# Gait speed testing in the emergency department: A nursing pilot project

Submitted to the faculty

of

Drexel University

by

Patricia A. Scherle

in partial fulfillment of the

requirements for the degree

of

Doctor of Nursing Practice

September 2016

## Table of Contents

## Abstract

Gait speed testing in the emergency department: A nursing pilot project

Patricia A. Scherle

Background: Objective functional screening tools are an important component of the assessment of older adults in the emergency department (ED) setting and are identified as a predictor of adverse events including ED revisits and falls. Gait speed is an easy screening tool that can be performed quickly and safely during the triage process without delaying the care of the patient. A gait speed of <1.0m/s may indicate the need to implement fall precautions, demonstrate an increased risk for lower extremity limitations, hospitalizations, death and an increased assistance with personal care.

Objective: The purpose of this quality improvement project was to implement gait speed testing in the ED and to examine the impact of gait speed on the disposition decision outcome.

Methods: A prospective descriptive design using a convenience sample of 30 older adult patients presenting to the ED was utilized. Gait speeds were categorized as low (<1.0m/s) and normal (>1.0m/s). Discharge disposition was categorized as discharged, discharged with physical therapy, and discharged with other support services. Data analysis consisted of descriptive statistics and the Fisher's exact test.

Results: The sample was primarily female (n=19, 63.3%), with a mean age of 71years (SD=8.9). The mean gait speed was .75m/s (SD=.25 Twenty-three patients had low gait speed < 1 m/s. Of those patients with low gait speed, 8 patients (34.8%) were admitted while 15 (65.2%) were discharged home, a result that was not statistically significant (P=1.00, Fisher's exact test).

Conclusion: Gait speed testing could be administered by nursing during the triage process without delaying the patient's length of stay. In this limited sample, gait speed testing did not impact the use of support services upon discharge. Further staff education is warranted to increase their understanding of the clinical implications of gait speed testing.

*Key words*: gait speed, walking speed, functional assessment, emergency department, older fallers, falls, geriatrics

# Gait speed testing in the emergency department

The older adult population will challenge healthcare systems throughout the nation in the coming years (Carpenter et al., 2014b). Older adults are also becoming a large and growing segment of the emergency department (ED) population and account for approximately 20.3 million ED visits annually (Centers for Disease Control and Prevention [CDC], 2011). Older patients are more likely to have multiple disease or chronic illnesses, with impaired physical or cognitive function and limited social support (Gray et al., 2013). Older aged patients are also associated with an increased ED length of stay and higher resource use (Gray et al., 2013) and it will be imperative for ED clinicians to make the most efficient use of resources and provide the appropriate patient care with the best patient outcomes.

The traditional ED model of rapid triage, treatment and throughput may not address the needs of the older adult in the ED (Baumbusch & Shaw, 2011). Providing appropriate ED care to the older adult population is important to addressing the needs of the aging population (Baumbusch & Shaw, 2011). Unlike the younger population, ED visits by older adults are complicated by comorbidities, cognitive and functional impairment, and complex social issues (Baumbusch & Shaw, 2011). The combination of aging and illness necessitates comprehensive assessments and referrals forming a gap between the acute episodic style of ED care and the multidimensional social and medical needs of the geriatric patient (Baumbusch & Shaw, 2011).

The purpose of this performance improvement project was to implement gait speed testing during the ED triage process, in conjunction with the subjective functional screening tools already in use, and provide the clinical staff with an objective evidence-based measurement about the patient's functional status. Gait speed is important in the clinical setting as it may

predict future health status and functional decline, including hospitalizations, fall risk, discharge location and mortality (Fritz & Lusardi, 2009) and can be used as another vital sign during the medical decision making process.

## Background

The care delivered in hospital based emergency departments is an important aspect in the United States (US) as hospitals seek to improve access to and the quality of healthcare (Schuur, Hsia, Burstin, Schull, & Pines, 2013). In the United States, ED's are: the critical staging area for severely ill patients; the site of one in eleven ambulatory care visits; key as the lead role in half of the hospital admissions; and the safety net for communities secondary to hospitals being required by law to evaluate all patients regardless of their ability to pay (Schuur et al., 2013). The care in emergency departments is subject to external quality measurement by the following four groups/organizations: Centers for Medicare and Medicaid (CMS) (eleven quality measures including three that have ED-specific measures), the Joint Commission (quality measures through Core Measure Sets and other accreditation standards), private payers and state regulators (Schuur et al., 2013). With pay for performance initiatives such as readmissions and hospital acquired conditions (i.e. falls) affecting financial reimbursement of hospitals (Wiler et al., 2015), there is now an increased focus on throughput times as a publicly reported measure. The quick paced nature of emergency departments often omits the assessment of patient functional status, which may have consequences for the geriatric population including falls, functional decline and hospital admission and re-admission (Lee, Ross, & Tracy, 2001).

Older adults present to the ED with complex medical and psychosocial needs (Hwang et al., 2013). They are more likely to have cognitive impairment, functional impairment, falls, depression, sensory impairment and multiple medication use (Hwang et al., 2013). Unlike their

younger counterparts, the older patient characteristics complicate the evaluation and management of their care (Hwang et al., 2013). Geriatric syndromes, such as cognitive impairment, falls, depression, functional impairment and sensory impairment, are under recognized by clinicians given the fast pace nature of the ED (Hwang et al., 2013). An alternative solution must also be created for those older adults unable to provide an accurate history (Bissett, Cusick, & Lannin, 2013).

The evidence-based geriatric nursing protocols for best practice guide nurses to provide a comprehensive functional assessment of older adults that includes independent performance of basic activities of daily living (ADLs) or instrumental activities of daily living (IADLs) and the assistance needed to accomplish these tasks (Kresevic, 2012). Nursing should include an assessment of the patient's sensory ability, cognition and capacity to ambulate (Kresevic, 2012). The barriers to successfully implement this comprehensive functional assessment in a small rural community hospital ED includes limited staff resources, lack of medical specialists such as geriatricians, and the throughput requirements.

One solution is for the ED nurse to perform a functional assessment measure such as gait speed, on patients 65 years and older, to objectively measure their functional ability, therefore providing objective real time data about the patient's functional status. Nursing can easily adopt this objective functional assessment tool in the ED as a safe and objective assessment technique under their scope of practice and is well within the American Nurses Association Standards of Nursing Practice (American Nurses Association [ANA], 2004).

**Functional assessment in the ED**

Functional assessment is an important component of the management of older adults in emergency departments and has been identified as a predictor of adverse events including ED

revisits and falls (Bissett et al., 2013). United States emergency departments are facing the challenge of caring for an aging population that requires complex and lengthy evaluations (Hwang et al., 2013). These lengthy evaluations are time consuming in an ED setting and require specialist expertise not always available to the ED (Bissett et al., 2013). The timeframe when patients present to the ED has also been recognized "as a sentinel event for older people; a time when immediate medical problems can be addressed and risk factors assessed and managed to reduce the probability of future adverse events" (Bissett et al., 2013, p. 164).Older adult patients may pose an assessment challenge to the ED staff during the triage and assessment phase of the ED visit (Bissett et al., 2013). Older adult patients frequently present with complex situations, involving decreased functional ability, polypharmacy and comorbidities (Nielsen, Maribo, Nielsen, Jensen, & Petersen, 2014). Functional disability increases the risk of readmissions, predicts longer hospitalizations and higher mortality (Nielsen et al., 2014). In the ED setting, information about functional ability and decline may assist in diagnosing patients and recognizing any post discharge needs (Bissett et al., 2013).

Function can be assessed in standardized or non-standardized formats using observation of performance or self or caregiver reports (Bissett et al., 2013). However, there is a lack of clear clinical guidelines as to the selection of the most appropriate functional assessment screen and what interventions to implement based on the functional assessment screen (Bissett et al., 2013). Presently, performance based functional assessments are not part of the routine standard of care in the ED or upon admittance to the inpatient units.

Self-reported subjective functional status tools with predictive ability are available for use in the ED setting (Hwang et al., 2013). These questionnaires may be as simple as a two item questionnaire asked during the triage process (Tiedemann et al., 2013) or a more comprehensive

questionnaire such as the Identification of Seniors at Risk (ISAR) Tool (Aldeen, Courtney, Lundquist, Dresden, & Gravenor, 2014). The Geriatric Emergency Department Guidelines represent the first formal attempt to characterize the essential attributes of the geriatric ED and care to this population specific patient group (Carpenter et al., 2014a). Although these tools are valid, using the self-reported methodology eliminates the opportunity for real time observation of patient function (Bissett et al., 2013). A major limitation of self-reported measures of mobility is that they are not designed to capture the entire range of function in older adults (Ostir et al., 2012).

Several functional assessment measures are available to clinicians that can be used in the clinical evaluation of older persons and for assessing patients over the age of 65 of presenting to EDs. There are many examples of functional assessment measures that assess patients' function and fall predictability such as functional reach test, four square test, gait speed test, timed up and go (TUG), five times sit to stand test, and a Six Minute Walk Test (Vicarro, Perera, & Studenski, 2011). Gait speed has been shown to predict hospitalization, declines in health and function, falls and survival while TUG may provide more information about fall risk (Viccaro et al., 2011). The TUG includes standing up from a chair, walking 3 meters, turning, walking back and sitting down (Hornyak, VanSwearingen, & Brach, 2012) while the gait speed test is quick, easy to measure and requires only a stopwatch and having the patient walk a marked distance (Hornyak et al., 2012).

**Older adults and falls**

In the United States, the number of older adults aged 65 years and older is expected to increase to 83 million or 23% of the population (DeGrauw, Annest, Stevens, Xu, & Coronado, 2016). Older patients are more likely to have severe illnesses, arrive by ambulances and be

admitted to the hospital after their ED visit (Gray et al., 2013). This is important as the incidence of geriatric syndromes and functional impairment may influence the physical layout, care delivery protocols, risk minimization, and staff training (Gray et al., 2013). The emergency department is also a critical point of access to healthcare as it is used by many older people who have had a fall (Close et al., 2012) and also is an important reason to perform a functional assessment measure prior to discharge or admission to the hospital.

Older fallers presenting to the ED consume higher healthcare resources (Close et al., 2012). Since falls are the leading cause of unintentional injuries in older adults, the cost of fall injuries will continue to rise and test the health care system (DeGrauw et al., 2016). Falls among older adults are the leading cause of both injury deaths and ED visits for trauma and can have long term, devastating effects for older adults including reduced mobility, loss of independence, and death (Liu, Obermeyer, Chang, & Shanker, 2015). ED's have a role in identifying risks and implementing interventions to reduce and prevent future falls, functional decline or readmission to the ED or as a hospital admission (Harper et al., 2013).

**Gait speed**

"Gait speed is a valid, reliable, and sensitive measure appropriate for assessing and monitoring functional status and overall health in a wide range of populations" (Middleton, Fritz, & Lusardi, 2015, p. 314). Gait speed can be used in the clinical or research setting (Middleton et al., 2015). This measure is indicative of an individual's functional capacity, general health status, and predictive of a range of outcomes including response to rehabilitation, functional dependence and mobility disability (Middleton et al., 2015). It has also been shown to predict cognitive decline, falls, institutionalization, hospitalization, cardiovascular-related events, mortality and all-cause mortality (Middleton et al., 2015,).

Fritz and Lusardi (2009) considered gait speed as the "sixth vital sign," since this measure has extensive predictive capabilities and is easy to administer. Like the other vital signs used to monitor and measure patient's physical state, gait speed also has cut off measures that are indicative of specific outcomes (Fritz & Lusardi, 2009). Gait speed may be a general measurement that can predict future events and reflect underlying physiological processes (Fritz & Lusardi, 2009). The range for normal gait speed is 1.2-1.4 meters/second (m/s), although it may vary for individuals based on the patient's age, gender and physical dimensions and properties of the body (Fritz & Lusardi, 2009). Gait speeds below 1m/s may indicate the need to implement fall precautions, demonstrate an increased risk for lower extremity limitations, hospitalizations, death and an increased assistance with personal care (Middleton, Fritz, & Lusardi, 2015). Like blood pressures, gait speed cannot stand alone in predicting functional abilities and outcomes (Fritz & Lusardi, 2009). If the gait speed measurement is used with other assessments of the patient's condition, these collective vital signs can assist in the determination of functional status, discharge location, and the need for rehabilitation (Fritz & Lusardi, 2009).

The ability to walk can lay the groundwork to assess basic and community functions for independence (Peel, Kuys, & Klein, 2012). The factors that influence walking can be classified into physiological subsystems (Peel et al., 2012). These subsystems include those like the central nervous system, peripheral nervous system, muscles, bones and joints, to name a few (Peel et al., 2012). When these systems become dysfunctional, walking slows and the onset of difficulties in walking marks a point that assessment of gait speed has become a credible vital sign (Peel et al., 2012). The gait speed test therefore is suitable for use in the clinical setting for evaluating older persons because it is a quick, reliable measure of functional capacity, has

predictive value for major healthcare outcomes, and is a useful measure to identify older persons at risk for adverse events (Peel et al., 2012).

## Review of literature

In order to address the PICO question, does gait speed testing at the time of triage predict discharge disposition as measured by admission to the hospital, discharge, discharge with physical therapy or discharge with social service referrals, the literature was systematically searched using PubMed, CINAHL, and Google Scholar databases. Search terms included gait speed, walking speed, functional assessments, falls, older fallers, and geriatrics. The dates were first restricted to the last ten years, the English language, and human subjects. This author broadened the years in the search to capture as many relevant articles that would inform the DNP project proposal. Using the search terms described above, the search yielded 34 articles in CINAHL, 406 in PubMed, and over 16,000 in Google Scholar. Articles were limited to those relevant to the searched subject matter, duplicates were eliminated, and 31 articles were selected.

A total of five systematic reviews, ten cohort studies, and one randomized controlled trial are included in the table of evidence, and the remaining articles that were either case reviews, fact sheets or a white paper were not included in Appendix A. The five systematic reviews included in this literature search (Carpenter et al., 2014a; Carpenter et al., 2014b, Bisset et al., 2013 & Peel et al., 2012, & (Kuys, Peel, Klein, Slater, & Hubbard, 2014) encompassed reviews of three clinical questions that support the PICO question. These reviews rigorously appraised fall risks in the ED setting, functional assessment in the ED setting and gait speed in the clinical settings. Kuys et al. (2014) studied ambulant patients in the long term care community. They concluded that in ambulant older people in long term care, gait speed is slow (less than 0.6m/s), but functional in this setting, and the results could not be generalized to the

population as a whole. Carpenter et al., (2014b) found that there are few ED based studies that assessed the accuracy of predictors for fall risks following an episode of ED care and supports the need for identification of at risk patients to fall prior to discharge from the ED.

Bissett et al's. (2013) systematic review had two major findings that relate to functional assessments in the ED setting. The first major finding was that functional assessments were administered only to those patients over 65 years and older and this finding may reflect that the ED practitioners are aware of the risk of adverse events in this population of patient (Bissett et al, 2013). The second finding is that assessments were always completed using the self-report method despite tools available for patient observation (Bissett, et al., 2013) which supports the PICO question. The last systematic review and meta-analysis found that the risk stratification of older adults following ED care is limited by the lack of accurate and reliable instruments (Carpenter et al., 2014b). Three screening instruments, Identification of Seniors at Risk (ISAR), Triage Risk Screening Tool (TRST), and Variables Indicative of Placement Risk (VIPR) tools were included in the meta-analysis and none were able to accurately distinguish between high or low risk subsets (Carpenter et al., 2014b). There were five constructs of frailty evaluated but none increased or decreased the risk of adverse outcomes such as unanticipated ED returns, hospital readmissions, functional decline or death (Carpenter et al., 2014b).

In a randomized control trial of 80 ED elderly patients, researchers used a functional assessment tool that contained not only a self-report tool, but a performance evaluation as well (Lee et al., 2001). The purpose of this study was to question whether there were factors predictive of initial discharge to home or hospital admission, are functional assessments of value in the ED setting for guiding discharge decision making, and rehabilitation consults appropriate in the ED (Lee et al., 2001). The tools used for performance evaluation included the Timed Up

and Go, the Tinetti Fall Risk Screen and a self-report tool, the Functional Autonomy Measurement System (SMAF) (Lee et al., 2001). No single factor can determine a patient's discharge outcome and that pre-morbid functioning, personal supports, living situations and current physical ability must be included in the discharge decision making process (Bissett et al., 2013). The authors determined that their study supported references found in emergency medicine literature regarding functional assessment's importance in the care of the older patient (Lee et al., 2001). This study also supports the question that functional assessments of geriatric patients are essential in the ED setting.

There were ten cohort studies used to support the PICO question. Studies addressing the risk of older fallers presenting to emergency departments was validated in studies by Close et al. ( 2012), (Faul et al., 2016), (2016), Harper et al., ( 2013), Liu et al., 2015), and Tiedeman et al., (2013). Aldeen et al., (2014) and Gray et al., (2013) support the need for geriatric assessments to occur in the ED.

Studenski et al. (2011) evaluated the relationship between gait speed and survival in a pooled analysis of nine cohort studies. This pooled analysis reported an overall 5 year survival rate was 84.4% and the 10 year survival rate was 59.7% and gait speed was associated with survival in all studies (Studenski et al., 2011). Viccaro et al., (2011) discuss the TUG as a superior test in predicting geriatric outcomes and while this study and the Studenski et al.(2011) study may appear to contradict each other, Viccaro et al., (2011) conclude that the TUG does not add to information provided by gait speed. Huded et al., (2015) conducted a study using the TUG assessment in the ED to assess patients aged 65 years and older. Their results showed that using a gait assessment tool (TUG) on their study population of 443 patients yielded 368 patients with positive results (Huded, Dresden, Gravenor, Rowe, & Lindquist, 2015). Interventions for

these positive results included ED physical therapy referrals, outpatient physical therapy referrals and social work consultation (Huded et al., 2015). This study supports the PICO question as an example of a physical functional performance test being administered successfully in the ED.

In summary, the literature review confirmed that the aging population is presenting to emergency departments with increasing frequency (Carpenter et al., 2014b). It also confirmed that the emergency care required by this older population will add additional strain on EDs due to the complexity of testing required for their multiple medical conditions (Hwang et al., 2013). As The Memorial Hospital of Salem County looks to address one piece of this problem through the implementation of gait speed testing in the ED, the literature review also supports the gaps in concluding which tool is best to use.

## Problem Statement

Nationally and internationally the use of effective, efficient, and reliable strategies to provide emergency care to aging adults is challenging crowded emergency departments (Carpenter et al., 2014b). Older adults account for a large and increasing portion of the ED population and are often admitted for non-urgent conditions such as dementia, impaired functional status, and gait instability (Aldeen et al., 2014), or discharged to home without the additional services such as planned support, aids and appliances (Baumbusch & Shaw, 2011). In an attempt to close the gap between the acute-episodic style of emergency care and the social and medical needs of the older adult patient (Baumbusch & Shaw, 2011), nurses can perform the gait speed assessment in the ED during triage or after the medical screen (Tucker & Evans, 2014). Information gleaned from a gait speed assessment can alert providers about those patients requiring additional support services such as physical therapy referrals for example, upon discharge or those experiencing new or worsening conditions (Tucker & Evans, 2014).

The phenomenon of interest was the effect of gait speed testing at the time of triage on discharge disposition and support services for patients 65 years and older presenting to the emergency department. The goal of this project was to roll out gait speed testing, examine if there were differences in discharge status in a small sample of patients with normal gait speed or slow gait speed. The findings of this work can inform future development of a fully deployed gait speed assessment program on health outcomes and resource utilization at MHSC.

The PICO question: Does gait speed testing at the time of triage predict discharge disposition as measured by admission to the hospital, discharge, discharge with physical therapy or discharge with social service referrals?

Population: ED patients 65 years and older

Intervention: Gait speed assessment

Comparison: None

Outcomes: Admission to inpatient unit, discharge, discharge with physical therapy referrals, home care or other support services

## Aims and objectives

The aim of this project was to implement gait speed testing by triage nurses in the emergency department to improve patient discharge disposition decision making. The project objectives were as follows: ED nurses will successfully implement gait speed testing during the triage process and gait speed testing will inform patient discharge decision making in the ED.

The project hypothesis is that in patients 65 years and older who have a gait speed of <1.0 m/s will be more likely to be admitted to the hospital or discharged with service referrals than those with a normal gait speed score. The independent variable for the project was gait speed. Dependent variable was discharge status coded as discharged, discharged with physical

therapy referrals, discharged with other support services referrals, or admitted to the inpatient unit.

## Methods/Implementation

### Theoretical Framework

The established quality improved methodology that was used to inform this project was the Plan-Do-Check-Act (PDCA) model (Seidl & Newhouse, 2012) and is the model currently used by MHSC and throughout Community Health Systems. The plan-do-check-act model is commonly used in healthcare and was first introduced by Shewart and Deming as a continuous quality improvement process in business (Seidl & Newhouse, 2012). During the planning phase, a definite change (gait speed) was aimed at improving functional assessment and a plan for implementation was developed (Seidl & Newhouse, 2012). The literature review and selection of gait speed testing was conducted during this phase. The "do" phase refers to the implementation of the planned change and the "check" phase requires an analysis of the results (Seidl & Newhouse, 2012). The "do" phase occurred as the core team performed the gait speed test and collected the data and the "check phase" included the analysis and discussion of the results. In the "act: phase a decision needs to be made to adopt, adapt or abandon the change (Seidl & Newhouse, 2012). The PDCA model (Appendix E) is intended to be a continuous model where the simplest changes are implemented first and then the more challenging changes to follow (Seidl & Newhouse, 2012).

**Project Design**

The design of this performance improvement project is a prospective descriptive design using a convenience sample of 30 older adult patients presenting to the ED to determine if there was a difference in discharge disposition in those with poor/slow gait speed and normal gait speed.

**Setting**

This project took place in the emergency department at The Memorial Hospital of Salem County (MHSC), located in Salem, New Jersey. MHSC holds Nurses Involved in the Care of the Hospitalized Elderly (NICHE) designation as well as a primary stroke care designation by the New Jersey Department of Health hospital licensing division. The Memorial Hospital of Salem County saw 22,510 patients in the ED in 2015 (MHSC Summary for 2015, 2015). MHSC saw 22,510 patients in the ED in 2015, of which 16% required hospitalization, and of those that required hospitalization, 11% were admitted and 4.9 % were placed in observation status (MHSC Summary for 2015, 2015). MHSC older patient population mimics the national data as discussed by Gray et al., (2013), Carpenter et al., (2014) and the CDC (2011).

**Participants/Sample**

A convenience sample of 30 patients who presented to the ED between July 5, 2016 and August 9, 2016 who were 65 years and older were eligible to have gait speed testing performed by a member of the core team of nurses trained for this project. Exclusion criteria included patients below the age of 65, non-ambulatory, or with critical or life threatening symptoms.

**Measures**

Gait speed is measured in meters/second (m/s) and the literature supports that patients with a walking speed of less than 1.0 m/s are at a risk for falls (Fritz & Lusardi, 2009).

Moreover, there are associations between slow gait and greater risk for lower extremity limitations, increased hospitalization, need for personal care assistance, an even death (Middleton et al., 2015) and this evidence was used for the cut off of <1.0m/s for this pilot project. Interpretation of these results is based on published norms and can be used as a predictor and outcome measure across multiple diagnoses (Fritz & Lusardi, 2009).

The gait speed test required only a stop watch and a marked off 20 meter walking space within the ED. Outcomes were measured by collection of the disposition status as follows: discharged without any support services, discharged with physical therapy referrals, discharged with social service referral, or admitted to the hospital.

**Procedures**

The core team, including the director of physical therapy, the ED medical director, the ED nursing director and three ED RNs met to discuss the implementation of gait speed testing in the ED. A workshop was held and training occurred with the nursing team. The ED medical director was given the same educational information to share with the rest of the ED medical staff.

Beginning July 5, 2016, this clinical initiative was piloted Monday through Friday during the hours of 8 am and 4pm when the physical therapists were available to support the nurses performing the test. The core team of nurses had demonstrated competencies in this assessment and their skills validated by the physical therapy department (Appendix B). The director of physical therapy marked the handrails on both corridors with a start, 5 meter and 10 meter mark for the staff to use as visual markers for timing. A data collection worksheet was provided to the core team. The data were recorded and collected by the core team and returned to the ED nurse director (Appendix C).

**Data Management and Data Analysis**

Data from the data collection worksheet was entered into an Excel database. Raw data was coded and then imported into SPSS (Version 24.0, Armonk, NY: IBM Corp.) for analysis. Data was cleaned prior to analysis. Data analysis consisted of descriptive statistics including frequencies, proportions, means, and standard deviations and the Fisher's exact test was used to determine whether gait speed at triage was associated with the discharge disposition status.

**Human subjects' protection**

The Drexel Institutional Review Board (IRB) served as the IRB of record. Since no patient names, medical record numbers, account numbers, HIPAA (Health Insurance Portability and Accountability Act) identifiers were collected for this quality improvement project, the IRB determined this project as "not human subjects research". A Letter of Determination that this was not human subjects research was issued by the IRB.

**Timeline**

This clinical initiative began in the first week of June 2016 and included a meeting with the core team, ED medical director and physical therapy director (Appendix F.). The core team members were trained and skills and competencies were validated during the following 2 weeks. The data collection period was started on July 5, 2016 and continued until thirty gait speed tests were completed on August 9, 2016.

After this project was approved by the Drexel IRB, the data was submitted for review and analysis.

## Results

Data were collected from 30 patients and descriptive characteristics of the sample are included in Table 1. The sample was primarily female (n=19, 63.3 %) with a mean age of 71years (SD=8.9). The mean gait speed was .75m/s (SD=.25), with 23 patients (76.7%) having gait speeds <1m/s.

To test the hypothesis, gait speeds <1m/s would be admitted or discharged home with physical therapy referrals or other social support referrals, a Fishers exact test was performed. The findings showed that 8 patients (34.8%) with gait speeds <1m/s were admitted while 15 (65.2%) were discharged home, a result that was not statistically significant (P=1.00, Fisher's exact test). Since no one was discharged to home with other social support services and only 5 (16.7%) of the patients were discharged home with physical therapy referrals instead of running a chi square test, the outcome variable discharge status was collapsed from four categories into two categories (admitted or discharged) and a Fisher's exact test was performed.

## Discussion

The purpose of this quality improvement project was to implement gait speed testing in the ED and to examine the impact of gait speed on the disposition decision outcome. No statistical significance was noted in terms of the admission status or discharged to home with PT or social services referrals, but gait speed testing was successfully implemented by the ED triage nurses. Further work needs to be performed to compare the differences in outcome in those older adults who did and did not have gait speed testing performed. The physical therapy department did confirm that the four referrals to physical therapy at discharge were the first referrals they had received from the ED. Another success of this project was that the request to add gait speed test to the electronic medical record triage screen was granted and implemented.

The challenge for MHSC as a small rural hospital is to provide the best evidence-based care for this older population with limited resources, lack of geriatricians and other specialists readily available, and throughput constraints. A comprehensive functional assessment of older adults includes basic activities of daily living (ADLs) such as bathing, dressing, grooming, eating and continence (Kresevic, 2012). It also includes instrumental ADLs such as meal preparation, shopping, medication administration, housework, and transportation (Kresevic, 2012). Although the use of standard instruments are readily available and the clinicians should be documenting baseline functional status with any recent or progressive decline in function, there is not always the time or resources in busy emergency departments for this to occur. This project proposed a solution to the challenges discussed above by using an evidence-based functional measure tool, gait speed testing, which would provide a quick, easily performed assessment of the ED patient's functional ability without prolonging the ED visit. The ED nursing team was able to complete the gait speed testing without any delays in the patients stay in the ED as reported anecdotally by the ED RNs.

The number of patients 65 years and older presenting to emergency departments continues to climb, therefore providing quality care to this population can be challenging (Carpenter et al., 2014b). These challenges include the potential for older adults to have more comorbidities as compared to their younger counterparts, such as impaired physical or cognitive function and limited social support (Carpenter et al., 2014b). The disposition decision making is based on the patient's risk of suffering an adverse outcome. Examples of these adverse outcomes include preventable revisits to the ED, readmissions to the hospital, and functional decline and a possible fall risk after being admitted to the hospital (Viccaro et al., 2011). Gait speed has the potential to predict future health status and functional decline, reflect functional and

physiological changes and is an easy and safe test to perform in the clinical setting (Fritz & Lusardi, 2009).

Future implications for the hospital include expanding the education and training of the entire emergency department team, working with the ED nurses to determine if the triage process is the best timing to perform the test, and engaging the medical staff in the process of gait speed testing and the clinical implications.

## Strengths and limitations

The strength of this DNP proposal was the use of gait speed testing for patients 65 and older in the ED as a screening assessment of function because it is objective, takes less than two minutes to complete in a designated 10 meter walking area. The limitations of this project were the small sample size, the limited number of core staff trained, lack of ongoing education regarding the use of gait speed as a functional assessment tool, and lack of engagement in this project from the medical staff during this pilot phase.

## Conclusion

The emergency department visits provided an opportunity for nurses to screen patient's functional performance using an evidence-based measure. The results of this performance improvement project showed that the gait speed test could be administered by nursing during the triage process without delaying the patient's length of stay. Although the sample size was small and the hypothesis rejected, the MHSC nurses successfully implemented the gait speed test but future work will continue and include additional data collection, evaluation, and feedback from nursing and the ED physicians relating to improving the care of our older patients in the ED.

# References

Aldeen, A. Z., Courtney, D. M., Lundquist, L. A., Dresden, S. M., & Gravenor, S. J. (2014). Geriatric emergency department innovations: Preliminary data for the geriatric nurse liaison model. *Journal of the American Geriatric Society*, *62*, 1781-1785.

American Nurses Association. (2004). *Nursing: Scope and standards of practice*. Silver Spring, MD: Nursesbooks.org.

Baumbusch, J., & Shaw, M. (2011). Geriatric emergency nurses: Addressing the needs of an aging population. *Journal of Emergency Nursing*, *37*(4), 321-327.

Bissett, M., Cusick, A., & Lannin, N. A. (2013). [Functional assessments utilised in emergency departments: a systemic review]. *Age and Aging*, *42,* 163-172.

Carpenter, C. R., Bromley, M., Catarino, J. M., Chun, A., Gerson, L. W., Greenspan, J., ... Wilber, S. (2014a). Optimal older adult emergency care: Introducing multidisciplinary geriatric emergency department guidelines from the American College of Emergency Physicians, American Geriatrics Society, Emergency Nurses Association, and Society for Academic Emergency Medicine. *Journal of American Geriatrics Society*, *62*, 1360-1363.

Carpenter, C. R., Shelton, E., Fowler, S., Suffoletto, B., Platts-Mills, T. F., Rothman, R. E., & Hogan, T. M. (2014b). Risk factors and screening instruments to predict adverse outcomes for undifferentiated older emergency department patients: A systematic review and meta-analysis. *Academic Emergency Medicine*, *22*(1), 1-21.

Centers for Disease Control and Prevention. (2011). *National hospital ambulatory medical care survey: 2011 emergency department summary tables* [Summary tables]. Retrieved from http://www.cdc.gov/nchs/fastats/emergency-department.htm

Close, J. C., Lord, S. R., Antonova, E., Martin, M., Lensberg, B., Taylor, M., ... Kelly, A. (2012). Older people presenting to the emergency department after a fall: a population with substantial recurrent healthcare use. *Emergency Medicine Journal*, *29*, 742-747. http://dx.doi.org/10.1136/emermed-2011-200380

DeGrauw, X., Annest, J. L., Stevens, J. A., Xu, L., & Coronado, V. (2016). Special report from the CDC: Unintentional injuries treated in hospital emergency departments among persons aged 65 years and older, United States, 2006-2011. *Journal of Safety Research*, *56*, 105-109.

Faul, M., Stevens, J. A., Sasser, S. M., Alee, L., Deokar, A. J., Kuhls, D. A., & Burke, P. A. (2016). Older adult falls seen by emergency medical service providers: A prevention opportunity. *American Journal of Preventive Medicine, 50(6)*, 719-726.

Fritz, S., & Lusardi, M. (2009). White paper: Walking speed: The sixth vital sign. *Journal of Geriatric Physical Therapy*, *32*(2), 2-4.

Gray, L. C., Peel, N. M., Costa, A. P., Burkett, E., Dey, A. B., Jonsson, P. V., ... Hirdes, J. (2013). Profiles of older patients in the emergency department: findings from the InterRAI multinational emergency department study. *Annals of Emergency Medicine*, *62(5)*, 467-474.

Harper, K. J., Gibson, N. P., Barton, A. D., Petta, A. C., Pearson, S. K., & Celenza, A. (2013). Effects of emergency department care coordination team referrals in older people presenting with a fall. *Emergency Medicine Australasia, 25*, 324-333.

Hornyak, V., VanSwearingen, J. M., & Brach, J. S. (2012). Measurement of Gait Speed. *Topics in Geriatric Rehabilitation*, *28*(1), 27-32.

Huded, J. M., Dresden, S. M., Gravenor, S. J., Rowe, T., & Lindquist, L. A. (2015). Screening for fall risks in the emergency department: A novel nursing-driven program. *Western Journal of Emergency Medicine*, *XVI*(7), 1043-1046.

Hwang, U., Shah, M. N., Han, J. H., Carpenter, C. R., Siu, A. L., & Adams, J. G. (2013). Transforming emergency care for older adults. *Health Affairs (Millwood)*, *32*(12), 2116-2121.

Kresevic, D. M. (2012). Assessment of physical function. In M. Boltz, E. Capezuti, T. Fulmer, & D. Zwicker (Eds.), *Evidence-based geriatric nursing protocols for best practice* (4th ed., pp. 89-103). New York, NY: Springer Publishing Company.

Kuys, S. S., Peel, N. M., Klein, K., Slater, A., & Hubbard, R. E. (2014). Gait speed in ambulant older people in long term care: a systematic review and meta-analysis. *Journal of American Medical Directors Association*, *15*, 194-200.

Lee, V., Ross, B., & Tracy, B. (2001). Functional assessment of older adults in an emergency department. *Canadian Journal of Occupational Therapy*, *68*(2), 121-129.

Liu, S. W., Obermeyer, Z., Chang, Y., & Shanker, K. N. (2015). Frequency of ED revisits and death among older adults after a fall. *American Journal of Emergency Medicine*, *33*(8), 1012-1018.

Middleton, A., Fritz, S. L., & Lusardi, M. (2015). Walking speed: The functional vital sign. *Journal of Aging and Physical Activity*, *23*, 314-322.

Nielsen, L. M., Maribo, T., Nielsen, H. G., Jensen, J., & Petersen, K. (2014). Assessing functional ability in older patients. *International Journal of Therapy and Rehabilitation*, *21*(5), 240-246.

Ostir, G. V., Berges, I., Kuo, Y., Goodwin, J. S., Ottenbacher, K. J., & Guralnik, J. M. (2012). Assessing gait speed in acutely ill older patients admitted to an acute care for elders hospital unit. *Archives of Internal Medicine, 172*(4), 353-358.

Peel, N. M., Kuys, S. S., & Klein, K. (2012). Gait speed as a measure in geriatric assessment in clinical settings: A systematic review. *Journal of Gerontology: Medical Sciences*, *68*(1), 39-46.

Schuur, J. D., Hsia, R. Y., Burstin, H., Schull, M. J., & Pines, J. M. (2013). Quality measurement in the emergency department: Past and future. *Health Affairs*, *32*(12), 2129-2138.

Seidl, K. L., & Newhouse, R. P. (2012). The intersection of evidence-based practice with 5 quality improvement methodologies. *Journal of Nursing Administration*, *42*(6), 299-304.

Studenski, S., Perara, S., Rosano, C., Faulkner, K., Inzitari, M., Brach, J., ... Guralnik, J. (2011). Gait speed and survival in older adults. *Journal of American Medical Association, 305*(1), 50-58.

The Memorial Hospital of Salem County [Data file]. (2015). Unpublished instrument. Salem, NJ: Community Health Systems.

Tiedemann, A., Sherrington, C., Orr, T., Hallen, J., Lewis, D., Kelly, A., ... Close, J. C. (2013). Identifying older people at high risk of future falls: development and validation of a screening tool for use in emergency departments. *Emergency Medicine Journal*, *30*, 918-922. http://dx.doi.org/10.1136/emermed-2012-201783

Tucker, P. R., & Evans, D. D. (2014). Gait speed in the emergency department. *Advanced Emergency Nursing Journal*, *36*(3), 209-214.

Viccaro, L. J., Perera, S., & Studenski, S. S. (2011). Is timed up and go better than gait speed in predicting health, function and falls in older adults? *Journal of American Geriatrics Society*, *59*, 887-892.

Wiler, J. L., Welch, S., Pines, J., Schuur, J., Jouriles, N., & Stone-Griffith, S. (2015). Emergency department performance measure updates: Proceedings of the 2014 emergency department benchmarking alliance consensus summit. *Academic Emergency Medicine*, *22*, 542-553. http://dx.doi.org/10.1111/acem.12654

Table 1.

*Descriptive Statistics*

| Variable | n | % | M | SD |
|---|---|---|---|---|
| Gait speed (m/s) | 30 | 100 | 0.75 | 0.32 |
| Age (years) | 30 | 100 | 76 | 8.9 |
| Gender | | | | |
| Male | 11 | 36.7 | | |
| Female | 19 | 63.3 | | |
| Chief Complaints | | | | |
| Chest Pain/SOB | 7 | 23.3 | | |
| Msk. Pain/Fall | 11 | 36.7 | | |
| Abd. Pain/GI symp. | 4 | 13.3 | | |
| Weak, dizzy, syncope | 3 | 10 | | |
| Other | 5 | 16.7 | | |
| Discharge Disposition | | | | |
| Admitted | 12 | 40 | | |
| Discharged | 14 | 46.7 | | |
| Discharged w/PT | 4 | 13.3 | | |

Note: Msk=musculoskeletal pain. Other includes complaints of ear wax, difficulty swallowing, hypertension, altered mental status and groin pain. PT= Physical Therapy

Table 2.

*Gait speed <1m/s-discharged cross tabulation*

| Gait Speed (GS) | Disposition Status | |
|---|---|---|
| | Admitted n (%) | Discharged n (%) |
| GS < 1m/s | 8 (34.8) | 15 (65.2) |
| GS >1m/s | 3 (42.9) | 4 (57.1) |
| Total | 11 (36.7) | 19 (63.3) |

Note: ** p = 1.00

# Appendix A.

## Table of evidence

| Author/ date | Purpose | Design | Sample Characteristics/ setting | Definition of the outcome concept/ Measures/ instruments used in the study and psychometrics of measure | Interventions being evaluated | Results/ findings | Limitations /Conclusions | Level of Evidence |
|---|---|---|---|---|---|---|---|---|
| Aldeen et al. (2014) | Goal of Geriatric Emergency Department Innovations through Workforce, Informatics and Structural Enhancements (GEDI WISE) model is to reduce preventable admissions for older adults in the ED | Prospective Cohort | Northwestern Memorial Hospital, Chicago Illinois- an 873 bed tertiary care academic hospital with the ED designation of a Level 1 trauma center with 56 beds and over 88,000 ED visits annually. April through August 2013 | Measured by the Emergency Severity Index (ESI) score. A lower ESI score indicates a more severe presentations. Differences in proportions were calculated using the *t*-test and reported with 95% confidence intervals. Differences in length of stay data were calculated with the Wilcoxon rank-sum test and reported with 25% to 75% interquartile ranges. | Reduce unnecessary admissions of older adults of all acuity levels | GEDI was associated with 13% fewer admissions overall, including almost 16% fewer in subjects who had and ESI score of 2. The reduction in admissions was due to discharges rather than more observations. | 1. Selection bias 2. The GEDI consultation resulted in a longer LOS; 3. The proportion of individuals that have undergone the GEDI WISE intervention was relatively small compared to the overall number of older adults in the ED. | Level IV |
| Bissett et al. (2013) | Identify functional assessments used in ED setting; examine what psychometric properties were analyzed; and establish recommendations for practice | Systematic review | Electronic search strategy of MEDLINE, CINAHL between January 1996 and October 2011. | Phase I-abstract and full text review; Phase 2-examination of assessments and linkage to the ICF | Assessments had to address function as defined by the World Health Organizations' International Classification of Functioning Disability and Health (ICF) | Four functional tests were identified: ISAR, TRST, OARS, and FSAS-ED | ISAR and TRST are suitable for fast screening<br><br>Further research warranted | Level I |

| Author/ date | Purpose | Design | Sample Characteristics/ setting | Definition of the outcome concept/ Measures/ instruments used in the study and psychometrics of measure | Interventions being evaluated | Results/ findings | Limitations /Conclusions | Level of Evidence |
|---|---|---|---|---|---|---|---|---|
| Carpenter et al. (2014a) | This systematic review quantifies the prognostic accuracy of individual risk factors and ED-validated screening instruments to distinguish patients more or less likely to experience short-term adverse outcomes like unanticipated ED returns, hospital readmissions, functional decline, or death. | Systematic review/meta-analysis | A medical librarian and two emergency physicians conducted a medical literature search of PubMed, EMBASE, SCOPUS, CENTRAL, and ClinicalTrials.gov using numerous combinations of search terms, including emergency medical services, risk stratification, geriatric, and multiple related MeSH terms in hundreds of combinations | Two physicians independently reviewed all abstracts and used the revised Quality Assessment of Diagnostic Accuracy Studies instrument to assess individual study quality. When two or more qualitatively similar studies were identified, meta-analysis was conducted using Meta-DiSc software | Primary outcomes were sensitivity, specificity, positive likelihood ratio (LR+), and negative likelihood ratio (LR–) for predictors of adverse outcomes at 1 to 12 months after the ED encounters. A hypothetical test–treatment threshold analysis was constructed based on the meta-analytic summary estimate of prognostic accuracy for one outcome. | A total of 7,940 unique citations were identified yielding 34 studies for inclusion in this systematic review. Studies were significantly heterogeneous in terms of country, outcomes assessed, and the timing of post-ED outcome assessments. All studies occurred in ED settings and none used published clinical decision rule derivation methodology. Individual risk factors assessed included dementia, delirium, age, dependency, malnutrition, pressure sore risk, and self-rated health. | This meta-analysis has several limitations 1. The meta-analysis of individual studies demonstrates significant statistical heterogeneity, even when assessing the same instrument for the same outcomes on similar patient populations. 2.A lack of sufficiently similar prognostic studies existed to perform meta-analysis for some of the instruments and outcomes, but a systematic review can only analyze previously published research. | Level I |

| Author/ date | Purpose | Design | Sample Characteristics/ setting | Definition of the outcome concept/ Measures/ instruments used in the study and psychometrics of measure | Interventions being evaluated | Results/ findings | Limitations /Conclusions | Level of Evidence |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | heterogeneous health care settings and bias estimates of prognostic accuracy for these instruments.<br>3. Multiple unmeasured and usually clinically unrecognized confounding variables at the patient and community levels exist across studies, such as cognitive impairment, limited health literacy, fixed finances, and access to primary care including transportation. | |

| Author/ date | Purpose | Design | Sample Characteristics/ setting | Definition of the outcome concept/ Measures/ instruments used in the study and psychometrics of measure | Interventions being evaluated | Results/ findings | Limitations /Conclusions | Level of Evidence |
|---|---|---|---|---|---|---|---|---|
| Carpenter et al. (2014b) | Review with two objectives:<br>1. Provide a quantitative estimate for each risk factor's accuracy to predict future falls;<br>2. quantify ED fall risk assessment test and treatment thresholds | Systematic review and meta-analysis | Medical literature search of PUBMED, CINAHL, CENTRAL, DARE, the Cochrane Registry and Clinical trials. Unpublished research was also included and search by Emergency medicine research abstracts from national meetings | The QUADOS-2 (Quality Assessment Tool for Diagnostic Accuracy) was used to assess individual study quality if met inclusion criteria.<br>Meta-DiSc software was used for meta-analysis of those studies that had more than one qualitatively similar study assessing the same risk factor for falls at the same interval following and ED evaluation. | Primary outcomes were sensitivity, specificity, and likelihood ratios for fall risk factors or risk stratification instruments.<br>Secondary outcomes were estimates of test and treatment thresholds using the Pauker method based on accuracy, screening risk, and the projected benefits of fall prevention interventions in the ED | Total of 608 studies identified but only three met inclusion criteria.<br>Two studies included 660 patients assessing 29 risk factors and two risk stratification instruments for falls in geriatric patients in the 6 months following an ED evaluation. One study of 107 patients assessed the risk of falls in the preceding 12 months. Self-report depression was associated with the highest likelihood ration of 6.55(95% confidence interval [CI] =1.41 to 30.48). Six fall predictors were identified and met-analysis was performed. One screening instrument was sufficiently accurate to identify a subset of geriatric ED patients at a low risk for falls with a negative LR of 0.11 (95% Cl= 0.06 to 0.20) Test threshold was 6.6% and treatment threshold was 27.5% | Limitations included: 1. Loss to follow up and those without complete 6 month outcomes; 2. Investigators relied on self-report of both predictor variables and outcomes; and 3. Systematic review limited to 6-month fall rates | Level I |

| Author/ date | Purpose | Design | Sample Characteristics/ setting | Definition of the outcome concept/ Measures/ instruments used in the study and psychometrics of measure | Interventions being evaluated | Results/ findings | Limitations /Conclusions | Level of Evidence |
|---|---|---|---|---|---|---|---|---|
| Close et al., (2012) | Document patient characteristics, care pathways, healthcare use and costs of fall related ED presentations by older adults | Retrospective Cohort | N=1210 adults 70 years and older presenting to the ED with a fall related injury in metropolitan hospital, Sydney, Australia | Data collected from ED electronic medical records, ED clinical records, and the hospital electronic information system database. Population estimates for 2008 were used to estimate ED presentation rates. | Any patient presenting to the ED with a fall, 70 years and older. Fallers were defined as patients in whom a fall was a contributing factor in the ED presentation. | 17% of all ED presentations to this hospital were due to a fall.<br>35.4% had one or more presentations.<br>20.3% had one or more previous admissions.<br>42.7% led to a hospital admission-male LOS 14.4 days; female LOS 13.7 days<br>9.5% -first time residents of long term care.<br>All fall related ED presentations and hospitalization cost= $11,241,387 over the study period | Older fallers consume significant healthcare resources but can be easily identified and screened with fall risk prevention tools. | Level IV |
| Faul et al., (2016) | Determine where falls occurred and the circumstances under which patients were transported by EMS, and to identify future fall prevention opportunities | Retrospective cohort | Total N= 903,588<br>Not transported=186,712 or 20.7%<br>Transported by EMS= 7186876 or 79.3% | 2012 National EMS Information System data from 42 participating states. Using EMS records from 911 calls, logistic regression examined patient and environmental factors associated with older adult transport | The dependent variable was whether or not the patient was transported. Independent variables included: demographics, clinical, and EMS data | Patients 65 years and older=17% of all EMS calls.<br>21% did not result in transport.<br>60.2% of falls occurred at home. | This study found one in five older adults seen by EMS for a fall were not transported to a medical facility but these patients are at a high risk for falling again.<br>This population would benefit from a community program addressing fall prevention | Level IV |

| Author/ date | Purpose | Design | Sample Characteristics/ setting | Definition of the outcome concept/ Measures/ instruments used in the study and psychometrics of measure | Interventions being evaluated | Results/ findings | Limitations /Conclusions | Level of Evidence |
|---|---|---|---|---|---|---|---|---|
| Gray et al. (2013) | Examined functional profiles and geriatric syndromes among older patients | Prospective Cohort Study | 13 metropolitan emergency departments<br>7 nations-Australia, Belgium, Canada, Germany, Iceland, India and Sweden<br>Sample size= 2,282 patients | InterRAI ED tool used by trained research nurse or an ED allied health professional. | Using the InterRAI tool, a proprietary geriatric assessment instrument, the researchers were screening for functional impairment. | 46% were dependent on others in one or more aspects of personal activities before becoming unwell- this percentage increased to 67% at presentation to the ED.<br>26% -cognitive impairment<br>49% could not walk without assistance<br>37% had a recent fall<br>48% had a geriatric syndrome before becoming unwell- increased to 78% at ED presentation | Limitations: ED patients recruited during normal weekday hours; consecutive patients could not be recruited; and diagnostic information was not included in the study<br>Conclusion: Functional problems and geriatric syndromes affect the majority of older patients in the ED – use of clinical protocols and physician design of ED's may be of importance. | Level IV |
| Harper et al. (2013) | Describe characteristics of patients presenting to the ED with a fall and evaluate multidisciplinary Care Coordination Team (CCT) referrals | Retrospective Cohort | Adult tertiary hospital in Perth, Australia. ED treats 55,000 patients annually | Data extracted from ED information system | Primary outcome measure= was representation to the hospital with 30 days –comparing patients referred to CCT and those not referred. Secondary outcomes were: readmission within 30 days, demographic characteristics, mode of arrival and triage score | 2006-2009-fallers referred to CCT decreasing trend, increasing urgency Statistically significant factors for referral were identified | A mature CCT is associated with a decrease in representation to the ED and readmission to the hospital Clinical effectiveness still needs evaluation | Level IV |

| Author/ date | Purpose | Design | Sample Characteristics/ setting | Definition of the outcome concept/ Measures/ instruments used in the study and psychometrics of measure | Interventions being evaluated | Results/ findings | Limitations /Conclusions | Level of Evidence |
|---|---|---|---|---|---|---|---|---|
| Hornyak et al. (2012) | Measurement of gait speed and discussion of validity. | None | Gait speed can be recorded over any distance but 4-10 m recommended to avoid the influence of endur443ance. | Test-retest reliability good to very good with intraclass correlation coefficients (ICC) greater than 0.89. | | Two features of measuring gait speed highlight clinical appropriateness: 1. everyone knows how to walk, 2. Test results immediately interpretable | Gait speed testing requires little time, effort or equipment to measure and provides information useful in clinical recognition of dysfunction | N/A |
| Huded et al., (2016) | Describe the use of TUGT assessments performed by geriatric nurses in the ED and nurse initiated interventions for positive TUGTs | Cohort | Study conducted as part of Geriatric ED innovations through Workforce, Informatics, and Structural Enhancements (GEDI WISE) program. Site=ED of an urban, academic, Level 1 Trauma Center. N= 443 | Patients aged 65 years and older, identified by a trained group of core nurses, performing fall risk screening with the Timed Up and Go tool | Gait assessment with the TUGT was performed | A prior fall was reported in 37% of patients in the previous six months. Of those screened with the TUGT, 368 patients experienced a positive result. Interventions for positive results included ED-based PT (n=63, 17.1%), outpatient PT referrals (n=56, 12.2%) and social work consultation (n=162, 44%). | Single site study | Level IV |

| Author/ date | Purpose | Design | Sample Characteristics/ setting | Definition of the outcome concept/ Measures/ instruments used in the study and psychometrics of measure | Interventions being evaluated | Results/ findings | Limitations /Conclusions | Level of Evidence |
|---|---|---|---|---|---|---|---|---|
| Kuys et al. (2014) | Review of studies measuring gait speed in long term care residents | Systematic review and meta-analysis | Searched electronic databases of Medline, CINAHL, Embase, Cochrane, Amed and Pedro for articles measuring gait speed across all settings for original research studies published prior to December 2012. N=2888 participants from 34 studies. | Inclusion criteria: participants living in long term care, mean age >70 years, and gait speed measured over a short distance. Meta-analysis determined gait speed data adjusting for covariates including age, sex and cognition. | Gait speed data from included studies was converted to a common measure, meters/second. Variables investigated for possible association with measured gait speed were publication year, mean age percentage of females in the study, distance, and type of start. A meta-regression was carried out to determine the significant association between these covariates and reported gait speed. | Only one study mentioned ineligible residents because of immobility. 22 studies reported cognitive status using the Mini-Mental State Examination. Usual pace and maximal pace gait speeds were determined separately using a random effects model. No association between gait speed and covariates was found. Usual pace gait speed was 0.475 m/s (95% confidence interval 0.396-0.554) and maximal pace was 0.672 m/s (95% confidence interval 0.532-0.811) | Results cannot be generalized due to many residents who were ineligible to participate. | Level I |

| Author/ date | Purpose | Design | Sample Characteristics/ setting | Definition of the outcome concept/ Measures/ instruments used in the study and psychometrics of measure | Interventions being evaluated | Results/ findings | Limitations /Conclusions | Level of Evidence |
|---|---|---|---|---|---|---|---|---|
| Lee et al. (2001) | Assess the operational effectiveness of the rehabilitation consult service in the ED. | Random Control Trial | The Emergency Department of St. Michael's Hospital in Toronto, Canada.<br>Study was from January 1996 thru June 1997. | Therapists use the Functional Autonomy Measurement System (SMAF)-data is collected on 29 items in 5 domains (self-care, mobility, communications, instrumental ADL and mental function). The SMAF has a 4-point rating scale from complete autonomy to dependence. | Subjects were emergency patients who were screened using the functional safety checklist and referred for a rehabilitation consultation. Study variables included age, gender, mobility scores and devices used for ambulation, report of falls, living situation, community support, SMAF disability scores and SMAF handicap scores. | 80 patients were referred and included in the study. Mean age was 74.6 years. 61% female, 70% lived in apartments, 44% had family/friends support 44.5% had homemaking assistance and 22.5 % had a family physician.<br>No single factor can determine a patient. Emergency staff felt the consultation process was helpful in decision making process. | Limitations included loss of patients to follow up.<br><br>Conclusion- supports recommendations of emergency medicine literature regarding the importance of functional assessments. This service offered a systematic method of targeting and evaluating elderly at-risk patients and directing the efficient utilization of resources. | Level II |

| Author/ date | Purpose | Design | Sample Characteristics/ setting | Definition of the outcome concept/ Measures/ instruments used in the study and psychometrics of measure | Interventions being evaluated | Results/ findings | Limitations /Conclusions | Level of Evidence |
|---|---|---|---|---|---|---|---|---|
| Liu et al. (2015) | This study will longitudinally examine administrative data of ED patients over a 7-year period. The researchers will report the characteristics and prevalence of fallers as well as the recurrent ED visit and mortality rate. | Retrospective Cohort | Patients were eligible if 65 years or older and presented to the ED between February 1, 2005, and December 31, 2011, with a fall-related ED diagnosis. We had follow-up data for the cohort until December 31, 2012. Data were obtained from hospital and ED databases. N=21,340 | Examined the frequency of accumulated ED revisits and death at 3 days, 7days, 30days, and1year. | Included characteristics of patients likely to impact outcomes such as age, sex, self-reported race/ethnicity, self-reported primary language, primary insurance, having a primary care physician (PCP), median income, Charlson comorbidity, and Injury Severity Score (ISS). | The average age was 78.6 years. An increasing proportion of patients revisited the ED over the course of 1 year, ranging from 2% of patients at 3 days to 25% at 1 year. Death rates increased from 1.2% at 3 days to 15% at 1 year. A total of 10728 patients (50.2%) returned to the ED at some point during our 7-year study period, and 36% of patients had an ED revisit or death within 1 year. In multivariate logistic regression, male sex and comorbidities were associated with ED revisits and death. | More than one-third of older adult ED fall patients had an ED revisit or died within 1 year. Falls are one of the geriatric syndromes that contribute to frequent ED revisits and death rates. | Level I |

| Author/ date | Purpose | Design | Sample Characteristics/ setting | Definition of the outcome concept/ Measures/ instruments used in the study and psychometrics of measure | Interventions being evaluated | Results/ findings | Limitations /Conclusions | Level of Evidence |
|---|---|---|---|---|---|---|---|---|
| Peel et al., (2012) | The purpose is to review gait speed for geriatric patients in hospital inpatient and outpatient settings | .Systematic review and meta-analysis | *Participants*<br>Adults, mean age ≥70 years, able to undertake bipedal locomotion<br>At least 20 participants from the same population sample<br>*Setting*<br>Participants recruited in a clinical setting including hospital inpatients (acute and subacute care or rehabilitation) and outpatients (ambulatory or day care)<br>N= 38 studies and 7000 participants | Relevant databases were searched systematically for original research articles published in February 2011 measuring gait speed in persons aged 70 or older in hospital inpatient or outpatients settings. Meta-analysis determined gait speed data for each setting adjusting for covariates | Variables investigated for correlation with gait speed were publication year, mean age of participants, percentage of females in the study, walking pace, static or moving start, clinical setting, and distance for the timed walk. | Across the hospital settings, the gait speed estimate for usual pace was 0.58 m/s (95% confidence interval [CI]: 0.49–0.67) and for maximal pace was 0.89 m/s (95% CI: 0.75–1.02).<br>These estimates were based on most recent year of publication (2011) and median percentage of female participants (63%).<br>Gait speed at usual pace in acute care settings was 0.46 m/s (95% CI: 0.34–0.57), which was significantly slower than the gait speed of 0.74 m/s (95% CI: 0.65–0.83) recorded in outpatient settings. | | Level I |

| Author/ date | Purpose | Design | Sample Characteristics/ setting | Definition of the outcome concept/ Measures/ instruments used in the study and psychometrics of measure | Interventions being evaluated | Results/ findings | Limitations /Conclusions | Level of Evidence |
|---|---|---|---|---|---|---|---|---|
| Studenski et al. (2011) | To evaluate the relationship between gait speed and survival | Cohort studies | Pooled analysis of 9 cohort studies between 1986 and 2000. Data from 34485 community dwelling older adult aged 65 years and older | Gait speed was measured for each participant using distance in meters and time in seconds. Walk at usual pace and from a standing start. Walk distance varied from 8 feet to 6 meters. For 8 feet=formula to convert to 4-m gait speed. For 6 m, a conversion formula was created. For 15 feet conversion = speed was meters divided by time. Survival used study monitoring methods including the National Death Index. | Variables included sex, age, race/ethnicity, height, body mass index, smoking and use of mobility aids, systolic blood pressure, self-reports of health, hospitalization in the past year, and physician-diagnosed medical conditions. | Survival increased across the full range of gait speeds either significant increments per 0.1m/s. Age 75, predicted 10 year survival across the range of gait speeds ranged from 19% to 87% in men and from 35% to 91% in women. | Gait speed was associated with survival in older adults | Level IV |
| Tiedemann et al. (2013) | Develop and validate a fall risk screening tool in hospital ED's | Prospectiv e Cohort | Two hospital ED's in Sydney, Australia People 70+ years who present to ED with fall and have a history of 2+ falls in previous year N=219 in tool development study N=178 in external validation study | Study measures included # of fallers during 6 month follow up period, and physical status, medical history, fall history and community service use | Five balance and mobility tests associated with disability and fall risk were administered: Standing balance; near tandem standing; sit to stand test; alternate step test; and the timed up and go. | Two item screening tool included 2+ falls on previous year and taking 6= medications ROC (AUC) was 0.70 (0.64-0.76). represents significantly better predictive ability than 2+ falls alone, and similar to the FROP-COM and PROFET screens | Simple two question tool with food external validity and accurately discriminates between fallers and non-fallers. Developed and used in the ED. | Level IV |
| Tucker et al. (2014) | Critique of findings from meta-analysis, "Gait speed and survival in older adults" by S. Studenski et al. (2011). | None | Case review | Research article discussed | None | Gait speed can be useful in identifying patients needing prompt evaluation. APN's should consider gait speed w older adults. | Easy, low risk test that can be interpreted easily and can affect patient outcomes. | N/A |

| Author/ date | Purpose | Design | Sample Characteristics/ setting | Definition of the outcome concept/ Measures/ instruments used in the study and psychometrics of measure | Interventions being evaluated | Results/ findings | Limitations /Conclusions | Level of Evidence |
|---|---|---|---|---|---|---|---|---|
| Viccaro et al., (2011) | Assess whether the Timed Up and Go (TUG) is superior to gait speed (GS) in predicting multiple geriatric outcomes. | Prospective Cohort | Medicare health maintenance organization and Veterans Affairs primary care clinics Adults aged 65 and older- N=457 | Baseline GS and TUG were used to predict health decline by EuroQol and SF-36 global health; functional decline by NHIS ADL score and SF-36 physical function index; hospitalization; and single and recurrent falls over 1 year. | Outcome measures including health status, functional status, hospitalizations, and falls were assessed at baseline and every 3 months over 12 months. | Mean age was 74 years and 44% were female. Odds ratios for all outcomes were equivalent for GS and TUG. Using area under the ROC curve ≥ 0.7 for acceptable predictive ability, GS and TUG each alone predicted decline in global health, new ADL difficulty, and falls, with no difference in predictive ability between performance measures. Neither performance measure predicted hospitalization, EuroQol decline, or physical function decline. As continuous variables, TUG did not add predictive ability to GS for any outcome. | GS predicts most geriatric outcomes, including falls, as does the TUG. The time alone in TUG may not add to information provided by GS, although its qualitative elements may have other utility. | Level IV |

# Appendix B.

The Memorial Hospital of Salem County

**Competency Validation**

**Gait speed measurements in the Emergency Department**

Employee:_____

| PERFORMANCE CRITERIA | METHOD OF EVALUATION (O,D,V) | SIGNATURE |
|---|---|---|
| Identifies patients for gait speed assessment:<br>1. Patients 65 years and older | | |
| Triage and preliminary assessment:<br>1. Vital signs within normal parameters<br>2. Patient physically able to walk | | |
| Performs and documents gait speed test accurately:<br>1. Starts stopwatch at 5 meters and stops at 10 meters.<br>2. Walks with patient and assesses for any signs of unsteady gait<br>3. Documents findings on record. | | |
| Communicates findings to medical provider:<br>1. Calculates findings in meters/seconds (m/s) by dividing time measured by 10 meters<br>2. Reports gait speeds of less than 1.0 m/s to medical provider | | |

Method of evaluation key: O=observation, D=demonstration, V=verbalization Must satisfactorily meet all three evaluations

# Appendix C.

## Data Collection Tool

| | Gait speed m/s | Patient chief complaint | Age | Male or Female | Admitted Y/N | Discharged to home Y/N | D/C to home with PT referrals Y/N | D/C to home with other referrals Y/N |
|---|---|---|---|---|---|---|---|---|
| 1 | | | | | Y/N | Y/N | Y/N | Y/N |
| 2 | | | | | Y/N | Y/N | Y/N | Y/N |
| 3 | | | | | Y/N | Y/N | Y/N | Y/N |
| 4 | | | | | Y/N | Y/N | Y/N | Y/N |
| 5 | | | | | Y/N | Y/N | Y/N | Y/N |
| 6 | | | | | Y/N | Y/N | Y/N | Y/N |
| 7 | | | | | Y/N | Y/N | Y/N | Y/N |
| 8 | | | | | Y/N | Y/N | Y/N | Y/N |
| 9 | | | | | Y/N | Y/N | Y/N | Y/N |
| 10 | | | | | Y/N | Y/N | Y/N | Y/N |
| 11 | | | | | Y/N | Y/N | Y/N | Y/N |
| 12 | | | | | Y/N | Y/N | Y/N | Y/N |
| 13 | | | | | Y/N | Y/N | Y/N | Y/N |
| 14 | | | | | Y/N | Y/N | Y/N | Y/N |
| 15 | | | | | Y/N | Y/N | Y/N | Y/N |
| 16 | | | | | Y/N | Y/N | Y/N | Y/N |
| 17 | | | | | Y/N | Y/N | Y/N | Y/N |
| 18 | | | | | Y/N | Y/N | Y/N | Y/N |
| 19 | | | | | Y/N | Y/N | Y/N | Y/N |
| 20 | | | | | Y/N | Y/N | Y/N | Y/N |
| 21 | | | | | Y/N | Y/N | Y/N | Y/N |
| 22 | | | | | Y/N | Y/N | Y/N | Y/N |
| 23 | | | | | Y/N | Y/N | Y/N | Y/N |
| 24 | | | | | Y/N | Y/N | Y/N | Y/N |
| 25 | | | | | Y/N | Y/N | Y/N | Y/N |
| 26 | | | | | Y/N | Y/N | Y/N | Y/N |
| 27 | | | | | Y/N | Y/N | Y/N | Y/N |
| 28 | | | | | Y/N | Y/N | Y/N | Y/N |
| 29 | | | | | Y/N | Y/N | Y/N | Y/N |
| 30 | | | | | Y/N | Y/N | Y/N | Y/N |

Appendix D.

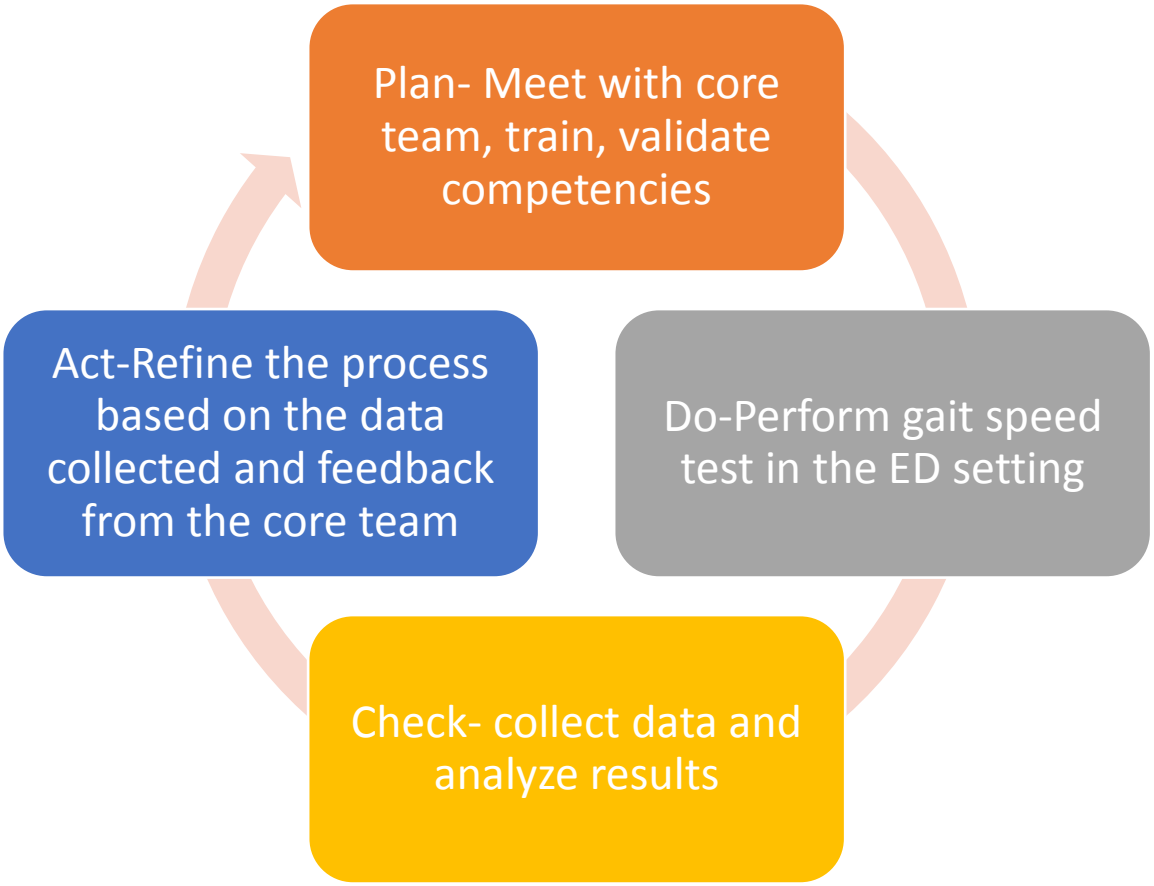
The Memorial Hospital of Salem County summary statistics

| Statistics | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Q1 | Q2 | Q3 | Q4 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total ER Census | 1,955 | 1,661 | 1,946 | 1,784 | 1,962 | 1,879 | 1,966 | 1,933 | 1,897 | 1,862 | 1,853 | 1,822 | 5,562 | 5,625 | 5,796 | 5,527 | 22,510 |
| Hospitalizations | 16.5% | 17.6% | 17.2% | 16.1% | 15.7% | 15.6% | 14.1% | 15.1% | 16.0% | 16.3% | 15.1% | 16.4% | 17.1% | 15.8% | 15.1% | 15.9% | 16.0% |
| | 323 | 293 | 335 | 287 | 309 | 294 | 278 | 292 | 303 | 301 | 280 | 298 | 951 | 890 | 873 | 879 | 3,593 |
| Admissions | 13.0% | 13.1% | 13.0% | 12.4% | 11.4% | 10.8% | 8.1% | 9.7% | 10.6% | 10.2% | 10.0% | 10.4% | 13.0% | 11.5% | 9.5% | 10.2% | 11.0% |
| | 254 | 218 | 253 | 221 | 224 | 203 | 160 | 187 | 201 | 188 | 186 | 189 | 725 | 648 | 548 | 563 | 2,484 |
| Observations | 3.5% | 4.5% | 4.2% | 3.7% | 4.3% | 4.8% | 6.0% | 5.4% | 5.4% | 6.1% | 5.1% | 6.0% | 4.1% | 4.3% | 5.6% | 5.7% | 4.9% |
| | 69 | 75 | 82 | 66 | 85 | 91 | 118 | 105 | 102 | 113 | 94 | 109 | 226 | 242 | 325 | 316 | 1,109 |
| Discharges | 77.9% | 78.3% | 77.5% | 79.3% | 78.6% | 79.2% | 80.1% | 79.3% | 78.1% | 78.0% | 79.2% | 79.6% | 77.8% | 79.0% | 79.2% | 78.9% | 78.7% |
| | 1,522 | 1,300 | 1,508 | 1,414 | 1,542 | 1,489 | 1,575 | 1,532 | 1,482 | 1,444 | 1,467 | 1,450 | 4,330 | 4,445 | 4,589 | 4,361 | 17,725 |
| Transfers | 2.8% | 2.8% | 3.0% | 2.9% | 2.4% | 2.9% | 3.2% | 3.3% | 3.3% | 3.6% | 2.8% | 2.3% | 2.9% | 2.7% | 3.2% | 2.9% | 2.9% |
| | 55 | 47 | 59 | 52 | 47 | 54 | 62 | 63 | 63 | 66 | 51 | 42 | 161 | 153 | 188 | 159 | 661 |

*Figure 1.* MHSC ED summary statistics

Appendix E.

Plan-Do-Check-Act Cycle




Note: Figure adopted from: Seidl, K. L., & Newhouse, R. P. (2012). The intersection of evidence-based practice with 5 quality improvement methodologies. *Journal of Nursing Administration*, *42*(6), 299-304

Appendix F.

Timeline