that they complete seven to ten studies per day and most studies are completed within one to four days. Overnights are completed using this SLP's van. The second SLP reported that three to eight studies are completed per day and the studies are completed within one to four days. This SLP will travel within a one hour radius from their city and no overnight stays are completed. The third SLP reported that seven to eleven studies are completed per day per van. There are up to three vans working per day and studies are completed within one to three days. This SLP travels up to 100 miles from their main office and no overnight stays are completed. There is a 95-98% success rate of patients for attendance across all respondents. Two SLPs report that they call before the VFSS is scheduled to take place to ensure the patient will be present. One SLP reports that patients sometimes die before the VFSS can take place. Patients are prioritized on a case by case basis or on a first come first served basis. If patients are urgent, they may be prioritized, however if the VFSS is very urgent, patients are encouraged to go to the hospital as it is not cost effective to go to locations last minute.

5.2.6 *Overheads*

A fifth theme emerging from the results was the overheads required for VFSS van use. In the process of establishment SLPs required: Van, staff, office, billing staff, license for equipment, contracts with facilities, insurance, medicare number, marketing, registrations and equipment. While running the van, the overheads involved are: van, x-ray, inspections for x-ray, insurance, gas, office, hardware, software, office building, staff, drivers hotel, travel, training and educational services. Some vans require a physician on board due to medicare supervision requirements. The vans move around all day. This service is considered to be both private and public and the costs of this service are variable. The van takes on liabilities such as medical, auto and professional liabilities. The risk of car accidents for the vans is prominent along with the safety of patients travelling into and out of the van. Some vans engage in research whereas others do not due to time constraints. The vans do only VFSS except for one van which made an exception for covid testing during the pandemic. The price per VF per patient had some variability. One response was $435, one response was $250-$600 and one response was $300-$400.

5.3 NZL South Island SLP completed surveys

Nineteen clinicians in New Zealand responded to the survey. Seventeen of these respondents completed all 23 questions. Two respondents responded to the survey, however, they only partially answered the questions and were therefore excluded from the analysis. Six themes were identified from the survey results from this group.

5.3.1 *Current practice*

The first theme identified was the clinician's current practice. 10 clinicians reported working with both inpatients and outpatients, four reported working with just outpatients and three reported working with just inpatients. This proportion is seen below in figure one. Many clinicians report a high fluctuation in caseloads, with six reporting high caseloads and five reporting manageable caseloads. Some clinicians report several months long wait times. The Clinicians also report having a variable caseload in terms of diseases and disorders treated. *"Mixture of acute patients (across all wards of the hospital including paediatrics/neonatal, ED and CCU) and early rehab at home patients (normally neurological presentations such as stroke). Mixture of swallowing and communication disorders. Fluctuates daily based on acute referrals on the wards, normally also have 2-6x rehab patients I see once weekly at home".* (NZ P4).

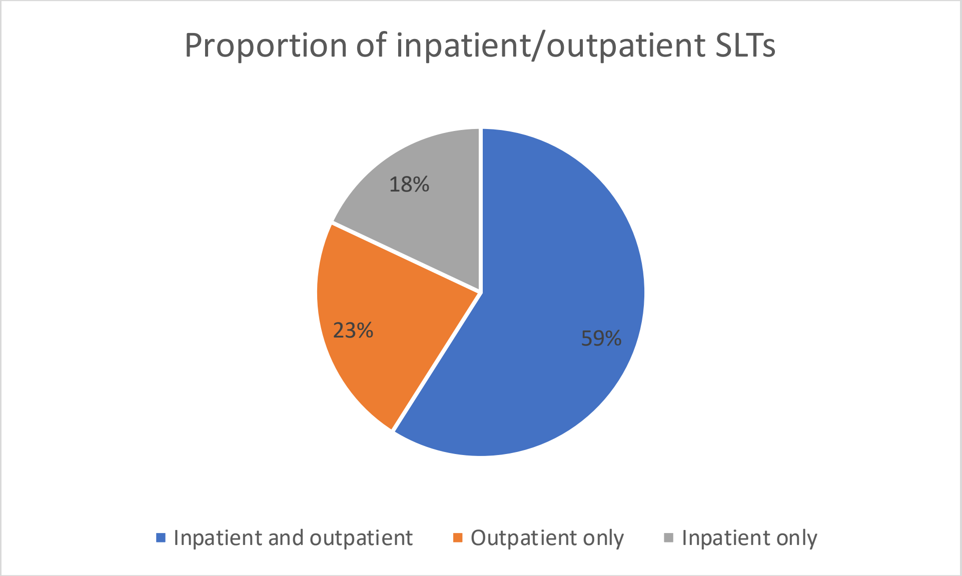

Figure 1

The assessment methods between clinicians were consistent. One hundred percent of clinicians report completing an initial clinical examination involving a case history, a cranial nerve examination (oromotor exam included), cough reflex testing if appropriate and oral trials if appropriate. Clinicians also report completing observations of patients at mealtimes, discussion with the patient, nurses and family, and completing the TOMASS (Test Of Masticating And Swallowing Solids) and/or TWST (Timed Water Swallow Test). Once clinical examination has been completed, 76% of clinicians stated that they regularly refer to instrumental assessment after these assessments are completed. This can be completed in inpatient or outpatient settings, however there is variability in how this process occurs.

Clinicians report that there is a simple transfer of care in some hospitals, however other clinicians report that outpatient referrals are required for patients whether SLP involvement was completed or not. Many report that the process for transfer of care between inpatient and outpatient is prioritized based on clinical needs.

5.3.2 *Access and use of VFSS*

A second theme identified in the survey results was the access and current use of VFSS in clinical practice. Sixteen out of seventeen (94%) respondents reported having VFSS in their hospital. For the respondent who does not have VFSS, the nearest VFSS is a three hour drive away. Fifteen out of seventeen respondents report that VFSS is a regularly used tool in their practice with a remaining two reporting that they use VFSS a few times monthly. Five participants reported using VFSS one day per week, four reported using VFSS two days per week, two reported they use VFSS three days per week, one reported using VFSS more than three days per week and one reported using VFSS daily. Four respondents did not elaborate on their daily/weekly use of VFSS. The mean use of VFSS is two point eight days per week, the median use is three days per week and the most common occurring value (mode) was respondents using VFSS once per week. Respondents reported that VFSS is used to assist with swallowing evaluation in many circumstances. Reasoning such as: It is the gold standard for determining swallow physiology and airway protection, it detects silent aspiration, it guides compensatory strategies, guides management for oral feeding and rehabilitation, provides differential diagnosis, provides a visualization to view the impact of rehabilitation exercises, provides a baseline for degenerative conditions and it guides the decision-making process for patient and whanau. "*After conducting a clinical exam, taking into account cranial nerve information, cough reflex test findings etc then I would use VFSS to gather objective information on a patients oropharyngeal physiology, trial indicated strategies and plan for rehabilitation*." (NZ P16)

5.3.3 *Barriers to access*

A third theme seen in the responses were barriers for patients accessing swallowing assessment and rehabilitation. Though VFSS is a valued part of the diagnostic and management process, respondents report issues with access to it. Some respondents specify that it is either not available at their hospital, or has low availability. This low availability can be due to only a few dedicated time and days for VFSS. "*Yes, time. The wait is long. Although the team at [hospital name removed] have been doing an extra day of VFSS outpatient clinics to cut down waiting times (have been working extremely hard) the wait is still approximately 4weeks-6weeks. Community team members are also very backlogged due to Covid and Illness, so it is hard*" (NZ P12). Sixty five percent of respondents reported the time and distance required for patients to reach VFSS facilities was a barrier to access. "*Yes - travel distance and time. People who are not able to access VFSS for mobility/health/positional reasons. Our VFSS quality of images is poor so we do not always gain the information we need from our images. Rehabilitation - we do not have equipment or software to offer skill based swallowing rehabilitation. Ongoing staff shortages is also an issue, as well as pregnancies where SLTs who are pregnant are unable to be in the VFSS room so there are times where VFSS cannot be offered.*"(NZ P3). Survey results showed the mean maximum distance was 183km, the maximum distance for a patient to reach a VFSS facility was 300km, with the smallest maximum distance being 89km. The distance range in kilometres can be seen below in figure two.

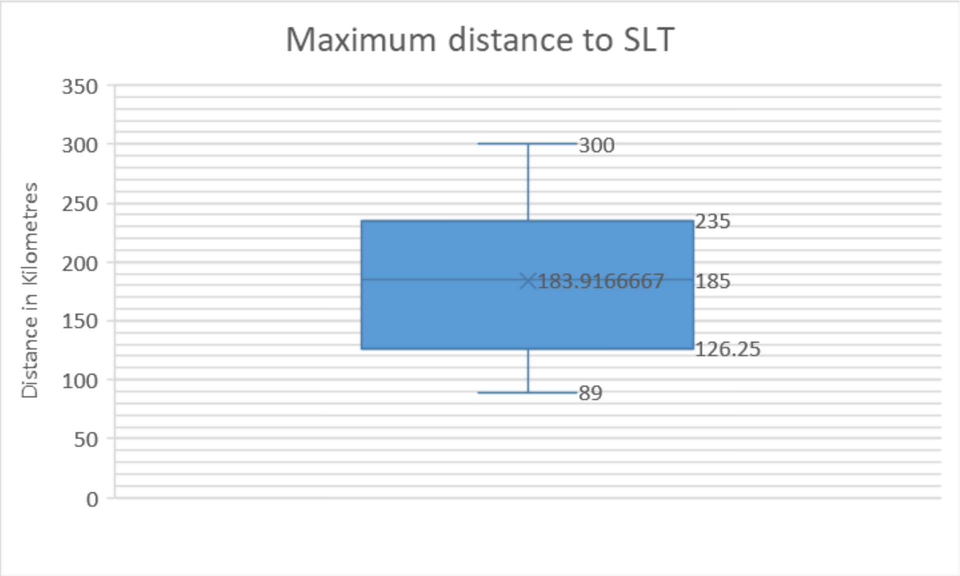

Figure 2

Twenty nine percent of respondents reported long waitlists as a barrier to access. "*Very commonly a 3-6 month wait for access to VFS for community patients*" (NZ P1). Other limitations many clinicians reported were: the money required for transport for patients to access this service, patients travelling too far and being too fatigued to undergo assessment and patients unable to undergo VFSS due to positional and mobility reasons. Additionally, some clinicians report that they believe there is some apprehension from clinicians to use VFSS regularly due to some of the above limitations. One respondent discussed a range of factors that they believed prevented people from accessing healthcare services altogether.

"*Isolation (physical or social), lower socioeconomic situations, access to general practice (cost, previous experiences, etc.), health "literacy", cultural differences, inequities, institutional racism, lack of kaupapa Māori health services. We have no data on this, so these are based on reasons that people do not access other health services.*" (NZ P8). One respondent also acknowledged that follow up VFSS is more uncommon to complete. "*Even if patients get initial VFSS to inform swallow rehab it's* *very uncommon we will do a follow up to objectively assess the results of the rehab - usually this is assessed clinically due to the barriers or having follow up*." (NZ P14).

5.3.4 *Ideal practice*

A fourth theme seen in the responses was the clinician perspective of what their ideal practice would be. When asked about how clinicians would change their practice in response to unlimited resources, many discussed eliminating the barriers surrounding access to assessment rehabilitation and increasing staffing. "*One of the big kickers is the ageing population that are living is care facilities and having their diets changed by the teams working in those units. The assumption being that thickened fluids are best for all older people (this is not the case, obviously). This could be remedied with better education and access to VFSS, but there are many barriers. They are often falling through the cracks only sometimes eventually being screened in the community and then referred for a VFSS, placed on a very long waiting list and are meanwhile essentially becoming deconditioned/dehydrated along with all the other effects modified diets and poorly managed dysphagia. I would ideally change this*". "*Routine screening via instrumental assessment would be seriously considered given the benefit of this assessment and reduction in risks to patients that is potentially there if we did this*". (NZ P16).

Many clinicians also reported wanting more access to instrumental assessments. "*Instrumental assessment would be considered/available EARLY - this would probably help with overdiagnosis of dysphagia, over prescription of compensatory strategies and lack of need for prolonged caseload management/follow up. Joint clinics with ORL. Upskill of all staff for instrumental assessment - particularly FEES as this appears to be easily portable device in other countries.*"(NZ P17).

Rehabilitation tools such as BISSKiT and BISSApp were also considered to be important and could improve regular practice. Respondents reported wanting to spend more time with patients and their whanau. This allowed for more opportunities for educating patients and their support systems. One clinician also reported that they would want to provide education to other professionals. "*For the adult caseload: There would be more communication input. Dysphagia rehab commencing in this acute setting! Manometry! To assist with differential diagnosis. The ability to effect environmental changes and changes to practice of other staff - e.g. aphasia friendly wards, safe swallowing approaches for all patients, dementia friendly environments (for both swallowing and communication), wider staff education, increased awareness of dysphagia and communication disorders for all staff*" (NZ P8).

5.3.5 *Perspective of mobile videofluoroscopy*

A fifth theme seen in the results was the clinician perspectives of mobile VFSS. Eight respondents reported having heard of mobile VFSS before, eight reported not hearing of it before, and one did not respond to this question. The proportion of this can be seen in Figure three.

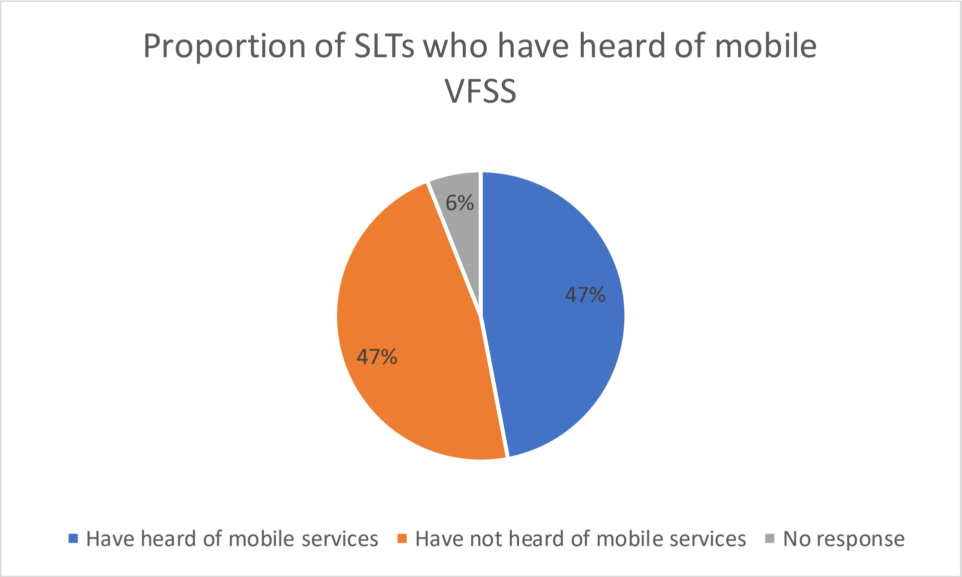

Figure 3

This theme is clearly outlined in both the benefits that clinicians anticipate VFSS would have and the shortcomings they felt it would have. The benefits anticipated are primarily around improving access to assessment for patients. "*I like the idea - especially for those in rural areas and potentially those who are unable to travel (either no transport or a disability makes this difficult). Would be really great for people in residential care facilities*". (NZ P8). Many NZL clinicians see benefit of mobile VFSS through decreasing the requirement for patients to travel in to receive a VFSS. This benefits patients that have mobility issues, cognitive difficulties and patients that live rurally. Respondents also reported that they felt as though the increased use of instrumental assessment would support the overall management of patients in the community. This was through increased ability to see patients in the community, improving the speed of assessments, helping ease staffing strains in hospitals and providing a service that does not require hospital admission. *"Fantastic. It would really help with accessibility for so many."* (NZ P12) and *"sounds like a good idea, particularly in rural areas"* (NZ P11*)*. Sixty five percent of respondents viewed the integration of mobile VFSS into their practice as purely positive and could not see any shortcomings. "*This would be an invaluable service that would help remove barriers and inequities in our health industry. It would be a relief to know there is help on the roads for our patients*". (NZ P1). Seventeen percent of respondents reported that they view mobile VFSS as something that may positively impact their service, however, they saw several shortcomings with its implementation. Twelve percent believed it would not affect their practice at all and six percent provided no response to this question. This is seen in figure four.

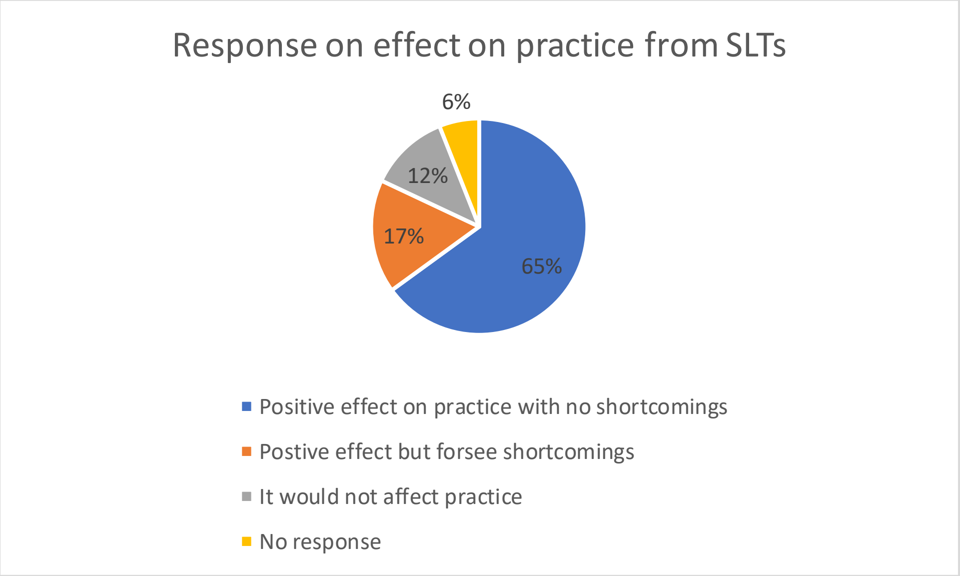

Figure 4

Respondents discussed a range of shortcomings with the possible implementation of mobile VFSS. Participants questioned how this service would be equitable across the whole South Island *"It could be very helpful but I also see several issues that would need addressed, e.g. how would this be equitable across the whole of New Zealand if there were only 1-2 units, who would decide patient access. Additionally, the clinicians were unsure of the logistics of this service and how it fits into the* *current health model*." (NZ P4). One respondent also reported that there may be issues with ensuring that local SLTs can be involved with the VFSS due to time constraints. "*Links with public health settings, referral criteria. Who continues management with the patient (e.g. in residential care facilities where they may not have a SLT who is associated with that care facility). Funding; will residential care facilities fund this if they will not fund private SLT currently - would need education around benefits and cost savings to them in the long run; how will individuals without private/not under ACC be able to afford this? Will it be publicly funded? Then where does this sit with the public health system and SLT systems already in place? Who would run the VFSS unit - does it come with SLTs or would the SLTs who indicate the need for the unit be running the VFSS'? Potential competency issues to sort out if it is the latter and that SLT does not have competency or it is difficult for them to maintain competency*" (NZ P8).

The overall response to mobile VFSS was positive and many clinicians reported that this service would hopefully make access to instrumental assessment more equitable. Seventy one percent of clinicians anticipated referring patients to a mobile VFSS should they have the option. Sixteen percent didn't know if they would refer patients and 12% said they would not refer to the service. This is seen in figure five. Clinicians wanting to refer patients to this service estimated referring between one patient per month to 15 patients per week.

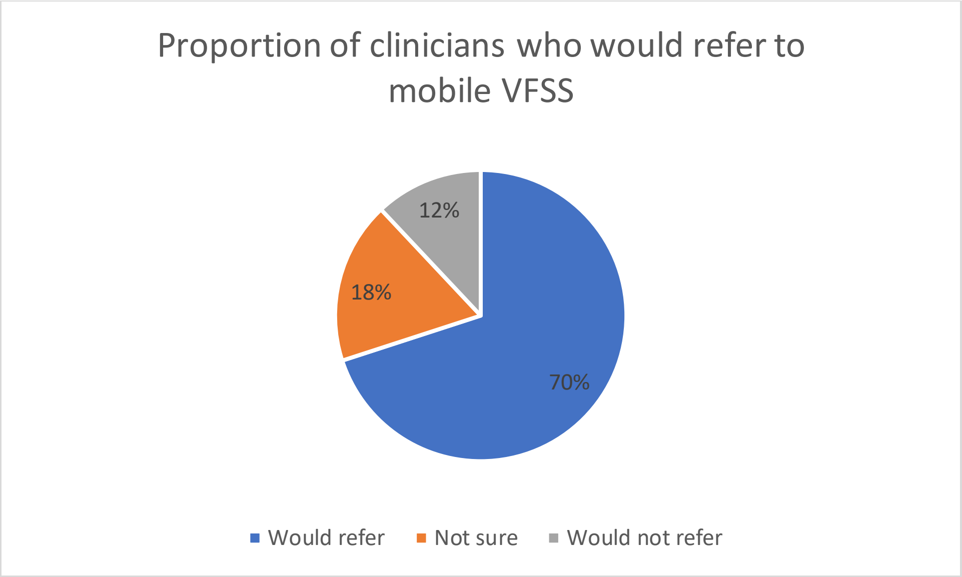
Proportion of clinicians who would refer to mobile VFSS
12%
18%
70%
Would refer
Not sure
Would not refer

Figure 5

Chapter 6 – Discussion

The primary research aim of this study was to establish the perceived need for an instrumental assessment unit for dysphagia diagnosis in New Zealand's South Island. The results yielded perspectives from USA clinicians who utilise this kind of practice already and NZL clinicians who have no experience with this kind of practice. The findings indicate that there is substantial interest from NZL SLPs for a mobile instrumental assessment unit in the South Island of New Zealand. The findings also confirm that should a mobile unit be implemented, there needs to be a clear linkage between the NZL public hospital SLPs and the van. The surveys received from the USA SLPs provided guidance and indications of what linkage between the public and the private system in the USA are currently in place. This could perhaps be used when decision making for NZL mobile unit future implementation.

The service model of mobile instrumental assessment is used in the USA for both FEES and VFSS and has successfully been implemented into the healthcare system with results of improved patient outcomes and an increase in the number of patients receiving instrumental assessment. From this, there proves to be a basis for this kind of service to exist in New Zealand. Given the high populations in rural areas along with groups of people having difficulty accessing care - even in urban areas – there is a clear need for support to be provided to this patient population. Clinicians in the USA have identified a number of motivations for establishing this kind of service.

One of the NZ SLP's reported that barriers to accessing healthcare services does not always exist solely for patients who are rural or have difficulty with transport. Many barriers exist in urban areas and this prevents patients from accessing healthcare. This could be due to long term effects of racism, overall low socioeconomic status and poor health literacy. Levy et al's (2020) study in Detroit indicated that urban dwelling patients who experienced barriers utilized healthcare service when it was available in a mobile van as this allowed the van to travel to their community. This study indicates that communities living in urban areas who are at risk of not accessing healthcare services in NZ may respond positively to a mobile unit should it be available.

Given that this reasoning was an important motivator for USA SLPs in establishing their mobile businesses to fill this service gap, there is a possibility this service gap may exist in New Zealand. Brabyn & Skelly's (2002) research identified that when tertiary care is required in New Zealand, the average time to access this is 85.5 minutes. The maximum distance stated by NZL clinicians in the surveys ranges from 89km to 300km with a mean of 183.8km. Assuming a car is travelling consistently at 100kmp/h, the maximum time patients in the South Island take on average to access SLP services is one hour and 50 minutes. Under this assumption, the length of time to access care for patients requiring SLP input is similar to that of Brabyn & Skelly's research findings. Given that clinicians in this study have reported that distance and time are significant barriers in patients accessing SLP services, there is a very high likelihood that this length of time to access care will be a barrier to patients receiving appropriate instrumental assessments. Furthermore, Brabyn & Skelly (2002) reported that a deterring factor of patients seeking healthcare is distance and time travelled, therefore corresponding with the results of this study. Additionally, one SLP reported that low socioeconomic status, indigenous populations and decreased health literacy were deterring factors for patients seeking SLP services, again corresponding with Brabyn & Skelly's (2002) findings. Not only do previous research findings show that distance and time are strong deterring factors for accessing care, when put into the context of South Island SLP perspectives, these are also strong deterring factors which indicates that to increase the ability for patients to be seen, these factors must be addressed. This further indicates that this gap in services seen in NZL could be supported by the establishment of a mobile service, such as the ones seen from the USA clinicians.

All populations reported in the literature review that experience dysphagia are reported in the caseloads of NZL and USA participants. The most prevalent causes of dysphagia reported by clinicians are patients with stroke, TBI, degenerative diseases and dementia. These patients were most commonly seen in caseloads across the NZL SLPs and the USA SLPs. Though there wasn’t much comment from the clinicians about under identified dysphagia, there was a comment about residential care facilities putting patients on modified diets with no evidence to support this decision. This comment is similar to the findings from Miles et al (2020). This finding showed that 1/3 of residential care facility residents are on modified diets however not all of these residents have been screened or diagnosed with dysphagia. This indicates that there is a gap in the healthcare system for accurate diagnosis of dysphagia in this particular population. Given the research indicating the high prevalence of malnutrition and aspiration pneumonia in residential care facilities, best practice would be to provide consistent instrumental assessment to this population. The results do not reflect this, and instead show that this is an underserviced population and action is taken without SLP input.

Mobile healthcare services have been a topic that has been researched in other disciplines and the results of these studies are consistent with our findings. Talukdar & Reddy’s (2012) research centring around mobile gastrointestinal services showed that patients who did not have the money or transport options were able to access this kind of care when they wouldn’t otherwise have been able to. Additionally, Marino et al’s (2020) study looking into mobile mammogram specifically wanted to see if there was increased access to patients living rurally without any specific health limitations. These studies correspond with the responses of the NZ clinicians in our study who report that some of their clientele do not easily access their services due to money or transport limitations. Additionally, the distance for some rural patients is up to three hours one way, therefore disadvantaging rural communities. Furthermore, the USA SLPs who utilize mobile services report that much of their clientele are patients who are unable to access care for a range of reasons – many being a lack of money or transport options along with living rurally.

Though there are areas in which similarities can be objectively identified between NZL SLPs and USA SLPs, the NZL perspectives indicate that the majority of NZL SLPs see the implementation of this kind of unit to positively affect their practice. This could be through providing a means of assessment for patients unable to travel to assessment for various reasons, or it may be due to an increase in availability of instrumental assessment units in the South Island overall.

Regardless, services in the USA are shown to have protocols and service implementations to ensure that they have protocol and consistency for their practice. This includes the logistics of practice, how local SLPs are involved and how patients are prioritized. Though the logistics may be of concern, the USA services may be used as models to understand how such a service may exist in New Zealand.

The results indicated that FEES and VFSS providers in the USA have successful outcomes for their patients and providers. Some use their units to support local hospitals in the assessment process whereas others use their units to support rural communities. Regardless, these services have protocols and service implementations to ensure that they have a vision for their practice. This includes the logistics of practice, how local SLPs are involved and how patients are prioritized. NZL SLPs identified issues surrounding staffing shortages and a lack of adequate time allocated by the hospital to SLP therapies. Though this may impact the interest of the mobile unit, it does infer that these issues may need to be further investigated by the local DHBs to ensure that high quality services can be delivered.

No previous research has been completed that analyzes the qualitative results of the implementation of the units in the USA, however Birchall et al (2022) asked clinicians working in residential care units their perspectives on the implementation of mobile FEES units. As previously discussed, the clinicians in this study were supportive of this service however some NZL participants had concerns surrounding the logistical implementation of these units. The findings in this study are very similar to that of Birchall et al's study. Clinicians are supportive and interested in this kind of idea, however there is an overall hesitation of how these units are implemented. Where this study differs from ours is that we have looked into how these units are already being utilized. This demystifies how these units are used in practice. Currently, logistics of these units differ between clinicians, however most units are used in both the public and private sectors. Patients are referred by GPs and clinicians and are often considered as a first in first serve basis. In terms of cost, the clinicians reported costs of fuel, maintenance, insurance and the cost of hiring the SLPs as the main costs. Depending on the service (public or private), the patient will pay between $200-$600 per service, however this is only if privately funded.

Though incredibly valuable information was gathered, no research is without flaw. Limitations of this study included a small sample size, convenience sampling, not knowing whether the respondents are fully representative of the clinicians contacted – perhaps most were from one region or DHB – there is no way of knowing as results were anonymous. Additionally, there are no studies directly looking into both current practices using mobile instrumental assessment and clinician perspective of this so there is nothing to directly compare against. An additional limitation that could be involved in the responses is the interpretation of questions – whether it be due to misunderstanding or due to NZ English to American English. Participants may not have responded with the information intended due to miscommunication.

As discussed by Cameron et al (2012) and Barker-Collo et al (2019), Māori are disproportionately represented in statistics for several illnesses – many of which are risk factors for stroke, therefore putting this population at higher risk of suffering from dysphagia. Further discussed by Cameron et al (2012) Māori are also more likely to live in rural populations, therefore causing access to care to become more difficult. In conjunction with this, New Zealand participant eight stated that due to distrust in the medical system some Māori may be less likely seek care or continued input. This corresponds with Loschmann & Pearce (2006) that state that the lasting effects of colonisation and racism on indigenous populations affect utilization of healthcare services. We can hypothesise that if correct and appropriate cultural competency systems be in place, a mobile videofluoroscopy unit may increase access to healthcare for Māori living in rural areas. Mobile videofluoroscopy may also increase access for Māori in urban areas as the assessment can be brought to a whanau instead of the expectation that Māori come to the providers. This could perhaps decrease feelings of distrust which are outlined by NZL participant eight.

Chapter 7 – Conclusion

The null hypothesis stated in chapter three was: There are no clear benefits to the implementation of mobile instrumental assessment units in New Zealand's South Island. The alternative hypothesis stated was: There is a strong and clear perceived need for implementation of mobile instrumental assessment units in New Zealand's South Island. There enough evidence to suggest that the alternative hypothesis is correct, therefore the null hypothesis is rejected, and we accept the alternative hypothesis.

The responses from the surveys indicate that not only are NZL clinicians interested in the concept of mobile instrumental assessment units, the perceived need for this kind of unit to be implemented into New Zealand's South Island appears to exist. Reports from clinicians say that there are long waitlists, minimal access to the fluoroscopy suite, a lack of follow up VFSS completed, difficulties for patients accessing care due to location, health conditions or health literacy. From USA responses, many of these issues can be responded to or remedied by mobile instrumental units. NZL clinician estimates of referrals to this service ranged from one patient per month to 15 per week (approximately 60 patients per month) should this unit be available. Seventy one percent of clinicians reported that they anticipated that they would certainly refer patients to this service should it be available. These statistics indicate that should this service be available, there would be clinicians willing to refer to this service, resulting in a successful implementation.

Most clinicians responded positively to the concept of a mobile instrumental unit. The results indicated that clinicians saw the unit as an opportunity to refer their rural or less mobile patients for instrumental assessment. This would in turn provide more patients with access to care both from the unit and within the hospital. Clinicians also felt that a service like this one would ease staff strains on hospitals and improve the overall speed of assessments. Though respondents saw this service as a good opportunity, they were apprehensive due to potential limiting factors. This was due to concerns about equity of this service and how referrals for different areas would be serviced. Some clinicians had concerns around the cost of fuel and maintenance. Additionally, there was confusion around the management of the patient after the assessment had taken place. These findings show that while the perception of need exists, further information and research around the cost and management of patients when referred to this service is required. Though we have received information from the USA SLPs to guide our understanding of these areas, NZL specific research must be completed to ensure the cost to benefit ratio is appropriate.

The majority of NZ SLPs report that they would utilize this service should the correct logistical processes be in place. Given the consistency of patients serviced by the USA and NZL clinicians seen in the results, an implementation of this service would likely reach patient groups that typically have difficult access to care such as low socioeconomic status groups, indigenous groups, rurally based patients and patients with cognitive or mobility issues. In addition, the barriers reported by previous research, the results of the NZL participants and the USA participants correspond to each other. Given that the USA participants report that the need for their service is widespread and their service is needed across difficult to reach groups, this indicates that anticipated patients for this kind of service in NZL will be similar. While we cannot conclude that the results will be exactly the same in NZL, we can anticipate that there would perhaps be similarities between the patients serviced in the USA and the patients potentially serviced in NZL.

Successes of mobile units in the USA are things such as: Patients can be seen at home, there is a high success rate for patients being present at appointments which shows high patient motivation for this kind of service. This service supports community SLPs to have access to this kind of assessment in addition to supporting hospital SLPs when necessary. This kind of service can be built into the public or private system which allows autonomy for those offering this service.

Drawbacks of mobile units were not reported by the USA SLPs however the NZL SLP community reported concerns with its implementation. Issues of how patients will be prioritized was brought up along with the potentially sporadic nature of this van for some areas. How the van would fit into current practice and hospitals was also a concern of the SLPs in NZL. They were also concerned about how much input the local/community SLP would have before/during/after the VFSS due to time constraints.

These benefits and drawbacks are significant as this provides more understanding for what may occur should this kind of service be available in NZL. The USA SLPs reported no drawbacks, however this does not mean they do not exist. While we cannot conclude that these specific benefits and drawbacks – whether they were reported or hypothetical - will or will not occur in NZL, there would be significant benefit to further researching these areas. Completing research specifically within the community to identify whether patients would utilize this service as well as specifically analysing whether groups such as Māori and Pasifika people would feel comfortable with this service would be beneficial in understanding the need to implement this service from a healthcare consumer point of view.

Overall, we can conclude that though there is a clear perceived interest and need from NZL SLPs for a mobile assessment unit, there is not yet enough empirical evidence to suggest that the outcomes experienced by the FEES and VFSS SLPs in the USA would be experienced in NZL. While both NZL and the USA are western countries, there are countless other differences which may affect the implementation of a mobile unit. Should no additional research be completed, there is no guarantee that the implementation of a mobile assessment unit would be utilized efficiently by the public healthcare system along with having an appropriate cost to benefit ratio.

Chapter 8 – Recommendations and practical application

Practical applications of study findings would be to implement a mobile instrumental assessment unit with VFSS and FEES. This unit would be implemented in the South Island and sit under the public health sector in order to support surrounding DHBs.

Recommendations for future research:

1. Quantitative research looking into patients requiring mobile assessment units most in New Zealand contexts.
2. Qualitative research looking into patient perspectives of a mobile assessment unit in New Zealand with a focus on higher risk groups for dysphagia.
3. Quantitative research into the cost-benefit analysis of a mobile assessment unit being implemented in New Zealand.
4. A pilot study of the implementation of a mobile instrumental assessment unit in New Zealand's South Island.
5. Focus groups with SLPs in New Zealand for how their practice is currently affected by the NZ health system and how they can be better supported by new services in New Zealand.

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Appendix A.

Questions for VFSS SLPs in USA

MOTIVATION	DAILY TASKS	OPERATIONAL
What made you want to establish an MBS van? What groups of people do you feel benefits most from your van? What do you believe about your van's impact on people in lower socioeconomic status positions and /or people who are indigenous populations? i.e. native American people. Tell me what you think about your van's impact on overall client and patient access to SLP services? Tell me what you think about your van's impact on SLP visibility in the community? I.e. do more people in the community know about SLP services and what SLPs do due to this service?	Can you tell me about your typical caseload? So how do you go about each VFSS? What is your protocol? – time? In the course of a day, how many patients would you see? Are you in the van every day of the week or just some days? How are your weeks structured? Once you have completed the VF, what is the protocol afterwards if they require treatment? Are you going to follow up that person? Are the local SLPs? If the person requires a treatment plan do you complete this and in what timeframe? What sort of areas do you service? Are they nearby or do you travel and do overnight stays? How often would you complete these if so? How do you prioritize patients in terms of accessibility? E.g. one person in very very remote area versus 5 in a much more urban area How long is the wait for a new patient to your service? Are there factors that would affect this? What is your success rate for attendance to this kind of mobile service? I.E do you show up at a care home and the person has gone out for the day. In terms of completing the VFs, do you do them wholly or do you involve local SLPs who may have long term community engagement with the patient?	What was the process involved in establishing the MBS van in your area? What is the process of reviewing new clients? Do they need to be referred by their physician or do they contact you directly? Throughout the week do you tend to park at one location or do you move around day to day? Would you consider this a more private or public healthcare model? Does insurance cover this service? What liabilities do you take on when using the MBS van? What overheads are involved in the use of the MBS van? Insurance, gas, maintenance etc Do you only complete patient VFs or do you take part in research as well? Is your van used solely for VF or do you use it for other purposes or other services? What is the cost per VF for patients?

Questions for FEES SLPs in USA

MOTIVATION	DAILY TASKS	OPERATIONAL
What made you want to establish a FEES van? What groups of people do you feel benefits most from your van? What do you believe about your van's impact on people in lower socioeconomic status positions and /or people who are indigenous populations? i.e. native American people. Tell me what you think about your van's impact on overall client and patient access to SLP services? Tell me what you think about your van's impact on SLP visibility in the community? I.e. do more people in the community know about SLP services and what SLPs do due to this service?	Can you tell me about your typical caseload? So how do you go about each FEES? What is your protocol? – time? In the course of a day, how many patients would you see? Are you in the van every day of the week or just some days? How are your weeks structured? Once you have completed the FEES, what is the protocol afterwards if they require treatment? Are you going to follow up that person? Are the local SLPs? If the person requires a treatment plan do you complete this and in what timeframe? What sort of areas do you service? Are they nearby or do you travel and do overnight stays? How often would you complete these if so? How do you prioritize patients in terms of accessibility? E.g. one person in very very remote area versus 5 in a much more urban area How long is the wait for a new patient to your service? Are there factors that would affect this? What is your success rate for attendance to this kind of mobile service? I.E do you show up at a care home and the person has gone out for the day. In terms of completing the FEES, do you do them wholly or do you involve local SLPs who may have long term community engagement with the patient?	What was the process involved in establishing the FEES van in your area? What is the process of reviewing new clients? Do they need to be referred by their physician or do they contact you directly? Throughout the week do you tend to park at one location or do you move around day to day? Would you consider this a more private or public healthcare model? Does insurance cover this service? What liabilities do you take on when using the FEES van? What overheads are involved in the use of the FEES van? Insurance, gas, maintenance etc Do you only complete patient FEES or do you take part in research as well? Is your van used solely for FEES or do you use it for other purposes or other services? What is the cost per FEES for patients?

Questions for NZ SLPs

VIDEO FLUOROSCOPIC SWALLOWING STUDIES	FIBREOPTIC ENDOSCOPIC EVALUATION OF SWALLOWING	LOGISTICS	RESOURCING	MOBILE VIDEOFLUOROSCOPY
What is your current access to VFSS? Is it in your hospital? If not, where is the nearest VFSS to you? Do you refer patients to VFSS often in your practice? Why/Why not? How often would you refer patients to VFSS in a typical week? If outpatients are required to undergo VFSS are they expected to travel to this? What is the maximum distance (that you are aware of) that a patient has to undergo to travel to VFSS or another appropriate swallowing assessment.	What is your current access to fees? Is it in your hospital? If not, where is the nearest FEES to you? Do you refer patients to FEES often in your practice? Why/Why not? How often would you refer patients to FEES in a typical week? If outpatients are required to undergo FEES are they expected to travel to this? What is the maximum distance (that you are aware of) that a patient has to undergo to travel to FEES or another appropriate swallowing assessment.	How do you currently assess patients? What assessments do you typically use? Do you work with a mixture of acute patients and outpatients? If not, what is the process involved for a patient requiring follow up assessment or treatment following hospital admission? Do you believe any barriers exist that prevent some people in your community from accessing swallowing assessment and rehabilitation?	What is your current caseload like? If you had unlimited resources, no time constraints and access to everything you need, how would managing your caseload differ to how you currently manage it?	Have you heard of Mobile videofluoroscopy units before? If so, where from? What is your perspective of a Mobile videofluoroscopy unit being used in New Zealand? Are there any benefits or shortcomings that you believe exist with the implementation of mobile videofluoroscopy in New Zealand? If so, what are they? Do you think mobile videofluoroscopy would affect your clinical practice? If so, how? If you had access to mobile videofluoroscopy, how many patients do you estimate that you would refer to this kind of clinic over the period of a month?

Appendix B.

Email sent to FEES participants in the USA:

Dear XX,

I hope this email finds you well.

My name is Claire Cooper and I am a graduate speech and language pathologist from New Zealand. I am currently completing my Master of Science degree from the University of Canterbury with Prof Maggie-Lee Huckabee. I am conducting research that looks into the need for a mobile instrumental assessment unit in New Zealand. I believe that this research is incredibly important and hypothesise that it will show that many people in New Zealand do not have feasible access to specialist equipment that is needed.

I am emailing you as we are aware that you are associated with a company who is already successfully utilizing mobile fibreoptic endoscopic evaluation of swallowing units in the USA. As such, we would like to invite you to complete a survey regarding your experiences with mobile FEES. We understand that you are likely extremely busy, however we firmly believe this information would be invaluable to this research.

We will be opening the survey on August 1st and it will remain open for three weeks. If you have any questions, please let me know as I am happy to discuss this further.

I appreciate your time in reading this email and I look forward to hearing back from you should you choose to accept this invite to participate in this research project.

Yours sincerely,
Claire Cooper,
BSLP

Email sent to USA VFSS participants

Dear XX,

I hope this email finds you well.

My name is Claire Cooper and I am a graduate speech and language pathologist from New Zealand. I am currently completing my Master of Science degree from the University of Canterbury with Prof Maggie-Lee Huckabee. I am conducting research that looks into the need for a mobile instrumental assessment unit in New Zealand. I believe that this research is incredibly important and hypothesise that it will show that many people in New Zealand do not have feasible access to specialist equipment that is needed.

I am emailing you as we are aware that you are associated with a company who is already successfully utilizing mobile videofluoroscopy units in the USA. As such, we would like to invite you to complete a survey regarding your experiences with mobile VFSS/MBS. We understand that you are likely extremely busy, however we firmly believe this information would be invaluable to this research.

We will be opening the survey on August 1st and it will remain open for three weeks. If you have any questions, please let me know as I am happy to discuss this further.

I appreciate your time in reading this email and I look forward to hearing back from you should you choose to accept this invite to participate in this research project.

Yours sincerely,
Claire Cooper,
BSLP

Email to NZL SLPs:
Kia Ora XX,

I hope this email finds you well.
My name is Claire Cooper and I am a graduate speech and language therapist. I am currently completing my Master's in Science from the University from Canterbury. I am based at the Rose Centre for Stroke Recovery and Research at St George's hospital and am working with Prof Maggie-Lee Huckabee. We are conducting research that looks into the need for a mobile instrumental assessment unit in the South Island, particularly for those in rural areas. I believe that this research is incredibly important and hypothesise that it will show that many people do not have feasible access to specialist equipment that is needed.

This research will centre around gathering qualitative information from Speech language therapists through an online survey. This research will be evaluating the need for a mobile instrumental assessment unit. Attached to this email is a sheet with more detailed information about the study. I am emailing you as we are aware that you are a Speech and Language therapist who is working in the XX DHB and we would like to invite you to participate in this study.

If you have any questions about this research please don't hesitate to email me. A survey will be uploaded on August 1st and will remain open for 3 weeks. I appreciate your time in reading this email and I look forward to seeing your responses in the survey should you choose to be involved.

Nga mihi,
Claire Cooper,
BSLP

Follow up email sent:

Kia Ora,

I am just following up my initial email about my survey.

As planned, the survey has now closed, and I have started looking through responses. The responses so far provide extraordinarily valuable information for my research, and I thank all the respondents.

Though the information so far has been extremely useful, I am hoping to obtain more responses. To have a representative understanding of the perspectives of New Zealand Speech Therapists, I will require more data.

For this reason, I am extending the closing date of the survey. The survey will re-open from today at 1:00pm and will close at 5pm on Friday September the 9th. If you have already filled out the survey, thank you. If you have not, I would greatly appreciate if you are able to take the time to submit a response.

Please let me know if you have any questions and I will be happy to answer them.

The password is: MastersResearch2022

https://canterbury.qualtrics.com/jfe/form/SV_1z9ZBItZzVbOR8y

Nga mihi,

Claire Cooper

BSLP (Hons)
Master's student at the University of Canterbury

Appendix C.

UC School of Psychology, Speech and Hearing
Phone: *03 369 1326*
Email: *cec78@uclive.ac.nz*
05/05/2022
HREC Ref: 2022/12/LR

Diagnostic dysphagia service in the community – a qualitative analysis of the need for instrumental assessment in New Zealand's South Island

Information Sheet for participants

Kia Ora| Hello,

You are invited to participate in a research study on diagnostic dysphagia service in the community. This study is being conducted by Claire Cooper from the University of Canterbury ǀ Te Whare Wānanga o Waitaha. Other research team members include Professor Maggie-Lee Huckabee. The study is being carried out as a requirement for a Master's of science.

What is the purpose of this research?

This research aims to determine the need for Videofluoroscopic Swallowing Studies and/or Fibreoptic Endoscopic Evaluation of Swallowing in New Zealand's South Island. We are interested in finding out about perspectives of New Zealand Speech Language Therapists of their current practice and their opinions about a proposed mobile instrumental assessment unit in the South Island. This study will also explore the current use of mobile VFSS units and mobile FEES units in the USA and their successes and shortcomings. The information from this study will help to determine the feasibility of a mobile instrumental assessment unit being implemented in New Zealand's South Island.

Why have you received this invitation?

You are invited to participate in this research because you are a practicing speech and language therapist in New Zealand or the United States of America working in the health sector. We obtained your contact information from publicly available sources.

Your participation is voluntary (your choice). If you decide not to participate, there are no consequences. Your decision will not affect your relationship with me, the University of Canterbury or any member of the research team.

What is involved in participating?

If you choose to take part in this research, please complete the online survey that follows this information page. This survey involves 3 different groups answering 3 different sets of questions. Participants only view the questions that apply to their group. USA participants are provided 25 questions about mobile videofluoroscopy and their experiences and NZ participants are provided 31 questions about their experiences in working in NZ. Completing the survey should take around 15 to 30 minutes for both groups. Surveys will open on August 1st and remain open for 3 weeks. The survey will close on the 23rd of August.

Are there any potential benefits from taking part in this research?
We do not expect any direct benefits to you personally from completing this survey. However, the information gathered will potentially benefit patients and clinicians in the South Island should a mobile instrumental assessment unit be available in the future.

Are there any potential risks involved in this research?
We are not aware of any risks to participants in the research.

What if you change your mind during or after the study?
You are free to withdraw at any time. To do this, simply close your browser window or the application (App) the survey is presented on. Any information you have entered up to that point will be deleted from the data set. As this is an anonymous survey it will not be possible to withdraw your information after you have completed the survey.

What will happen to the information you provide?
All data will be anonymous. All data will be stored on the University of Canterbury's computer network in password-protected files

All data will be destroyed five years after completion of the study/publication of study findings. Claire Cooper and Professor Maggie-Lee Huckabee will be responsible for making sure that only members of the research team use your data for the purposes mentioned in this information sheet.

Will the results of the study be published?
The results of this research will be published in a Master's thesis. This thesis will be available to the general public through the UC library. Results may be published in peer-reviewed, academic journals. Results will also be presented during conferences or seminars to wider professional and academic communities. You, or your business/employer will not be identifiable in any publication.

I will send a summary of the research to you at the end of the study, if you request this. If you provide an email address for this purpose, it will not be linked with your survey responses, thus maintaining confidentiality of your specific responses.

Who can I contact if I have any questions or concerns?
If you have any questions about the research, please contact: Claire Cooper: cec78@uclive.ac.nz

This study has been reviewed and approved by the University of Canterbury Human Research Ethics Committee (HREC). If you have concerns or complaints about this research, please contact the Chair of the HREC at human-ethics@canterbury.ac.nz .

What happens next?
If you would like a PDF version of this information sheet, please email Claire Cooper at the email address above.

Please read the following statement of consent and start the survey below.

Statement of consent

I have read the study information and understand what is involved in participating. By completing the survey and submitting my responses, I consent to participate.

Appendix D.

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

HUMAN RESEARCH ETHICS COMMITTEE
Secretary, Rebecca Robinson
Telephone: +64 03 369 4588, Extn 94588
Email: human-ethics@canterbury.ac.nz

Ref: HREC 2022/14/LR

19 May 2022

Claire Cooper
School of Psychology, Speech and Hearing
UNIVERSITY OF CANTERBURY

Dear Claire

Thank you for submitting your low risk application to the Human Research Ethics Committee for the research proposal titled “Diagnostic Dysphagia Service in the Community – a Qualitative Analysis of the Need for Videofluoroscopic Swallowing Studies in New Zealand’s South Island”.

I am pleased to advise that this application has been reviewed and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 17th May 2022.

With best wishes for your project.

Yours sincerely

Dr Dean Sutherland
Chair, Human Research Ethics Committee

University of Canterbury Private Bag 4800, Christchurch 8140, New Zealand. **www.canterbury.ac.nz**

Appendix E.

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

HUMAN RESEARCH ETHICS COMMITTEE
Secretary, Rebecca Robinson
Telephone: +64 03 369 4588, Extn 94588
Email: human-ethics@canterbury.ac.nz

Ref: HREC 2022/14/LR Amendment 1
18 July 2022

Claire Cooper
School of Psychology, Speech and Hearing
UNIVERSITY OF CANTERBURY
Dear Claire

Thank you for your request for an amendment to your research proposal "Diagnostic Dysphagia Service in the Community – a Qualitative Analysis of the Need for Videofluoroscopic Swallowing Studies in New Zealand's South Island" as outlined in your email dated 7th July 2022.

I am pleased to advise that this request has been considered and approved by the Human Research Ethics Committee.

Yours sincerely

Dr Dean Sutherland
Chair, Human Research Ethics Committee