FRAILTY MEASURES AND THEIR ASSOCIATION WITH POST-ACUTE REHABILITATION OUTCOMES

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Declaration

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

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Summary

Introduction

With frailty a worldwide concern in a rapidly expanding ageing population, proactive approaches to the management and identification of frailty are recommended to help reduce hospitalisations and adverse outcomes. Yet, there is lack of evidence for frailty screening and rehabilitation of adults in an Irish post-acute rehabilitation setting.

Aims and Objectives

The primary aim of this study was to compare clinicians' appraisal and patients' subjective appraisal of frailty and explore their association with each other and with post-acute rehabilitation outcomes.

Methods

In a prospective cohort observational study in Peamount Healthcare from Oct. 2019-Feb. 2020 32 participants were assessed on admission and discharge. Frailty was measured through clinicians' appraisal using the Clinical Frailty Scale (CFS) and patients' subjective appraisal using the Identification of Seniors at Risk Questionnaire (ISAR). Rehabilitation outcomes were measured using the Timed Up and Go (TUG), the Elderly Mobility Scale (EMS) and the Euro-Qol 5D (EQ-5D).

Results

Mean age of participants was 82.66 (±SD 8.31) years. There was no significant difference in the level of frailty reported by clinicians and patients (81.3% vs 84.4%) and no association was found between the ISAR and CFS. Significant improvements were noted in the TUG ($p<0.001$) the EMS ($p<0.001$), left grip strength ($p=0.05$), EQ5D Visual Analogue Scale ($p=0.002$) and in EQ5D domains except anxiety/depression. A relationship was observed between clinicians' rating of frailty on admission with measures of activity limitations on discharge with a strong positive association found with TUG ($p<0.001$) on discharge and a strong negative association with the EMS ($p<0.001$) on discharge. Little association was noted between levels of impairment and participation restriction. Moderate to strong relationships were found between patients' frailty appraisals on admission with measures of quality of life on discharge with no associations noted with levels of impairment and activity limitation.

Conclusion

The association of levels of frailty with rehabilitation outcomes varied by method of frailty appraisal used. Both methods provide different yet potentially complementary information in relation to rehabilitation outcomes.

Implications of Findings

This research found improvements in frail older adults following post-acute rehabilitation, however there was variability in levels of frailty in this setting depending on the frailty screening measure used.

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List of Abbreviations

ADL	Activities of daily living
BI	Barthel Index
CFS	Clinical Frailty Scale
CI	Confidence Interval
ED	Emergency Department
EMS	Elderly Mobility Scale
EQ5D	European Quality of Life 5 Domains Questionnaire
GDPR	General Data Protection Regulation
ICC	Intra-class coefficient
IRQ	Inter Quartile Range
ISAR	Identification of Seniors at Risk Questionnaire
KG	Kilogram
LOS	Length of Stay
MCID	Minimal clinical important difference
MDT	Multidisciplinary team
MFS	Modified Rankin Scale
N	Number
PI	Primary Investigator
PIL	Patient information leaflet
RCT	Randomised Control Trial
ROC	Receiver Operating Characteristic
RR	Risk Ratio

SD	Standard Deviation
SHARE-FI	Survey of Health, Ageing, and Retirement in Europe Frailty Instrument
SJH	St James's Hospital
SPSS	Statistical Package for the Social Sciences
STROBE	The Strengthening the Reporting of Observational Studies in Epidemiology
T1	Initial Assessments
T2	Discharge Assessments
TUG	Timed Up and Go
TUH	Tallaght University Hospital
VAS	Visual Analogue Scale
VES	Vulnerable Elders Survey

Introduction

As a result of the rapidly expanding aging population, the impact of frailty is quickly becoming a worldwide critical concern (Hoogendijk et al. 2019). Frailty has been associated with increased healthcare utilisation within the Irish healthcare system (Roe et al. 2017). However, its impact is being felt across healthcare systems globally, with higher levels of frailty and the associated health concerns driving an increase in healthcare costs (Hoogendijk et al. 2019).

Frailty has been characterised by a reduction in physiological reserve in response to a stressor eventually leading to adverse outcomes (Fried et al. 2001; Clegg et al. 2013). Frailty increases with age and is associated with multiple other factors that predispose an individual to advance into the cascade of the frailty cycle including multiple comorbidities (Lang et al. 2009). The cascade is further advanced by the consequences of lower socioeconomic status and poor nutrition experienced by some older adults (Lang et al. 2009). However, frailty is not an inevitable process of aging, it is a dynamic syndrome whereby through appropriate intervention and management individuals can transition between frailty states (Xue 2011; Morley et al; 2013).

A proactive, person centred and integrated approach to frailty management within the healthcare system may activate appropriate supports thereby helping to reduce further hospital admissions and future adverse outcomes (Turner and Clegg, 2014; Gwyther et al. 2018). Such findings and conclusions encourage the development of systematic and sustained efforts to increase awareness among key stakeholders and health care professionals around the preventability and malleability of frailty (Gwyther et al. 2018). Increased consistency is required in relation to frailty screening to guide healthcare services on how and when frailty should be measured (Gwyther et al. 2018).

This will increase the likelihood that those most in need of intervention will be targeted and help ensure direct healthcare resources are utilized more appropriately.

Positive effects on function, balance, and grip strength, key components of frailty, have been seen in adults over 65 years of age undergoing post-acute inpatient rehabilitation (Gosselin et al. 2008; Bachman et al. 2010). Evidence suggests that frail older adults can also benefit from rehabilitation, in particular multicomponent exercise programmes (Theou et al. 2011; Dent et al. 2019a). However, studies to date have varied in design and methodological quality with large heterogeneity in frailty screening and definitions used making the drawing of definitive conclusions and recommendations more difficult. In addition, only a limited number of studies to date have examined frailty in the post-acute rehabilitation setting, particularly in the Irish healthcare setting.

Understanding and targeting frailty in the post-acute rehabilitation setting is a critical concern. Those who are more functionally impaired in a post-acute rehabilitation setting are at increased risk for readmission to the acute services, leading to increased mortality and reduced chance of discharge home (Burke et al. 2016). Early identification of frailty is critical as it will help guide the implementation of multidisciplinary intervention strategies to minimise adverse outcomes and disabling age-related conditions (Cesari et al. 2016). It will also contribute to identifying those more at risk of adverse outcomes on admission to a post-acute setting helping service provision and predicting rehabilitation outcomes (Roberts et al. 2019). Numerous frailty screening instruments have been examined in the literature, but there continues to be a lack of clarity on the best method of frailty appraisal (Dent et al. 2019b). There are also guidelines that suggest that frailty screening should be setting and purpose-

specific (Dent et al. 2019a). The limited research undertaken to date has not examined the use of different frailty appraisal tools in a post-acute rehabilitation setting.

This research examined the profile of older adults admitted to a post-acute rehabilitation unit within the Irish healthcare setting and the effects of rehabilitation in relation to impairments, activity limitations and participation restriction in this frail older cohort. This study also explored the level of frailty in post-acute rehabilitation using different methods of frailty appraisal. Clinicians' appraisal of frailty and patients' subjective appraisal of frailty were compared using different frailty appraisal tools and their association with each other explored. The association between methods of frailty appraisal and post-acute rehabilitation outcomes was then examined to establish the utility in this setting of using these tools to guide service provision and models of rehabilitation in the future.

Chapter 1 Literature Review

1.1 Frailty Definition and Models

Frailty is characterised by a weakening in physiological reserve in response to a stressor (Clegg et al. 2013; Chen et al. 2014). Repeated exposure to minor stressors may eventually result in negative changes in health status and potentially increased vulnerability to adverse health outcomes such as falls, early mortality, reduced activities of daily living and hospitalisation (Clegg et al. 2013; Chen et al. 2014; Vermeiren et al. 2016). The accumulation of ageing along with multiple contributors such as reduced physical activity, social, environmental factors, disease, and malnutrition have been perceived as an initial trigger for a cascade of events leading to a cycle of frailty (Lang et al. 2009). Deficits including sarcopenia and loss of reserve capacity are resulting components of this cycle of frailty, predisposing individuals down a path of functional decline (Lang et al. 2009). The prevalence of frailty in Ireland has been reported as 21.5% in adults over the age of 65 years of age, with levels in women twice that of men (24.9% versus 12.6%) (O'Halloran and O'Shea, 2018). Increasing age is associated with increasing levels of frailty in both sexes with greater prevalence of frailty associated with lower educational status, living alone and being widowed in the Irish setting (O'Halloran and O'Shea, 2018).

There is a lack of consensus regarding a single operationalisation of frailty (World Health Organisation, 2017); despite this, it is becoming increasingly recognised that frailty is a dynamic syndrome (Xue, 2011). Different frailty trajectories have been described in the literature including robust, pre-frail and frail with evidence suggesting

that individuals may transition between frailty states over a period of time leading to functional decline (Gill et al. 2006; Lang et al. 2009). Lang et al. (2009) reports that individuals in a pre-frail state have the physiological reserve to withstand an acute illness or injury. Those categorised in higher frailty trajectories are more at risk of recurrent emergency department (ED) attendance, hospitalisation, and mortality (Chamberlain et al. 2016). In a meta-analysis including 32,998 individuals, Chang et al. (2018) examined the impact of different frailty stages (robust, pre-frail and frail) and risk for hospitalisation. Frailer individuals in all the studies were at a greater risk for hospitalisation compared to pre-frail individuals (Risk Ratio (RR) 1.25, Confidence Interval (CI) 1.11-1.14). Those in a pre-frail category were at a higher risk of hospitalisation than those in a robust category (RR 1.20, CI 1.07-1.34). Frailty screening tools varied throughout the studies, which could be deemed a limitation. The findings highlight the lack of consistency in the measurement of frailty in the literature; despite this variability, results indicate risk of hospitalisation at different frailty stages. Frailty also has the potential to be reversed through targeted interventions such as physical activity, nutritional support and reduced polypharmacy (Morley at al. 2013). In a double-blinded randomised control trial (RCT) including 131 frail older women, Kim et al. (2015) found that frailty was four times more likely to be reversed in those receiving 60 minutes of class-based exercise combined with nutrition supplementation three times per week over three months. The inclusion of females only in this study is a major limiting factor.

Methods for identifying frailty have originated from two popular frailty models. Fried et al. (2001) describes a frailty phenotype model where frailty is classified as a syndrome with individuals meeting three out of five phenotypic criteria of reduced

grip strength, reduced gait speed, reduced physical activity, self-reported exhaustion, and unintentional weight loss. One or two of these components characterises individuals as pre-frail and at moderate risk for adverse outcomes. Cheung et al. (2018) highlights that frailty may coexist with disability and multimorbidity; however, other authors such as Fried et al. (2004) established frailty as its own clinical entity. The presence of frailty has been reported to have predictive ability for adverse outcomes such as hospitalisations, falls, reduced mobility and increased disability (Fried et al. 2001; Cesari et al. 2017). In a second approach, Mitnitski et al. (2001) used data from the Canadian Longitudinal Study on Ageing to characterise the number of deficits accumulated to determine levels of frailty. Using a frailty index enables the level of frailty and vulnerability to be quantified (Rockwood and Mitnitski, 2007). The frailty index has a wider quantitative range and is perhaps more sensitive to changes in patients' status over time (Clegg et al. 2013; Cesari et al. 2014). However, specific components of the index are only generated after a Comprehensive Geriatric Assessment, making it a cumbersome initial screening tool (Cesari et al. 2014; Cesari et al. 2017).

1.2 Frailty and Hospital-Associated Decline

Prolonged hospitalisation of an older person due to medical illness may result in a level of deconditioning (Gillis and MacDonald, 2005). This may lead to a reduction in functional performance and independence between admission and discharge (Covinsky et al. 2003). Up to 30% of patients fail to regain their baseline functional status up to one year following discharge (Boyd et al. 2008). Zisberg et al. (2015) examined risk factors for functional decline in 684 hospitalised older adults in a large

prospective cohort study where functional decline at discharge was reported in 41.2%. Reduced physical activity levels, poor continence care and length of stay were significantly associated with this inpatient functional decline ($p<0.001$). Covinsky et al. (2003) reported similar levels of functional decline in a large observational study of 2293 hospitalised older adults. A new functional decline was reported in 35% of patients and was associated significantly with age. Patient profiles in both studies were similar, however Covinsky's study had a significantly larger sample size. Zisberg et al.'s (2015) study is not without limitations as risk factors were only assessed within 48 hours of admission and did not capture other possible risk factors experienced by those with a prolonged length of stay. An individual's social situation at the time of admission was also identified as a risk factor for adverse outcomes associated with hospitalisation, particularly institutionalisation (de Saint-Hubert et al. 2009).

As described earlier by Chang et al. (2018), frailty is strongly associated with increased risk of hospital admission, resulting in the most vulnerable of patient cohorts being exposed to the adverse effects of hospitalisation. Baztan et al. (2017) found significant associations between mortality rates during admission and three months post admission in 623 adults categorised as frail ($p<0.001$) using the Clinical Frailty Scale (CFS). Frailer patients had a longer length of stay and an increased risk for institutionalisation at discharge. Hartley et al. (2017) examined the impact of frailty measured using the CFS in 493 hospitalised older adults, on functional trajectories measured using the Modified Rankin Scale (MRS). Frailty was significantly associated with illness severity on admission. Functional decline was observed irrelevant of an individual's level of frailty on admission; however, the frailest of individuals showed less absolute functional decline possibly due to a ceiling effect of

the MRS. Frailer individuals admitted to the acute hospital did show less and somewhat slower recovery of functional status. However, the retrospective nature of outcome assessment was a limitation of this study.

Gill et al. (2011) highlighted the impact of recurrent hospitalisations on trajectories of frailty in a longitudinal study of 754 community dwelling adults. Level of frailty was established using Fried's phenotype model every 18 months for 108 months. Hospital admissions were recorded monthly by telephone call. Over an 18-month period, 89% of participants had one hospital admission with 88% of participants transitioning between one frailty state, more often to a higher level of frailty. Hospitalisation was significantly associated with transitioning from non-frail to frail states, while the risk increased by 33% with each hospitalisation. Limitations of this study were the lack of information collected regarding hospital length of stay and illness severity which may have contributed to levels of frailty as discussed earlier.

It is evident that hospitalisation of older adults significantly contributes to adverse outcomes including reduced functional status on discharge. Frailer individuals appear to have the highest risk of hospitalisation with repeated hospital admissions contributing to declining frailty trajectories. Frailer individuals showing less functional decline may be reflective of the outcome measures used in the studies and potentially poorer baseline status in the frailer cohort. However, the evidence does indicate that frailer individuals may be slower to recover from hospital associated decline. Post-acute rehabilitation may therefore have a role to play in reducing this functional decline acquired in the acute hospital setting.

1.3 Benefits of Post-Acute Rehabilitation on frailty

Post-acute care encompasses a range of health care settings including inpatient rehabilitation units, which aim to restore patients to the highest possible level of functioning post hospitalisation (Buntin, 2007). A specific definition of post-acute rehabilitation is lacking, as many studies interchange post-acute care with sub-acute care which may take place within an acute hospital setting or externally in specific rehabilitation hospitals. Bachmann et al. (2010) found positive effects of inpatient rehabilitation in older adults on function and mortality; however, frailty was not examined.

Interventions for the management of frailty have been shown to be beneficial across a variety of settings, with multicomponent exercise programmes strongly recommended (Theou et al. 2011; Dent et al. 2019). In an observational study of 104 inpatient older adults, Leung et al. (2016) demonstrated the benefits of post-acute slow stream rehabilitation at improving mobility and function. Patients' mean level of frailty on admission was 0.41 measured using the Comprehensive Geriatric Assessment Frailty Index, indicating moderate levels of frailty. Functional improvement was measured using the Functional Independence Measure with a mean change observed on discharge of 22.16 ($p<0.001$). Significant changes were also observed in balance, mobility status and gait speed from admission to discharge ($p<0.001$). This study showed positive effects of rehabilitation on a frail patient cohort; however, the study was limited to one centre and therapy intervention was not standardised. The impact of frailty on the outcomes of the study are not established in this study's methodology.

In a small observational study, Nolan et al. (2016) also examined the impact of post-acute rehabilitation carried out in a rehabilitation hospital. Unlike Leung et al. (2016),

the impact on frailty was measured. The study included 41 adults over 65 years of which 97.5% were classified as frail using the CFS, with 82.9% falling in the moderate to severely frail categories. Levels of frailty significantly improved during the rehabilitation process ($p<0.001$). A modest but significant relationship was found between levels of frailty on admission and outcomes of physical performance such a Timed Up and Go test (TUG) ($p<0.047$), time spent in therapy ($p<0.019$) and length of stay (LOS) ($p<0.013$). This study showed similar results in relation to the effect of rehabilitation in a frail cohort; however, the very small sample size was a significant limitation.

Romero-Ortuno et al. (2014) examined the impact of frailty on rehabilitation outcomes using the Survey of Health, Ageing, and Retirement in Europe Frailty Instrument (SHARE-FI) in 172 older adults admitted to a short stay unit in a post-acute rehabilitation hospital. Frailty correlated significantly with patients' age ($p<0.001$) and was associated with both increased dependency on admission as measured using the Barthel Index (BI), and LOS. Improvements in BI scores were comparable in non-frail patients highlighting that frail individuals have potential to make functional gains in rehabilitation. These results are similar to those of Nolan et al. (2014), although little information is available on the specific rehabilitation that patients received including physiotherapy, which is a limitation of the study.

In another small observational study, Coleman et al. (2012) reported positive effects of 4-6 weeks of post-acute inpatient rehabilitation on balance and gait in 36 frail older adults. After six weeks, 71.9% of patients remained in the rehabilitation unit as they required further rehabilitation, and only 25% were discharged home. Patients demonstrated significant improvements in measures related to gait speed, balance and

quality of life on discharge. Significant changes were also noted in frailty measured using the CFS ($p<0.001$); however, the influence of frailty on rehabilitation outcomes was not examined. Level of frailty may have contributed to LOS. Other limitations of the study included small sample size and lack of control group.

To date, only a small number of studies exist highlighting the benefits of post-acute inpatient rehabilitation on the frail older adult. A number of studies are available in the community setting examining the benefits of exercise on frailty. In an RCT of 100 community dwelling older adults, Tarazona-Santabalbina et al. (2016) examined the effects of a supervised multicomponent exercise program on frailty. The program was run over 24 weeks and the intervention group attended group exercise five days a week for 65 minutes. Frailty was measured using the Edmonton Frailty Scale and Fried's frailty phenotype. Frailty was reversed in 31% of the intervention group with no reversal seen in the control group. Despite the positive effects on frailty, the intervention was highly intensive and a drop out of 19% was noted in both groups which may be a limitation of the design of the intervention.

In a systematic review of RCTs, de Labra et al. (2015) examined the effects of physical exercise interventions on the frail older adult in acute, community and residential settings. Multi-component exercise programmes were used incorporating walking programmes, circuit training, balance rehabilitation and resistance training in six of the studies, while the remaining studies focused on strength training alone. All the studies showed improvements in mobility, balance, frailty, and functional capacity. However, there was considerable variability in the interventions described such as the intensity and the duration of the studies, sample sizes, level of frailty and frailty definitions used.

In an RCT of 216 community dwelling older adults, Cameron et al. (2013) demonstrated the benefits of a 12-month interdisciplinary rehabilitation intervention in the community on frailty. Participants were recruited from an aged-related rehabilitation community and hospital service. Frailty was measured using Fried's criteria similar to Tarazona-Santabalbina et al. (2016). At 12 months post treatment, significant changes were observed between intervention and control groups in frailty status ($p<0.01$) and in mobility measured by the Short Physical Performance Battery ($p<0.001$). This supports the work by Covinsky et al. (2013) and Hartley et al. (2017) in that rehabilitation of the frail older adult can induce benefits, but it may be a slower process. This study showed aspects of strong methodological quality including clear randomisation methods and blinding, although it is acknowledged that some patients disclosed their treatment status which may have led to contamination of the study. There was also lack of blinding of the intervention group, and no control group. The vulnerability of the cohort of patients and the nature of the study would make it difficult to address these limitations.

Evidence for rehabilitation on the management of frailty exits across a variety of settings including community settings and to a lesser extent post-acute rehabilitation; however, many of the studies described above measured frailty in different ways with lack of clarity on the exact intensity and duration of interventions required. Further research particularly in the post-acute setting is warranted to support the evidence for post-acute rehabilitation in a frail patient cohort and to establish frailty measures that may be associated with rehabilitation outcomes in this setting.

1.4 Screening for Frailty; acute, post-acute and rehabilitation settings

Early identification of vulnerable patients admitted to rehabilitation may give multidisciplinary teams time to implement treatment strategies and reduce adverse outcomes (Roberts et al. 2019). Screening for frailty in those with multimorbidity (NICE 2016) and the use of a setting-specific validated instrument is recommended (Dent at al. 2019a). There are large variations in the numerous frailty measures available with respect to items included in the scales and the model of frailty on which they are constructed on, with a lack of clarity as to what measure is most beneficial (Dent et al. 2019b).

Arjunan et al. (2019) examined the use of a Frailty Index and gait speed and their association with adverse outcomes in 258 older adults on inpatient geriatric rehabilitation wards. A higher frailty index and slower gait speed on admission was predictive of LOS and poor discharge outcomes such as mortality or discharge to a higher level of care ($p<0.001$). The use of both measures together may be useful in identifying the most vulnerable patients. Even though this study was based on geriatric rehabilitation wards within a tertiary hospital and is relevant to a post-acute rehabilitation hospital setting, this study was in a single centre, limiting its generalisability.

Robert et al. (2018) carried out a review of frailty in post-acute care settings. The quality of the research included in the review was limited with only five RCTs available which met inclusion criteria. A variety outcomes measures such as physical (83%), cognitive (61%) and nutritional scales (22%) were used to identify risk factors for adverse outcomes with little consistency noted between studies. Only three studies used a specific frailty scale to measure the level of frailty. One study included in the

review was by Haley et al. (2014), who carried out an observational prospective cohort study of 75 patients admitted to a sub-acute rehabilitation hospital. Haley et al. (2014) reported that the Edmonton Frailty Scale was not predictive of LOS in a sub-acute setting. Frailer patients attended a higher number of therapy sessions compared to less frail patients; however, the less frail were often prioritised out if caseloads were busy, which may have explained the results. Stroke patients were included in this study which may have limited its ability to identify frail patients and the measurement of functional gains; furthermore, the sample size was very small.

In a longitudinal cohort study of 389 patients admitted to a rehabilitation centre, Van der Ploeg et al. (2017) found strong associations between physiotherapist reports of patient fatigue and unintentional weight loss on admission with LOS and mortality. Gait speed was not a predictor in this study; however, this was only based on subjective accounts where objective measures of gait may have indicated a stronger association.

The evidence for the management of frailty and its measurement in a post-acute rehabilitation setting is very limited (Roberts et al. 2018). There appears to be a lack of consistency between measures used with some studies using non-validated measures for identifying frailty or adults at risk. A larger body of evidence examining frailty identification and management in the acute setting is available, particularly in the ED. In the ED, moderate agreement between the CFS as rated by clinicians and patients has been reported (Dresden et al. 2019). In a review, Preston et al. (2018) identified 90 studies in which 57 focused on frailty identification in the ED. Significant heterogeneity in the tools and interventions used in ED make it difficult to draw comparisons between the studies. However, evidence suggested that tools used in the

studies helped to identify appropriate management pathways for patients in the ED setting. The studies included were of varying quality, from systematic reviews to conference abstracts which is a large limitation.

Chong et al. (2018) compared the use of a frailty index with the CFS, the Tilburg Frailty Indicator and the FRAIL scale in 210 patients admitted to an acute geriatric department. The FRAIL scale was more predictive of inpatient mortality; however, the CFS was more predictive of mortality within 12 months. In contrast, two large scale comparable retrospective studies examining the CFS were carried out by Romero-Ortuno et al. (2017) and Wallis et al. (2015). They included 8202 and 5764 older adults admitted to hospital for the first time. The CFS was significantly associated with inpatient mortality ($p<0.001$), LOS and transfer to specialist geriatric wards. However, the studies here were carried out in the same hospital making it difficult to generalise the studies to a national or international level.

Routine frailty assessments have also been encouraged in community-dwelling older people and outpatient settings (Turner and Clegg, 2014). Bongue et al. (2017) examined the predictive ability for adverse outcomes of the Fried phenotype, the Groningen Frailty Indicator, the Abbreviated Comprehensive Geriatric Assessment and the Vulnerable Elders Survey (VES-13) in 1224 community dwelling older adults. The VES-13 showed greatest sensitivity for predicting mortality, institutionalisation and disability; however, none of the tools had strong discriminative ability. Sutorius et al. (2016) compared ten different forms of frailty identification in 102 adults recruited from a primary care centre. The PRISMA-7, gait speed, self-report measures and a Frailty Index showed good levels of accuracy. This study was beneficial as it compared many different frailty identification tools. Variations in the prevalence of

frailty were associated with the frailty measure used. Only one primary care centre was included limiting its generalisability.

In a systematic review of frailty identification methods in primary care, Clegg et al. (2015) identified three studies in which 3261 adults were included. Similar to Sutorius et al. (2016), PRIMSA-7 and gait speed demonstrated high sensitivity; however, most of the scales had low specificity which limits their value as single assessment tools for frailty. Theou et al. (2015) examined the difference between a self-reported frailty index, a test-based frailty index or a combination of both, in measuring frailty in 4961 community dwelling older adults. Little difference was observed between the methods of frailty assessment; however, the combined approach was stronger at predicting adverse outcomes (ROC 0.64-0.81). Patients who were unable to travel to test centres were excluded from the analysis. Therefore, the results may not be reflective of the frailest community-dwelling, institutionalised or hospitalised older adults.

There is no clear consensus regarding the most appropriate screening measure for frailty in any setting, including post-acute rehabilitation. Prevalence can vary depending on the measure of choice. Further research is warranted to establish the most valuable method of frailty screening within each specific setting at identifying frailty prevalence.

1.5 Conclusion

Frailty is a dynamic concept with evidence that it may transition between states. Repeated exposure to hospitalisation may influence the trajectory of frailty and it is often associated with adverse outcomes during and post-hospitalisation of the older adult. There is evidence to suggest that rehabilitation of the frail older adult may take a longer period of time, but it has the potential to influence levels of frailty. However,

the studies examining rehabilitation of the frail older adult vary significantly in methodological quality and interventions used. As a result, it is difficult to draw conclusions regarding specific intervention protocols for frailty management.

Screening for frailty across a variety of settings has been recommended. Frailty screening on admission to post-acute rehabilitation services may be beneficial in monitoring the level of patients at risk of adverse outcomes in a post-acute rehabilitation setting; however, only a few studies to date have looked at use of frailty identification measures in this environment. There are numerous methods of frailty identification available; however, to date no one method has been recommended in any particular setting. Lack of a standard definition of frailty makes it difficult to establish the wealth of evidence required to support a single method of frailty identification. Due to limited evidence available in a post-acute rehabilitation setting on frailty and frailty screening, the aims of this study were: firstly, to identify the prevalence of frailty in a post-acute rehabilitation unit using two methods of frailty appraisal a clinician's appraisal and a patient's subjective appraisal; and secondly, to compare the association between two methods of frailty appraisal with post-acute rehabilitation outcomes.

Chapter 2 Methodology

2.1 Aims and Objectives

The primary aim of this study was to compare clinicians' appraisal of frailty and patients' subjective appraisal of frailty and explore their association with post-acute rehabilitation outcomes.

2.1.1 Study Objectives

1. To profile the cohort of older adults admitted to a post-acute rehabilitation setting.
2. To describe levels of frailty among a cohort of inpatient older adults in a rehabilitation unit using two methods of frailty appraisal and explore the association between these methods.
3. To evaluate the post-acute rehabilitation outcomes of this cohort of older adults using measures of impairment, activity limitations and participation restriction.
4. To explore the association between patients' frailty on admission with their post-acute rehabilitation outcomes using patients' subjective appraisal and clinicians' appraisal of frailty screening methods.

2.2 Study Design

This study used a prospective cohort design evaluating the association between two methods of frailty appraisal with outcomes of physical function and quality of life. The Strengthening the Reporting of Observational Studies in Epidemiology

(STROBE) guidelines (Appendix 1) were followed to ensure a standardised approach to the conduct of the study (von Elm et al. 2007).

2.3 Sample

2.3.1 Participant Recruitment

A convenience sample of patients admitted to the Age-Related Rehabilitation Unit in Peamount Healthcare between October 2019 and February 2020 was recruited. The primary investigator (PI) screened new admissions for eligibility (see inclusion and exclusion criteria, section 2.3.2). Once deemed eligible, a gate keeper (physiotherapy staff member) approached suitable participants and asked for permission for the PI to discuss the study with them and invite them to participate. Following receipt of consent to discuss the study from the gatekeepers, the PI met with potential participants to the discuss the nature of the study including benefits, risks and right to withdraw from the study and issued a patient information leaflet (PIL) (Appendix 2). Participants were given 24 hours to review the information and decide if they would like to participate or not. Following 24 hours, the PI met with eligible participants again, explained the nature of the study and answered any questions. Once eligible participants agreed to participate, they reviewed and signed the consent form (Appendix 3) and received their own signed copy of this consent form.

2.3.2 Inclusion and Exclusion Criteria

Inclusion Criteria

- Aged over 65 years admitted to the Age-Related Rehabilitation Unit from the acute or community setting.
- Able to give informed consent.
- Mobile with or without aid on admission to the unit.
- Medically stable for rehabilitation.

The following patients were excluded from the study:

- Patients with a new diagnosis of stroke admitted for stroke rehabilitation.
- Patients deemed unable to provide informed consent by the rehabilitation team.
- Patients unable to mobilise prior to acute hospital admission or at baseline.

2.3.3 Sample Size

A power calculation was completed using normative data from a geriatric inpatient setting by Brooks et al. (2006) and older adults with hip fracture (Kristensen et al. 2011). To detect a minimal clinical important difference of 2.9 seconds in the Timed Up and Go (TUG) between admission (31.9 seconds) and discharge (29.1 seconds) with a standard deviation of 6.9 and using a power of 80% with an alpha of 5% requires an estimated sample size of 38 participants. To allow for a dropout rate of 20%, it was anticipated that a total number of 46 patients would be recruited.

2.3.4 Pilot Study

Two participants were recruited as part of a pilot study to identify exact assessment procedures. These participants were not included in the analysis of final results. The

length of time for the assessments was established at 30 minutes. The addition of a yes and no box was added to the formal supports question in the data sheet as a result of the pilot.

2.4 Ethical Considerations

The study was approved by the joint Tallaght University Hospital and St James's Hospital (TUH/SJH) Joint Research Ethics Committee and the Royal College of Surgeons in Ireland (RCSI) Research Ethics Committee (Appendix 4). Participant recruitment commenced following receipt of approval from the ethics committees (Appendix 5). The PIL (Appendix 2) highlighted the details of the study, what information was gathered, and where and for long how it would be stored.

2.4.1. Informed Consent

Informed consent was sought from each participant prior to commencing the study and participants were informed of their right to opt out of the study and that participation was voluntary. All patients admitted to the rehabilitation unit were screened for eligibility. A gate keeper approached eligible participants to establish their interest in participating and asked for consent for the PI to discuss the study with them. The PI met with each patient and issued them with a PIL (Appendix 2) which explained the nature of the study including the purpose, risks and benefits and highlighted participation as voluntary. Each participant was given 24 hours to review the information. Following this the PI met with the participant again and answered any questions they had. Once happy to participate, the participant signed the consent form. A copy of the consent form was issued to each participant. Once informed consent was gained data collection commenced.

2.4.2 Data Collection and Storage

All data gathered were coded, pseudo-anonymised and stored securely in line with General Data Protection Regulation (GDPR) (2018), in an encrypted Excel file in a personal drive on a password protected hospital computer in a locked physiotherapy space. Codes for the data were stored in a separate file. All hard copy data were stored in a locked filing cabinet in a locked physiotherapy office as per TUH/SJH research ethics committee guidance.

The results of routine outcome measures were documented in the participants' medical healthcare records at the time of assessment by the PI as part of best practice. This avoided duplication of assessments by treating therapists which minimised assessment burden.

Following completion of the study all hard copy data were uploaded onto the secure personal drive on a password protected computer in the locked physiotherapy office at Peamount Healthcare and hard copies were shredded using the confidential shredding company in the hospital. All research data will be stored on the hospital computer for five years, at which point it will be deleted.

2.5 Assessment Procedure

2.5.1 Initial Assessment

Participants completed their initial assessments between 24 and 48 hours of admission to the unit where possible. However, patients admitted on a Friday waited 72 hours

for assessment as they required 24 hours to review the PIL. To assure standardisation, the PI carried out all Initial Assessments (T1) and all Discharge Assessments (T2). Baseline demographic data was gathered by the PI from the participants' medical chart and entered into a data collection sheet (Appendix 6). Information gathered included age, presenting complaint, gender, social situation, baseline functional status and acute hospital LOS. Number of medications was gathered using a count method of admission medications with five or more, indicating polypharmacy (Masnoon et al. 2017). Past medical history was taken from the medical chart and added together to provide the number of comorbidities.

Time 1 (T1) questionnaires including the Identification of Seniors at Risk Questionnaire (ISAR) and the European Quality of Life 5 Domains Questionnaire (EQ-5D-5L) were completed at the participants' bedside or in the reading room if the ward was busy. Following this, participants were brought to the physiotherapy gym where they completed objective measures including the Timed Up and Go test (TUG), the Elderly Mobility Scale (EMS) and grip strength. If the participant was unable to complete all assessments on the same day due to fatigue, they were offered the opportunity to complete the assessments the following day.

Equipment required for the assessments included a stopwatch, ruler, handheld dynamometer, a plinth, a 6-metre walkway and a cone. To ensure standardisation, the TUG was completed in the same location in the gym for each participant using the same chair. All data was entered on to the data collection form (Appendix 6). Results of routine outcome measures were also entered into the participants' medical charts to avoid duplication of assessments. A Clinical Frailty Scale score was established for

each participant within one week of admission at a weekly multidisciplinary team (MDT) meeting held each Monday.

2.5.2 Description of rehabilitation phase in a post-acute rehabilitation setting

Participants were admitted from two referring acute hospitals or through a reablement pathway from the community for rehabilitation. All participants underwent routine multidisciplinary (MDT) rehabilitation under consultant geriatrician-led medical care. All participants received nursing care, physiotherapy and occupational therapy routinely and input from speech and language therapy, clinical nutrition, pharmacy, medical social work and counselling when required. All participants received routine physiotherapy which included a comprehensive assessment and patient-centred goal setting. Interventions chosen were based on the findings from the comprehensive initial physiotherapy assessment and goals identified with their respective therapists. Physiotherapy intervention occurred at least four days per week for 30-45minutes and consisted of strengthening exercises for upper and lower limbs, balance retraining, gait re-education, stairs and transfer practice. Some participants also attended extra therapy in the form of a lower limb strengthening class three days a week for 30 minutes if deemed appropriate.

Participants were discussed each week at a brief MDT meeting and every second week at a larger MDT meeting where rehabilitation goals were discussed, and discharge planning was facilitated. Once physiotherapy goals had been achieved, all participants were placed on a maintenance programme, which consisted of 30 minutes of therapy delivered by a physiotherapy assistant between 2 and 4 days per week while awaiting discharge home. Therapy consisted of similar rehabilitation exercises used by the

treating therapist. If there was a prolonged delay in discharge home, participants were discharged from the physiotherapy service after a period of maintenance rehabilitation. Prior to discharge home all participants were issued with a home exercise programme and received onward referral to local community therapy services or day hospital when indicated.

2.5.3 Discharge Assessments

Time 2 (T2) assessments were completed by the PI where possible 24-48 hours prior to discharge from the unit. The participants were asked to complete the EQ-5D at the bedside by the PI and were then invited to the physiotherapy gym to repeat the primary objective measures of the TUG, EMS and a grip strength measure. Following completion of the T2 assessments, participants were informed about their progress during rehabilitation. Results of T2 assessments were documented in the participants' medical chart by the PI after completion.

Following discharge, the PI gathered information regarding applications for social supports, discharge destination, length of stay, number of physiotherapy contacts and mobility status from the participants' medical chart and inputted these data onto the data collection sheet (See Appendix 6).

2.6 Frailty Appraisal

Subjective appraisal and clinical appraisal of frailty took place on admission (T1).

2.6.1 Subjective Appraisal of Frailty:

The Identification of Seniors at Risk Questionnaire (ISAR) (Appendix 7) was used to assess patients' subjective appraisal of frailty. The ISAR is a screening tool used to

identify adverse outcomes following Emergency Department (ED) attendance in older adults (Sutton at al. 2008). It comprises six questions regarding baseline dependency, hospital admissions, current dependency, vision, memory and medications. A score of two or greater classifies the patient at risk for functional decline. The ISAR has been shown to have modest predictive pooled specificity (Sp) for mortality 6 months post ED attendance (sp=0.87, 95% CI 0.75-0.94), emergency hospitalisation (sp=0.82, CI 95% 0.70–0.87) and return to the emergency department (sp=0.80, 95% CI 0.74–0.88) (Galvin et al. 2017).

2.6.2 Clinician Appraisal of Frailty:

Clinicians' appraisal of frailty was assessed using the Canadian Study of Health and Aging Clinical Frailty Scale (CFS) (Appendix 8). The CFS is a 9-point scale where clinicians provide a global clinical impression of patients' level of frailty with 1 (very fit) to 9 (terminally ill). The CFS score of each participant was established one-week post-admission at an MDT meeting. Medical, nursing and therapy teams rated each participant at the MDT meeting on the CFS. If there was discrepancy in scores a discussion was undertaken, and the final score was reached using majority consensus. The CFS has been reported to have a high inter-rater reliability (intra-class coefficient (ICC) 0.97, $p<0.01$) and good criterion validity for 5-year prediction of death or institutionalisation (Rockwood et al. 2005). It has demonstrated strong correlation with the Frailty Index (r=0.80). Its construct validity for measuring frailty by medical professionals in a hospital setting has been reported (Gregorevic et al. 2016).

2.7 Rehabilitation Outcomes

Rehabilitation outcomes included the primary outcome of the Time Up and Go taking place on admission (T1) and discharge (T2).

2.7.1 Primary Outcome

The primary outcome for the study was the Timed Up and Go (TUG) (Appendix 9). The TUG involves standing up from a chair 46 cm in height with arm rests, walking at a "usual pace" 3 metres out and back to return to sit in the chair. A trial test was given to the patient and an average of three tests is taken as the final score. A minimal clinical important difference (MCID) of 3 seconds has been reported for the TUG (Brooks et al. 2006; Kristensen et al. 2011). High test-retest reliability has been described in older adults in inpatient rehabilitation settings (ICC 0.80-0.95) (Yeung et al. 2008; Kristen et al. 2011). It demonstrates moderate correlation with gait speed (r=-0.55) and is validated in inpatient geriatrics (Podsiadlo and Richardson 1991; Brooks et al. 2006). Associations between the TUG and levels of frailty and increased functional dependency in acute and community dwelling adults has also been reported (Savva et al. 2013; Eagles et al. 2017; Lee et al. 2020).

2.7.2 Secondary Outcomes

The Elderly Mobility Scale (EMS) (Appendix 10) is a validated scale used to assess mobility in the older adult population (Smith 1994; Prosser and Canby 1997; Spilg et al. 2001). It contains seven components of functional mobility including bed mobility, sit to stand, functional reach, and gait speed. It is scored from 0 to 20 with a higher score indicating greater functional independence. Prosser and Canby (1997)

demonstrated concurrent validity (*rho=0.*79, p< 0.001) and high inter-rater reliability (*rho*= 0.88, p<0.0001) in hospitalised older adults. The EMS has been shown to have high concurrent validity with the Barthel Index (r = 0.962) (Smith 1994).

Grip Strength (Appendix 11) was measured using a handheld dynamometer with the average of three tests to be used to increase reliability (Mathiowetz et al. 1984). Grip strength was measured sitting with the elbow at 90 degrees. Grip strength has been shown to be associated with increased mortality and an indication of overall health (Bohannon 2008; Bohannon 2015; Bohannon 2019). Roberts et al. (2012) reported that hand grip was associated with LOS in a rehabilitation unit, with changes in strength associated with discharge to usual residence (Kerr et al. 2006). Reduced grip strength is also associated with weakness and reduced gait speed (Alley et al. 2014). The combination of grip strength and gait speed measures has shown a positive predictive value of 87.5% for identifying frailty (Lee et al. 2017).

Quality of life was assessed using the Euroqol-5D-5L (EQ-5D-5L) (Appendix 12). It measures health-related quality of life across many health conditions and rates self-perceived status in relation to five domains including mobility, pain/discomfort, mood, self-care and activities of daily living (ADLs). Participants were asked to rate each domain in relation how they perceived themselves on the day of the assessment with five different possible scores assigned to each domain. The therapist read out each question if the patient requested or if they required assistance. The participants also rated their overall general health status from 0 to 100 on a visual analogue scale. The EQ-5D shows good discriminatory power (mean 1.87) and convergent validity with the World Health Organisation Five Well Being Index with a reduced ceiling affect compared to other versions of the measure (Janssen et al. 2013). It shows good

reliability, validity, responsiveness and utility in older adults and in a hospital setting (Holland et al; 2004, Haywood et al; 2005; Grund et al. 2017).

2.8 Statistical Methods

The data were analysed using the Statistical Package for the Social Sciences (IBM SPSS Version 25) for Windows. Missing outcome measure data at T2 was accounted for using T1 scores (n=3). Baseline demographic data was summarised using descriptive statistics (See Appendix 13). Normality of data was established using a Shapiro-Wilks's test (See Appendix 13). Paired t-tests were used to measure changes in normally distributed data and Wilcoxon Singed Rank tests were used for non-parametric data from T1 to T2 (See Appendix 13). A Chi-square test was used to explore the relationship between frailty measures (See Appendix 13). Associations between frailty variables and outcome measures were measured using Spearman Rank order correlation tests for non-parametric data and Pearson Correlation tests for parametric data (See Appendix 13).

Chapter 3 Results

3.0 Introduction

This chapter will present the results of the study where the primary aim was to compare clinician's appraisal of frailty and patient's subjective appraisal of frailty and establish their association with post-acute rehabilitation outcomes in a post-acute rehabilitation unit.

The objectives were:

1. To profile a cohort of older adults presenting to a post-acute rehabilitation setting.
2. To describe levels of frailty among a cohort of inpatient older adults in a rehabilitation unit using two methods of frailty appraisal and explore the association between these methods.
3. To evaluate the post-acute rehabilitation outcomes of this cohort of older adults using measures of impairment, activity limitations and participation restriction.
4. To explore the association between patients' subjective and clinicians' appraisal of frailty and the post-acute rehabilitation outcomes in this cohort.

3.1 Participant Flow

Recruitment took place in the post-acute rehabilitation setting of Peamount Healthcare from the end of October 2019 to mid-February 2020. During this timeframe fifty-two patients were admitted to the rehabilitation unit in Peamount Healthcare and screened for inclusion. Thirty-six patients were eligible for inclusion and three declined to

participate. One participant withdrew from the study shortly after commencement. The final sample included thirty-two participants. The flow of patients in the study is outlined in Figure 3.1.

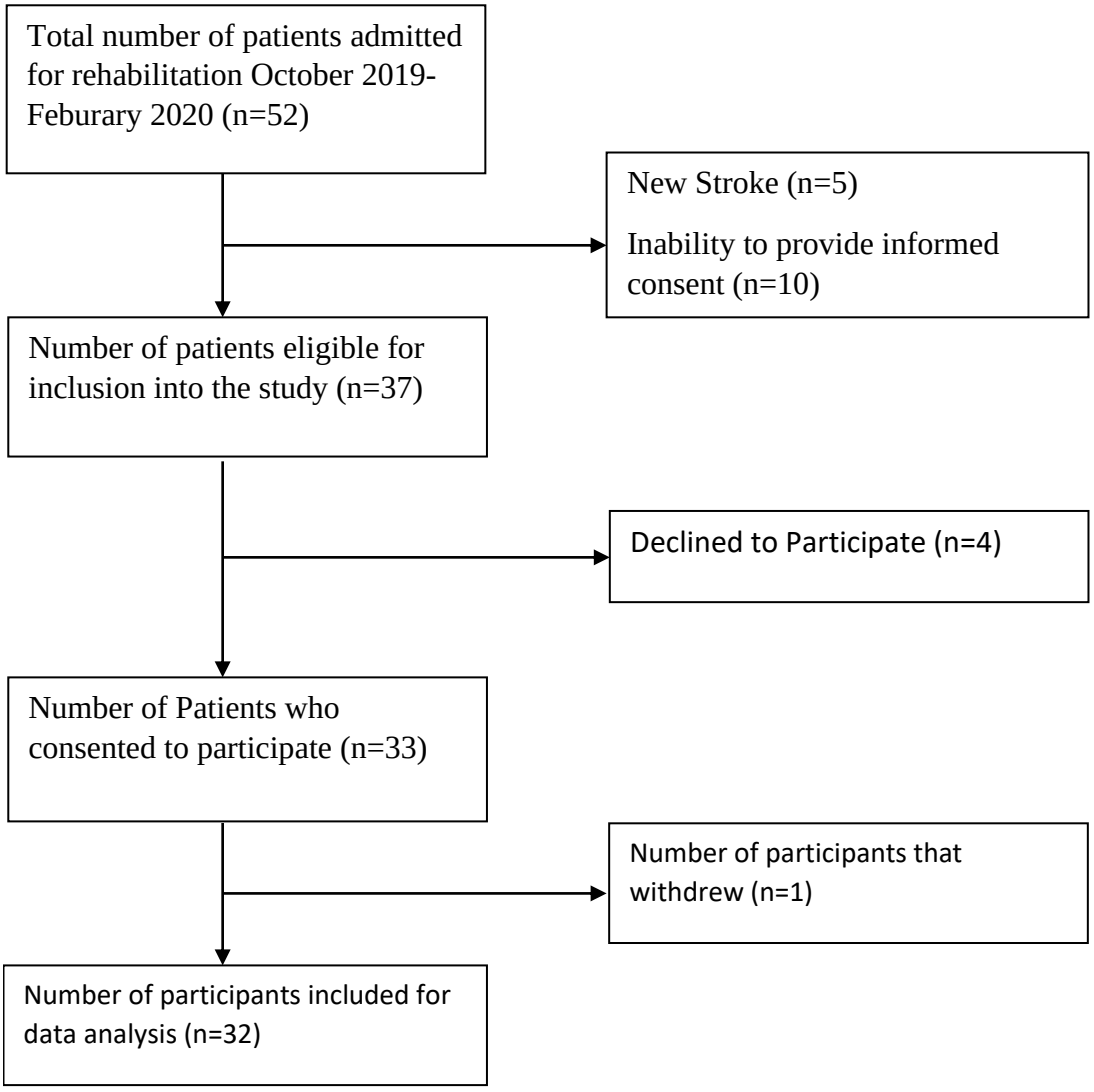

Figure 3.1 Participant flow through the study

3.2 Patient Profile

3.2.1 Baseline Demographics

The mean participant age was 82.66 (±SD 8.31) years. A total of 50% of the participants were over 85 years of age and 65.6% of participants were female. Ninety seven percent (n=31) were admitted from the acute hospital with three percent (n=1) admitted from home as part of a reablement programme. A total of 65.7% (n=21) participants were admitted to hospital secondary to a fall with over half of the participants (56.3%, n=18) sustaining a fracture secondary to the fall. All participants (100%) had polypharmacy and required five or more medications and had a mean number of 6.97 (±SD 1.73) comorbidities. Half of the sample was living alone (50%, n=16) with 72% (n=23) having either formal or informal support prior to admission. At baseline, all participants were independently mobile with 65.6% (n=21) using a mobility aid. Baseline demographic data are presented in Table 3.1 and presenting conditions and baseline functional status are presented in Table 3.2.

3.2.2 Rehabilitation and Discharge Demographics

On admission to post-acute rehabilitation, 75% (n=24) of participants required supervision or assistance to mobilise and transfer with an aid. Ninety five percent (n=23) of those requiring assistance or supervision to transfer and mobilise with an aid on admission were classified as frail using the CFS. Participants received a median (IQR) of 15 (13) physiotherapy sessions. The median (IQR) length of stay in post-acute rehabilitation was 23 (22) days. A total of 84.4% (n=27) were discharged home with 6.3% (n=2) transferred to the acute hospital as they were medically unwell. A total of 9.4% (n=3) remained an inpatient with two of these patients experiencing a

delay in discharge as they were awaiting increased home supports. Over half, 53.1% (n=17) did not require any change in supports on discharge; however, 31.2% (n=10) required new or increased social supports on discharge.

Table 3.1 Baseline Demographic Data

Baseline Demographic Data		
	Mean	**SD**
Age (years)	82.66	8.31
Medications	12.22	3.65
Comorbidities	6.97	1.73
	Median	**IQR**
Acute Hospital Length of stay(days)	16	20
	n	**%**
Male	11	34.4
Female	21	65.6
65-74(yrs.)	8	25
75-84 (yrs.)	8	50
85+ (yrs.)	16	50
Living Alone	16	50
Baseline Social Supports	18	56.3

IRQ=Interquartile range, SD=Standard deviation

Table 3.2 Presenting conditions, transfer and mobility status (N=32)

Presenting Conditions		
	Number	**%**
Fall	2	6.3
Fall and Fracture	18	56.3
Fracture, no fall	1	3.1
Fall dislocation	1	3.1
Respiratory Tract Infection	4	12.5
Other	1	3.1
Urinary Tract Infection	1	3.1
Cardiac Condition	1	3.1
Respiratory Condition	1	3.1
Limb Cellulitis	1	3.1
Deconditioning	1	3.1
Baseline Transfer Status		
	n	**%**
Independent with or with aid	31	96.9
Assistance with aid	1	3.1
Baseline Mobility Status		
	n	**%**
Independent, with or without an aid	32	100

3.3 Levels of Frailty and Association Between Two Screening Methods

3.3.1 Clinician Appraisal of Frailty

The median (IQR) level of frailty on admission as measured by the CFS was 6 (1). The majority of participants (59.4%, n=19) were classified as moderately frail (CFS = 6). Figure 3.2 below displays the levels of frailty as measured by the CFS.

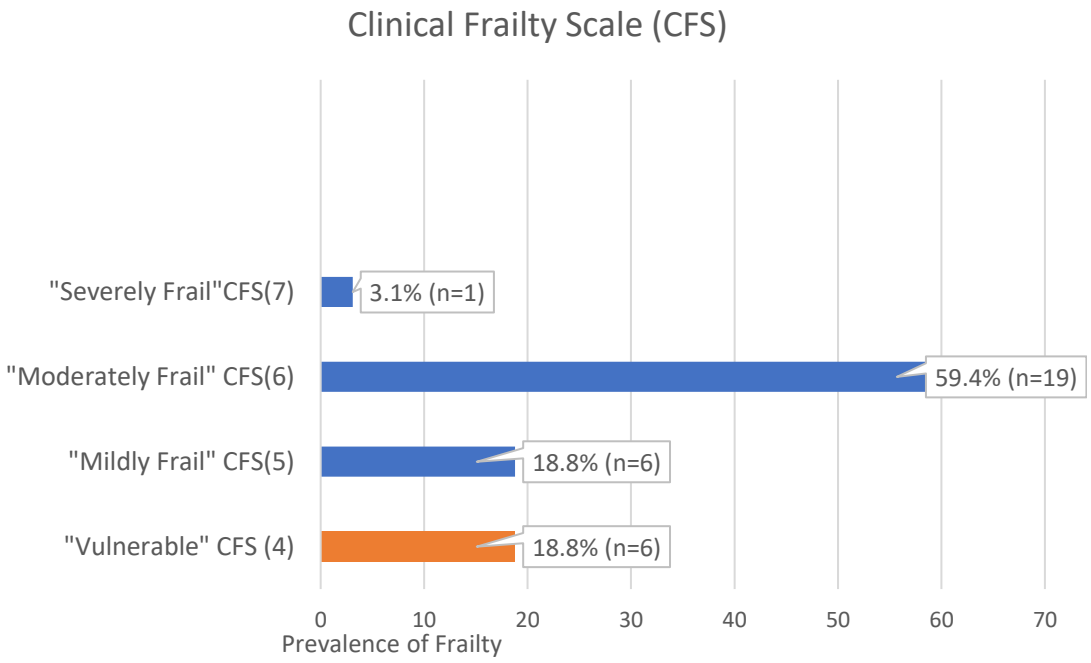

Figure 3.2 Level of frailty as measured by the Clinical Frailty Scale.

3.3.2 Patients' Subjective Appraisal of Frailty

The median (IQR) level of frailty as measured by the ISAR was 2(1). A total of 84.4.% (n=27) scored two or more on the ISAR, indicating a high subjective appraisal of frailty and risk for adverse outcomes. A small percentage of participants 15.6% (n=5) scored 1 on the ISAR indicating that these participants did not report themselves frail. Figure 3.3 below displays these findings.

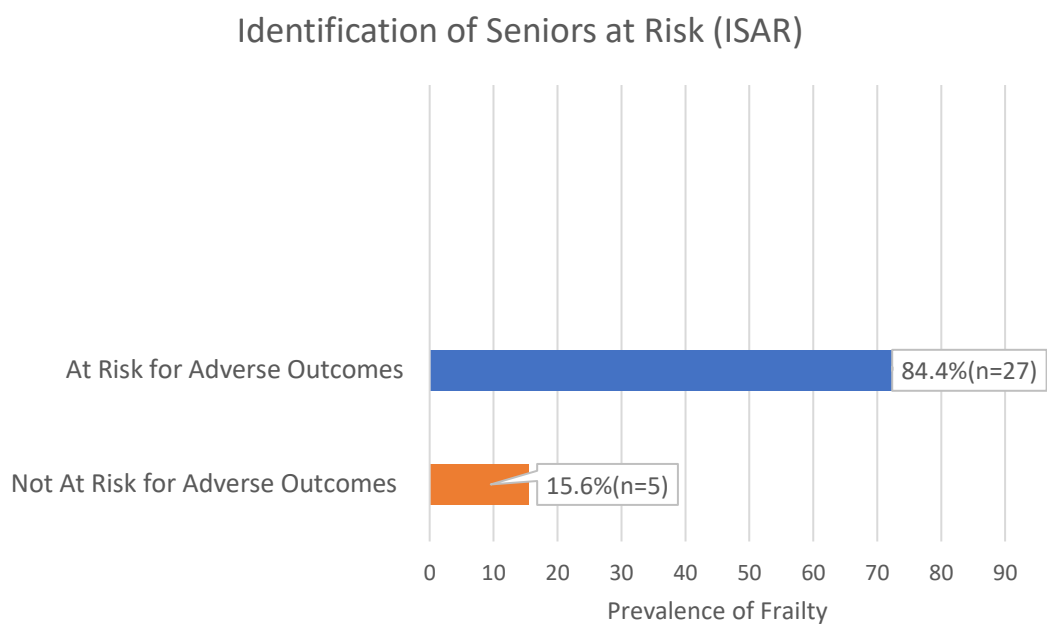

Figure 3.3: Level of frailty as measured by the ISAR

3.3.3 Comparison of Clinicians' Appraisal of Frailty with Patients' Subjective Appraisal of Frailty

A total of 81.3% (n=26) of participants were classified as frail by clinicians on admission using the CFS compared to 84.4.% (n=27) using patients reported ISAR. Figure 3.4 illustrates the comparison between levels of frailty when clinician and subjective measures are used. There was no significant difference in the proportion of participants identified as frail when subjective and clinician's appraisal of frailty were used (x^2=0.00, p=1.00). There was no significant association between the CFS and the ISAR frailty tools with frailty status (phi=0.01, p=0.94).

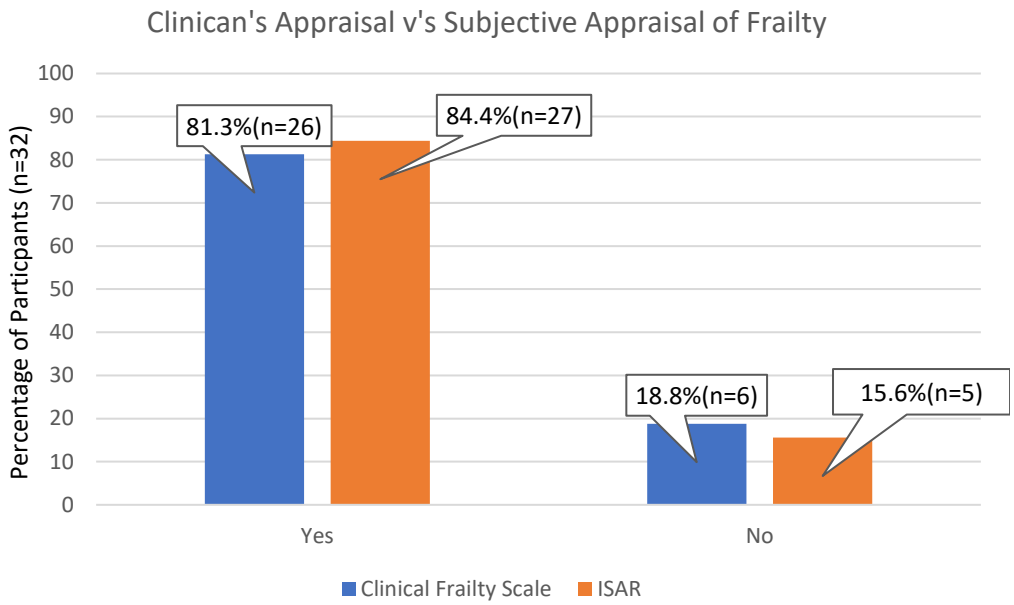

Figure 3.4: Comparison of clinicians' appraisal of frailty versus subjective appraisal of frailty.

3.4 Clinical Profile from Admission to Discharge

3.4.1 Changes in Rehabilitation Outcomes from T1 to T2.

Participants' TUG scores decreased from a median (IQR) of 28.36 (26.81) seconds on admission to a median (IQR) 20.06 (23.63) seconds at the time of discharge. There was a significant change between the TUG from admission to discharge ($p<0.001$). Significant changes were also observed from T1 to T2 in the EMS, left grip strength, EQ-5D VAS and EQ5D health domains of mobility, self-care, usual activities and pain/discomfort as outlined in Table 3.3. A paired T Test was used to establish the significance between T1 and T2 in grip strength measures and EQ5D-VAS. A Wilcoxon Signed Rank test was used to evaluate the changes between T1 and T2 for the TUG, EMS and EQ5D Health domains. Table 3.3 outlines the change in scores from T1 to T2 and the results of the statistical tests.

Table 3.3: Changes in rehabilitation outcomes from T1 to T2 (n=32)

	Time 1 Median (IQR)	Time 2 Median (IQR)	z score	p-value
Timed up and Go	28.36 (26.81)	20.06 (23.63)	-4.08	<0.001*
EMS	14.00 (8)	17.00 (6)	-4.56	<0.001*
	Mean (SD)	**Mean (SD)**	**t score**	**p-value**
Grip Strength R (kg)	15.35 (8.25)	15.83 (8.12)	-1.11	0.28
Grip Strength L (kg)	13.62 (7.84)	14.85 (7.41)	-2.07	0.05*
EQ5D VAS	59.38 (23.38)	71.25 (20.10)	-3.31	0.002*
EQ5D Health Domains	**(n=) %**	**(n=) %**	**z score**	**p-value**
Mobility			-2.65	0.008*
No Problems	4 (12.5)	11 (34.4)		
Any Problems	28 (87.5)	21 (65.6)		
Self-Care			-3.74	<0.001*
No Problems	8 (25)	22 (68.8)		
Any Problems	24 (75)	10 (31.3)		
Usual Activities			-3.05	0.002*
No Problem	5 (15.5)	16 (50)		
Any Problem	27 (84.5)	16 (50)		
Pain/Discomfort			-2.12	0.03*
No Problem	10 (31.3)	16 (50)		
Any Problem	22 (68.8)	16 (50)		
Anxiety/Depression			-0.38	0.71
No Problems	21(65.6)	20 (62.5)		
Any Problems	11(34.4)	12 (37.5)		

*Significant at p≤0.05. T1=Admission, T2= Discharge, IRQ=Interquartile range, TUG= Timed Up and Go, EMS= Elderly Mobility Scale, EQ5D VAS= EuroQol Visual Analogue Scale, kg =Kilogram, SD=Standard Deviation, N=, number of participants.

3.4.2 Changes in Transfers and Mobility from T1 to T2

At T2, 84.4% (n=27) were transferring independently with or without an aid compared to 25% (n=8) on admission. A total of 15.6% (n=5) required supervision or assistance to transfer at T2 compared to 75% (n=24) on admission. A significant change was found in transfer status from T1 to T2 ($p<0.001$).

At T2, 84.4% (n=27) were mobilising independently without an aid compared to 25% (n=8) at T1. A total of 15.6% (n=5) required either assistance or supervision to mobilise with an aid at T2 compared to 75% (n=24) at T1. There was a significant change in mobility status from T1 to T2 ($p<0.001$).

3.5 Correlation between frailty measures and rehabilitation outcomes

3.5.1 Clinicians' Appraisal of Frailty with Significant Rehabilitation Outcomes

As outlined in Table 3.4, there were strong positive correlations between frailty on admission as measured by clinicians using the Clinical Frailty Scale with the TUG (rho=0.64, $p<0.001$) and EMS (rho=-0.61, $p<0.001$) on discharge. There was no significant association between clinicians' appraisal of frailty on admission and the EQ5D or left grip strength (r=-0.23, p=0.20) on discharge. Table 3.4 below summarises the results in relation to clinicians' appraisal of frailty and rehabilitation outcomes, impairment, activity limitation and participation restriction at discharge.

Table 3.4: Correlations between clinicians' appraisal of frailty and significant rehabilitation outcome measures

Clinicians' Appraisal of Frailty: CFS Time 1			
Significant Outcomes at T2	**Correlation Co-efficient**	**Significance (p-value)**	**Intensity of Correlation**
TUG	*rho*= 0.64	<0.001	Strong Positive
EMS	*rho*= -0.61	<0.001	Strong Negative
EQD5 Mobility	*rho*= -0.22	0.23	Not Significant
EQ5D Self Care	*rho*= 0.15	0.42	Not Significant
EQ5D Usual Activities	*rho*= 0.13	0.46	Not Significant
EQ5D Pain/Discomfort	*rho*= 0.04	0.84	Not Significant
EQ5D VAS	*r*= 0.10	0.60	Not Significant
Left Grip Strength	*r*= -0.23	0.20	Not Significant

**rho*=Spearman Correlation Coefficient, *r*=Pearson Correlation Coefficient. Correlation significant at 0.001 levels (2-tailed), VAS=Visual Analog Scale, EQ5D=EuroQol, EMS=Elderly Mobility Scale, TUG=Time Up and Go.

3.5.2. Patients' Subjective Appraisal of Frailty with Significant Rehabilitation Outcomes

A relationship between patients' subjective appraisal of frailty and quality of life on discharge was identified. A strong positive association (rho=0.59, p<0.001) was identified between patients' subjective rating of frailty and self-reported self-care needs at T2 with a moderate negative association (r=-0.42, p=0.02) identified with

overall health rating at T2. There was no significant relationship between self-rating of frailty and outcomes of impairment and activity limitations. Table 3.5 below summarises the results in relation to patients' subjective appraisal of frailty and rehabilitation outcomes measures in relation to impairment, activity limitation and participation restriction at discharge

Table 3.5: Correlation between patients' subjective appraisal of frailty and significant rehabilitation outcome measures

Patients' Subjective Appraisal of Frailty: ISAR T1			
Significant Outcomes at T2	**Correlation Co-efficient**	**Significance (p-value)**	**Intensity of Correlation**
TUG	*rho*= 0.19	0.30	Not Significant
EMS	*rho*= -0.33	0.07	Not Significant
EQ5D Mobility	*rho*= 0.27	0.14	Not Significant
EQ5D Self Care	*rho*= 0.59	<0.001*	Strong Positive
EQ5D Usual Activities	*rho*= 0.32	0.08	Not Significant
EQ5D Pain/Discomfort	*rho*= -0.22	0.24	Not Significant
EQ5D VAS	r= -0.42	0.02*	Moderate Negative
Left Grip Strength	*r*= -0.17	0.36	Not Significant

rho=Spearman Correlation Coefficient, *r*=Pearson Correlation Coefficient. Correlation significant at 0.05 levels (2-tailed) VAS=Visual Analog Scale, EQ5D=EuroQol, EMS=Elderly Mobility Scale, TUG=Time Up and Go.

3.6 Summary of Results

Patients admitted to a post-acute rehabilitation had a profile of being over 80 years of age, with the majority of participants rated as frail upon admission. No difference was observed in the proportion of participants identified as frail whether clinicians' appraisal or subjective appraisal of frailty was used. No significant association was identified between CFS and ISAR. The results demonstrated significant improvements in relation to measures of impairment, activity limitation and participation restriction in frail older adults undergoing rehabilitation.

A relationship was observed between clinicians' rating of frailty on admission with measures of activity limitations on discharge with a strong positive association found with the TUG on discharge and a strong negative association with the EMS on discharge. No relationship was found between clinicians' rating of frailty and measures of impairment such as grip strength and participation restriction such as in all components of the EQ5D. A relationship was observed between subjective appraisal of frailty on admission with measures of quality of life on discharge. A strong positive association was observed between patients' subjective appraisal of frailty on admission and self-reported self-care needs on discharge and a moderate negative association was noted between subjective appraisal of frailty on admission and overall health rating on discharge. No relationship was identified between subjective appraisal of frailty and measures of impairment or activity limitations on discharge. These results will be discussed in Chapter 4.

Chapter 4 Discussion

4.1 Introduction

In this study, improvement in strength, functional mobility and quality of life was demonstrated after a period of post-acute rehabilitation in frail older adults. Clinician appraisal of frailty using the CFS and patient subjective appraisal using the ISAR identified similar proportions of the cohort being frail however scores on the tools were not correlated. Clinician appraisal of frailty on admission was associated with improvements in levels of impairment and activity limitations at T2. Patient subjective appraisal of frailty on admission was associated with higher quality of life but there was little association with measures of impairment or activity limitations.

4.2 Patient Profile in Post-Acute Rehabilitation

The baseline profile of study participants including mean age of 82.66 (±SD 8.31) and predominately female gender were comparable to previous studies in similar settings (Haley et al. 2014, Romero-Ortuno et al. 2014, Nolan et al. 2016, Leung et al. 2016, Van der Ploeg et al. 2017). The most common reason for admission to rehabilitation was secondary to a fall resulting in a fracture (n=18, 56.3%) which was similar to prior reports (Romero-Ortuno et al. 2014, Haley et al. 2014, Nolan et al. 2016). All the participants mobilised independently with or without an aid prior to admission. Over half of the participants lived alone (n=16, 50%) similar to Coleman et al. (2012) and Romero-Ortuno et al.'s (2014) study; however, 56.3% of the sample here required formal supports prior to admission. All the sample had polypharmacy (≥5 medications, 100%) and the mean number of comorbidities was 6.97, slightly higher than Coleman et al.'s (2012) and Haley et al.'s (2014) reports. On admission to rehabilitation, 75% (n=24) of participants required assistance to mobilise and transfer.

Mobility and transfer status improved significantly from T1 to T2 ($p<0.001$), with 84.4% mobilising and transferring independently on discharge despite a significant proportion being classified as frail on admission. The median (IRQ) LOS was 23 (22) days with 31.2% of participants requiring new or increased home supports on discharge. The LOS was comparable to the median LOS of 19 days reported by Haley et al. (2014), and was considerably less than the 6 weeks recommended by The National Clinical Programme for Older Person (HSE 2012) and reports in similar studies, with a median LOS of 82.5 days and 42 days reported (Leung et al. 2016, Romero-Ortuno et al. 2014).

Participants included in this study were comparable to previous studies in similar settings. The sample appeared to have a high functional baseline in relation to mobility prior to acute hospital admission with a clear functional decline noted during acute hospitalisation which has been noted in previous studies (Covinsky et al. 2003). Risk factors for functional decline and frailty were identified throughout the sample.

4.3 Levels of Frailty and the Association Between Methods of Appraisal

Two different methods of frailty appraisal were used in this study. As regards clinicians' rated level of frailty on admission using Rockwood et al.'s (2005) CFS, a total of 81.3%, (n=26) of participants were classified as frail on admission with the majority rated as moderately frail (59.4% n=19). Similar levels of moderate frailty were reported by Leung et al. (2016) using a comprehensive geriatric assessment where mean frailty score on admission was 0.4. Nolan et al. (2016) also reported moderate levels of frailty (58.5%, n=24) using the CFS but reported a higher number of severely frail participants (24.4% versus 3.1%). Level of frailty on admission was

considerably higher than the 56.5% identified as frail by Romero-Ortuno Roman et al. (2014), but that study used the SHARE Frailty Instrument and had a retrospective study design. Lower levels of frailty were reported by Haley et al. (2014) using the Edmonton Frailty Scale. Haley et al. (2014) did conclude that the Edmonton Frailty scale may not be an appropriate measure to use in a subacute rehabilitation setting.

As regards subjective appraisal of frailty on admission using the ISAR, 84.4% (n=27) scored as frail. There were no significant differences in levels of frailty reported between clinician or subjective appraisal methods. However, when measured, there was no direct correlation between the ISAR and CFS. Where clinicians rated 26 participants as being frail using the CFS (5-7), four of these participants did not rate themselves as frail on the ISAR. Dresden et al. (2019) previously found moderate agreement between clinician rating of frailty and patients rating of frailty using the CFS in the Emergency Department, but also reported that patients were more likely to rate themselves as "fit" and "well" (CFS 1 and 2) whereas clinicians were more likely to rate individuals in the "moderate" to "very severely" frail (CFS 6 to 8). Theou et al. (2015) also reports lower levels of frailty when a self-report frailty index was used. A combined approach of a self-report and objective frailty index were stronger at predicting adverse outcomes in this study. Van der Ploeg et al. (2017) reported strong agreement between physiotherapists' and patients' ratings of frailty indicators, but in that study, clinicians and participants used the same frailty criteria making direct comparisons easier.

As has been noted in previous studies, there appears to be a tendency for clinicians to rate frailty in a higher domain compared patients' own rating. Unlike other studies there was little direct association found between the CFS and the ISAR score which

differs from other studies, but those studies often compared the same frailty tool perhaps facilitating more comparable results.

4.4 Rehabilitation Outcomes and their Association with Frailty

Indictors for frailty seen throughout the sample at T1 included reduced grip strength and reduced functional mobility (Fried et al. 2001). The accumulation of age, multiple comorbidities, living alone, and acute hospitalisation of a median (IQR) 16 (20) days may have predisposed the current sample to functional decline and a cycle of frailty (Lang et al. 2009). At T2 there were significant improvements in baseline rehabilitation outcome measures of impairment, activity limitation and participation restriction. Relationships were also identified between frailty and rehabilitation outcomes.

4.4.1 Impairment: Grip Strength

There was a statistically significant change from T1 to T2 in left grip strength in this study (p=0.05) with no significant change noted in right grip strength. The mean grip strength on discharge for females was 15.01kg and 15.47kg in males. Female discharge scores were higher than mean scores reported for inpatient females undergoing rehabilitation; however, grip strength in males was considerably less (Roberts et al. 2014). Scores overall were comparable to those reported by Nolan et al. (2016); however, values were considerably less than reported community-dwelling population normative values (Bohannon et al. 2006, Kenny et al. 2013).

Post-rehabilitation scores for grip strength were less than cut off points (26 kg in men and 16 kg in females) reported by Alley et al. (2014) as a sign of weakness and associated with reduced gait speed. There was an average change of 1.2 kg in left grip strength however the 0.5 kg change found in right grip strength is less than the

previously reported 1 kg change associated with a 3% increase in discharge to usual residence by (Kerr et al. 2006). This could be attributed to the higher number of females in the study who on admission had higher than normal average grip strength in a rehabilitation setting (Roberts et al. 2014).

Low grip strength is identified as a key marker for frailty (Fried et al. 2001). There is also evidence to suggest that grip strength is a biomarker for issues contributing to reduced health status such as falls, recurrent hospitalisation, malnutrition and multimorbidity (Bohannon 2019). However, no association was found between frailty measured by clinician or by participants and T2 scores of left grip strength. Similar findings were reported by (Nolan et al. 2016).

4.4.2 Activity Limitation: EMS and TUG

There was a significant change in median TUG scores from T1 to T2 ($p<0.001$). Median TUG at T1 was 28.36 seconds, considerably lower than T1 scores reported by Nolan et al. (2016) and Coleman et al. (2012) of 42.5seconds and 59 seconds. Perhaps this could be explained by the greater number of severely frail participants recruited in the study by Nolan et al. (2016). The TUG on discharge was 20.06 seconds which was comparable to post-test TUG scores reported by Nolan et al. (2016). In community dwelling older adults, a TUG score of greater than 30 seconds indicates increased dependence for transfers and mobility with scores of less than 20 seconds indicative of complete independence with basic transfers (Podsiadlo and Richardson 1991). In the current study at T1, 75% of the participants required assistance or supervision to mobilise, while at T2 84.4% were mobilising and transferring independently.

There was mean (±SD) change of -8.68(13.58) seconds between T1 and T2. Similar levels of changes in the TUG were reported in an older adult population following a period of rehabilitation with a minimal clinically importance difference of three seconds reported in TUG scores (Brooks et al. 2006). In hip fracture patients who score 30 seconds in the TUG at baseline, a change of 9.3 seconds in a group of patients or three seconds in a single patient indicates real changes in functional mobility (Kristensen et al. 2011). The results of the present study are comparable to this.

There was a strong positive relationship between clinicians' rating of frailty on admission and TUG scores at T2 ($p<0.001$). Higher ratings of frailty on admission by clinicians were associated with higher TUG scores at T2. Others have also reported moderate to strong associations between the TUG and frailty within the acute, post-acute and community settings (Savva et al. 2013, Nolan et al. 2016, Eagles et al. 2017). Associations between the TUG and increased risk of functional dependency in community dwelling older adults have also been reported (Lee et al. 2020). Savva et al. (2013) reported TUG scores of >10seconds to be highly sensitive for identifying 96% of frail individuals. Higher cut-offs of >15 seconds are more sensitive in identifying individuals in the pre-frail and frail domains; however, they lack specificity for pre-frail individuals (Savva et al. 2013). Using this method, at T1 87.5% of participants recorded TUG of >15 seconds which is a comparable level of frailty identified at T1 in this study using both methods of frailty appraisal. A total of nine participants scored under the 15 seconds at T2, indicative of frailty (Savva et al. 2013). Four of these participants were rated as not frail/vulnerable on admission by clinicians; however, interestingly only one participant self-rated as not frail. Direct comparison

between frailty at discharge and TUG using Savva et al.'s (2013) method cannot be made due to lack of frailty appraisal at this time point.

In contrast, no relationship was found between patients' subjective rating of frailty and T2 TUG scores despite similar proportions of adults being identified as frail. This is also consistent with the lack of a direct association found between measures used for subjective and clinicians' objective appraisal of frailty.

A clinically relevant change was also noted in participants in the EMS from T1 to T2 ($p<0.001$). The median change in EMS was 3 points. This change was slightly less then median changes of 4 points reported by (Nolan et al. 2016 and Haley et al. 2016). At T1, median EMS scores were 13 indicating patients were borderline in terms of mobility and required some assistance with ADL's (Smith 1994). At T2 the median EMS was 17 which indicates a greater level of functional mobility and increased readiness to return home (Smith 1994).

A strong negative relationship was noted between clinicians' appraisal of frailty and T2 EMS scores. Those rated frailer by clinicians on admission had significantly lower functional mobility as rated by the EMS on discharge. Nolan et al. (2016) also reported a moderate negative relationship with respect to the frailty and the EMS on discharge. Haley et al. (2016) found no relationship between frailty and the EMS; however, this may also reflect the different frailty measure used. Patients' subjective appraisal of frailty at T1 did not correlate with the EMS on discharge. Interestingly, Dresden et al. (2019) reported patients' self-rating of frailty was higher in those who had difficulty with selfcare and difficulty with routine ADL's; however, this was not objectively measured making difficult direct comparison with EMS scores.

Overall, significant improvement in post-acute rehabilitation outcomes in the frail older adult were noted in activity limitations particularly in functional mobility and transfers. Clinicians' appraisal of frailty was associated more with activity limitation outcomes than patients' subjective appraisal. The association of frailty with TUG and EMS score may be dependent on the method of frailty appraisal used.

4.4.3 Participation Restriction: EQ5D VAS and Health Domains

Following a period of post-acute rehabilitation, patients demonstrated a significant improvement in quality of life in the domains of mobility, self-care, usual activities, and pain and discomfort. No significant change was noted in the domain of anxiety and depression. Similar improvements in the domains of mobility, self-care and usual activities were noted in a similar frail cohort of 356 participants in slow stream rehabilitation settings (Comans et al. 2013). Similar to findings by Comans et al. (2013), at T2 in the present study over 65% of participants rated mobility as a problem, however over 60% rated no problem with anxiety or depression. A small percentage of participants (3.1%) rated themselves as "extremely" anxious on discharge similar to Comans et al.'s (2013) study. However, it is unclear from the methodology what version of the EQ5D was used in the study therefore these comparisons are made with caution. Currently, no normative data exists for the EQ5D-5L. When compared to normative data in the EQ5D-3L in those over 60 years of age, a greater percentage of participants in this study reported problems in all domains except pain and discomfort (Janssen and Szende 2014).

Clinically relevant changes were also found in overall health rating as measured by the VAS from T1 to T2 ($p=0.002$). At T2 overall median health rating was 71.25

comparable to health ratings reported in similar studies of frail older adults undergoing post-acute rehabilitation (Coleman et al. 2012, Nolan et al. 2016). The health rating in this study also reflects normative data in the United Kingdom (VAS 73.8) for community dwelling adults over 75 years of age (Janssen and Szende 2014). Higher levels of self-reported frailty on admission were moderately associated with lower health ratings following a period of post-acute rehabilitation. This finding is consistent with other studies examining the impact of frailty on quality of life (Gobbens et al. 2012, Lahousse et al. 2014, Crocker et al. 2019).

Similarly, a strong positive relationship was found between self-perceived frailty status and higher self-perceived dependency in self-care requirements on discharge. No similar relationship was identified between mobility, usual care, pain/discomfort or anxiety/ depression. However, the percentage of participants (31.2%) reporting problems in selfcare at T2 was lower than any other health domain. Interestingly the same percentage of participants (31.2%) required new or increased home supports on discharge. In the present study, clinicians' appraisal of frailty using the CFS was not associated with quality of life outcomes. This finding is similar to the findings in Nolan et al.'s (2016) study. In the review by Crocker et al. (2019) a wide heterogeneity of frailty measures and quality of life tools were included, and it was concluded frailty clearly and sustainably impacts quality of life in community dwelling older adults. Lack of association here may mean the sensitivity of the frailty tool chosen may have impacted the results.

Only levels of frailty subjectively rated by participants were associated with quality of life outcomes in this study. From this study it cannot be concluded as to what, if any, aspects of post-acute rehabilitation influenced quality of life. It must also be

considered that improvement in acute medical status and change of environment from the acute hospital setting to a post-acute rehabilitation setting may have all been influential in improving quality of life experienced by participants.

4.5 Clinical Implications

The Sláinte Care report in 2017 highlights some of the key priorities within the Irish healthcare system, including the provision of efficient services for clinicians and patients and improving outcomes. The aim is to provide healthcare that meets the needs of the whole population that is effective and supports people to live in the community *(Houses of the Oireachtas Committee on The Future of Healthcare: Sláinte Care Report 2017)*. Early identification of vulnerable patients on admission to a post-acute rehabilitation setting may help with service provision, patient management and reduce adverse outcomes (Roberts et al. 2019).

From this study it is evident that the frail older adult improves with a period of post-acute rehabilitation. Frailty has moderate to strong associations with different rehabilitation outcomes; however, this is highly dependent on the method of appraisal and the frailty appraisal tool used. It is difficult to establish from this study which method of frailty appraisal, if any, is superior in a post-acute rehabilitation setting. Both methods provide different yet potentially complementary information in relation to rehabilitation outcomes. However, it would not be an efficient use of time to carry out patient and clinician appraisal of frailty for each patient. A frailty screening tool that is validated in the post-acute rehabilitation setting that is sensitive and specific to the different domains of frailty and is associated with a wider range of rehabilitation

outcomes would help policy makers, service providers and clinicians provide the most effective patient specific rehabilitation service for this aging population.

4.6 Limitations of the Study

- The sample size in this study was small and underpowered to detect some associations. The planned sample size for the study was 38, which would be required to detect significant changes in the TUG.

- As a single centre study, it is difficult to generalise the results across other rehabilitation centres due to potential variations in rehabilitation services and models of rehabilitation.

- A proportion of patients with cognitive impairment unable to provide consent and with new neurological conditions were excluded from this study. Inclusion of this cohort may have provided a more representative cohort of patients admitted to post-acute rehabilitation within the Irish healthcare system.

- This was an observational based study with no control group. Specific improvements in outcomes may have been influenced by other factors which were not controlled for such as the natural healing process, environmental factors and medical management. Therefore, improvements achieved during the study cannot be attributed to post-acute rehabilitation alone.

- Therapy time and intensity was not captured in this study therefore it is unknown to what extent therapy influenced rehabilitation outcomes.

- The use of two different styles of frailty tools made it difficult to make direct comparisons between clinician and patient ratings of frailty.

- Frailty was not measured on discharge (T2) in this study which is a limitation. Clinicians' and patients' perception on changes in level of frailty was not established as a result.

4.7 Recommendations for Further Research

- Future research should include large multicentre follow up studies to examine if rehabilitation gains are consistent across sites and are sustained in different groups of frail older adults.

- In any large multicentre prospective study in post-acute rehabilitation units there should be systematic efforts to compare clinician and patient appraisal of frailty using a common frailty tool. This would assist with understanding the utility of frailty screening in a post-acute rehabilitation setting.

- Future multicentre research should also examine the association with outcomes of levels of frailty across the acute to post-acute settings. This may support the development of fast track pathways to enable timely transfer of frail patients from the acute to post-acute services.

- Multicentre and cross-site research as patients transition between the acute to post-acute rehabilitation services could explore aspects of acute and post-acute rehabilitation that are influential in quality of life in this patient cohort and support the development of patient driven rehabilitation services which may enhance quality of life in frail older adults at a national level.

- A large RCT with consistent delivery and intensity of interventions in a post-acute rehabilitation setting, would be beneficial in examining what intensity of therapy is required to induce clinically relevant gains in the frail older

population. The insights gained would then guide service provision in rehabilitation centres.

4.8 Conclusion

There is a considerable drive within the Irish healthcare system under Sláinte Care to enhance patient and clinician experience, improve outcomes, and deliver efficient and integrated services that will support and enable older individuals to live as independently for as long as possible in their own community.

The findings of the present study highlight the profile of patients admitted to a post-acute rehabilitation unit within the Irish healthcare setting. A cohort of frail older adults with multiple comorbidities were recruited, many of whom lived alone. A significant proportion of participants required physical assistance to mobilise and attend to their personal needs following acute hospitalisation. Following a period of rehabilitation this frail older cohort demonstrated significant improvements in grip strength, functional mobility, and quality of life. The majority of patients returned to live at home alone and were able to mobilise independently with only as small percentage requiring increased supports.

A high proportion of participants recruited in this study were identified as frail using both clinician appraisal and patient subjective appraisal of frailty. There was no direct association found between scores on the two screening tools used in this study. The relationship between frailty and rehabilitation outcomes varied depending the method of appraisal used. Clinicians' appraisal of frailty was strongly associated with outcomes of activity limitations with little association noted between levels of impairment and participation restriction. In contrast patients' subjective rating of frailty was associated moderately to strongly with quality of life in post-acute rehabilitation; however, no associations were noted with levels of impairment and activity limitation.

Early identification of frail older adults admitted to rehabilitation may help with service provision and influence the model of rehabilitation provided. No consensus from this study can be drawn in relation to the best method of frailty appraisal in a post-acute rehabilitation setting. Both methods were associated with different but equally important rehabilitation outcomes. Despite limitations in the study positive findings were seen in frail older adults undergoing rehabilitation. Further research is warranted to explore frailty screening tools and methods of frailty appraisal in a post rehabilitation setting.

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Appendices

Appendix 1 Strobe Guideline Checklist for Observational Studies

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No.	Recommendation	Page No.	Relevant text from manuscript
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	I	Summary Methods
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	I	Summary
Introduction				
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	1	Introduction
Objectives	3	State specific objectives, including any prespecified hypotheses	18	Section 2.1.1
		Methods		
Study design	4	Present key elements of study design early in the paper	18	Section 2.2
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	19	Section 2.3.1
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	20	Section 2.3.3
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	N/A	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	27	Section 2.6 and 2.7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	22-27	Section 2.5.1 and 2.5.1 and Section 2.6 and 2.7
Bias	9	Describe any efforts to address potential sources of bias	22	Section 2.5.1
Study size	10	Explain how the study size was arrived at	20	Section 2.3.3

Continued on next page

Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	29	Section 2.8
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	29	Section 2.8
		(*b*) Describe any methods used to examine subgroups and interactions	N/A	
		(*c*) Explain how missing data were addressed	29	Section 2.8
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	N/A	
		(*e*) Describe any sensitivity analyses	N/A	
		Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	30	Section 3.1
		(b) Give reasons for non-participation at each stage	30	Figure 3.1
		(c) Consider use of a flow diagram	30	Figure 3.1
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	32-36	Section 3.2 and 3.3
		(b) Indicate number of participants with missing data for each variable of interest	29	Section 2.8
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	35	Section 3.2.2
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	*35-37*	Section 3.3 and 3.4
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	*N/A*	
		Cross-sectional study—Report numbers of outcome events or summary measures	*N/A*	
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	35-39	Section 3.3 and 3.4 and 3.5
		(*b*) Report category boundaries when continuous variables were categorized	N/A	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A	

Continued on next page

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A	
Discussion				
Key results	18	Summarise key results with reference to study objectives	43-52	Section 4.2 and 4.3 and 4.4
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	54	Section 4.6
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	58	Section 4.8
Generalisability	21	Discuss the generalisability (external validity) of the study results	52	Section 4.5
Other information				
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	N/A	

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

Appendix 2: Patients Information Leaflet

PARTICIPANT INFORMATION LEAFLET

Frailty Measures and Their Association with Post-Acute Rehabilitation Outcomes

Principal Investigator: Louise McCarron Senior Physiotherapist Age Related Rehabilitation Unit Peamount Healthcare Newcastle Co Dublin.

Supervisor's:

1) Prof. Frances Horgan, Royal College of Surgeons in Ireland. Contact email fhorgan@rcsi.ie
2) Dr Rose Galvin, University of Limerick. Contact email rose.galvin@ul.ie
3) Prof Roman Ortuno Global Brain Institute Trinity College Dublin romeror@tcd.ie

You are invited to take part in this research study which is being carried out in the Age-Related Rehabilitation Unit at Peamount Healthcare by Louise Mc Carron Senior Physiotherapist. Before you decide to participate in this study take time to read the information leaflet carefully. You may want to discuss it with your family or friends. Take enough time to ask questions and don't feel under pressure to make a decision. In order to make an informed decision it is important you understand the risk and benefit of taking part in the study. You don't have to take part in the study, and it will not affect your care in the rehabilitation unit if you decide not to participate in the study. You can also decide to change your mind and with draw from the study at any point in time and you can be reassured that it won't affect your care if you decide to opt out halfway through.

PART 1 – THE STUDY

Why is this study being done?

This study is been undertaken as part of a physiotherapy masters research project at the Royal College of Surgeons in Ireland (RCSI). The purpose of the study is to see if different screening forms looking at frailty help health professionals to understand how you progress in your rehabilitation while here at Peamount. As part of the project, we will follow your progress during rehabilitation to see if your mobility, strength and level of function improve.

Why am I being asked to take part?

You are being invited to participate as you were admitted to the rehabilitation unit to help improve your mobility, function and ability to carry out important daily tasks.

Do I have to take part? What happens if I say no? Can I withdraw?

You don't have to take part in the study, and it will not affect your care in the rehabilitation unit if you decide not to participate in the study. You can also decide to change your mind and withdraw from the study at any point in time without giving a reason and you can be reassured that it won't affect your care if you decide to opt out halfway through. If you wish to opt out, please contact Louise Mc Carron Senior Physiotherapist Age Related Rehabilitation Unit 01-6515933

How will the study be carried out?

This study will take place on rehabilitation unit in Peamount Healthcare from the Summer 2019 until February 2020. On admission to the Age-Related Rehabilitation Unit all suitable patients will be invited to participate in the study by a gatekeeper – physiotherapy staff member. You will be given time to read the patient information leaflet and answer any questions. If you are happy to participate you will be asked to sign a consent form.

What will happen to me if I agree to take part?

Once you sign the consent form the primary investigator/research physiotherapist (Louise McCarron) will provide you with two short questionnaires to complete one about to quality of life and the second in relation to levels of frailty. It will ask questions about your general health and how much help you require at present and before hospital. The research physiotherapist will then take you to the physiotherapy gym and assess your grip strength and your functional mobility including the speed at which you walk.

Following this you will commence your normal rehabilitation programme in the gym as normal with your assigned physiotherapist. This study will not interfere with your normal physiotherapy input. Once your rehabilitation is complete and before you go home, the primary investigator will reassess your grip strength and mobility and ask you to re-complete the initial questionnaire about quality of life to see how you have improved during your rehabilitation.

Are there any benefits to me or others if I take part in the study?

This study will enable us to see how you have progressed during your rehabilitation while at Peamount. It will also help therapists to see if the screening tools used at the start of rehabilitation are helpful in seeing how patients progress with their rehabilitation.

Are there any risks to me or others if I take part in the study?

During the mobility assessment there may be a risk of losing your balance, but the Primary Investigator will ensure all falls risks will be minimised and will be beside you for the full assessment.

Will I be told the outcome of the study?

You will be told how you progressed during your rehabilitation by the research physiotherapist after your mobility is reassessed. The information gathered in the study will be used as part of a master's thesis and may be published in a journal however your information will not be identifiable if published.

PART 2 – DATA PROTECTION

What information about me (personal data) will be used as part of this study? Will my medical records be accessed?

In order to complete the study your medical chart will be reviewed to gather information such as your date of birth, gender, your reason for admission, the length of time you were in hospital if appropriate ,the number of medications you take, how you walked prior to admission and if you have any other medical conditions. Information on your living situation and social supports will be gathered. We will also be collecting information regarding your strength, mobility, quality of life and level of frailty.

What will happen my personal data?

Only data necessary for the study will be collected. All hard copy data and consent forms will be transferred into an electronic format and hard copies will be shredded immediately post the study. This data will be stored in an electronic format securely in Peamount Healthcare for the duration of the study and for a duration of 5 years post completion of the study. Following this period, the electronic data will be destroyed. The results of your physiotherapy assessments relating to your walking, mood and strength will also be written into your medical chart, so your physiotherapist does not have to repeat them.

Who will access and use my personal data as part of this study?

Only the research physiotherapist and supervisors will have access to the personal data collected.

Will my personal data be kept confidential? How will my data be kept safe?

All data will remain confidential. On admission you will be issued with a unique code that will be assigned to all paper and electronic copies of your data. This code will be secured in a separate file on a password protected computer that only the research physiotherapist will have access too. Any data gathered will be kept securely in a locked cabinet in the Peamount physiotherapy department. Electronic Data will be stored on a password protected desktop computer in the physiotherapy office.

Louise Mc Carron (Primary Investigator, Data Collector, Data Processor)
Senior Physiotherapist,
Age Related Rehabilitation unit
Peamount Healthcare
Newcastle Co Dublin
lmccarron@peamount.ie
01-6515922
(8.30-4.30)

Research Supervisors:

Prof. Frances Horgan, Royal College of Surgeons in Ireland. Contact email fhorgan@rcsi.ie
Tel: 01 4022472 (9-5pm)

Dr Rose Galvin, University of Limerick. Contact email rose.galvin@ul.ie (9-5pm)

Prof Roman Ortuno Global Brain Institute Trinity College Dublin romeror@tcd.ie (9-5pm)

Appendix 3: Consent Form

CONSENT FORM

Frailty Measures and Their Association with Rehabilitation Outcomes

To be completed by the **PARTICIPANT**:

I have read and understood the information leaflet and I have been given sufficient time to do so.	YES ☐	NO ☐
I have had the opportunity to discuss the study, ask questions about the study and I have received satisfactory answers to all my questions.	YES ☐	NO ☐
I have received enough information about this study.	YES ☐	NO ☐
I understand that I am free to withdraw from the study at any time without giving a reason and this will not affect my future medical care.	YES ☐	NO ☐
I give informed explicit consent to allow the researchers use and process my information (personal data) as part of this study as outlined in the information leaflet.	YES ☐	NO ☐
I agree to allow the researchers access my medical records as part of this study.	YES ☐	NO ☐
I have been given a copy of the information leaflet and signed consent form for my records.	YES ☐	NO ☐
I agree to be contacted by researchers as part of this study	YES ☐	NO ☐
I consent to take part in the study having been fully informed of the benefits, alternatives and risks.	YES ☐	NO ☐

Participant's Name (Block Capitals):	
Participant's Signature:	
Date:	

To be completed by the **RESEARCHER**:

I have fully explained the purpose and nature (including benefits and risks) of this study to the participant in a way that he/she could understand. I have invited him/her to ask questions on any aspect of the study that concerned them.	YES ☐	NO ☐
I confirm that I have given a copy of the information leaflet and consent form to the participant.	YES ☐	NO ☐

Researcher's Name (Block Capitals):	

Researcher's Title & Qualifications:	
Researcher's Signature:	
Date:	

Appendix 4: Ethics Application

SAF – Version 5.6 (Sep 2014) / Revised (Aug+Oct 2018)

APPLICATION FORM

For the Ethical Review of Health-Related Research Studies, which are not Clinical Trials of Medicinal Products For Human Use as defined in S.I. 190/2004

DO NOT COMPLETE THIS APPLICATION FORM
IF YOUR STUDY IS A CLINICAL TRIAL OF A MEDICINAL PRODUCT

THIS APPLICATION FORM HAS BEEN ADAPTED FROM THE STANDARD APPLICATION FORM TO COMPLY WITH THE DATA PROTECTION ACT (2018) AND THE DATA PROTECTION ACT (HEALTH RESEARCH) REGULATIONS 2018: APPLICATIONS SUBMITTED ON OR AFTER 8TH AUGUST 2018 WILL ONLY BE ACCEPTED USING THIS VERSION OF THE FORM

REVISIONS ARE HIGHLIGHTED IN YELLOW

Title of Study: Frailty Measures and their Association with Post-Acute Rehabilitation Outcomes.

Application Version No:

Application Date:

For Official Use Only – Date Stamp of Receipt by REC:

TABLE OF CONTENTS /OPTIONAL MANDATORY

This Application Form is divided into Sections.

*Sections A, B, C, D, E, J and K are **Mandatory.**

(Sections F, G, H, I and L are optional. Please delete Sections F, G, H, I and L if these sections do not apply to the application being submitted for review.)

IMPORTANT NOTE: Please refer to **Section I** within the form before any attempt to complete the Standard Application Form. **Section I** is

designed to assist applicants in ascertaining if their research study is in fact a clinical trial of a medicinal product.

IMPORTANT NOTE: This application form permits the applicant to delete individual questions within each section depending on their response to the preceding questions. Please respond to each question carefully and refer to the accompanying *Guidance Manual* for more in-depth advice prior to deleting any question.

PLEASE ENSURE TO REFER TO THE ACCOMPANYING GUIDANCE MANUAL
WHEN COMPLETING THIS APPLICATION FORM.
SAF – Version 5.6 (Sep 2014) / Revised (Aug+Oct 2018)

SECTION A: GENERAL INFORMATION

SECTION A IS MANDATORY

A1. What is the title of the research study?

Frailty Measures and their Association with Post-Acute Rehabilitation Outcomes

A2. Is this a single site or multi-site study? Single Site

For single site studies: Answer questions A3 (a) and (b) and delete questions A3 (c), (d) and (e)

A3(a). Where will this single site study will take place?

Age Related Rehabilitation Unit Peamount Healthcare

A3(b). Who is the principal investigator with overall responsibility for the conduct of this single site study?

Title: Ms.
Name: Louise McCarron
Qualifications: BSc (HONS) Physiotherapy
Position: Senior Physiotherapist
Dept: Physiotherapy Department
Organisation: Peamount Healthcare
Address: Physiotherapy Department, Peamount Healthcare, Peamount Road, Newcastle Co Dublin
Tel: 0877669616
E-mail: lmccarron@peamount.ie

For multi-site studies: Answer questions A3 (c), (d) and (e) and delete questions A3 (a) and (b)

A4. Who are the co-investigators for this study?

Name: Catherine Slattery
Position: Director of Rehabilitation
Organisation: Peamount Healthcare
Address: Peamount Healthcare, Peamount Road, Newcastle, Co Dublin.
Tel: 01-6010374
Email: cslattery@peamount.ie

A5. Who is the lead contact person i.e. the person to receive correspondence in relation to this application or be contacted with queries about this application.
Name: Louise McCarron
Position: Senior Physiotherapist
Organisation: Peamount Healthcare

Address for Correspondence: Physiotherapy Department, Peamount Healthcare, Peamount Road, Newcastle Co Dublin
Tel (work): Answer
Tel (mob.): 0877669616
E-mail: lmccarron@peamount.ie

A6(a). Is this study being undertaken as part of an academic qualification? Yes

If No, delete A6(b) and (c).

A6(b) If Yes, complete the following:
Student Name(s): Louise McCarron
Academic Course: MSc Neurology and Gerontology RCSI
Academic Institution: Royal College of Surgeons

A6(c) Academic Supervisor(s):
Title: Prof. **Name:** Frances Horgan
Qualifications:
Position: Acting Head RCSI School of Physiotherapy
Dept: Physiotherapy
Organisation: Royal College Of Surgeons
Address: Physiotherapy , The Royal College Of Surgeons ,123 St Stephens Green Dublin 2 Ireland
Tel: 01-4022472
E-mail: fhorgan@rcsi.ie

Title: Dr. **Name:** Rose Galvin
Qualifications:

Position: Honorary Lecturer
Dept: Physiotherapy RCSI
Organisation: Royal College Of Surgeons
Address: Physiotherapy , The Royal College Of Surgeons ,123 St Stephens Green Dublin 2 Ireland
Tel: Answer
E-mail: rose.galvin@ul.ie

Title Prof. **Name:** Roman Romero-Ortuno
Qualifications:
Position: Associate Professor and Consultant Physician
Dept: Global Brain Health Institute
Organisation/Address: Trinity College Dublin
Tel: 01-8968551
E-mail: romeroor@tcd.ie

A7. Has an application been submitted to any other research ethics committee in relation to this study? no

If yes, provide further details.

Site:	Name of Research Ethics Committee:	Status / Outcome of the Application:
Answer	Answer	In Progress / Approved / Not Approved

SECTION B: STUDY DESCRIPTORS

SECTION B IS MANDATORY

B1. What is the anticipated start date of this study?

Mid-August -1st September 2019

B2. What is the anticipated duration of this study? State the anticipated duration in months or, if more than 12 months, in years.

The study will run for approximately 7 months with last data been collected the end of February 2020.

B3. Provide a brief lay (plain English) description of the study. The description should be in the format of an abstract using the following headings: study background, research aim(s), study design, study setting, participants (including selection and recruitment), data collection

and processing, data analysis). Ensure the language used in your answer is at a level suitable for use in a research participant information leaflet. This section should not exceed 500 words.

Frailty has been defined as a decrease in physiological reserve across multiple body systems. (Clegg et al. 2013). There may be potential to alter levels of frailty through intervention or preventive measures which may reduce the adverse effects associated with frailty. Despite the extensive investigation into the different screening methods for frailty, it is clear there is still a lack of agreement which frailty screening method is superior. Little evidence surrounds which frailty measure associates better with rehabilitation outcomes in a post-acute rehabilitation unit.

Aim: The aim of the study is to see if different screening forms looking at frailty associate with how patients progress in rehabilitation.

Study design: The study will be an observation prospective cohort study

Setting: The study will be based in the age-related rehabilitation unit at Peamount Healthcare.

Participants: Eligible participants will be identified when admitted to the age-related rehabilitation unit for rehabilitation. Those that fit the inclusion criteria will be invited to participate by a staff member not involved in the study. If participants are happy to

participate the primary investigator will provide participants with an information leaflet and consent form. Participants will have 24 hours to review the information and decide if they wish to participate.

Data Collection: Data will be gathered on admission following consent to participate to the study. The primary investigator will gather information needed for the study from the medical charts and input it onto a specific data collection form. Participants will be issued with a subjective frailty measure called the identification of seniors at risk questionnaire and a quality of life questionnaire to complete on admission. A clinical frailty scale will be carried out at week one prior to admission by the multidisciplinary time which will measure how the team rates a patient's level of frailty. Assessments related to function such as grip strength, functional mobility and walking speed will take place in the physiotherapy gym on admission and before the patient goes home. A measure examining quality of life will also be carried out again on discharge. Information regarding the number physiotherapy sessions, application for home supports, mobility status, and discharge destination will also be recorded. Results of routine outcome measures assessed as part of this study relating to physiotherapy rehabilitation goals such as grip strength, functional mobility, walking speed and quality of life will be documented into the patient's medical healthcare records at the time of assessment by the primary investigator (PI) as part of best practice and too avoid assessment burden on the patient by treating therapists.

Data Processing:

All data will remain confidential. On admission participants will be issued with a unique code that will be assigned to all paper and electronic copies of the data. This code will be secured in a separate file on a password protected computer that only the PI will have access too. Any data gathered will be kept securely in a locked cabinet in the physiotherapy department. Only the PI will have access to data gathered.

Data Analysis:
The data will be analysed using a statistical package for the social sciences (SPSS) for windows. Statistical tests will be carried out to examine the level of changes that occurred during rehabilitation in terms of grip strength, walking speed, functional mobility and quality of life and to see if any of these changes associate with the frailty measures used.

B4. Provide brief information on the study background. Ensure the rationale for undertaking the research is clear. This section should not exceed 500 words and five references.

The prevalence of frailty in Ireland in those over 65 years of age is estimated at 24% , with 45% of those over 65 years falling into the pre frail category (Roe et al., 2017). Healthcare utilisation is increased significantly in the frail population with General Practitioner visits, hospital admission, and nights spent in hospital, significantly greater in those who are frail compared to the robust population in Irish Healthcare settings ($p<0.001$) (Roe et al., 2017). There is a growing need to raise both the profile of frailty management in a European setting (Gwyther et al., 2018) and to consider its usefulness in predicting rehabilitation outcomes.

Post-acute inpatient rehabilitation has been shown to have positive effects on functional independence, balance, and grip strength in adults under and over 65 years of age (Gosselin et al., 2008). Inpatient rehabilitation designed specifically for the older adult can have positive effects on function, mortality and affect nursing home admission (Bachmann et al.

2010). There is increasing evidence to suggest that those who are more functionally impaired are more likely to be readmitted to the acute services from a post-acute rehabilitation setting and have increase mortality and reduced chance of discharge home (Burke et al 2016). Identification of those more at risk to a post-acute setting may help service provision and predict rehabilitation outcomes. There are a number of measure used to identify frailty, however many of these measures are based on community dwelling patients and may not translate into the hospital setting (Illsley and Clegg, 2016). There is little literature available on appropriate frailty measures in post-acute rehabilitation hospitals and furthermore little is known about their association with rehabilitation outcomes particularly in the Irish Healthcare setting.

The aim of this research project is to compare clinician appraisal of frailty with patient's self-perception of frailty and their association with post-acute rehabilitation outcomes. The author will undertake a prospective cohort study using convenience consecutive sampling to firstly establish the prevalence of frailty in this setting.

Secondly rehabilitation outcomes in this patient cohort will be described in terms of impairments, activity limitations and participation restriction. Clinicians appraisal of frailty measured using the clinical frailty scale and patient's subjective appraisal of frailty using the identification of seniors at risk questionnaire and their association with rehabilitation outcomes in particular the elderly mobility scale timed up and go, grip strength and quality of life will be established

B5. List the study aim(s) and objective(s).

Aim
To compare clinician's appraisal and patient's self-perception of frailty and their correlation to post-acute rehabilitation outcomes.

Objective

- To quantify the prevalence of frailty among a cohort of inpatient older adults at a rehabilitation unit.
- To describe the post –acute rehabilitation outcomes of this cohort of older adults using measures of impairment, activity limitations and participation restriction.
- To explore the association between self-report and objective measures of frailty and post-acute rehabilitation outcomes among this cohort.

B6. List the study outcomes (s).

Clinical Frailty Scale (CSF)
Identification of Seniors a Risk Questionnaire (ISAR)
Elderly Mobility scale (EMS) (Routine care)
Grip Strength (Routine care)
Timed up and GO (TUG) (Routine Care)
Euro QOL 5D

Length of Stay
Discharge destination
Application for Home care package
Physiotherapy Contacts

B7. Provide information on the study design and the rationale for that design.

This will be an observational prospective cohort study to compare the association between two frailty measures and outcomes from post-acute rehabilitation. It will examine the difference of using a clinical judgement-based measure and a patient self-reported measure of frailty and establish associations between measures to rehabilitation outcomes such as physical function, length of stay, quality of life. This

study is observational as their will be no intervention as part of this study and the majority of outcomes are measured as part of routine care.

B8. For experimental studies, provide information on the study intervention(s).

Answer N/A

B8. List where the study will take place i.e. where:

- **the participants will be recruited.**
- **the participants will undertake the research.**
- **the data will be collected.**
- **the data will be stored.**
- **the data will be analysed.**

Participants will be recruited on admission to the age-related rehabilitation unit in Peamount Healthcare. All patients admitted will be screened by the PI to establish suitability for inclusion. A gate keeper (physiotherapy staff) will approach all suitable participants and invite them to participate in the study. The gate keeper would inform the PI if patients expressed an interest to participate. The PI issue the potential participants a patient information leaflet and a consent form. Participants will be given 24 hours to review the information and decide if they would like to participate. Following 24 hours the PI will then meet with the participants again and answer any questions and gather the consent form if they agree to participate. The participants will have the right to withdraw from the study at any point and will be informed of this on signing the consent form.

Data Collection
Baseline demographic data will be gathered from the patient's medical chart by the PI following receipt of consent. Baseline data collected will include age, gender, presenting complaint, number of medications, co-morbidities, length of stay in acute hospital, premorbid level of mobility, and social situation. After baseline demographics are gathered, the primary investigator will invite the participant to the physiotherapy gym to complete initial assessments this will likely be 24-48 hours post admission to the unit. To ensure standardisation and to try minimising bias where possible the PI will carry out all outcome measure assessments. The physiotherapist will administer the identification of seniors at risk questionnaire (ISAR), the EURO-QOL5D .The PI will then invite participants to the gym complete a grip strength assessment using a handheld dynamometer and carry out an elderly mobility scale (EMS) assessment and a timed up and go. Equipment required will include a

plinth, a stopwatch a ruler, a chair and a 6-metre walkway. All T1 data will be inputted onto the data collection form. Following the T1 assessments the participants will undergo routine multidisciplinary rehabilitation to achieve their set

rehabilitation goals. The participants will have physiotherapy, and occupational therapy involvement and may have speech therapy, dietitian and social work input as appropriate. Participants will likely receive 30min-45 mins of physiotherapy 4-5 days per week. All participants will be under the care of a consultant geriatrician as part of routine care on admission to the age-related rehabilitation unit in Peamount. This study will not interfere with routine rehabilitation. At the end of week one the PI will gather a clinical frailty scale score using multidisciplinary team consensus at the Monday MDT meeting. Prior to discharge (T2) the PI will invite the participants to the gym to repeat the primary outcome measures. This will include the EURO-QOL5D the EMS TUG and a grip strength measure. Patients will be informed about their progress during rehabilitation by the PI.
Following discharge, the PI will also gather the following information from the patient's medical chart including application for social supports, discharge destination, length of stay, number of physiotherapy contacts and mobility status.

Results of routine outcome measures assessed as part of this study relating to physiotherapy rehabilitation goals such as grip strength, Euro Qol 5D elderly mobility scale and Timed up and Go will be documented into the patient's medical healthcare records at the time of assessment by the PI as part of best practice and too avoid assessment burden on the patient by treating therapists.

Data Storage

All data hard copy and electronic data collected will be pseudo-anonymised with a unique code. The PI will have an excel spread sheet which will link each code to a participant. The codes for the data will be stored on a separate file on a password protected computer. The electronic data will be stored on a password protected desktop computer which is in a therapy office with a keypad on the door. All data sheets will only be identifiable by a code and will be uploaded to the desktop computer. The hard copy data will be stored in a locked filing cabinet in the therapy office which will be locked at all times. All data will be stored for 5 years.

Data Analysis

The data will be analysed using a statistical package for the social sciences (SPSS) for windows. Baseline demographic data will be summarised using descriptive statistics including the mean and standard deviation. Paired T Tests and ANVOA will be used to analyse changes parametric data such as grip strength from T1 to T2. Nonparametric data will be analysed using a Wilkinson Signed Rank test. The relationship between frailty variables and outcome measures will be analysed using a Spearman Rank order correlation test as it doesn't rely on normally distributed data and a Pearson test for normally distributed data.

B8. Who is the target population for the study?

The target population for this study is those over the age of 65 years admitted for rehabilitation from the acute or community setting to a post-acute rehabilitation unit who fit the inclusion criteria.

B10 (a) Please justify the proposed sample size and provide details of its calculation (including minimum clinically important difference).

A sample size was calculated with a power calculation from normative data from a geriatric inpatient rehabilitation to population (brooks et al 2006). Using a power of 80%to detect a minimum clinically important difference of 3 seconds in the timed up and go (Standard Deviation 6.9) and an alpha of 5% a sample size of n=41 was estimated. To allow for a drop out of 20% as seen in similar studies it is hoped to recruit 50 patients. (Brooks et al 2006)

B10 (b) Where sample size calculation is impossible (e.g. it is a pilot study and previous studies cannot be used to provide the required estimates) then please explain why the sample size to be used has been chosen.

n/a

B11 How many research participants are to be recruited in total?

To allow for a drop out of 20% as seen in similar studies it is hoped to recruit a minimum of 50 patients in a 5-6-month time period. (Brooks et al 2006)

B12 (a) How many research participants are to be recruited in each study group (where applicable)? Please complete the following table (where applicable). N/A

Name of Study Group:	**Name of Study Group:**	**Name of Study Group:**	**Name of Study Group:**	**Name of Study Group:**
Answer	Answer	Answer	Answer	Answer
Number of Participants in this Study Group:	**Number of Participants in this Study Group:**	**Number of Participants in this Study Group:**	**Number of Participants in this Study Group:**	**Number of Participants in this Study Group:**
Answer	Answer	Answer	Answer	Answer

B12 (b) Please provide details on the method of randomisation (where applicable).

n/a

B13 How many research participants are to be recruited at each study site (where applicable)? Please complete the following table.

Site:	Number of Research Participants at this site:
N/A	

B7. List the data set that will be created, and tools used to collect the data.

Baseline data collected will include date of birth (age), gender, presenting complaint, acute hospital length of stay number of medications, co-morbidities, length of stay in acute hospital, premorbid level of mobility, and social situation.

Outcome Measures will include:

The Identification of Seniors at risk questionnaire
Clinical Frailty Scale
Euro QOL 5D
Elderly Mobility Scale
Timed Up and Go
Grip Strength

Other information gathered on discharge will include application for social supports, discharge destination, length of stay, number of physiotherapy contacts and mobility status.

B9 Provide information on the statistical approach to be used in the analysis of your results (if appropriate) / source of any statistical advice.

Baseline demographic data will be summarised using descriptive statistics including the mean and standard deviation. Paired T Tests and ANVOA will be used to analyse changes parametric data such as grip strength from T1 to T2. Nonparametric data will be analysed using a Wilkinson Signed Rank test. The relationship between frailty variables and outcome measures will be analysed using a Spearman Rank order correlation test as it doesn't rely on normally distributed data and a Pearson test for normally distributed data.

SECTION C: STUDY PARTICIPANTS

SECTION C IS MANDATORY

C1: SELECTION AND RECRUITMENT

C1.1. What are the inclusion criteria? Justify where necessary.

Eligibility Criteria
Inclusion criteria:

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Patients over the age of 65 years admitted from the acute/community setting for rehabilitation
Able to give informed consent
Mobile +/- aid on admission to the unit
Medically stable

C1.2. What are the exclusion criteria? Justify where necessary.

Exclusion criteria

Patients with a new diagnosis of stroke admitted for stroke rehabilitation.
Patients deemed unable to provide informed consent by the rehabilitation team.
Patient unable to mobilise prior to acute hospital admission or at baseline**.**

C1.3. How will potential research participants be identified by or to the researchers? Ensure that you specify any source(s) that will be used e.g. databases, healthcare records.

All patients admitted to the rehabilitation unit are automatically referred for rehab. The Primary investigator will screen new admissions via their medical admission note in the medical chart to deem if patients are suitable for inclusion. If there is lack of clarity regarding ability to consent to participate the Primary investigator will seek clearance from the rehabilitation team as cognitive assessments may not be available. A gate keeper (physiotherapy staff member) will approach eligible participants and invite them to participate in the study. If they express an interest to participate the gate keeper will inform the primary investigator.

C1.4. Who will identify potential research participants?

The primary investigator on screening admissions.

Under the Health Research Regulations 2018,

- Health professionals **providing care to a patient** may access **that patient's** healthcare record in order to identify if the

patient is suitable for inclusion in health research without the patient's explicit consent.

- Health professionals or other persons **not connected with the care of a patient** may not access that patient's healthcare record in order to identify if the patient is suitable for inclusion in health research without the patient's explicit consent.

C1.5. What sampling method(s) will be used?

- **Simple random sampling** No
- **Stratified sampling** No
- **Systematic sampling** No
- **Convenience sampling** Yes
- **Cluster sampling** No

C1.6. How will the research participants be recruited?

Participants will be recruited consecutively from those admitted to the age-related rehabilitation unit for a period of rehabilitation from two acute referring hospitals and from community. All patients admitted to the unit are referred routinely for rehabilitation. Patients will be screened on admission by the primary investigator by using a selection criterion to deem if they are eligible to participate.

Once deemed eligible for inclusion a gate keeper will invite the participants to participate in the study. If patients show an interest to participate the gate keeper will inform the primary investigator who will then provide an information leaflet regarding the details of the study and a consent form. The patient will be given 24 hours to review the information and provide consent to participate. If the patient consents to the study the primary investigator will gather a completed the consent form and further educate the patient on the details of the study.

C1.7. Who will recruit the research participants?

Once deemed eligible for inclusion the gate keeper will invite the patients to participate in the study. If they express an interest the gate keeper will inform the primary investigator who will then provide an information leaflet regarding the details of the study and consent form.

C1.8 Will any participants recruited to this research study be simultaneously involved in any other research project? Not to my knowledge

C2: CONSENT

C2.1 (a) Will informed consent be obtained? Yes

Under the Data Protection Act (Health Research Regulations) 2018, explicit consent **is required** to process personal data for research purposes except if a consent declaration has been made by the Health Research Consent Declaration Committee.

C2.1 (b) If no, please justify. You must provide a full and detailed explanation as to why informed consent will not be obtained.

Answer

C2.1 (c) If yes, please outline the consent process in full. (How will consent be obtained, when, by whom and from whom etc.)

On admission to the age-related rehabilitation unit the primary investigator will screen for eligible participants. Participants will be invited to participate in the study by a gate keeper. The gate keeper will inform the primary investigator if the patient expresses an interest to participate. Then the primary investigator will issue the potential participants an information leaflet explaining the details of the study and data that will be collected and a consent form. The participants will be informed that participation is voluntary, and it will not affect their care on the unit if they decide not to participate. They will also be informed they can opt out of the study at any time without requiring a reason and it will also not affect any of their care in the unit. The participant will be given enough time to make a decision about participating in the study. Following 24 hours the participant will be asked if they have any further questions relating the study and if they are happy to participate. If they consent to participate, they will be asked to sign a consent form by the primary investigator. On informed signed consent, participants will be once again made aware of their legal and ethical rights to withdraw from the study without giving reasons and without personal consequences. Once informed consent is gained data collection may begin by the primary investigator.

C2.2 (a) Will participants be informed of their right to refuse to participate and their right to withdraw from this research study? Yes

Yes, this will be made clear by the primary investigator and on the information leaflet. On signing the consent from the primary investigator will further highlight the patients right to withdraw from the study.

C2.2 (b) If no, please justify.

Answer

C2.3 (a) Will there be a time interval between giving information and seeking consent? Yes

C2.3 (b) If yes, please elaborate.
Participants will be given enough time to decide to participate in the study.

Participants will be given 24 hours to review the information leaflet. This time period was chosen as it is important to gather initial assessment data as close to admission time as is feasible.

C2.3 (c) If no, please justify and explain why an instantaneous decision is reasonable having regard to the rights of the prospective research participants and the risks of the study.

n/a

C3: CAPACITY – ADULT PARTICIPANTS (AGED 18 OR OVER) *****

C3.1 (a) Will all adult research participants have the capacity to give informed consent? Yes

If answer is Yes, please delete remaining questions in Section C3

C4: CAPACITY – CHILD PARTICIPANTS (AGED 17 OR UNDER)

C4.1 (a) Will any research participants be under the age of 18 i.e. Children? No

If answer is No, please delete remaining questions in Section C4

C4: CHECKLIST

C5.1 Please confirm if persons from any of the following groups will participate in this study. This is a quick checklist to assist research ethics committee members and to identify whether study participants include persons from vulnerable groups and to establish what special arrangements, if any, have been made to deal with issues of consent. It is recognised that not all groups in this listing will automatically be vulnerable or lacking in capacity. Please refer to the HSE's National Consent Policy, particularly Part 3, Section 5.

Committees are particularly interested to know if persons in any of these groups are being targeted for inclusion, as per the inclusion criteria.

(a) Healthy Volunteers No

(b) Patients Yes

- **Unconscious patients** No
- **Current psychiatric in-patients** No
- **Patients in an emergency medical setting** No

(c) Relatives / Carers of patients No

(d) Persons in dependent or unequal relationships No

- **Students** No
- **Employees / staff members** No
- **Persons in residential care** No
- **Persons highly dependent on medical care** No

(e) Intellectually impaired persons No

(f) Persons with a life-limiting condition No
(Please refer to guidance manual for definition)

(g) Persons with an acquired brain injury No

C5.2 If yes to any of the above, please comment on the vulnerability of the research participants, and outline the special arrangements in recognition of this vulnerability (if any).

Due to the nature of the study reviewing frailty measures a cohort of over 65-year-old patients is required. The patient cohort admitted for rehabilitation are all over 65 years of age and would routinely be admitted to the rehabilitation unit under a geriatrician for comprehensive rehabilitation. The PI has no control over patients admitted to the rehabilitation unit and as this is an observational study routine practices of patient care for this vulnerable population will continue as normal throughout the study duration.

C5.3 Please comment on whether women of child-bearing potential, breastfeeding mothers, or pregnant women will be included or excluded in this research study.

Excluded in this study.

SECTION D: RESEARCH PROCEDURES

SECTION D IS MANDATORY

D1 (a) What activities, procedures or interventions (if any) are research participants asked to undergo or engage in for the purposes of this research study?

The participants will undergo routine care as part of this study. The only additional measures will be a subjective frailty measure completed on admission and self-rated quality of life scale on admission and discharge. All other outcome measures being completed by the PI related to mobility and function would likely have been completed routinely by the patient's primary therapist on admission and discharge.

Results of routine outcome measures assessed as part of this study relating to patient care and rehabilitation goals such as grip strength, elderly mobility scale and Timed up and Go will be documented into the patient's medical healthcare records at the time of assessment by the PI

as part of best practice and too avoid assessment burden on the patient by treating therapists and duplication of assessments.

D1 (b) What other activities (if any) are taking place for the purposes of this research study e.g. chart review, sample analysis etc?

The medical chart will be reviewed following consent to participate to gather baseline data.

D2. Please provide details below of any potential harm that may result from any of the activities, procedures, interventions or other activities listed above.

Due to the nature of the study there may be a slight risk of loss of balance during the mobility assessments however this will be minimised as much as possible and the PI will be with the patient throughout the assessment.

D3. What is the potential benefit that may occur as a result of this study?

This study will benefit individuals working in post-acute rehabilitation with knowledge on frailty measures and if different types of frailty measures associate better with rehabilitation outcomes. It will be helpful for patients at risk of frailty or

capturing those who are frail and help plan the needs of those in post-acute rehabilitation settings.

D4 (a) Will the study involve the withholding of treatment? Non-applicable

D4 (b) Will there be any harms that could result from withholding treatment? No

D4 (c) If yes, please elaborate.

N/A

D5 (a) How will the health of participants be monitored <u>during</u> the study, and who will be responsible for this?

Patients will be under a geriatrician during their stay in rehabilitation who will be monitoring their medical status throughout their inpatient stay as part of routine practice.

D5 (b) How will the health of participants be monitored <u>after</u> the study, and who will be responsible for this?

As this is an observational study it is not expected any additional health monitoring will be required then normal post discharge from a rehabilitation unit.

D6 (a) Will the interventions provided during the study be available if needed after the termination of the study? Non-applicable

D6 (b) If yes, please state the intervention you are referring to and state who will bear the cost of provision of this intervention?

N/A

D7. Please comment on how individual results will be managed.

The results gathered from this study will be inputted onto a specific data collection form which will be coded with a unique patient code. The data will be then inputted on to an excel spread sheet which will be stored on a password protected desktop computer in the physiotherapy office. Hard copies of data will be uploaded on the password protected desktop computer and paper copies will be shredded. Data will be stored for 5 years post the study.

Results of routine outcome measures assessed as part of this study relating to patient care and rehabilitation goals such as grip strength, elderly mobility scale, quality of life and Timed up and Go will be documented into the patient's medical healthcare records at the time of assessment by the PI as part of best practice and too avoid assessment burden on the patient by treating therapists.

D8. Please comment on how aggregated study results will be made available.

The results of the study will be submitted as part of a thesis for a taught master in Neurology and Gerontology with the Royal College of Surgeons (RCSI). Presentation of the results in the thesis will be monitored by supervisors assigned by RCSI. The results may also be published in a research paper on completion of the masters.

D9. Will the research participant's general practitioner be informed that the research participant is taking part in the study (if appropriate)? Non-applicable

D10. Will the research participant's hospital consultant be informed that the research participant is taking part in the study (if appropriate)? Yes

SECTION E: DATA PROTECTION

SECTION E IS MANDATORY

E1: DATA PROCESSING – CONSENT

E1.1 (a). Will explicit consent be sought for the processing of data?

Yes, on identification of suitable participants a gate keeper will invite patients to participate. If the patient expresses an interest to the gate keeper, the PI will issue the patient with an information leaflet. The information leaflet will highlight the details of the study and the information that will be gathered. It will highlight where and for how long the information will be stored. It will also highlight the patients right to opt out of the study at any time.

Under the Data Protection Act (Health Research Regulations) 2018, explicit consent **is required** to process personal data for research purposes except if a consent declaration has been made by the Health Research Consent Declaration Committee.

- Identifiable and pseudonymised data (e.g. linked by code) is classified as personal data by GDPR and **is subject to this requirement**.

- Fully (irrevocably) anonymised data is not classified as personal data and is not subject to this requirement. However, consent **is required** to process personal data to make the data fully (irrevocably) anonymised and **is subject to this requirement**.

An **explicit** consent statement should:

- specifically refer to the particular data set that is to be processed;
- specifically refer to the precise purpose of processing (including any automated decision-making);
- identify any risks and/or implications that might arise for the data subject as a result of the data processing;
- provide any other relevant and specific information that might influence the decision of a data subject to give or not give their consent.

E1.1 (b). If no, please elaborate.

Answer

E2: DATA PROCESSING – PERSONNEL

E2.1. Who will control (i.e. determine the purpose for which and the way in which the data will be processed) and be responsible for the data (i.e. the data controllers)?

Peamount will control the databases.

E2.2. Who will hold or process the data (i.e. the data processors)?

Include anyone who will collect, store or analyse the data. An individual can be both a data controller and processor simultaneously (and may need to be listed in E2.1 and E2.2).

The primary investigator will hold and process the databases.

E2.3. What training in data protection law and practice have the data controller(s) and data processor(s) completed?

Under the Data Protection Act (Health Research Regulations) 2018, data controllers must ensure that anyone involved in carrying out research project has completed training in data protection law and practice.

Training on GDPR legislation from the HSE.

E2.4 (a). Is it intended to share any of the collected data (including pseudonymised data) with anyone else (i.e. anyone not listed in E2.1 and E2.2)? No .

E2.4 (b). If yes, with whom will the data be shared and what is the purpose of such sharing?

Answer

E2.5. If the data is pseudonymised (coded), who will retain the 'key' to re-identify the data?

The Primary Investigator will retain the key within Peamount Healthcare.

E3: DATA PROCESSING – CONTENT

E3.1 What specific data will be collected?

Include all variables that will be collected particularly demographic details. If appropriate, attach a case report form or other document(s) detailing the variables that will be collected (e.g. questionnaire).

- Date of birth (age)
- Gender
- Acute Hospital Length of Stay if appropriate
- Co morbidities
- No of medications
- Presenting complaint
- Clinical Frailty scale on admission
- Identification of seniors at risk questionnaire on admission
- Elderly mobility scale admission and discharge
- Grip strength admission at discharge
- Quality of life on admission and discharge
- Mobility status on admission and discharge
- Timed up and Go admission and discharge
- Length of stay
- Application for home supports or increased home supports
- Discharge Destination
- No of physiotherapy contacts

E3.2 What measures will be taken to limit the data collected to what is necessary to achieve the aim of the research only?

Under the Data Protection Act 2018, collected data must be 'adequate, relevant and not excessive in relation to the purposes for which they are processed' (data minimisation).

Personal data will be collected and processed **only as is necessary** to achieve the objective of the research being carried out and will not be processed in a way that damage or distress will be caused to the participant. Only necessary outcome measures will be completed to identify rehabilitation outcomes and many of these are part of routine care.
The data will only be collected and used if the participant has provided explicit consent as is the legal basis and falls under the article 6(1)f Legitimate Interest and article 9(2)j Scientific Purposes.

E3.3 What will be the level of identification of the collected data?

- **Fully identifiable (e.g. name, date of birth, address)?** No
- **Pseudonymised (e.g. coded)?** Yes
- **Fully (irrevocably) anonymised?** No

E3.4 (a) Will the collected data undergo further processing after collection? Yes

E3.4 (b) If yes, what type of processing will be undertaken?

- **Pseudonymisation (coding data should be classified as pseudonymisation)?** Yes
- **Full (irrevocable) anonymisation?** no
- **Other?** no

E3.4 (c) If other, please elaborate.

Answer

E4: DATA PROCESSING – METHOD

E4.1 Who will collect the data?

The primary investigator

E4.2 Where will the data be collected?

The data will be collected on the age-related rehabilitation unit and the physiotherapy gym which is located within the same building.

E4.3 (a) What media of data will be collected?

- **Written (paper)?** Yes
- **Written (electronic)?** No
- **Audio recordings?** No

- **Photographs?** No
- **Video recordings?** No
- **Other?** No

E4.3 (b) If other, please elaborate.

Answer

E4.4 (a) Will any of the data collected consist of audio recordings / video recordings? No

E4.4 (b) If yes, will participants be given the opportunity to review and amend transcripts of the tapes?

Answer

E4.5 (a) Will any of the data collected consist of photographs / video recordings? No

E4.5 (b) If yes, please elaborate.

Answer

E5: ACCESS TO HEALTHCARE RECORDS

E5.1 (a) Does the study involve access to healthcare records (hard copy / electronic)? Yes

If NO, please delete the remaining questions in Section E5.

E5.1 (b) If yes, please elaborate.

It will be necessary to access the healthcare records to establish demographic data such as:
Date of birth (age)
Gender
Acute Hospital Length of Stay if appropriate
Co morbidities
Number of medications
Presenting complaint
Baseline Mobility
Social Situation

Patients will be informed of this on the patient information leaflet.

E5.2 Who or what legal entity is the data controller in respect of the healthcare records?

The primary investigator/Data Controller is a permanent employee of Peamount healthcare and works in the age-related rehabilitation unit as a Senior Physiotherapist.

E5.3 Who will access these healthcare records?

The primary investigator.

E5.4 Will explicit consent be sought from patients for research team members to access their healthcare records? Yes

E6: DATA PROCESSING – STORAGE

E6.1 Where will the collected data be stored?

Data collected will be coded and inputted onto an excel spread sheet and stored securely on a password protected desktop computer in a locked office. Only the PI will have access to the codes and gathered data. All data sheets will only be identifiable by a code and be uploaded to the password protected computer and hard copies will be shredded. Codes for the data will be stored in a separate file. All data will be stored for the duration of the study and for 5 years after. It will then be destroyed.

Results of routine outcome measures relating to patient care and rehabilitation goals such as grip strength, elderly mobility scale, quality of life and Timed up and Go will be inputted into the medical healthcare records at the time of assessment by the PI as part of best practice and too avoid assessment burden on the patient by treating therapists.

E6.2 (a) Will data that is collected leave the site(s) of storage at any stage?

no

E6.2 (b) If yes, please elaborate.

Answer

E7: DATA PROCESSING – ANALYSIS

E7.1 Who will analyse the data?

The primary investigator will analyse the data.

E7.2 Where will the data be analysed?

The data will be analysed in the physiotherapy office of Peamount Healthcare.

E8: DATA PROCESSING – DISPOSAL

E8.1 (a) After data analysis has taken place, will data be destroyed, archived or anonymised?

- **Destroyed?** No
- **Archived?** Yes
- **Anonymised?** No

The data will remain pseudo-anonymised and archived for 5 years before it is destroyed.

E8.1 (b) If destroyed, how, when and by whom will it be destroyed?

Hard copies of data will be transferred into an electronic format and paper copies will be shredded immediately by a confidential shredding company used at Peamount healthcare. The data will be deleted of the master computer by the primary investigator after 5 years.

E8.1 (c) If archived, for how long, for what purpose, and where will it be archived?

The backed-up data will be stored on a password protected computer in the physiotherapy office. It will be archived for 5 years as is recommended in good research practice. It will be deleted of the primary computer by the primary investigator after 5 years.

E8.1 (d) If anonymised, how, when and by whom will it be anonymised?

Answer NA

E9: DATA PROCESSING – RISK ASSESSMENT & MANAGEMENT

E9.1 What measures (including technical and organisational) will be in place to ensure the protection and security of the collected data?

Include any specific measures that maintain the confidentiality of the collected data.

- Pseudo- Anonymised data.
- Codes stored separately on a master computer password protected in an L Drive that only with PI has access too
- Password access restricted to investigator only.
- Data Not removed from investigator site
- No transference across organisation of data.
- Antivirus software, firewalls to prevent unauthorised access attempt.
- No remote access.
- No use third party unsecured Wi-Fi networks.
- Backup system: All data will be backed up on the L Drive on a password protected computer.

E9.2 What controls will be in place to prevent unauthorised consultation, alteration, disclosure or erasure of the collected data?

- Pseudo Anonymised data and encrypted storage
- Password restricted storage with only access by PI
- Security from firewalls
- Antivirus software.
- Backup system for data.
- No portable devices used

E9.3 What controls will be in place to log whether and by whom the collected data has been consulted, altered, disclosed or erased?

A locked cabinet would have to be accessed to highlight if the hard copy data would be consulted.

E9.4 (a) Is there any aspect of the proposed research that indicates a high risk (either in terms of likelihood or severity) to the rights and freedoms of the data subject (e.g. a data breach)?

No

E9.4 (b) If yes, complete the following data protection impact assessment.

Risk Identified	**Consequence**	**Risk Level** (Low / Medium / High)	**Risk Management**
Example: Data collection site (OPD clinic) distant from data	Example: Loss of data in transit	Example: Medium risk	Examples: - Data carried in bag sealed prior to departure from collection

storage site (Research Office) – 10 minute walk but within the hospital grounds			site and only unsealed upon arrival at storage site - Data is brought directly from collection site to storage site

E9.5 Describe how data subjects will be informed of what data will be collected (and why) and how they can exercise their data subject rights (i.e. transparency).

Personal data will be collected and processed only as is necessary to achieve the objective of the research being carried out and will not be processed in a way that damage or distress will be caused to the participant.
The data will only be collected and used if the participant has provided explicit consent as is the legal basis and falls under the article 6(1)f Legitimate Interest and article 9(2)j Scientific Purposes.

Patients will be informed of data collected and reason for collection on the patient information leaflet. Their rights to access their data will be clearly outlined on the patient information leaflet along with the following:

- Right to access data held
- Right to restrict the use of the data held
- Right to correct inaccuracies
- Right to have information deleted
- Right to data portability
- Right to object to profiling and processing

E9.6 Describe the measures that will be in place to ensure compliance with data subject rights.

- Transparency with information provided to patient on the study purpose and type and how data will be collected, stored and deleted.
- Security to ensure data collection and storage secure at all times.
- Pseudo -anonymised encrypted personal data.
- Appropriate processing system, only collecting personal data necessary for processing.
- Data Controller and processor are the same person no outsourcing.
- GPR security measures in place: back up, report breach, carry out data protection impact assessment. Liaise with DPO

SECTION F: HUMAN BIOLOGICAL MATERIAL

F1: BODILY TISSUE / BODILY FLUID SAMPLES - GENERAL

F1 Does this study involve human biological material? No

SECTION G: RADIATION

G1: RADIATION – GENERAL

G1.1 (a) Does this study/trial involve exposure to radiation? No

SECTION H: MEDICAL DEVICES

H1 (a) Is the focus of this study/trial to investigate/evaluate a medical device? No

SECTION I: MEDICINAL PRODUCTS / COSMETICS / FOOD AND FOODSTUFFS

I1: NON-INTERVENTIONAL TRIALS OF MEDICINAL PRODUCTS

I1.1 (a) Does this study involve a medicinal product? No

I2: COSMETICS

I2.1 (a) Does this study involve a cosmetic? No

I3: FOOD AND FOOD SUPPLEMENTS

I3.1 (a) Does this study involve food or food supplements? No

SECTION J: INDEMNITY AND INSURANCE

SECTION J IS MANDATORY

J1 Please confirm and provide evidence that appropriate insurance/indemnity is in place for this research study <u>at each site.</u>

This research is being undertaken at Peamount Healthcare which is covered by the clinical indemnity scheme (CIS) under the State Claims Agency (SCA).

J2 Please confirm and provide evidence that appropriate insurance/indemnity is in place for this research study <u>for each investigator.</u>

The primary Investigator is a permanent employee of Peamount Healthcare and is covered under Peamount Healthcare Indemnity. The primary study supervisor (FH) is covered by RCSI indemnity.

J3.1 Please give the name and address of the organisation / or individual legally responsible for this research study?

Physiotherapy department, Age related healthcare unit, Peamount Healthcare, Newcastle, Co Dublin.

J3.2 Where an organisation is legally responsible, please specify if this organisation is:

A pharmaceutical company No
A medical device company No
A university No
A registered charity No
Other yes If yes, please specify: Hospital

J3.3 Please confirm and provide evidence of any specific <u>additional</u> insurance / indemnity arrangements which have been put in place, if any, <u>by this organisation / or individual</u> for this research study?

This research is been undertaken to fulfil a masters in Neurology and Gerontology under supervision by the Royal College of Surgeons. The researcher is a registered student at RSCI.

SECTION K: COST AND RESOURCE IMPLICATIONS, FUNDING AND PAYMENTS

SECTION K IS MANDATORY

K1: COST AND RESOURCE IMPLICATIONS

K1.1 Please provide details of all cost / resource implications related to this study (e.g. staff time, office use, telephone / printing costs etc.)

Photo coping of data sheets will be covered by the primary investigator. Time to complete assessments will be provided by the physiotherapy manager which will estimate 1 hour per week.

K2: FUNDING

K2.1 (a) Is funding in place to conduct this study?
No

K2.1 (b) If no, has funding been sought to conduct this study? From where? Please elaborate.

This study is taking place as part of a taught masters, so no funding is required.

K2.1 (c) If yes, please state the source of funding (industry, grant or other), the name of the funder, the amount of funding and duration of funding.

Source of funding (industry, grant or other): n/a
Answer
Name of Funder:
Answer
Amount of Funding:
Answer
Duration of Funding
Answer

K2.1(d) Please provide additional details in relation to management of funds.

Answer

K2.1(e) Is the study funded by a 'for profit' organisation? No

K2.2 (a) Do any conflicts of interest exist in relation to funding or potential funding? No

K2.2 (b) If yes, please elaborate.

Answer

K3: PAYMENTS TO INVESTIGATORS

K3.1 (a) Will any payments (monetary or otherwise) be made to investigators? No

K3.1 (b) If yes, please provide details of payments (including amount).

Answer

K4: PAYMENTS TO PARTICIPANTS

K4.1 (a) Will any payments / reimbursements (monetary or otherwise) be made to participants? No

K4.1 (b) If yes, please provide details of payments / reimbursements (including amount).

Answer

SECTION L: ADDITIONAL ETHICAL ISSUES

L1 (a) Does this project raise any additional ethical issues? No

If answer is No, please delete remaining questions in Section L.

PLEASE ENSURE THIS APPLICATION FORM IS FULLY COMPLETED AS INCOMPLETE SUBMISSIONS WILL NOT BE REVIEWED.

Appendix 5: Ethical Approval

Tallaght University Hospital | Ospidéal Ollscoile Thamhlachta
An Academic Partner of Trinity College Dublin

SJH/TUH Research Ethics Committee Secretariat
email: researchethics@tuh.ie

Ms Louise McCarron,
Peamount Hospital,
Newcastle Road,
Co. Dublin

19 September 2019

REF: Frailty Measures and their Association with Post-Acute Rehabilitation Outcomes

REC: 2019-09 List 35 (05)
(Please quote reference on all correspondence)

Date of Valid Submission to REC: 29.08.2019
Date of Ethical Review: 04.09.2019
R&I Application Number: N/A

Dear Ms McCarron

Thank you for your correspondence in which you sent in a response to the Committee's letter which detailed the Committee's queries and concerns in relation to the initial submission for the above referenced research study.

The Chairman, Prof. Richard Dean, on behalf of the Research Ethics Committee, has reviewed your correspondence and given full ethical approval for this study to proceed.
The following documents were reviewed:

- Cover Letter, dated 29.08.2019
- PIL and SAF

Applicants must submit an annual report for ongoing projects and an end of project report upon completion of the study. It is the responsibility of the researcher/research team to ensure all aspects of the study are executed in compliance with the General Data Protection regulation (GDPR), Health Research Regulations and the Data Protection Act 2018. Additionally, please note for documents submitted for GDPR purposes that the REC and the Chair are not confirming that you're documents are GDPR compliant, they are approving the document from an ethical perspective.

Yours sincerely,

Sadhbh O'Neill

REC Officer – Dr Sadhbh O'Neill
SJH/TUH Research Ethics Committee

The SJH/TUH Joint Research and Ethics Committee operates in compliance with and is constituted in accordance with the European Communities (Clinical Trials on Medicinal Products for Human Use) Regulations 2004 & ICH GCP guidelines.

Appendix 6: Data Collection Sheet

Data Collection Form

Principal Investigator	Louise McCarron	Senior Physiotherapist Age Related Rehabilitation Unit Peamount Healthcare lmccarron@peamount.ie 01 -6515933
Supervisors	Prof Frances Horgan	Royal College of Surgeons fhorgan@rcsi.ie
	Dr Rose Galvin	University of Limerick Rose.galvin@ul.ie

Study ID:	**Study Unit:**
Admission Date:	**Admitted from: Community:** ☐ **Acute:** ☐

DOB (Age)	**Gender**	**Male:** ☐ **Female:** ☐
Acute Hospital LOS IF applicable		
Presenting Complaint		
Number of Medications on Admission		

Past Medical History		

1

Assistance no aid						
Assistance aid						
Other						

Length of Stay	
Number of physiotherapy contacts	
Discharge Destination	Home: ☐ Long term Care: ☐ Interim Care: ☐ Readmission to the acute hospital ☐ Deceased: ☐
Application for home supports **Yes** ☐ **No** ☐	Home Care Package: New ☐ Increased ☐ Home Help New ☐ Increased ☐

Appendix 7: Identification of Seniors at Risk Questionnaire

THE ISAR TOOL: Initial Screening Questionnaire

To be completed by the staff with the patient or caregiver.

ADDRESSOGRAPH

PLEASE ANSWER YES OR NO TO EACH OF THESE QUESTIONS

		Hospital use only
1. Before the illness or injury that brought you to the Emergency, did you need someone to help you on a regular basis?	☐ YES ☐ NO	1 0
2. Since the illness or injury that brought you to the Emergency, have you needed more help than usual to take care of yourself?	☐ YES ☐ NO	1 0
3. Have you been hospitalized for one or more nights during the past 6 months (excluding a stay in the Emergency Department)?	☐ YES ☐ NO	1 0
4. In general, do you see well?	☐ YES ☐ NO	0 1
5. In general, do you have serious problems with your memory?	☐ YES ☐ NO	1 0
6. Do you take more than three different medications every day?	☐ YES ☐ NO	1 0
	TOTAL:	_____

Score: Positive / Negative (circle one)

If positive:	
☐ Referred for SEISAR	Notes: _____
☐ Social Worker	Notes: _____
☐ Liaison nurse	Notes: _____
☐ Discharged	Follow-up: _____

Signature: _____ Date: _____

2011/02 Version

For clinical & administrative manual: isar.seisar@ssss.gouv.qc.ca www.smhc.qc.ca/en/research/our-research/research-made-practical

Appendix 8: Clinical Frailty Scale

Study ID _____

Admission Score_____ Date _____

Clinical Frailty Scale

1. Very fit – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.

2. Well – People who have no active disease symptoms but are less fit than category 1. Often, they exercise or are very active occasionally, e.g. seasonally.

3. Managing well – People whose medical problems are well controlled, but are not regularly active beyond routine walking.

4. Vulnerable – While not dependent on others for daily help, often symptoms limit activities. A common complaint is being "slowed up", and/or being tired during the day.

5. Mildly frail – These people often have more evident slowing, and need help in high order IADLs (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.

6. Moderately frail – People need help with all outside activities and with keeping house. Inside, they often have problems with stairs and need help with bathing and might need minimal assistance (cuing, standby) with dressing.

7. Severely frail – Completely dependent for personal care, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).

8. Very severely frail – Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.

9. Terminally Ill – Approaching the end of life. This category applies to people with a life expectancy <6 months, who are not otherwise evidently frail.

Scoring frailty in people with dementia

The degree of frailty corresponds to the degree of dementia. Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderate dementia,** recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In **severe dementia,** they cannot do personal care without help.

Appendix 9: Timed Up and Go

Timed Up and Go

Study ID: _____

Instructions to therapist:

1. Have the person sit in the chair wearing their regular footwear. Chair height 46cm.
2. The patients back should be against the chair and their arms resting on the arm rests.
3. The patient is instructed to walk at a normal pace using their assistive device to a line 3 metres from the chair turn around and walk back to the chair and sit down.
4. Demonstrate the test to the patient.
5. When the patient is ready say "Go"
6. The stopwatch starts when you say go and stops when their buttock reaches the seat.
7. The patient should be given 1 trial and 3 actual tests.
8. The average score of 3 test should be take.

Timed Up and Go	Assistive Device	Date	Trail 1	Trail 2	Trail 3	Average	Physiotherapist Signature
T1							
T2							

Appendix 10: Elderly Mobility Scale

Elderly Mobility Scale		
Task	(T1) Date	(T2) Date
Lying to Sitting 2 Independent 1 Need help of 1 person 0 Needs help of +2 people		
Sitting to Lying 2 Independent 1 Needs help of 1 person 0 Needs help of +2 people		
Sit to Stand 3 Independent in under 3 seconds 2 Independent in over 3seconds 1 Needs help of 1 person (Verbal of Physical) 0 Needs help of +2 people		
Standing 3 Stands without support* and able to reach 2 Stands, without support but needs support* to reach 1 Stands, but needs support * 0 Stands, only with physical support of another person **Support= uses upper limbs to steady self*		
Gait 3 Independent (incl. use of 1 stick) 2 Independent with Frame, 2 sticks or crutches 1 Mobile with walking aid but erratic/unsafe 0 Requires physical help to walk or constant supervision		
Timed Walk 6 metres 3 Under 15 seconds 2 16-30 seconds 1 Over 30 Seconds 0 Unable to cover 6 metres		
Functional Reach 4 Over 20cm 2 10-20cm 0 Under 10cm or Unable		
Total Score	/20	/20
Physiotherapist Signature		

Appendix 11: Grip Strength

Grip Strength

Study ID: _____

Date	**Left Hand (Kg)**	**Right Hand (Kg)**	**Physiotherapist Signature /Print**
Time 1:	Trail 1: Trail 2: Trail 3: **Average Score:**	Trail 1 Trail 2 Trail 3 **Average:**	
Time 2:	Trail 1: Trail 2: Trail 3: **Average Score:**	Trail 1: Trail 2: Trail 3: **Average:**	

Instructions:

- Ensure the patients elbow is at 90 degrees and the elbow is not resting on a surface. Calculate the average of 3 scores.
- Instruct the patient to maintain the elbow at 90 degrees and squeeze their hand on the dynamometer as tight as they can and then relax the grip. Repeat these 2 more times.

An average of 3 attempts is the most reliable measurement (Matiowetz et al. 1984)

Appendix 12: EuroQol 5D-5L

Under each heading, please tick the ONE box that best describes your health TODAY.

MOBILITY

I have no problems in walking about ❑
I have slight problems in walking about ❑
I have moderate problems in walking about ❑
I have severe problems in walking about ❑
I am unable to walk about ❑

SELF-CARE

I have no problems washing or dressing myself ❑
I have slight problems washing or dressing myself ❑
I have moderate problems washing or dressing myself ❑
I have severe problems washing or dressing myself ❑
I am unable to wash or dress myself ❑

USUAL ACTIVITIES *(e.g. work, study, housework, family or leisure activities)*

I have no problems doing my usual activities ❑
I have slight problems doing my usual activities ❑
I have moderate problems doing my usual activities ❑
I have severe problems doing my usual activities ❑
I am unable to do my usual activities ❑

PAIN / DISCOMFORT

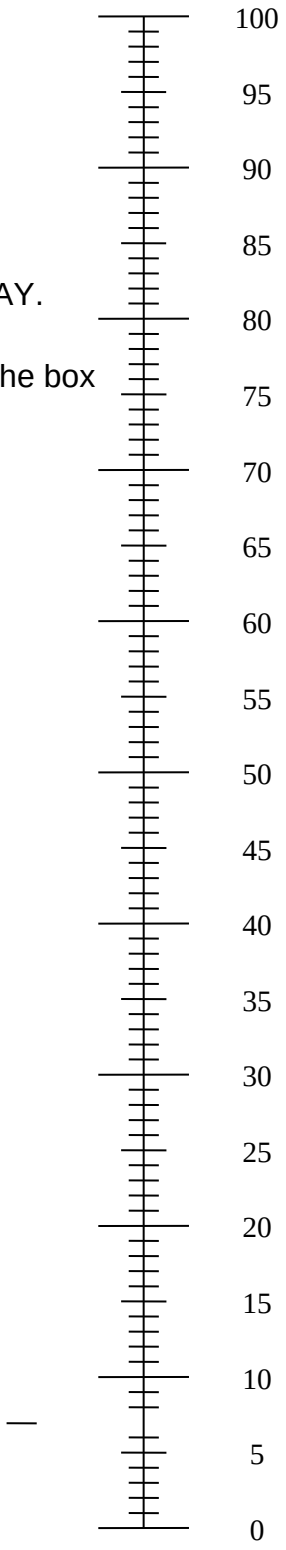
I have no pain or discomfort ❑
I have slight pain or discomfort ❑
I have moderate pain or discomfort ❑
I have severe pain or discomfort ❑
I have extreme pain or discomfort ❑

ANXIETY / DEPRESSION

I am not anxious or depressed ❑
I am slightly anxious or depressed ❑
I am moderately anxious or depressed ❑
I am severely anxious or depressed ❑
I am extremely anxious or depressed ❑

- 100 means the best health you can imagine.
  0 means the worst health you can imagine.
- Mark an X on the scale to indicate how your health is TODAY.
- Now, please write the number you marked on the scale in the box below.

YOUR HEALTH TODAY = ☐



Appendix 13: SPSS Data Outputs for Statistical Tests

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Age	32	100.0%	0	0.0%	32	100.0%

Descriptives

			Statistic	Std. Error
Age	Mean		82.66	1.468
	95% Confidence Interval for Mean	Lower Bound	79.66	
		Upper Bound	85.65	
	5% Trimmed Mean		82.82	
	Median		84.50	
	Variance		69.007	
	Std. Deviation		8.307	
	Minimum		65	
	Maximum		97	
	Range		32	
	Interquartile Range		14	
	Skewness		-.244	.414
	Kurtosis		-.761	.809

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	21	65.6	65.6	65.6
	Male	11	34.4	34.4	100.0
	Total	32	100.0	100.0	

```
FREQUENCIES VARIABLES=supports
  /STATISTICS=RANGE MINIMUM MAXIMUM MODE
  /ORDER=ANALYSIS.
```

Supports

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Formal	18	56.3	56.3	56.3
	Informal	5	15.6	15.6	71.9
	None	9	28.1	28.1	100.0
	Total	32	100.0	100.0	

```
FREQUENCIES VARIABLES=living_alone
  /STATISTICS=RANGE MINIMUM MAXIMUM MODE
  /ORDER=ANALYSIS.
```

Living alone

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	16	50.0	50.0	50.0
	yes	16	50.0	50.0	100.0
	Total	32	100.0	100.0	

Baseline Mobility

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ind no aid	11	34.4	34.4	34.4
	ind aid	21	65.6	65.6	100.0
	Total	32	100.0	100.0	

```
FREQUENCIES VARIABLES=baseline_transfer
  /STATISTICS=RANGE MINIMUM MAXIMUM MODE
```

```
  /ORDER=ANALYSIS.
```

Baseline Transfer

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ind no aid	11	34.4	34.4	34.4
	ind aid	20	62.5	62.5	96.9
	ass aid	1	3.1	3.1	100.0
	Total	32	100.0	100.0	

Presenting Condition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Other	1	3.1	3.1	3.1
	Fall	2	6.3	6.3	9.4
	Fall and fracture	18	56.3	56.3	65.6
	LRTI	4	12.5	12.5	78.1
	UTI	1	3.1	3.1	81.3
	Cardiac	1	3.1	3.1	84.4
	Resp	1	3.1	3.1	87.5
	Cellulitis	1	3.1	3.1	90.6
	Falls dislocation	1	3.1	3.1	93.8
	Deconditioning	1	3.1	3.1	96.9
	No falls with fracture	1	3.1	3.1	100.0
	Total	32	100.0	100.0	

```
FREQUENCIES VARIABLES=acute_LOS
  /STATISTICS=RANGE MINIMUM MAXIMUM MODE
  /ORDER=ANALYSIS.
```

Age categories

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	65-74	8	25.0	25.0	25.0
	75-84	8	25.0	25.0	50.0
	85+	16	50.0	50.0	100.0
	Total	32	100.0	100.0	

```
FREQUENCIES VARIABLES=no_of_medications
  /STATISTICS=RANGE MINIMUM MAXIMUM MODE
  /ORDER=ANALYSIS.
```

Number of medications

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5	1	3.1	3.1	3.1
	6	1	3.1	3.1	6.3
	7	3	9.4	9.4	15.6
	9	1	3.1	3.1	18.8
	10	4	12.5	12.5	31.3
	11	3	9.4	9.4	40.6
	12	4	12.5	12.5	53.1
	13	4	12.5	12.5	65.6
	14	3	9.4	9.4	75.0
	15	1	3.1	3.1	78.1
	16	4	12.5	12.5	90.6
	17	1	3.1	3.1	93.8
	19	1	3.1	3.1	96.9
	20	1	3.1	3.1	100.0
	Total	32	100.0	100.0	

```
FREQUENCIES VARIABLES=no_comorbidties
  /STATISTICS=RANGE MINIMUM MAXIMUM MODE
  /ORDER=ANALYSIS.
```

number of Comorbidities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4	2	6.3	6.3	6.3
	5	5	15.6	15.6	21.9
	6	6	18.8	18.8	40.6
	7	8	25.0	25.0	65.6
	8	4	12.5	12.5	78.1
	9	5	15.6	15.6	93.8
	10	1	3.1	3.1	96.9
	11	1	3.1	3.1	100.0
	Total	32	100.0	100.0	

```
EXAMINE VARIABLES=no_of_medications no_comorbidties
  /PLOT BOXPLOT STEMLEAF
  /COMPARE GROUPS
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
```

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Number of medications	32	100.0%	0	0.0%	32	100.0%
number of Comorbidities	32	100.0%	0	0.0%	32	100.0%

Descriptives

			Statistic	Std. Error
Number of medications	Mean		12.22	.646
	95% Confidence Interval for	Lower Bound	10.90	

	Mean	Upper Bound	13.54	
	5% Trimmed Mean		12.19	
	Median		12.00	
	Variance		13.338	
	Std. Deviation		3.652	
	Minimum		5	
	Maximum		20	
	Range		15	
	Interquartile Range		5	
	Skewness		.016	.414
	Kurtosis		-.263	.809
number of Comorbidities	Mean		6.97	.306
	95% Confidence Interval for Mean	Lower Bound	6.34	
		Upper Bound	7.59	
	5% Trimmed Mean		6.93	
	Median		7.00	
	Variance		2.999	
	Std. Deviation		1.732	
	Minimum		4	
	Maximum		11	
	Range		7	
	Interquartile Range		2	
	Skewness		.290	.414
	Kurtosis		-.380	.809

Admission_transfer_Independent_recoded

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Independent	8	25.0	25.0	25.0
	assistance/supervision	24	75.0	75.0	100.0
	Total	32	100.0	100.0	

```
FREQUENCIES VARIABLES=discrgae_transfer_independenent_recoded
  /STATISTICS=RANGE MINIMUM MAXIMUM MODE
  /ORDER=ANALYSIS.
```

discrgae_transger_independenent_recoded

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	independent	27	84.4	84.4	84.4
	assistance/supervision	5	15.6	15.6	100.0
	Total	32	100.0	100.0	

```
FREQUENCIES VARIABLES=admission_mobility_independent_Recoded
  /STATISTICS=RANGE MINIMUM MAXIMUM MODE
  /ORDER=ANALYSIS.
```

admission_mobility_independent_Recoded

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	independent	8	25.0	25.0	25.0
	assistance/supervision	24	75.0	75.0	100.0
	Total	32	100.0	100.0	

```
FREQUENCIES VARIABLES=discharge_mobility_independent_Recoded
  /STATISTICS=RANGE MINIMUM MAXIMUM MODE
  /ORDER=ANALYSIS.
```

discharge_mobility_independent_Recoded

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Independent	27	84.4	84.4	84.4
	Assistance/Supervision	5	15.6	15.6	100.0
	Total	32	100.0	100.0	

```
EXAMINE VARIABLES=los_days
```

```
/PLOT BOXPLOT STEMLEAF
/COMPARE GROUPS
/STATISTICS DESCRIPTIVES
/CINTERVAL 95
/MISSING LISTWISE
/NOTOTAL.
```

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
los_days	29	90.6%	3	9.4%	32	100.0%

Descriptives

			Statistic	Std. Error
los_days	Mean		28.69	3.332
	95% Confidence Interval for Mean	Lower Bound	21.86	
		Upper Bound	35.52	
	5% Trimmed Mean		27.28	
	Median		23.00	
	Variance		322.007	
	Std. Deviation		17.945	
	Minimum		10	
	Maximum		75	
	Range		65	
	Interquartile Range		22	
	Skewness		1.330	.434
	Kurtosis		.944	.845

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent

physio_contacts	29	90.6%	3	9.4%	32	100.0%

Descriptives

			Statistic	Std. Error
physio_contacts	Mean		16.90	1.826
	95% Confidence Interval for Mean	Lower Bound	13.16	
		Upper Bound	20.64	
	5% Trimmed Mean		16.06	
	Median		15.00	
	Variance		96.667	
	Std. Deviation		9.832	
	Minimum		4	
	Maximum		51	
	Range		47	
	Interquartile Range		13	
	Skewness		1.524	.434
	Kurtosis		3.831	.845

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Discharge Destination	29	90.6%	3	9.4%	32	100.0%

Descriptives

			Statistic	Std. Error
Discharge Destination	Mean		.21	.144
	95% Confidence Interval for Mean	Lower Bound	-.09	
		Upper Bound	.50	
	5% Trimmed Mean		.06	
	Median		.00	
	Variance		.599	

	Std. Deviation	.774	
	Minimum	0	
	Maximum	3	
	Range	3	
	Interquartile Range	0	
	Skewness	3.591	.434
	Kurtosis	11.695	.845

Supports on Discharge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	none	17	53.1	63.0	63.0
	HCP New	5	15.6	18.5	81.5
	HCP increased	5	15.6	18.5	100.0
	Total	27	84.4	100.0	
Missing	999	5	15.6		
Total		32	100.0		

```
FREQUENCIES VARIABLES=dc_destination
  /STATISTICS=RANGE MINIMUM MAXIMUM MODE
  /ORDER=ANALYSIS.
```

Discharge Destination

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	home	27	84.4	93.1	93.1
	acute hospital	2	6.3	6.9	100.0
	Total	29	90.6	100.0	
Missing	999	3	9.4		
Total		32	100.0		

Clinical_Frailty_Scale_Yes_No

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	6	18.8	18.8	18.8
	Yes	26	81.3	81.3	100.0
	Total	32	100.0	100.0	

ISAR_Scale_Yes_No

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	5	15.6	15.6	15.6
	Yes	27	84.4	84.4	100.0
	Total	32	100.0	100.0	

```
DESCRIPTIVES VARIABLES=csf_admission isar_admission
  /STATISTICS=MEAN STDDEV MIN MAX.
```

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent

cfs_admission	32	100.0%	0	0.0%	32	100.0%
isar_admission	32	100.0%	0	0.0%	32	100.0%

Descriptives

			Statistic	Std. Error
cfs_admission	Mean		5.47	.149
	95% Confidence Interval for Mean	Lower Bound	5.17	
		Upper Bound	5.77	
	5% Trimmed Mean		5.49	
	Median		6.00	
	Variance		.709	
	Std. Deviation		.842	
	Minimum		4	
	Maximum		7	
	Range		3	
	Interquartile Range		1	
	Skewness		-.761	.414
	Kurtosis		-.568	.809
isar_admission	Mean		2.44	.174
	95% Confidence Interval for Mean	Lower Bound	2.08	
		Upper Bound	2.79	
	5% Trimmed Mean		2.43	
	Median		2.00	
	Variance		.964	
	Std. Deviation		.982	
	Minimum		1	
	Maximum		4	
	Range		3	
	Interquartile Range		1	
	Skewness		.295	.414
	Kurtosis		-.855	.809

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
csf_admission	.361	32	.000	.758	32	.000
isar_admission	.266	32	.000	.864	32	.001

a. Lilliefors Significance Correction

cfs_admission

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4	6	18.8	18.8	18.8
	5	6	18.8	18.8	37.5
	6	19	59.4	59.4	96.9
	7	1	3.1	3.1	100.0
	Total	32	100.0	100.0	

```
FREQUENCIES VARIABLES=isar_admission
  /ORDER=ANALYSIS.
```

isar_admission

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	15.6	15.6	15.6
	2	14	43.8	43.8	59.4
	3	7	21.9	21.9	81.3
	4	6	18.8	18.8	100.0
	Total	32	100.0	100.0	

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Clinical_Frailty_Scale_Yes_No * ISAR_Scale_Yes_No	32	100.0%	0	0.0%	32	100.0%

Clinical_Frailty_Scale_Yes_No * ISAR_Scale_Yes_No Crosstabulation

			ISAR_Scale_Yes_No		
			No	Yes	Total
Clinical_Frailty_Scale_Yes_No	No	Count	1	5	6
		% within Clincal_Frailty_Scale_Yes_No	16.7%	83.3%	100.0%
		Adjusted Residual	.1	-.1	
	Yes	Count	4	22	26
		% within Clincal_Frailty_Scale_Yes_No	15.4%	84.6%	100.0%
		Adjusted Residual	-.1	.1	
Total		Count	5	27	32
		% within Clincal_Frailty_Scale_Yes_No	15.6%	84.4%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.006[a]	1	.938		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.006	1	.938		
Fisher's Exact Test				1.000	.673
Linear-by-Linear Association	.006	1	.939		
N of Valid Cases	32				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .94.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.014	.938
	Cramer's V	.014	.938
N of Valid Cases		32	

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
eq5d_mobility_collapse_T1	32	100.0%	0	0.0%	32	100.0%
eq5d_mobility_collapse_T2	32	100.0%	0	0.0%	32	100.0%

Descriptives

			Statistic	Std. Error
eq5d_mobility_collapse_T1	Mean		.8750	.05940
	95% Confidence Interval for Mean	Lower Bound	.7539	
		Upper Bound	.9961	
	5% Trimmed Mean		.9167	
	Median		1.0000	
	Variance		.113	
	Std. Deviation		.33601	
	Minimum		.00	
	Maximum		1.00	
	Range		1.00	
	Interquartile Range		.00	
	Skewness		-2.381	.414
	Kurtosis		3.909	.809
eq5d_mobility_collapse_T2	Mean		.6563	.08531
	95% Confidence Interval for Mean	Lower Bound	.4823	
		Upper Bound	.8302	
	5% Trimmed Mean		.6736	
	Median		1.0000	

	Variance	.233	
	Std. Deviation	.48256	
	Minimum	.00	
	Maximum	1.00	
	Range	1.00	
	Interquartile Range	1.00	
	Skewness	-.691	.414
	Kurtosis	-1.629	.809

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
eq5d_mobility_collapse_T1	.520	32	.000	.391	32	.000
eq5d_mobility_collapse_T2	.418	32	.000	.602	32	.000

a. Lilliefors Significance Correction

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
eq5d_mobility_collapse_T2 - eq5d_mobility_collapse_T1	Negative Ranks	7[a]	4.00	28.00
	Positive Ranks	0[b]	.00	.00
	Ties	25[c]		
	Total	32		

a. eq5d_mobility_collapse_T2 < eq5d_mobility_collapse_T1

b. eq5d_mobility_collapse_T2 > eq5d_mobility_collapse_T1

c. eq5d_mobility_collapse_T2 = eq5d_mobility_collapse_T1

Test Statistics[a]

	eq5d_mobility_collapse_T2 - eq5d_mobility_collapse_T1
Z	-2.646[b]
Asymp. Sig. (2-tailed)	.008

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

Explore

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
eq5d_selfcare_t1	32	100.0%	0	0.0%	32	100.0%
eq5d_selfcare_collapsed_t1	32	100.0%	0	0.0%	32	100.0%
eq5d_selfcare_t2	32	100.0%	0	0.0%	32	100.0%
eq5d_Selfcare_collapsed_t2	32	100.0%	0	0.0%	32	100.0%

Descriptives

			Statistic	Std. Error
eq5d_selfcare_t1	Mean		2.31	.203
	95% Confidence Interval for Mean	Lower Bound	1.90	
		Upper Bound	2.73	

	5% Trimmed Mean		2.24	
	Median		2.00	
	Variance		1.319	
	Std. Deviation		1.148	
	Minimum		1	
	Maximum		5	
	Range		4	
	Interquartile Range		2	
	Skewness		.834	.414
	Kurtosis		.151	.809
eq5d_selfcare_collapsed_t1	Mean		.7500	.07777
	95% Confidence Interval for Mean	Lower Bound	.5914	
		Upper Bound	.9086	
	5% Trimmed Mean		.7778	
	Median		1.0000	
	Variance		.194	
	Std. Deviation		.43994	
	Minimum		.00	
	Maximum		1.00	
	Range		1.00	
	Interquartile Range		.75	
	Skewness		-1.212	.414
	Kurtosis		-.570	.809
eq5d_selfcare_t2	Mean		1.53	.168
	95% Confidence Interval for Mean	Lower Bound	1.19	
		Upper Bound	1.87	
	5% Trimmed Mean		1.41	
	Median		1.00	
	Variance		.902	
	Std. Deviation		.950	
	Minimum		1	
	Maximum		5	
	Range		4	
	Interquartile Range		1	
	Skewness		2.073	.414
	Kurtosis		4.641	.809
eq5d_Selfcare_collapsed_t2	Mean		.3125	.08325
	95% Confidence Interval for Mean	Lower Bound	.1427	
		Upper Bound	.4823	
	5% Trimmed Mean		.2917	

	Median	.0000	
	Variance	.222	
	Std. Deviation	.47093	
	Minimum	.00	
	Maximum	1.00	
	Range	1.00	
	Interquartile Range	1.00	
	Skewness	.849	.414
	Kurtosis	-1.368	.809

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
eq5d_selfcare_t1	.263	32	.000	.865	32	.001
eq5d_selfcare_collapsed_t1	.465	32	.000	.540	32	.000
eq5d_selfcare_t2	.400	32	.000	.625	32	.000
eq5d_Selfcare_collapsed_t2	.434	32	.000	.585	32	.000

a. Lilliefors Significance Correction

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
eq5d_selfcare_t2 - eq5d_selfcare_t1	Negative Ranks	18[a]	10.14	182.50
	Positive Ranks	1[b]	7.50	7.50
	Ties	13[c]		
	Total	32		
eq5d_Selfcare_collapsed_t2 - eq5d_selfcare_collapsed_t1	Negative Ranks	14[d]	7.50	105.00
	Positive Ranks	0[e]	.00	.00
	Ties	18[f]		

Total	32		

a. eq5d_selfcare_t2 < eq5d_selfcare_t1

b. eq5d_selfcare_t2 > eq5d_selfcare_t1

c. eq5d_selfcare_t2 = eq5d_selfcare_t1

d. eq5d_Selfcare_collapsed_t2 < eq5d_selfcare_collapsed_t1

e. eq5d_Selfcare_collapsed_t2 > eq5d_selfcare_collapsed_t1

f. eq5d_Selfcare_collapsed_t2 = eq5d_selfcare_collapsed_t1

Test Statistics[a]

	eq5d_selfcare_t2 - eq5d_selfcare_t1	eq5d_Selfcare_collapsed_t2 - eq5d_selfcare_collapsed_t1
Z	-3.697[b]	-3.742[b]
Asymp. Sig. (2-tailed)	.000	.000

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

Explore

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
eq5d_ususal activities_t1	32	100.0%	0	0.0%	32	100.0%
eq5d_usualactvities_collapsed_t1	32	100.0%	0	0.0%	32	100.0%
eq5d_ususalactivites_t2	32	100.0%	0	0.0%	32	100.0%
eq5d_usualactivites_collapsed_T2	32	100.0%	0	0.0%	32	100.0%

Descriptives

			Statistic	Std. Error
eq5d_ususal activities_t1	Mean		3.88	.276
	95% Confidence Interval for Mean	Lower Bound	3.31	
		Upper Bound	4.44	
	5% Trimmed Mean		3.97	
	Median		5.00	
	Variance		2.435	
	Std. Deviation		1.561	
	Minimum		1	
	Maximum		5	
	Range		4	
	Interquartile Range		2	
	Skewness		-.974	.414
	Kurtosis		-.679	.809
eq5d_usualactvities_collapsed_t1	Mean		.8438	.06521
	95% Confidence Interval for Mean	Lower Bound	.7107	
		Upper Bound	.9768	
	5% Trimmed Mean		.8819	
	Median		1.0000	
	Variance		.136	
	Std. Deviation		.36890	
	Minimum		.00	
	Maximum		1.00	
	Range		1.00	
	Interquartile Range		.00	
	Skewness		-1.988	.414
	Kurtosis		2.078	.809
eq5d_ususalactivites_t2	Mean		2.09	.235
	95% Confidence Interval for Mean	Lower Bound	1.61	
		Upper Bound	2.57	
	5% Trimmed Mean		1.99	
	Median		1.50	
	Variance		1.765	
	Std. Deviation		1.329	
	Minimum		1	
	Maximum		5	
	Range		4	
	Interquartile Range		2	

	Skewness		.874	.414
	Kurtosis		-.527	.809
eq5d_usualactivites_collapsed_T2	Mean		.5000	.08980
	95% Confidence Interval for Mean	Lower Bound	.3168	
		Upper Bound	.6832	
	5% Trimmed Mean		.5000	
	Median		.5000	
	Variance		.258	
	Std. Deviation		.50800	
	Minimum		.00	
	Maximum		1.00	
	Range		1.00	
	Interquartile Range		1.00	
	Skewness		.000	.414
	Kurtosis		-2.138	.809

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
eq5d_ususal activities_t1	.358	32	.000	.708	32	.000
eq5d_usualactvities_collapsed_t1	.508	32	.000	.438	32	.000
eq5d_ususalactivites_t2	.295	32	.000	.790	32	.000
eq5d_usualactivites_collapsed_T2	.338	32	.000	.638	32	.000

a. Lilliefors Significance Correction

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
eq5d_ususalactivites_t2 - eq5d_ususal activities_t1	Negative Ranks	22[a]	11.98	263.50
	Positive Ranks	1[b]	12.50	12.50
	Ties	9[c]		

	Total	32		
eq5d_usualactivites_collapsed_T2 - eq5d_usualactvities_collapsed_t1	Negative Ranks	12[d]	7.00	84.00
	Positive Ranks	1[e]	7.00	7.00
	Ties	19[f]		
	Total	32		

a. eq5d_ususalactivites_t2 < eq5d_ususal activities_t1

b. eq5d_ususalactivites_t2 > eq5d_ususal activities_t1

c. eq5d_ususalactivites_t2 = eq5d_ususal activities_t1

d. eq5d_usualactivites_collapsed_T2 < eq5d_usualactvities_collapsed_t1

e. eq5d_usualactivites_collapsed_T2 > eq5d_usualactvities_collapsed_t1

f. eq5d_usualactivites_collapsed_T2 = eq5d_usualactvities_collapsed_t1

Test Statistics[a]

	eq5d_ususalactivites_t2 - eq5d_ususal activities_t1	eq5d_usualactivites_collapsed_T2 - eq5d_usualactvities_collapsed_t1
Z	-3.850[b]	-3.051[b]
Asymp. Sig. (2-tailed)	.000	.002

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

Explore

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
eq5d_paindiscomfort_t1	32	100.0%	0	0.0%	32	100.0%
eq5d_paindiscomfort_t2	32	100.0%	0	0.0%	32	100.0%

eq5d_paindiscomfort_collapsed_T1	32	100.0%	0	0.0%	32	100.0%
eq5d_paindiscomfort_collapsed_T2	32	100.0%	0	0.0%	32	100.0%

Descriptives

			Statistic	Std. Error
eq5d_paindiscomfort_t1	Mean		2.38	.209
	95% Confidence Interval for Mean	Lower Bound	1.95	
		Upper Bound	2.80	
	5% Trimmed Mean		2.33	
	Median		2.00	
	Variance		1.403	
	Std. Deviation		1.185	
	Minimum		1	
	Maximum		5	
	Range		4	
	Interquartile Range		2	
	Skewness		.318	.414
	Kurtosis		-.936	.809
eq5d_paindiscomfort_t2	Mean		1.81	.165
	95% Confidence Interval for Mean	Lower Bound	1.48	
		Upper Bound	2.15	
	5% Trimmed Mean		1.76	
	Median		1.50	
	Variance		.867	
	Std. Deviation		.931	
	Minimum		1	
	Maximum		4	
	Range		3	
	Interquartile Range		2	
	Skewness		.653	.414
	Kurtosis		-.928	.809
eq5d_paindiscomfort_collapsed_T1	Mean		.6875	.08325
	95% Confidence Interval for Mean	Lower Bound	.5177	
		Upper Bound	.8573	
	5% Trimmed Mean		.7083	
	Median		1.0000	
	Variance		.222	

	Std. Deviation		.47093	
	Minimum		.00	
	Maximum		1.00	
	Range		1.00	
	Interquartile Range		1.00	
	Skewness		-.849	.414
	Kurtosis		-1.368	.809
eq5d_paindiscomfort_collapsed_T2	Mean		.5000	.08980
	95% Confidence Interval for Mean	Lower Bound	.3168	
		Upper Bound	.6832	
	5% Trimmed Mean		.5000	
	Median		.5000	
	Variance		.258	
	Std. Deviation		.50800	
	Minimum		.00	
	Maximum		1.00	
	Range		1.00	
	Interquartile Range		1.00	
	Skewness		.000	.414
	Kurtosis		-2.138	.809

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
eq5d_paindiscomfort_t1	32	100.0%	0	0.0%	32	100.0%
eq5d_paindiscomfort_t2	32	100.0%	0	0.0%	32	100.0%
eq5d_paindiscomfort_collapsed_T1	32	100.0%	0	0.0%	32	100.0%
eq5d_paindiscomfort_collapsed_T2	32	100.0%	0	0.0%	32	100.0%

Descriptives

			Statistic	Std. Error
eq5d_paindiscomfort_t1	Mean		2.38	.209
	95% Confidence Interval for Mean	Lower Bound	1.95	
		Upper Bound	2.80	
	5% Trimmed Mean		2.33	
	Median		2.00	
	Variance		1.403	
	Std. Deviation		1.185	
	Minimum		1	
	Maximum		5	
	Range		4	
	Interquartile Range		2	
	Skewness		.318	.414
	Kurtosis		-.936	.809
eq5d_paindiscomfort_t2	Mean		1.81	.165
	95% Confidence Interval for Mean	Lower Bound	1.48	
		Upper Bound	2.15	
	5% Trimmed Mean		1.76	
	Median		1.50	
	Variance		.867	
	Std. Deviation		.931	
	Minimum		1	
	Maximum		4	
	Range		3	
	Interquartile Range		2	
	Skewness		.653	.414
	Kurtosis		-.928	.809
eq5d_paindiscomfort_collapsed_T1	Mean		.6875	.08325
	95% Confidence Interval for Mean	Lower Bound	.5177	
		Upper Bound	.8573	
	5% Trimmed Mean		.7083	
	Median		1.0000	
	Variance		.222	
	Std. Deviation		.47093	
	Minimum		.00	
	Maximum		1.00	
	Range		1.00	
	Interquartile Range		1.00	
	Skewness		-.849	.414
	Kurtosis		-1.368	.809

eq5d_paindiscomfort_collapsed_T2	Mean		.5000	.08980
	95% Confidence Interval for Mean	Lower Bound	.3168	
		Upper Bound	.6832	
	5% Trimmed Mean		.5000	
	Median		.5000	
	Variance		.258	
	Std. Deviation		.50800	
	Minimum		.00	
	Maximum		1.00	
	Range		1.00	
	Interquartile Range		1.00	
	Skewness		.000	.414
	Kurtosis		-2.138	.809

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
eq5d_paindiscomfort_t1	.190	32	.005	.881	32	.002
eq5d_paindiscomfort_t2	.309	32	.000	.780	32	.000
eq5d_paindiscomfort_collapsed_T1	.434	32	.000	.585	32	.000
eq5d_paindiscomfort_collapsed_T2	.338	32	.000	.638	32	.000

a. Lilliefors Significance Correction

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
eq5d_paindiscomfort_t2 - eq5d_paindiscomfort_t1	Negative Ranks	12[a]	8.58	103.00
	Positive Ranks	3[b]	5.67	17.00
	Ties	17[c]		
	Total	32		

eq5d_paindiscomfort_collaps	Negative Ranks	7[d]	4.50	31.50
ed_T2 -	Positive Ranks	1[e]	4.50	4.50
eq5d_paindiscomfort_collaps	Ties	24[f]		
ed_T1	Total	32		

a. eq5d_paindiscomfort_t2 < eq5d_paindiscomfort_t1

b. eq5d_paindiscomfort_t2 > eq5d_paindiscomfort_t1

c. eq5d_paindiscomfort_t2 = eq5d_paindiscomfort_t1

d. eq5d_paindiscomfort_collapsed_T2 < eq5d_paindiscomfort_collapsed_T1

e. eq5d_paindiscomfort_collapsed_T2 > eq5d_paindiscomfort_collapsed_T1

f. eq5d_paindiscomfort_collapsed_T2 = eq5d_paindiscomfort_collapsed_T1

Test Statistics[a]

	eq5d_paindiscomfort_t2 - eq5d_paindiscomfort_t1	eq5d_paindiscomfort_collapsed_T2 - eq5d_paindiscomfort_collapsed_T1
Z	-2.489[b]	-2.121[b]
Asymp. Sig. (2-tailed)	.013	.034

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

```
EXAMINE VARIABLES=eq5d_anxietydepression_t1
eq5d_anxietydepression_t2
    eq5d_Anxietydepression_collasped_T1
eq5d_anxietydepression_collapsed_t2
  /PLOT BOXPLOT STEMLEAF NPPLOT
  /COMPARE GROUPS
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
```

Explore

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
eq5d_anxietydepression_t1	32	100.0%	0	0.0%	32	100.0%
eq5d_anxietydepression_t2	32	100.0%	0	0.0%	32	100.0%
eq5d_Anxietydepression_collasped_T1	32	100.0%	0	0.0%	32	100.0%
eq5d_anxietydepression_collapsed_t2	32	100.0%	0	0.0%	32	100.0%

Descriptives

			Statistic	Std. Error
eq5d_anxietydepression_t1	Mean		1.47	.135
	95% Confidence Interval for Mean	Lower Bound	1.19	
		Upper Bound	1.74	
	5% Trimmed Mean		1.38	
	Median		1.00	
	Variance		.580	
	Std. Deviation		.761	
	Minimum		1	
	Maximum		4	
	Range		3	
	Interquartile Range		1	
	Skewness		1.749	.414
	Kurtosis		2.944	.809
eq5d_anxietydepression_t2	Mean		1.53	.162
	95% Confidence Interval for Mean	Lower Bound	1.20	
		Upper Bound	1.86	
	5% Trimmed Mean		1.39	
	Median		1.00	
	Variance		.838	
	Std. Deviation		.915	
	Minimum		1	
	Maximum		5	
	Range		4	

	Interquartile Range		1	
	Skewness		2.460	.414
	Kurtosis		6.952	.809
eq5d_Anxietydepression_collasped_T1	Mean		.3438	.08531
	95% Confidence Interval for Mean	Lower Bound	.1698	
		Upper Bound	.5177	
	5% Trimmed Mean		.3264	
	Median		.0000	
	Variance		.233	
	Std. Deviation		.48256	
	Minimum		.00	
	Maximum		1.00	
	Range		1.00	
	Interquartile Range		1.00	
	Skewness		.691	.414
	Kurtosis		-1.629	.809
eq5d_anxietydepression_collapsed_t2	Mean		.3750	.08695
	95% Confidence Interval for Mean	Lower Bound	.1977	
		Upper Bound	.5523	
	5% Trimmed Mean		.3611	
	Median		.0000	
	Variance		.242	
	Std. Deviation		.49187	
	Minimum		.00	
	Maximum		1.00	
	Range		1.00	
	Interquartile Range		1.00	
	Skewness		.542	.414
	Kurtosis		-1.824	.809

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
eq5d_anxietydepression_t1	.387	32	.000	.660	32	.000
eq5d_anxietydepression_t2	.344	32	.000	.605	32	.000
eq5d_Anxietydepression_collasped_T1	.418	32	.000	.602	32	.000
eq5d_anxietydepression_collapsed_t2	.402	32	.000	.615	32	.000

a. Lilliefors Significance Correction

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
eq5d_anxietydepression_t2 - eq5d_anxietydepression_t1	Negative Ranks	4[a]	4.50	18.00
	Positive Ranks	5[b]	5.40	27.00
	Ties	23[c]		
	Total	32		
eq5d_anxietydepression_collapsed_t2 - eq5d_Anxietydepression_collasped_T1	Negative Ranks	3[d]	4.00	12.00
	Positive Ranks	4[e]	4.00	16.00
	Ties	25[f]		
	Total	32		

a. eq5d_anxietydepression_t2 < eq5d_anxietydepression_t1

b. eq5d_anxietydepression_t2 > eq5d_anxietydepression_t1

c. eq5d_anxietydepression_t2 = eq5d_anxietydepression_t1

d. eq5d_anxietydepression_collapsed_t2 < eq5d_Anxietydepression_collasped_T1

e. eq5d_anxietydepression_collapsed_t2 > eq5d_Anxietydepression_collasped_T1

f. eq5d_anxietydepression_collapsed_t2 = eq5d_Anxietydepression_collasped_T1

Test Statistics[a]

	eq5d_anxietydepression_t2 - eq5d_anxietydepression_t1	eq5d_anxietydepression_collapsed_t2 - eq5d_Anxietydepression_collasped_T1
Z	-.577[b]	-.378[b]
Asymp. Sig. (2-tailed)	.564	.705

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
tug_t1_sec	32	100.0%	0	0.0%	32	100.0%
tug_t2_Sec	32	100.0%	0	0.0%	32	100.0%

Descriptives

			Statistic	Std. Error
tug_t1_sec	Mean		38.0553	4.71554
	95% Confidence Interval for Mean	Lower Bound	28.4379	
		Upper Bound	47.6727	
	5% Trimmed Mean		35.0077	
	Median		28.3600	
	Variance		711.562	
	Std. Deviation		26.67511	
	Minimum		12.08	
	Maximum		133.22	
	Range		121.14	
	Interquartile Range		26.81	
	Skewness		1.917	.414
	Kurtosis		4.360	.809
tug_t2_Sec	Mean		29.3738	3.74356
	95% Confidence Interval for Mean	Lower Bound	21.7387	
		Upper Bound	37.0088	
	5% Trimmed Mean		27.2229	
	Median		20.0550	
	Variance		448.455	
	Std. Deviation		21.17676	
	Minimum		9.12	
	Maximum		89.49	
	Range		80.37	
	Interquartile Range		23.63	
	Skewness		1.560	.414
	Kurtosis		1.955	.809

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
tug_t1_sec	.179	32	.010	.811	32	.000
tug_t2_Sec	.196	32	.003	.813	32	.000

a. Lilliefors Significance Correction

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
tug_t2_Sec - tug_t1_sec	Negative Ranks	26[a]	15.62	406.00
	Positive Ranks	3[b]	9.67	29.00
	Ties	3[c]		
	Total	32		

a. tug_t2_Sec < tug_t1_sec

b. tug_t2_Sec > tug_t1_sec

c. tug_t2_Sec = tug_t1_sec

Test Statistics[a]

	tug_t2_Sec - tug_t1_sec
Z	-4.076[b]
Asymp. Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
ems_t1	32	100.0%	0	0.0%	32	100.0%
ems_t2	32	100.0%	0	0.0%	32	100.0%

Descriptives

			Statistic	Std. Error
ems_t1	Mean		12.56	.845
	95% Confidence Interval for Mean	Lower Bound	10.84	
		Upper Bound	14.29	
	5% Trimmed Mean		12.66	
	Median		14.00	
	Variance		22.835	
	Std. Deviation		4.779	
	Minimum		3	
	Maximum		20	
	Range		17	
	Interquartile Range		8	
	Skewness		-.356	.414
	Kurtosis		-.728	.809
ems_t2	Mean		15.91	.762
	95% Confidence Interval for Mean	Lower Bound	14.35	
		Upper Bound	17.46	
	5% Trimmed Mean		16.27	
	Median		17.00	
	Variance		18.604	
	Std. Deviation		4.313	
	Minimum		3	
	Maximum		20	
	Range		17	
	Interquartile Range		6	
	Skewness		-1.252	.414
	Kurtosis		1.203	.809

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
ems_t1	.149	32	.067	.956	32	.211
ems_t2	.171	32	.018	.850	32	.000

a. Lilliefors Significance Correction

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
ems_t2 - ems_t1	Negative Ranks	0[a]	.00	.00
	Positive Ranks	27[b]	14.00	378.00
	Ties	5[c]		
	Total	32		

a. ems_t2 < ems_t1

b. ems_t2 > ems_t1

c. ems_t2 = ems_t1

Test Statistics[a]

	ems_t2 - ems_t1
Z	-4.555[b]
Asymp. Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Explore

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
grip_strentgh_t1_right_kg	32	100.0%	0	0.0%	32	100.0%
grip_strength_t2_right_kg	32	100.0%	0	0.0%	32	100.0%

Descriptives

			Statistic	Std. Error
grip_strentgh_t1_right_kg	Mean		15.3531	1.45819
	95% Confidence Interval for Mean	Lower Bound	12.3791	
		Upper Bound	18.3271	
	5% Trimmed Mean		15.1605	
	Median		13.3300	
	Variance		68.042	
	Std. Deviation		8.24876	
	Minimum		.00	
	Maximum		36.00	
	Range		36.00	
	Interquartile Range		9.92	
	Skewness		.408	.414
	Kurtosis		.116	.809
grip_strength_t2_right_kg	Mean		15.8281	1.43331
	95% Confidence Interval for Mean	Lower Bound	12.9049	
		Upper Bound	18.7514	
	5% Trimmed Mean		15.5024	
	Median		13.3300	
	Variance		65.740	
	Std. Deviation		8.10804	
	Minimum		3.30	
	Maximum		36.33	
	Range		33.03	
	Interquartile Range		11.25	
	Skewness		.716	.414
	Kurtosis		.168	.809

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
grip_strentgh_t1_right_kg	.142	32	.099	.974	32	.605
grip_strength_t2_right_kg	.152	32	.057	.949	32	.132

a. Lilliefors Significance Correction

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	grip_strentgh_t1_right_kg	15.3531	32	8.24876	1.45819
	grip_strength_t2_right_kg	15.8281	32	8.10804	1.43331

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	grip_strentgh_t1_right_kg & grip_strength_t2_right_kg	32	.956	.000

Paired Samples Test

		Paired Differences			
					95% Confidence Interval of the Difference
		Mean	Std. Deviation	Std. Error Mean	Lower
Pair 1	grip_strentgh_t1_right_kg - grip_strength_t2_right_kg	-.47500	2.42782	.42918	-1.35032

Paired Samples Test

	Paired Differences			
	95% Confidence Interval of the Difference	t	df	Sig. (2-tailed)

		Upper			
Pair 1	grip_strentgh_t1_right_kg - grip_strength_t2_right_kg	.40032	-1.107	31	.277

```
EXAMINE VARIABLES=grip_strentgh_t1_left_kg grip_strength_t2_left_kg
  /PLOT BOXPLOT STEMLEAF NPPLOT
  /COMPARE GROUPS
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
```

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
grip_strentgh_t1_left_kg	32	100.0%	0	0.0%	32	100.0%
grip_strength_t2_left_kg	32	100.0%	0	0.0%	32	100.0%

Descriptives

			Statistic	Std. Error
grip_strentgh_t1_left_kg	Mean		13.6209	1.38647
	95% Confidence Interval for Mean	Lower Bound	10.7932	
		Upper Bound	16.4487	
	5% Trimmed Mean		13.5857	
	Median		12.0000	
	Variance		61.514	
	Std. Deviation		7.84306	
	Minimum		.00	
	Maximum		28.00	
	Range		28.00	
	Interquartile Range		11.50	
	Skewness		-.017	.414
	Kurtosis		-.753	.809
grip_strength_t2_left_kg	Mean		14.8456	1.30940
	95% Confidence Interval for	Lower Bound	12.1751	

	Mean	Upper Bound	17.5162	
	5% Trimmed Mean		14.8347	
	Median		13.5000	
	Variance		54.865	
	Std. Deviation		7.40708	
	Minimum		.00	
	Maximum		30.33	
	Range		30.33	
	Interquartile Range		10.84	
	Skewness		.192	.414
	Kurtosis		-.325	.809

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
grip_strentgh_t1_left_kg	.123	32	.200*	.958	32	.245
grip_strength_t2_left_kg	.108	32	.200*	.979	32	.767

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

T-Test

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	grip_strentgh_t1_left_kg	13.6209	32	7.84306	1.38647
	grip_strength_t2_left_kg	14.8456	32	7.40708	1.30940

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	grip_strentgh_t1_left_kg & grip_strength_t2_left_kg	32	.905	.000

Paired Samples Test

		Paired Differences			
					95% Confidence Interval of the Difference
		Mean	Std. Deviation	Std. Error Mean	Lower
Pair 1	grip_strentgh_t1_left_kg - grip_strength_t2_left_kg	-1.22469	3.35429	.59296	-2.43404

Paired Samples Test

		Paired Differences			
		95% Confidence Interval of the Difference			
		Upper	t	df	Sig. (2-tailed)
Pair 1	grip_strentgh_t1_left_kg - grip_strength_t2_left_kg	-.01534	-2.065	31	.047

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
eq5d_healthrating_t1	32	100.0%	0	0.0%	32	100.0%
eqd5_healthrating_t2	32	100.0%	0	0.0%	32	100.0%

Descriptives

			Statistic	Std. Error
eq5d_healthrating_t1	Mean		59.38	4.132
	95% Confidence Interval for Mean	Lower Bound	50.95	
		Upper Bound	67.80	

	5% Trimmed Mean		59.31	
	Median		60.00	
	Variance		546.371	
	Std. Deviation		23.375	
	Minimum		20	
	Maximum		100	
	Range		80	
	Interquartile Range		35	
	Skewness		-.019	.414
	Kurtosis		-.910	.809
eqd5_healthrating_t2	Mean		71.25	3.554
	95% Confidence Interval for Mean	Lower Bound	64.00	
		Upper Bound	78.50	
	5% Trimmed Mean		71.91	
	Median		72.50	
	Variance		404.129	
	Std. Deviation		20.103	
	Minimum		25	
	Maximum		100	
	Range		75	
	Interquartile Range		39	
	Skewness		-.229	.414
	Kurtosis		-.705	.809

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
eq5d_healthrating_t1	.144	32	.090	.950	32	.146
eqd5_healthrating_t2	.136	32	.139	.945	32	.105

a. Lilliefors Significance Correction

T-Test

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	eq5d_healthrating_t1	59.38	32	23.375	4.132
	eqd5_healthrating_t2	71.25	32	20.103	3.554

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	eq5d_healthrating_t1 & eqd5_healthrating_t2	32	.572	.001

Paired Samples Test

		Paired Differences			
					95% Confidence Interval of the Difference
		Mean	Std. Deviation	Std. Error Mean	Lower
Pair 1	eq5d_healthrating_t1 - eqd5_healthrating_t2	-11.875	20.324	3.593	-19.203

Paired Samples Test

		Paired Differences			
		95% Confidence Interval of the Difference			
		Upper	t	df	Sig. (2-tailed)
Pair 1	eq5d_healthrating_t1 - eqd5_healthrating_t2	-4.547	-3.305	31	.002

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
discrgae_transger_independenent_recoded - Admission_transfer_Independent_recoded	Negative Ranks	19[a]	10.00	190.00
	Positive Ranks	0[b]	.00	.00
	Ties	13[c]		
	Total	32		
discharge_mobility_independent_Recoded - admission_mobility_independent_Recoded	Negative Ranks	19[d]	10.00	190.00
	Positive Ranks	0[e]	.00	.00
	Ties	13[f]		
	Total	32		

a. discrgae_transger_independenent_recoded < Admission_transfer_Independent_recoded

b. discrgae_transger_independenent_recoded > Admission_transfer_Independent_recoded

c. discrgae_transger_independenent_recoded = Admission_transfer_Independent_recoded

d. discharge_mobility_independent_Recoded < admission_mobility_independent_Recoded

e. discharge_mobility_independent_Recoded > admission_mobility_independent_Recoded

f. discharge_mobility_independent_Recoded = admission_mobility_independent_Recoded

Test Statistics[a]

	discrgae_transger_independenent_recoded - Admission_transfer_Independent_recoded	discharge_mobility_independent_Recoded - admission_mobility_independent_Recoded
Z	-4.359[b]	-4.359[b]
Asymp. Sig. (2-tailed)	.000	.000

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

Correlations

		eqd5_healthrating_t2	isar_admission
eqd5_healthrating_t2	Pearson Correlation	1	-.416*
	Sig. (2-tailed)		.018
	N	32	32
isar_admission	Pearson Correlation	-.416*	1
	Sig. (2-tailed)	.018	
	N	32	32

*. Correlation is significant at the 0.05 level (2-tailed).

```
CORRELATIONS
  /VARIABLES=isar_admission grip_strength_t2_left_kg
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

		isar_admission	grip_strength_t2_left_kg
isar_admission	Pearson Correlation	1	-.167
	Sig. (2-tailed)		.362
	N	32	32
grip_strength_t2_left_kg	Pearson Correlation	-.167	1
	Sig. (2-tailed)	.362	
	N	32	32

```
NONPAR CORR
  /VARIABLES=isar_admission tug_t2_Sec
```

Correlations

			isar_admission	tug_t2_Sec
Spearman's rho	isar_admission	Correlation Coefficient	1.000	.189
		Sig. (2-tailed)	.	.301
		N	32	32
	tug_t2_Sec	Correlation Coefficient	.189	1.000
		Sig. (2-tailed)	.301	.
		N	32	32

```
NONPAR CORR
  /VARIABLES=isar_admission ems_t2
  /PRINT=SPEARMAN TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Nonparametric Correlations

Correlations

			isar_admission	ems_t2
Spearman's rho	isar_admission	Correlation Coefficient	1.000	-.330
		Sig. (2-tailed)	.	.065
		N	32	32
	ems_t2	Correlation Coefficient	-.330	1.000
		Sig. (2-tailed)	.065	.

a. Based on availability of workspace memory

Correlations

			isar_admission
Spearman's rho	isar_admission	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	32
	eq5d_mobility_collapse_T2	Correlation Coefficient	.267
		Sig. (2-tailed)	.139
		N	32

Correlations

			eq5d_mobility_collapse_T2
Spearman's rho	isar_admission	Correlation Coefficient	.267
		Sig. (2-tailed)	.139
		N	32
	eq5d_mobility_collapse_T2	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	32

```
NONPAR CORR
  /VARIABLES=isar_admission eq5d_Selfcare_collapsed_t2
  /PRINT=SPEARMAN TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Nonparametric Correlations

Correlations

	isar_admission

Spearman's rho	isar_admission	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	32
	eq5d_Selfcare_collapsed_t2	Correlation Coefficient	.590**
		Sig. (2-tailed)	.000
		N	32

Correlations

			eq5d_Selfcare_collapsed_t2
Spearman's rho	isar_admission	Correlation Coefficient	.590**
		Sig. (2-tailed)	.000
		N	32
	eq5d_Selfcare_collapsed_t2	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	32

**. Correlation is significant at the 0.01 level (2-tailed).

```
NONPAR CORR
  /VARIABLES=isar_admission eq5d_usualactivites_collapsed_T2
  /PRINT=SPEARMAN TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Nonparametric Correlations

Correlations

			isar_admission
Spearman's rho	isar_admission	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	32
	eq5d_usualactivites_collapsed_T2	Correlation Coefficient	.315
		Sig. (2-tailed)	.079

	N	32

Correlations

			eq5d_usualactivites_collapsed_T2
Spearman's rho	isar_admission	Correlation Coefficient	.315
		Sig. (2-tailed)	.079
		N	32
	eq5d_usualactivites_collapsed_T2	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	32

```
NONPAR CORR
  /VARIABLES=isar_admission eq5d_paindiscomfort_collapsed_T2
  /PRINT=SPEARMAN TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Nonparametric Correlations

Correlations

			isar_admission
Spearman's rho	isar_admission	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	32
	eq5d_paindiscomfort_collapsed_T2	Correlation Coefficient	-.215
		Sig. (2-tailed)	.238
		N	32

Correlations

			eq5d_paindiscomfort_collapsed_T2
Spearman's rho	isar_admission	Correlation Coefficient	-.215
		Sig. (2-tailed)	.238
		N	32

	eq5d_paindiscomfort_collapsed_T2	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	32

Correlations

Correlations

		isar_admission	grip_strength_t2_left_kg
isar_admission	Pearson Correlation	1	-.167
	Sig. (2-tailed)		.362
	N	32	32
grip_strength_t2_left_kg	Pearson Correlation	-.167	1
	Sig. (2-tailed)	.362	
	N	32	32

Correlation

Correlations

		isar_admission	eqd5_healthrating_t2
isar_admission	Pearson Correlation	1	-.416*
	Sig. (2-tailed)		.018
	N	32	32
eqd5_healthrating_t2	Pearson Correlation	-.416*	1
	Sig. (2-tailed)	.018	
	N	32	32

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

			csf_admission
Spearman's rho	csf_admission	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	32
	eq5d_mobility_collapse_T2	Correlation Coefficient	-.218
		Sig. (2-tailed)	.230
		N	32

Correlations

			eq5d_mobility_collapse_T2
Spearman's rho	csf_admission	Correlation Coefficient	-.218
		Sig. (2-tailed)	.230
		N	32
	eq5d_mobility_collapse_T2	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	32

Correlations

			csf_admission
Spearman's rho	csf_admission	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	32
	eq5d_Selfcare_collapsed_t2	Correlation Coefficient	.149
		Sig. (2-tailed)	.416
		N	32

Correlations

			eq5d_Selfcare_collapsed_t2
Spearman's rho	csf_admission	Correlation Coefficient	.149
		Sig. (2-tailed)	.416
		N	32

	eq5d_Selfcare_collapsed_t2	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	32

Correlations

			csf_admission
Spearman's rho	csf_admission	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	32
	eq5d_usualactivites_collapsed_T2	Correlation Coefficient	.134
		Sig. (2-tailed)	.464
		N	32

Correlations

			eq5d_usualactivites_collapsed_T2
Spearman's rho	csf_admission	Correlation Coefficient	.134
		Sig. (2-tailed)	.464
		N	32
	eq5d_usualactivites_collapsed_T2	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	32

Correlations

			csf_admission
Spearman's rho	csf_admission	Correlation Coefficient	1.000
		Sig. (2-tailed)	.

		N	32
	eq5d_paindiscomfort_collapsed_T2	Correlation Coefficient	.038
		Sig. (2-tailed)	.835
		N	32

Correlations

			eq5d_paindiscomfort_collapsed_T2
Spearman's rho	csf_admission	Correlation Coefficient	.038
		Sig. (2-tailed)	.835
		N	32
	eq5d_paindiscomfort_collapsed_T2	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	32

Correlations

			csf_admission
Spearman's rho	csf_admission	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	32
	eq5d_anxietydepression_collapsed_t2	Correlation Coefficient	-.309
		Sig. (2-tailed)	.085
		N	32

Correlations

			eq5d_anxietydepression_collapsed_t2
Spearman's rho	csf_admission	Correlation Coefficient	-.309
		Sig. (2-tailed)	.085
		N	32
	eq5d_anxietydepression_collapsed_t2	Correlation Coefficient	1.000
		Sig. (2-tailed)	.

	N	32

Correlations

			csf_admission	tug_t2_Sec
Spearman's rho	csf_admission	Correlation Coefficient	1.000	.638**
		Sig. (2-tailed)	.	.000
		N	32	32
	tug_t2_Sec	Correlation Coefficient	.638**	1.000
		Sig. (2-tailed)	.000	.
		N	32	32

**. Correlation is significant at the 0.01 level (2-tailed).

.

Correlations

			csf_admission	ems_t2
Spearman's rho	csf_admission	Correlation Coefficient	1.000	-.611**
		Sig. (2-tailed)	.	.000
		N	32	32
	ems_t2	Correlation Coefficient	-.611**	1.000

	Sig. (2-tailed)	.000	.
	N	32	32

**. Correlation is significant at the 0.01 level (2-tailed).

```
CORRELATIONS
```

Correlations

		csf_admission	grip_strength_t2_left_kg
csf_admission	Pearson Correlation	1	-.231
	Sig. (2-tailed)		.204
	N	32	32
grip_strength_t2_left_kg	Pearson Correlation	-.231	1
	Sig. (2-tailed)	.204	
	N	32	32

```
CORRELATIONS
  /VARIABLES=csf_admission eqd5_healthrating_t2
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

		csf_admission	eqd5_healthrating_t2
csf_admission	Pearson Correlation	1	.098
	Sig. (2-tailed)		.595
	N	32	32
eqd5_healthrating_t2	Pearson Correlation	.098	1
	Sig. (2-tailed)	.595	
	N	32	32