A Quick TUG to Prevent Older Adult Falls in the Emergency Department

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Abstract

Preventing falls in acute care settings has been a topic of regulatory and quality improvement discussions for decades. Older adults are particularly at risk for fall related morbidity and mortality. Many emergency departments (ED) have implemented the Memorial Emergency Department Fall Risk Assessment Tool (MEDFRAT) which is a questionnaire screening for falls. With a rapidly aging population in the United States, professional organizations recommend using an assessment approach with implementation of the Timed Up and Go (TUG) mobility screening. The TUG assessment was implemented in an urban ED for 22 days yielding 243 mobility screening results. All adults over 65 years of age without exclusionary criteria were assessed to determine degree of frailty in an acute care setting. An assessment time of greater than 12 seconds is considered positive and prompts the ED provider to place a referral to the patient's primary care physician for an outpatient physical therapy assessment. One in five of adults screened received outpatient physical therapy referrals. Data analysis finds very little correlation between the MEDFRAT and TUG results. Approximately 15 percent of patients scoring zero and 40 percent scoring low on the MEDFRAT were found to be a fall risk by the TUG mobility assessment. This project demonstrates the importance of an interdisciplinary mobility assessment approach to reducing costs, loss of independence, and mortality related to falls in our older adult population. The recommendation is to favor mobility assessments over verbal questionnaires to prevent falls and promote outpatient therapies in this population.

Keywords: emergency department, Memorial Emergency Department Fall Risk Assessment Tool, Timed Up and Go, older adults, fall prevention

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It would be challenging to identify a healthcare organization that is not seeking to improve fall prevention practices to optimize patient safety. Falls can be costly and leave older adults with reductions in mobility that contribute to significant morbidity and mortality. Patients presenting to the emergency departments (ED) present unique challenges because they are treated rapidly and are rarely evaluated for chronic conditions focusing only on the presenting chief complaint. Incomplete assessment leaves older adults vulnerable to falls within the hospital and in the community. Increasing clinical staff awareness, promoting critical thinking, and restructuring assessment protocols can prevent costly, chronic injuries resulting from a single fall for patients seeking emergency care.

Background and Significance

Problem

Within the next few years, it is predicted that there will be a three-fold increase in the need for older adult-specific medical care. Many professional organizations have responded by creating geriatric healthcare interest groups to prepare for this specific population growth (Magidson & Carpenter, 2021). These interest groups and regulatory agencies advocate for the reduction of older adult falls to obtain and maintain organizational accreditation, reduce healthcare costs, and most importantly to reduce patient injury (ACEP, n.d.; TJC, n.d.).

Purpose and Rationale

In just over a decade, the older adult population is projected to outnumber children for the first time in U.S. history. The Centers for Disease Control and Prevention (CDC, 2020) notes that adults over 65 years that experience falls currently costs the healthcare system 50 billion dollars annually with 29 billion paid by Medicare and 9 billion paid by Medicaid. Therefore,

older adult falls affects the financial wellbeing of every taxpaying American. Of greater concern, according to the Arizona Falls Prevention Coalition (2021), in 2020 nearly half of older adults who fell sustained a traumatic brain injury and there were 1112 reported fall-related deaths. It is well documented that effective fall prevention strategies have positive financial impacts and reduction in older adult morbidity. The purpose of this project is to determine if implementing fall prevention protocols that include mobility screenings will be more effective at fall reduction than use of only screening questionnaires in the emergency department setting.

Population and Epidemiological Data

In 2019, there were over 51,000 older adult fall-related visits recorded in Arizona EDs with almost 10,000 of those occurring in Maricopa County (ADHS, 2022). In most of these cases, Medicare is the primary payee. Data demonstrates that care costs increase in the older adult population related to comorbidity complications and anatomic frailness that can occur with advancing age. Nationally, the population of older adults is increasing faster than originally anticipated (U.S. Census Bureau, 2019). This results in a looming financial burden placed on government budgets and US taxpayers. Using adequate screening algorithms to prevent unnecessary and costly injury from falls should be the focus of ED stakeholders across the nation. Avoiding preventable and potential injury-causing events increases patient and family satisfaction, controls costs, and promotes financial stewardship.

Current State in an Urban Emergency Department

Current ED screenings for older adult fall prevention are underdeveloped and self-reporting falls is an unreliable predictor of injury (Dasgupta et al., 2022). The ED in this project found nursing judgment of a patient's fall risk status overrode null and low scores on Memorial Emergency Department Fall Risk Assessment Tool (MEDFRAT, Appendix A) when screening

patients during the triage process. This means that nursing judgement is more effective than the tool in some cases at preventing fall related injuries. Yet, nursing judgment is not enough. There has been a recent increase in falls involving older adults in this ED prompting root-cause analyses and creation of specialized fall workgroups.

Many EDs rely on one-time triage screening tools to assess a patient's fall risk. The MEDFRAT is a common tool that has mixed reliability reports. It is a 14-point rating scale with 1-2 points defining low fall risk, 3-4 points moderate fall risk, and greater than 5 points as high fall risk. Guthrie & Hochman (2018) found that the MEDFRAT properly identifies 43% of patients at risk for falls, and Scott et al. (2018) found a 16.7% reduction in falls after implementation of MEDFRAT. However, neither study differentiated older adult populations and heavily scores patients with altered mental status. Southerland et al. (2017) echo that fall screenings alone are inadequate and combining functional balance tests with screening questions identified a larger population of patients at risks for falls. The ED in this project currently does not implement any balance or mobility assessments in their clinical screenings or discharge preparation for older adults.

In adults 65 years or older (P), how does the addition of the Timed Up & Go (TUG) mobility test (I) compared with only the MEDFRAT questionnaire (C) affect the number of patients considered high risk for falls in the emergency department (O)?

Evidence Synthesis

High Risk Profile of Elders Who Fall in the Emergency Department

Many studies disagree which gender is more likely to experience a fall, but Chow et al. (2019) identified gender characteristics that would increase the risk for falls in populations over 65 years old. Risk factors for men include age, depression, and alterations in balance. Women

who are incontinent or clinically frail have higher fall rates. Lee et al. (2022) found that older women with lower levels of education have the highest fall risk in the community population that they studied. They also found that long-term medications lowered the fall risk while short term medications increased fall risk. Considering study results, it can be concluded that advancing age, frailty, and short-term medication use can all raise the risk for falls in the older adult population versus gender alone.

Blomaard et al. (2021) further describe causes of falls. Nearly half are attributed to environmental risk factors and almost ten percent result from syncope. Older adult study subjects in this research who are initially screened as non-frail or low fall risk are found to have a higher probability of falling indoors and in a pre-frail phase. The missed identification of pre-frail is likely due to not performing a mobility screening. Therefore, fall locations combined with mobility screening results are better predictors of long-term risk. Tracking and communicating pre-frail findings with primary care teams can improve 12-month outcomes for these older adults.

Interventions Begin with an Interdisciplinary Team

O'Keeffe et al. (2020) emphasize the interdisciplinary approach to fall prevention in the ED and note that a nurse practitioner is the ideal leader to monitor the risk reduction stratification for secondary fall prevention. Thatphet et al. (2021) also stress the importance of a diverse team and use the results of a series of screening tests in their research (positive orthostatic vital signs, TUG greater than 14 seconds) to prompt evaluation by physical therapy or inpatient geriatric teams for further evaluations before discharge. The ED in this project currently has an interdisciplinary workgroup that is pursuing Geriatric Emergency Department Accreditation (GEDA) through the American College of Emergency Physicians (ACEP) and open to evidence-based change and quality improvement initiatives.

Clinical Time Constraints

One barrier to implementing multi-step fall reduction programs in an ED is time. In most cases, providers will not spend more than five minutes assessing patients for fall risk (Carpenter et al., 2018). Screening tests such as the Timed Up & Go (TUG) (CDC, 2017) take under a minute to implement yet do not reliably predict post-discharge falls. The TUG assessment requires the older adult to stand from a chair, walk ten feet, pivot, walk back to the chair, and sit down again within 12 seconds according to CDC guidelines. Hirano et al. (2022) found that increased TUG times are related to poor balance in pre-frail older adult and difficulty standing or changing position for those in the frail category. For these reasons, mobility screenings such as the TUG which assess for balance and movement can be good predictors for intradepartmental falls, thereby reducing the organization's internal fall rates. They can also prompt outpatient follow-up with physical therapy which meets ACEP recommendations for GEDA.

Mobility Assessment Tools

Meekes et al. (2021) outline six specific fall assessment tools yet none of them showed adequate predictive performance for future falls. The authors state that a thorough fall history assessment is the strongest predictor of future falls. Yet, mobility tools remain effective in assessing elders at imminent risk for a fall within the department. Two of the tests take over 20 minutes to administer and one is too complex to be administered quickly in ED screenings. The tests remaining to be considered are the TUG test, the Gait Speed test, and the Functional Reach test. The TUG test is like the Gait Speed test but more commonly used. The Functional Reach test takes specialized training to administer and is therefore not the best tool to implement in an ED with multiple stakeholders involved in screenings.

Albarrati et al. (2022) credit the TUG test for accurately assessing frailty in older adults

and capturing deficiencies related to physiological changes associated with aging. A cutoff time of eight seconds predicts frailty with 90 percent sensitivity and 80 percent specificity. Eagles et al. (2018) recommend a cutoff time of 10 seconds to assess for frailty as the older adult should demonstrate ability to safely ambulate and transfer weight in that timeframe. These authors report the TUG test is far more reliable than self-reported history and is realistic to use in an ED setting.

The TUG assessment has the unique ability to increase specificity to rule out non-fallers (Ibeneme et al., 2022). Walking slower reduces the pendulum effect of arms so more energy expenditure is required resulting in earlier fatigue; the TUG captures this data. Smith et al. (2017) found that the addition of either a motor or a cognitive task significantly increased TUG times with an average of almost two seconds for cognitive burdens. This demonstrates older adults who are cognitively distracted show impairments in mobility. Finally, Alosaimi et al. (2023) found that increased TUG times capture a fear of falling which should prompt further assessment.

Theoretical and Implementation Framework

Theoretical Framework

Imogene King's Theory of Goal Attainment involves examining the interaction of elements in the system and how they fit together to form the whole system, (Zaccagnini & Pechacek, 2021). King's Model of Transactions is the specific model described above under the Theory of Goal Attainment. The Model of Transactions is used in this project to explain the local exchange of actions and reactions between patient and system (Appendix B). Perception, judgment, and action form a basis for interaction between patient and nurse/system that leads to a transaction. The nurse/patient centric model also aligns with the project site's mission and

values. The transaction leads to feedback from both parties to alter perception and potentially change judgment for the next action.

Ideally, using the TUG assessment to identify a frail state will shift the perception to create safe judgment for actions based on current abilities. That is, an older adult who is normally independent but receives morphine, has potentially shifted into a fragile state. The patient now requires adaptation of her perception of health to make informed choices of actions that will maintain her safety. After the transaction, feedback occurs with shared decision making used to evaluate and modify the current environment. Assessments continue and information shared bidirectionally to form realistic perceptions of abilities and maintain safety in the ED environment. Caution should be used to not diagnosis or label the patient based on TUG results.

The outcomes measures of the project relate to King's Theory of Goal Attainment framework because of the continuous focus on actions and reactions between the patients and ED staff. Each TUG assessment can be defined as a transaction in this framework that will ideally lead to perception shifts about frail states to create safety, improved judgement, and a realistic interpretation of current limitations. The fluidity of the framework mirrors the unpredictability of the ED, and the goal is to use the TUG assessment to increase information sharing and shared decision-making to prevent falls and injury.

Implementation Framework

The project site uses the Lean Six Sigma Company's (2023) Define, Measure, Analyze, Improve, and Control (DMAIC) model for quality improvement work. The five parts of the model are completed using 12 total steps to achieve sustainable outcomes. In the define phase, organizational values must be considered, resources including team members are identified, and project steps prioritized. It is at this time when the PICOT question becomes the foundation for

all other steps. Measurement includes not only looking at the data gathered from TUG test implementation, but also at the process steps. This may involve analyzing communication, variations between dayshift and nightshift, and appropriate documentation.

Analysis involves using tools, templates, and statistics to find meaning in the information. However, analysis is not just compiling numbers. It is an important step to ensure that the team has found the root causes of the quality gap in the project. This is where it is important to understand that despite a comprehensive literature review, analysis, and synthesis that the intervention may not solve the quality gap at the project site and that information still retains great value.

The improvement phase is using the analysis to formulate and prioritize solutions. Decisions must be made about the best process for implementation and define what is realistic for the unit with the current resources available. Once improvements are made, the team must continually work on controlling the process to prevent a relapse. An effective way to control the process is to transfer it to an operational owner who is invested in the project's continued success.

Methods

Setting and Stakeholders

The setting in this project is a 42-bed ED in an urban hospital in southwestern United States. The hospital serves patients with complex medical problems locally, nationally, and internationally and therefore has a diverse patient population with high acuity. The hospital's mission is for the staff to remain patient-focused with respect, integrity, and compassion defining core practice values. Ample resources are provided to ensure optimal staff and patient experience; resources would not be considered a barrier to change implementation. In 2018,

41.6% of ED patients served were over 65 years old, with 22.6% older than 75 years. With more than half of the ED census being older adults, fall reduction in this population is an important administrative and regulatory goal (K. Cheetham, personal communication, January 16, 2023).

Departmental fall data demonstrates a significant increase in the fourth quarter of 2022. Sixty percent of patients who experienced a reported fall between 2020 and 2022 were male and 61.5% were older than 65 years. Three of the eight older adult patients that fell in fourth quarter 2022 screened high risk for falls by nursing clinical judgment and not self-reported criteria on the MEDFRAT. In two of those cases, the older adults were left alone while toileting which is nonadherent to the organization's "Within Arm's Reach" policy that states any patient who qualifies as a fall risk must be within arm's reach of a staff member when out of bed. None of the patients had more than one initial fall screening and none of the patients received a mobility assessment.

Stakeholders for this project are from the existing GEDA workgroup. The group's Operation Administrator oversees physician training and is driving the accreditation pursuit due to organizational interest for optimal geriatric care. An ED physician oversees changes to order sets, process changes, and screening tests. An ED Quality Specialist and Clinical Nurse Specialist (CNS) work closely together on tracking fall data, organizing root cause analysis, and implementation of quality improvement projects. There is representation from pharmacy, information technology, social work, case management, and ED nursing leadership. ED educators partner peripherally to ensure GEDA nursing education requirements are met to fulfill requirements. Finally, the entire local stakeholder group partners with a similar Enterprise group out of state to standardize the order sets and care pathways. The external site would like to

implement mobility testing in 2024. Data from this project can be shared across the Enterprise to support or refute the value of added mobility testing for frailty prediction and outpatient referral.

Ethical Considerations

Ethical principles provide guidance during this project and include respect for persons, beneficence, and justice. Respect for persons is granting each person full disclosure of project risks and benefits, also called informed consent. Disclosure is always provided to give the individual complete information to decide about desired participation in the project (Reavy, 2016, p. 222). This project adheres to the principle of respect by informing the participant that a TUG mobility test is available to assess current capabilities. Benefits of assessment include identification of impaired mobility that can lead to departmental implementation plans to reduce the risk of falls. Risks include the possibility of falling during a mobility assessment and potential perception of stigmatization of being assessed with compromised mobility. To minimize this risk, a provider, nurse, physical therapist, or case manager will be involved to discuss a safety plan with the patient screening high risk before discharge home to create a plan and minimize anxiety. A separate signed consent is not required, the registration documents capture permissions for quality improvement. However, the patient can refuse the mobility assessment at any time without affecting the trajectory of ED care.

Beneficence is the ethical principle that requires the project team to minimize risks and maximize benefits of participants (Reavy, 2016, p. 222). This project adheres to beneficence by ensuring that participants understand that the mobility testing is an optional part of their visit without any recourse to the treatment plan if declined. Rewards or incentives will not be granted due to the possibility of implied or explicit coercion (Barrow et al., 2022).

Finally, justice is the right to both fair treatment and privacy (Barrow et al., 2022). This project adheres to justice by ensuring that all data is deidentified including only age and gender for analysis. All project data will be kept inside the site's firewall on internal servers in secure files. The methodology for this project will be reviewed by both site and faculty mentors and the Internal Review Board (IRB) for both the project site and academic institution. A data usage agreement (DUA) is also executed between the site and partnering academic institution involving principal investigators and legal teams.

Planning the Intervention and Timeline

Considering all applicable stakeholders, the high-level planning of the project will include engagement of project champions that are ED clinical staff, education of the TUG assessment, definition of ineligible patients through online and in-person teaching, a 22-day data collection period, weekly updates to the team for ongoing feedback and engagement, and statistical analysis to seek meaning in the data.

Meeting with the ED Quality Specialist and CNS, it was discovered that the EPIC electronic health record (EHR) used by ED staff has current capability to trigger the TUG mobility assessment for all patients over 65 years of age without additional programming (Appendix C). Therefore, the staff required education on navigating to and completing documentation for the tool already in place. The Falls Committee Members were early adopters of the project and engaged with educational content creation and review. They also volunteered to host the introductory discussion at the department's Unit Based Teams (UBT) monthly meeting to initiate departmental awareness. There is very little equipment used and each room is already equipped with a chair and wall clock for the screening.

Education consists of a brief, interactive module created with Microsoft PowerPoint and RISE 360 software. Educational objectives include review of ACEP accreditation goals, ED fall data for the past two years, review of departmental falls, and patient fall status based on MEDFRAT scoring. After a brief data review, the simple steps of the TUG mobility test are reviewed by video including an example of an assessment time of 12 seconds or greater triggering fall risk precautions and the need for further safety intervention. Additionally, the TUG screening contains eight additional observation tips that ED staff are asked to document into EPIC if applicable during the screening (Appendix D). Most importantly, the staff received weekly updates in huddles and unit rounding. Staff efforts generate results that are being used to make decisions about adding mobility screening for other Enterprise sites. Staff notification that the data precipitates important organizational changes assisted with buy-in and adherence to the mobility screening protocol.

After implementation, the stakeholder team reviewed TUG mobility data weekly looking for compliance, number of patients excluded, number of patients who were noted as fall risk per TUG assessment, and occurrence of any departmental falls. After the data collection period, the stakeholders reassembled with a project site statistician partner for analysis. All datasets are deidentified and shared by a nurse informaticist using Microsoft Excel. Results are reported to the local site, the academic institution, Enterprise stakeholders, and are undergoing preparation for publication in a peer reviewed journal. Based on findings, this project could become a legacy project with the second arm determining how to engage community stakeholders in safety interventions for frail geriatric patients post discharge from emergency department.

Timeline Review

Engagement with the Fall Champions occurred in July and initial information about the project will be presented to ED staff at their September and October UBT virtual meetings. Project site IRB Wizard request and ASU's IRB review were also submitted late July to enable the project to move forward in December. The educational intervention occurred during the month of November and spanned 4 weeks. TUG mobility screening and data collection was completed December 1 through 22. Weekly updates were provided to the staff by the project leader at morning and nightshift huddles followed by a minimum of one hour unit rounding. Data analysis commenced early January and was completed in partnership with the ED Quality Specialist, CNS, and a project-site statistician.

Participants and Recruitment

Participants eligible for the TUG mobility assessment included any adult over 65 years of age presenting to the ED for care. The patient will be given the option for participation and clearly notified that declining participation will not affect their ED treatment plan. For patients who consent verbally, the TUG assessment occurred at minimum during the time of transport to the room and at intervals of reassessment per Registered Nurse (RN) discretion. Repeat screenings only recommended if the patient did not meet fall risk criteria using the MEDFRAT or TUG test during the initial triage process. The rationale for repeat screenings is to try and capture acuity changes during the ED visit that result in an increasingly frail states and contribute to overall fall risk. The ED patient is not static, and many factors including fluid balance, pain, medications, changes in condition, and onset of delirium/confusion can contribute to a heightened fall risk. Ideally, the mobility assessment intervention will both prevent falls and predict frail states that can receive additional resources for follow-up and monitoring.

A literature review identified certain patients that should be excluded from mobility testing. Chow et al. (2019) excluded patients unable to consent or admitted to the hospital. Lee et al. (2022) did not screen patients with visual or auditory impairments, balance problems, or with wrist fractures. Smith et al. (2017) did not screen patients with a condition present that could affect walking and Southerland et al. (2017) did not include patients with lower extremity pain, bedrest orders, who were unable to follow commands. This list is posted throughout the nurses stations and was also presented to the ED at the UBT meeting for discussion and consensus.

Data Collection Plan

Data was collected by a nurse informaticist and sent by internal, secure email in the form of a deidentified Excel spreadsheet. Data was organized using a chart audit form using consecutive numbering in place of patient medical identifiers. The Microsoft products used to save and store data are owned by the organization and secured behind a firewall accessible only by employees with a password. Additionally, the data is organized into shared folders that are further protected by departmental access only. The data will likely be stored for 5 years or longer if determined necessary by the organization.

This data is useable by organizational staff after *Authorization and Service Terms* is signed by the patient at time of registration (Appendix E) stating under the *Notice of Health Information Practices* that certain data may be collected for safety, protocols, or quality improvement (Appendix F). Since the data points collected with the chart audit form are objective and fixed, there is high interrater reliability and validity with mitigated observer bias when the same form is used across multiple settings. Chart audit forms are used to identify and understand diagnostic errors (Brigham & Women's Hospital, 2019), to assess quality and maintain high standards of professional practice (Azzolini et al., 2019), and to obtain feedback

for continuous improvement (Royal College of Physicians and Surgeons of Canada, 2023). In this project the forms are used for both quality assessment and continuous process improvement.

Outcome Measures

The outcome measure chosen for this project is the implementation of the TUG mobility assessment for adults 65 years and older in the ED. The assumption is that the TUG assessment will identify more elderly patients at risk for fall in the ED than the verbal self-assessment MEDFRAT, thereby allowing staff to implement measures to increase patient safety. Two specific tools are needed to complete the improvement initiative according to Hickey & Giardino (2022). First, a valid and reliable tool will be needed to collect the data during the project's intervention phase to determine if the outcome results in goal attainment. Second, a tool is required to capture analytic measures of the data to determine the need for change or sustainment of the intervention.

The data captured during the preintervention phase helps determine the frequency, circumstances and demographics of falls using only the MEDFRAT screening. Data collected during the intervention phase identifies if more patients over age 65 are recognized as fall risks with the addition of mobility assessment and gait observance using the TUG tool. A full outline of outcome measures is available in logic table format (Appendix G).

Instruments

The instrumentation selected for evaluation and tracking of data is Microsoft Excel and Intellectus statistical software. Sutherland et al. (2017) use Microsoft Excel for collecting and storing data, but readings have shown while Excel is a great tracking tool, it can do very little to manipulate data and make it meaningful to answer the PICOT question. Use of Intellectus makes data organization and evaluation quick and can provide statistical significance of many data

points. Therefore, Excel and Intellectus are the instrumentation tools that were used for data analysis in this project to reduce reliance on other stakeholders to identify meaning in the data.

The instrument used for data collection during the intervention phase of this project is the TUG test. This tool captures mobility evaluation of the older adult and was originally demonstrated by Podsiadlo & Richardson (1991) as valid and reliable when compared to the Berg Balance Scale, gait speed variances, and the Barthel Index of Activities of Daily Living (ADL) score for an older adult. A TUG time of 10 seconds or less correlates with the ability to independently ambulate safely. Tests in the 20 second rage indicate older adults will benefit from an assistive device and fall into an intermediate safety zone. Patients who took 30 seconds or more needed assistance in many areas with ADLs such as toileting and going outdoors. The authors note that the TUG test is quick, valid, reliable, and does not require special equipment or assessor training. It should be noted that the CDC (2017) recommended is a TUG completion time of under 12 seconds.

The TUG test will capture times in seconds for older adults to rise from a chair, ambulate 10 feet, turn and walk back to sit in the chair. Times above 12 seconds will heighten the concern for the patient as a risk for falling in the ED. After the intervention phase, Microsoft Excel spreadsheets are used to store, manage, share, and interpret the data. Since the outcome measure of increased identification of older adults at risk for falls is reached, the stakeholders will discuss a sustainability plan. Discussion has already begun on partnerships with other departments and translating the TUG assessment into different areas such as the waiting room.

Data Analysis Plan

Data was collected for a 22-day period in the organization's fourth quarter. After the education intervention, the RNs verbalized confidence in their ability to enter the TUG scores

into the electronic health record. The ED Quality Specialist, CNS, and nurse informaticist all assisted with writing algorithms and collecting the necessary de-identified data in Excel spreadsheets. The project was also assigned a statistician by the organization to oversee the final data analysis as the results could affect implementation decisions for multiple sites and units.

Budget

Prevention for one fall is estimated at 13 thousand dollars (Dykes et al., 2023) with a benefit-cost ratio of 1.95 (Appendix H). The return on investment for the organization to prevent one fall is 95.5% and an extraordinary 877% for 5 prevented falls. Therefore, if implementation of TUG assessments captures more at-risk patients and prevents just one fall, the program is greatly justified in the organizational budget.

Results

Project Outcomes

Continuous variables of MEDFRAT scores that could range from zero to 14 and TUG variables that could range from one to 12 or more than 12 seconds are summarized using mean and standard deviation. Categorical variables such as gender, chief complaint, and age are summarized using frequency and percentage. Chi-square test for categorical variables and Kruskal-Wallis tests for continuous variables are used to compare variations in TUG scores. A combination of Intellectus Statistics software and R Statistical Software 4.2.2 are both used for analysis yielding identical results.

A total of 243 patients were screened for falls using both the MEDFRAT and TUG mobility assessment in a 22-day timeframe (Appendix I). Eighty percent of screened patients were assessed at 12 seconds or less on the TUG mobility screening and no further action was required. However, 20 percent scored greater than 12 seconds on the TUG prompting fall

precautions to be implemented in the ED, notification to the patient's Primary Care Provider (PCP) on the discharge instructions, and recommendation for the PCP to place outpatient physical therapy (PT) orders. Therefore, of all patients eligible for a TUG assessment, one in five are further eligible for outpatient PT mobility assessments. Sixty-eight percent of patients scored zero on the MEDFRAT verbal questionnaire, 21 percent scored low, six percent moderate, and five percent scored high. Interestingly, there was no correlation between MEDFRAT and TUG results regarding patients assessed as risk for falling.

Statistical and Clinical Significance

There were no statistically significant findings related to fall risk from either MEDFRAT or TUG regarding age, gender, or chief complaint. However, there were statistically significant findings that there is no correlation between TUG and MEDFRAT scoring (Appendix J). For example, one third of patients that scored more than 12 seconds on the TUG assessment scored a zero on the MEDFRAT questionnaire. Otherwise said, 16 total patients in a 22-day period would not have had fall precautions implemented in the ED and would not have had outpatient PT assessment recommendations. On average, patients that scored more than 12 seconds on the TUG assessment scored a 2 or low risk result on the MEDFRAT questionnaire.

Project Impact

Finding that the verbal MEDFRAT results do not significantly correlate with TUG assessment results, clinicians must decide which method yields more accurate results. The MEDFRAT is subjective, patients may not be truthful when answering, and more importantly the department is still experiencing patient falls with only the MEDFRAT in place. Since the TUG is a mobility assessment performed by an RN, it provides a more accurate picture of the patient's mobility at different intervals during an emergency room visit. Surprisingly, there were patients

with MEDFRAT scores in the high range that scored less than 12 seconds on the TUG assessment. This is likely because chief complaints such as confusion or a past fall automatically place the patient in a high-risk category. Statistical analysis did not show any positive TUG correlations from patients who had a chief complaint of altered mental status. An actual patient assessment demonstrates they did not currently have mobility deficits during the ED visit. For the patient, the TUG can work both ways demonstrating their best ability on their current ED visit.

Providers prefer the tangible data from an assessment and mentioned it did not negatively impact their workflow to add the "dot-phrase" into EPIC to order the PCP referral for outpatient PT. This aligns with the request from the ACEP to complete more safety screenings for older adults in the ED and makes GEDA much more achievable for the system. ED leadership is currently working on departmental protocols to add in mobility assessments permanently and to examine how they can be used from the waiting room to prevent falls before the patient even makes it back into the department. Hospital administration is supportive of policy changes that can increase patient safety and reduce care costs.

Sustainability

The site champions, CNS, Quality Specialist, Nursing Education Specialist, and department leadership are all part of the ED Falls Committee and have demonstrated commitment to site quality improvement projects. The team will continue to bring data back to the department stakeholders as ongoing maintenance of the DMAIC project. The ED manager and supervisors will be involved at the Enterprise level to report Arizona data to colleagues in other states for shared quality improvement initiatives.

Tools that will be permanently available for organizational use include the educational materials, the Microsoft OneNote communication documents and the Microsoft Excel data analysis templates and existing reports. Since this project is a piece of the larger GEDA goal, the plans, templates, and methods used through the DMAIC process will be available to collect data on other interventions such as elder abuse identification protocols and discharge follow up protocols.

Moran et al. (2020) recommend defining short- and long-term policies that are critical for strategizing sustainment of the project. Short term protocols will include a temporary procedure for continuing the MEDFRAT at time of triage for patients with TUG exclusionary criteria and administration of the TUG screening by the primary nurse for all other adults over 65 years old. Documentation details and frequency of screening intervals will also be protocolized to match routine vital sign assessments within an existing Enterprise protocol. Long-term procedures will include algorithmic information on how to adjust the protocol and future recommendations for action based on quarterly data results and potentially implement the assessments in other areas such as the waiting room. The goal the protocol is not only to prevent falls, but to encourage staff to critically think about multiple factors that contribute to falls including mobility assessments instead of relying solely on the MEDFRAT questionnaire.

Discussion

Limitations and Barriers

The greatest barrier in implementing mobility assessments in the ED is interdisciplinary collaboration and buy-in. Assessment results of greater than 12 seconds require a plan for outpatient services and that has not historically been the in the range of function of ED providers and leadership. Planning for outpatient services requires careful communication and follow

through by all stakeholders. Without interdisciplinary teamwork, TUG implementation and interventions are not possible.

In this project it is fortunate that the TUG assessment was already built into the EHR, automatically triggered on adults 65 years or older, and a useable datapoint easily collection on query spreadsheets. However, adding a documentation section to any EHR can be a daunting task. It is usually a lengthy process involving administration, EHR representatives, informatics, information technology, and clinical stakeholders who will be using the tool. It is not certain that this project would have been possible in the necessary timeframe if TUG did not exist in the EHR and that has the potential to be a major barrier for other organizations.

Findings Related to Literature

This project found publications by O'Keeffe et al. (2020) and Thatphet et al. (2021) were accurate that an interdisciplinary team is necessary both for implementation and ongoing risk stratification and intervention recommendations. Hirano et al. (2022) had similar findings that increased TUG times are related to poor balance and position changes in older adults. While the nurses were encouraged to document behaviors behind prolonged TUG times, only one nurse did so with findings of *slow pace, short strides, steadying self on wall, and shuffling*. These findings are important to our PT colleagues to help determine an accurate mobility diagnosis and plan of care. While this is not a reliable sample, it does demonstrate behaviors found in the literature that contribute to prolonged TUG times.

Since the MEDFRAT and TUG results did not correlate, Meekes et al. (2021) findings seem relevant that while a fall history is a strong predictor of future falls, mobility tools help to identify older adults at imminent risk. This is important because as mentioned acuities can fluctuate, and verbal screenings do leave room for subjective results. Unlike reports from several

articles in the literature search, there were no statistically significant findings related to gender or presenting problem including altered mental status. Ibeneme et al. (2022) had similar findings to this project where the TUG has a unique ability to rule-out non-fallers which can be just as important as identifying the patients who may fall. Finally, Alosaimi et al. (2023) note that the TUG also captures those with a fear of falling who also require intervention due to mobility complications from hesitancy. While that was not examined in this project, considering fear of falling as a fall indicator may be a foundation of another quality project in the future.

Recommendations for Future Studies

The ED leadership team has noticed a new trend in falls that occur from the waiting room. Therefore, they are looking to put the drafted protocol for using the TUG mobility assessment in place and have the Falls Committee working on ideas for implementation from waiting areas. It would be ideal to collect a year of fall data on patients over 65 with the TUG protocol in place. Increasing the timeframe can help to obtain a more accurate picture of the true intradepartmental prevention rate using the TUG screening.

After discussing results with PT colleagues, consistently adding in gait descriptors for patients who take greater than 12 seconds to complete the TUG screen could prove beneficial. Data points and trends could be captured so nurses and providers can be observant for certain gait behaviors that carry a prolonged TUG time. Long term benefits and additional datapoints that can contribute to quick assessment strategies will continue to empower ED staff and boost older adult safety in the department.

Conclusion

Mobility screenings in the ED are the source of many research publications in an urgent search to eliminate departmental falls, reduce healthcare costs, and increase patient safety.

Southerland et al. (2017) note that a combination of mobility screening and questionnaire tests are most effective in fall risk identification; there is not a singular tool identified that is able to capture all patients at risk for falls. The project has clearly demonstrated discrepancies inf findings between screening tools (Appendix K) Therefore, a project plan including stakeholder planning, champion engagement, staff and provider education, mobility assessment implementation, and data analysis can assist with determination if there is an increase in frail patient identification for the older adult population through use of mobility screening. Departmental fall reduction is necessary to maintain high organizational standards including Magnet® status, reduce healthcare associated costs locally and nationally, and most importantly to reduce morbidity and mortality for older adult ED patients.

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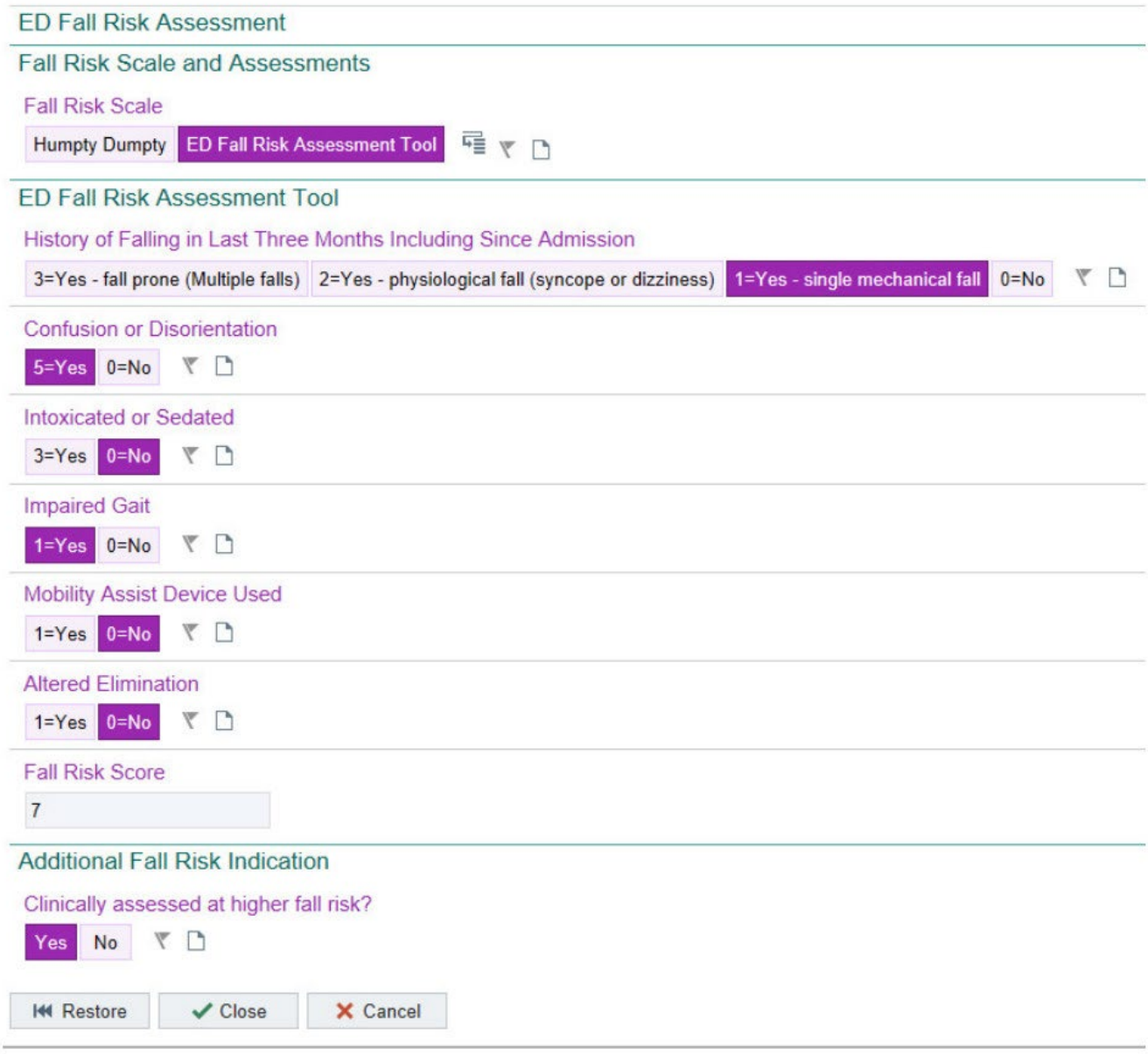
Appendix A

Memorial Emergency Department Fall-Risk Assessment Tool

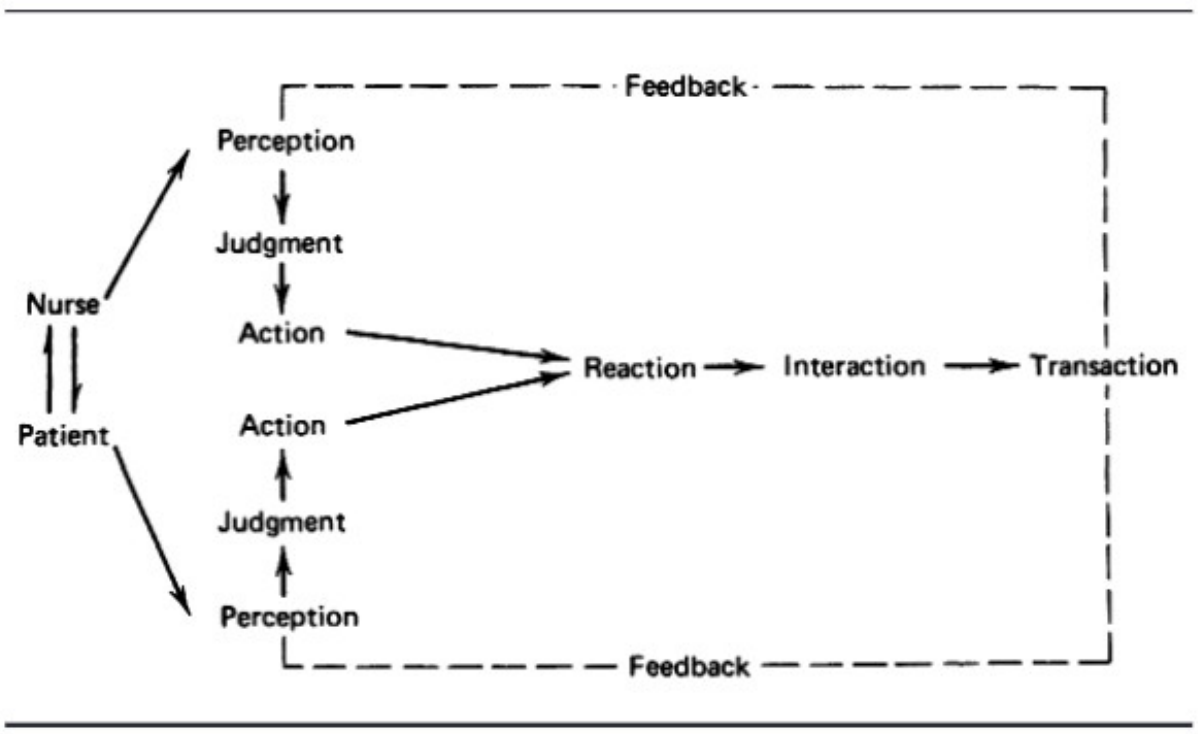


(Screenshot from EPIC Systems, 2023)

Appendix B

Models and Frameworks

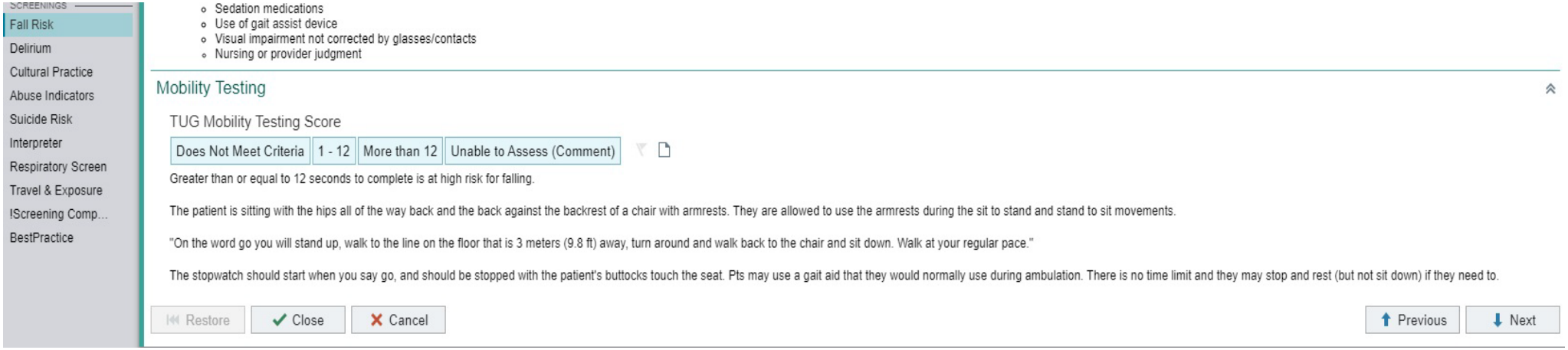
A Model of Transactions



(King, 2007)

Appendix C

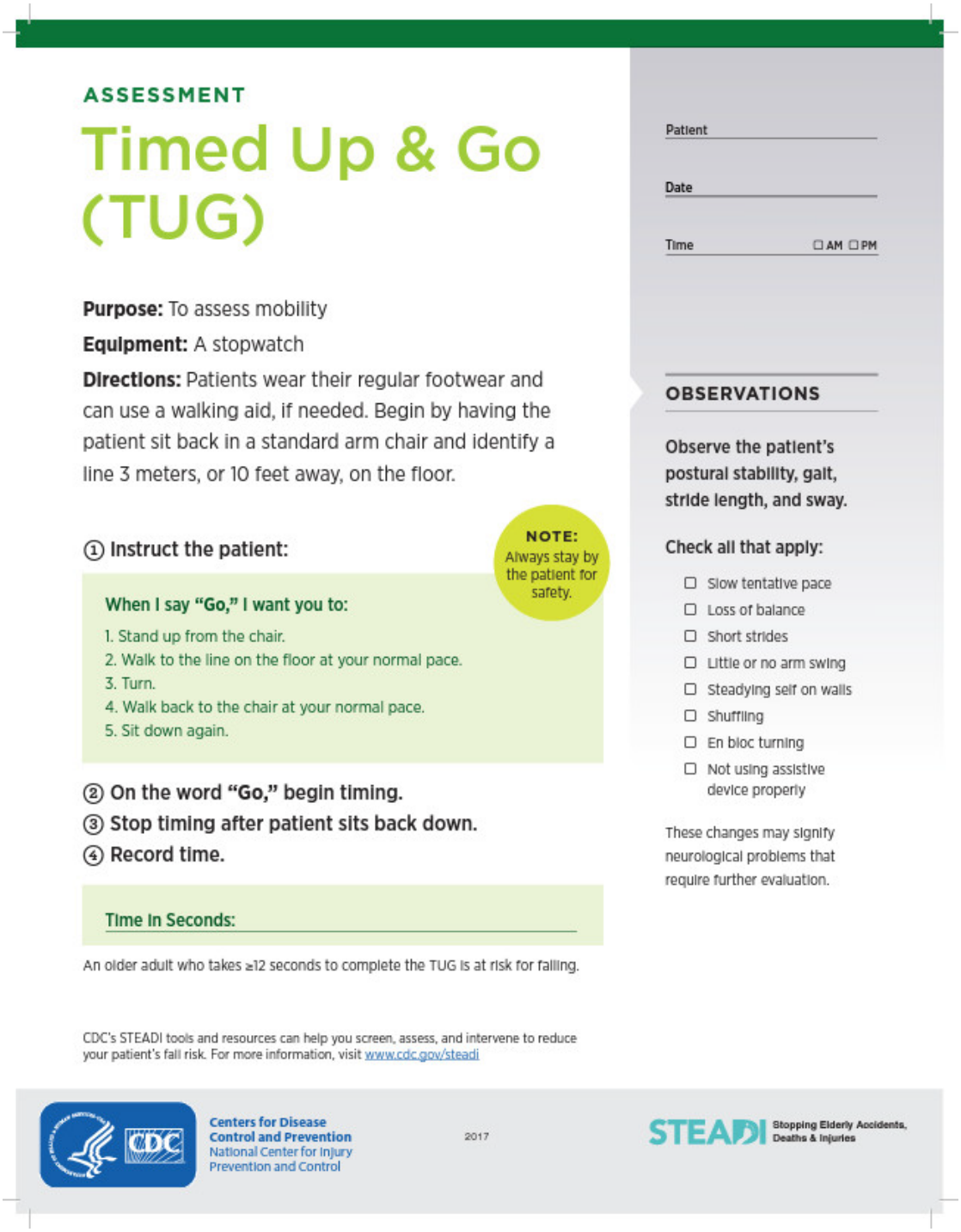
Timed UP & Go (TUG) EPIC Screenshot



(Screenshot from EPIC Systems, 2023)

Appendix D

Timed UP & Go (TUG) Assessment



ASSESSMENT

Timed Up & Go (TUG)

Purpose: To assess mobility

Equipment: A stopwatch

Directions: Patients wear their regular footwear and can use a walking aid, if needed. Begin by having the patient sit back in a standard arm chair and identify a line 3 meters, or 10 feet away, on the floor.

① **Instruct the patient:**

When I say "Go," I want you to:

1. Stand up from the chair.
2. Walk to the line on the floor at your normal pace.
3. Turn.
4. Walk back to the chair at your normal pace.
5. Sit down again.

NOTE: Always stay by the patient for safety.

② **On the word "Go," begin timing.**

③ **Stop timing after patient sits back down.**

④ **Record time.**

Time in Seconds: _____

An older adult who takes ≥12 seconds to complete the TUG is at risk for falling.

CDC's STEADI tools and resources can help you screen, assess, and intervene to reduce your patient's fall risk. For more information, visit www.cdc.gov/steadi

Patient _____

Date _____

Time _____ ☐ AM ☐ PM

OBSERVATIONS

Observe the patient's postural stability, gait, stride length, and sway.

Check all that apply:

- ☐ Slow tentative pace
- ☐ Loss of balance
- ☐ Short strides
- ☐ Little or no arm swing
- ☐ Steadying self on walls
- ☐ Shuffling
- ☐ En bloc turning
- ☐ Not using assistive device properly

These changes may signify neurological problems that require further evaluation.

CDC Centers for Disease Control and Prevention National Center for Injury Prevention and Control

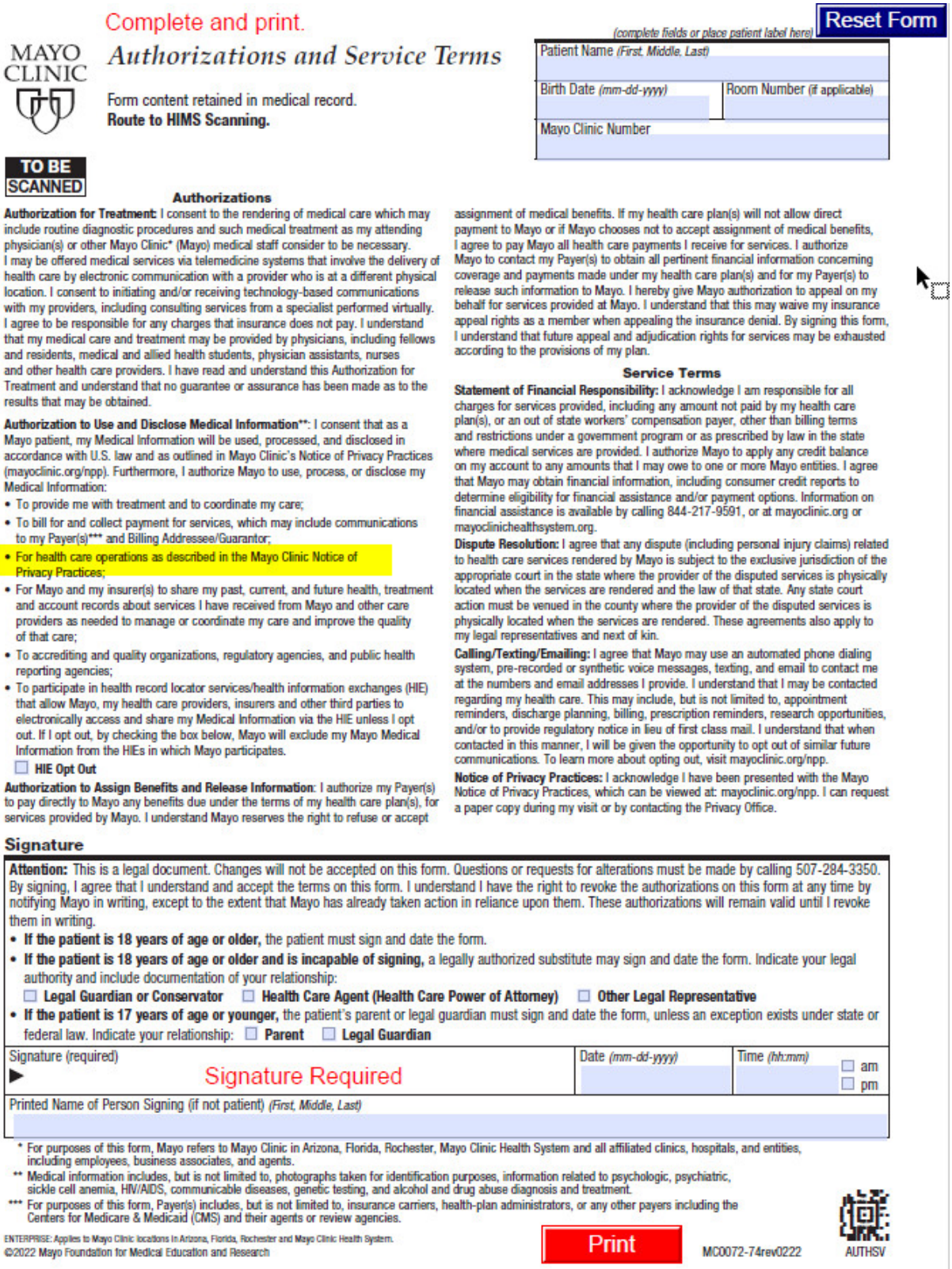
2017

STEADI Stopping Elderly Accidents, Deaths & Injuries

(CDC, 2017)

Appendix E

Authorization and Service Terms



Complete and print.

MAYO CLINIC

Authorizations and Service Terms

Form content retained in medical record.
Route to HIMS Scanning.

(complete fields or place patient label here) Reset Form

Patient Name *(First, Middle, Last)*

Birth Date *(mm-dd-yyyy)* | Room Number *(if applicable)*

Mayo Clinic Number

TO BE SCANNED

Authorizations

Authorization for Treatment: I consent to the rendering of medical care which may include routine diagnostic procedures and such medical treatment as my attending physician(s) or other Mayo Clinic* (Mayo) medical staff consider to be necessary. I may be offered medical services via telemedicine systems that involve the delivery of health care by electronic communication with a provider who is at a different physical location. I consent to initiating and/or receiving technology-based communications with my providers, including consulting services from a specialist performed virtually. I agree to be responsible for any charges that insurance does not pay. I understand that my medical care and treatment may be provided by physicians, including fellows and residents, medical and allied health students, physician assistants, nurses and other health care providers. I have read and understand this Authorization for Treatment and understand that no guarantee or assurance has been made as to the results that may be obtained.

Authorization to Use and Disclose Medical Information**: I consent that as a Mayo patient, my Medical Information will be used, processed, and disclosed in accordance with U.S. law and as outlined in Mayo Clinic's Notice of Privacy Practices (mayoclinic.org/npp). Furthermore, I authorize Mayo to use, process, or disclose my Medical Information:

- To provide me with treatment and to coordinate my care;
- To bill for and collect payment for services, which may include communications to my Payer(s)*** and Billing Addressee/Guarantor;
- For health care operations as described in the Mayo Clinic Notice of Privacy Practices;
- For Mayo and my insurer(s) to share my past, current, and future health, treatment and account records about services I have received from Mayo and other care providers as needed to manage or coordinate my care and improve the quality of that care;
- To accrediting and quality organizations, regulatory agencies, and public health reporting agencies;
- To participate in health record locator services/health information exchanges (HIE) that allow Mayo, my health care providers, insurers and other third parties to electronically access and share my Medical Information via the HIE unless I opt out. If I opt out, by checking the box below, Mayo will exclude my Mayo Medical Information from the HIEs in which Mayo participates.

☐ **HIE Opt Out**

Authorization to Assign Benefits and Release Information: I authorize my Payer(s) to pay directly to Mayo any benefits due under the terms of my health care plan(s), for services provided by Mayo. I understand Mayo reserves the right to refuse or accept assignment of medical benefits. If my health care plan(s) will not allow direct payment to Mayo or if Mayo chooses not to accept assignment of medical benefits, I agree to pay Mayo all health care payments I receive for services. I authorize Mayo to contact my Payer(s) to obtain all pertinent financial information concerning coverage and payments made under my health care plan(s) and for my Payer(s) to release such information to Mayo. I hereby give Mayo authorization to appeal on my behalf for services provided at Mayo. I understand that this may waive my insurance appeal rights as a member when appealing the insurance denial. By signing this form, I understand that future appeal and adjudication rights for services may be exhausted according to the provisions of my plan.

Service Terms

Statement of Financial Responsibility: I acknowledge I am responsible for all charges for services provided, including any amount not paid by my health care plan(s), or an out of state workers' compensation payer, other than billing terms and restrictions under a government program or as prescribed by law in the state where medical services are provided. I authorize Mayo to apply any credit balance on my account to any amounts that I may owe to one or more Mayo entities. I agree that Mayo may obtain financial information, including consumer credit reports to determine eligibility for financial assistance and/or payment options. Information on financial assistance is available by calling 844-217-9591, or at mayoclinic.org or mayoclinichealthsystem.org.

Dispute Resolution: I agree that any dispute (including personal injury claims) related to health care services rendered by Mayo is subject to the exclusive jurisdiction of the appropriate court in the state where the provider of the disputed services is physically located when the services are rendered and the law of that state. Any state court action must be venued in the county where the provider of the disputed services is physically located when the services are rendered. These agreements also apply to my legal representatives and next of kin.

Calling/Texting/Emailing: I agree that Mayo may use an automated phone dialing system, pre-recorded or synthetic voice messages, texting, and email to contact me at the numbers and email addresses I provide. I understand that I may be contacted regarding my health care. This may include, but is not limited to, appointment reminders, discharge planning, billing, prescription reminders, research opportunities, and/or to provide regulatory notice in lieu of first class mail. I understand that when contacted in this manner, I will be given the opportunity to opt out of similar future communications. To learn more about opting out, visit mayoclinic.org/npp.

Notice of Privacy Practices: I acknowledge I have been presented with the Mayo Notice of Privacy Practices, which can be viewed at: mayoclinic.org/npp. I can request a paper copy during my visit or by contacting the Privacy Office.

Signature

Attention: This is a legal document. Changes will not be accepted on this form. Questions or requests for alterations must be made by calling 507-284-3350. By signing, I agree that I understand and accept the terms on this form. I understand I have the right to revoke the authorizations on this form at any time by notifying Mayo in writing, except to the extent that Mayo has already taken action in reliance upon them. These authorizations will remain valid until I revoke them in writing.

- **If the patient is 18 years of age or older,** the patient must sign and date the form.
- **If the patient is 18 years of age or older and is incapable of signing,** a legally authorized substitute may sign and date the form. Indicate your legal authority and include documentation of your relationship:
  ☐ **Legal Guardian or Conservator** ☐ **Health Care Agent (Health Care Power of Attorney)** ☐ **Other Legal Representative**
- **If the patient is 17 years of age or younger,** the patient's parent or legal guardian must sign and date the form, unless an exception exists under state or federal law. Indicate your relationship: ☐ **Parent** ☐ **Legal Guardian**

Signature (required) ▶ Signature Required | Date *(mm-dd-yyyy)* | Time *(hh:mm)* ☐ am ☐ pm

Printed Name of Person Signing (if not patient) *(First, Middle, Last)*

* For purposes of this form, Mayo refers to Mayo Clinic in Arizona, Florida, Rochester, Mayo Clinic Health System and all affiliated clinics, hospitals, and entities, including employees, business associates, and agents.

** Medical information includes, but is not limited to, photographs taken for identification purposes, information related to psychologic, psychiatric, sickle cell anemia, HIV/AIDS, communicable diseases, genetic testing, and alcohol and drug abuse diagnosis and treatment.

*** For purposes of this form, Payer(s) includes, but is not limited to, insurance carriers, health-plan administrators, or any other payers including the Centers for Medicare & Medicaid (CMS) and their agents or review agencies.

ENTERPRISE: Applies to Mayo Clinic locations in Arizona, Florida, Rochester and Mayo Clinic Health System.

Print MC0072-74rev0222 AUTHSV

Appendix F

Notice of Privacy Practices

healthcurrent

Notice of Health Information Practices

You are receiving this notice because your healthcare provider participates in a non-profit, non-governmental health information exchange (HIE) called Health Current. It will not cost you anything and can help your doctor, healthcare providers, and health plans better coordinate your care by securely sharing your health information. This Notice explains how the HIE works and will help you understand your rights regarding the HIE under state and federal law.

How does Health Current help you to get better care?
In a paper-based record system, your health information is mailed or faxed to your doctor, but sometimes these records are lost or don't arrive in time for your appointment. If you allow your health information to be shared through the HIE, your doctors are able to access it electronically in a secure and timely manner.

What health information is available through Health Current?
The following types of health information may be available:

- Hospital records
- Medical history
- Medications
- Allergies
- Lab test results
- Radiology reports
- Clinic and doctor visit information
- Health plan enrollment and eligibility
- Other information helpful for your treatment

Who can view your health information through Health Current and when can it be shared?

People involved in your care will have access to your health information. This may include your doctors, nurses, other healthcare providers, health plan and any organization or person who is working on behalf of your healthcare providers and health plan. They may access your information for treatment, care coordination, care or case management, transition of care planning, payment for your treatment, conducting quality assessment and improvement activities, developing clinical guidelines and protocols, conducting patient safety activities, and population health services. Medical examiners, public health authorities, organ procurement organizations, and others may also access health information for certain approved purposes, such as conducting death investigations, public health investigations and organ, eye or tissue donation and transplantation, as permitted by applicable law.

Health Current may also use your health information as required by law and as necessary to perform services for healthcare providers, health plans and others participating with Health Current.

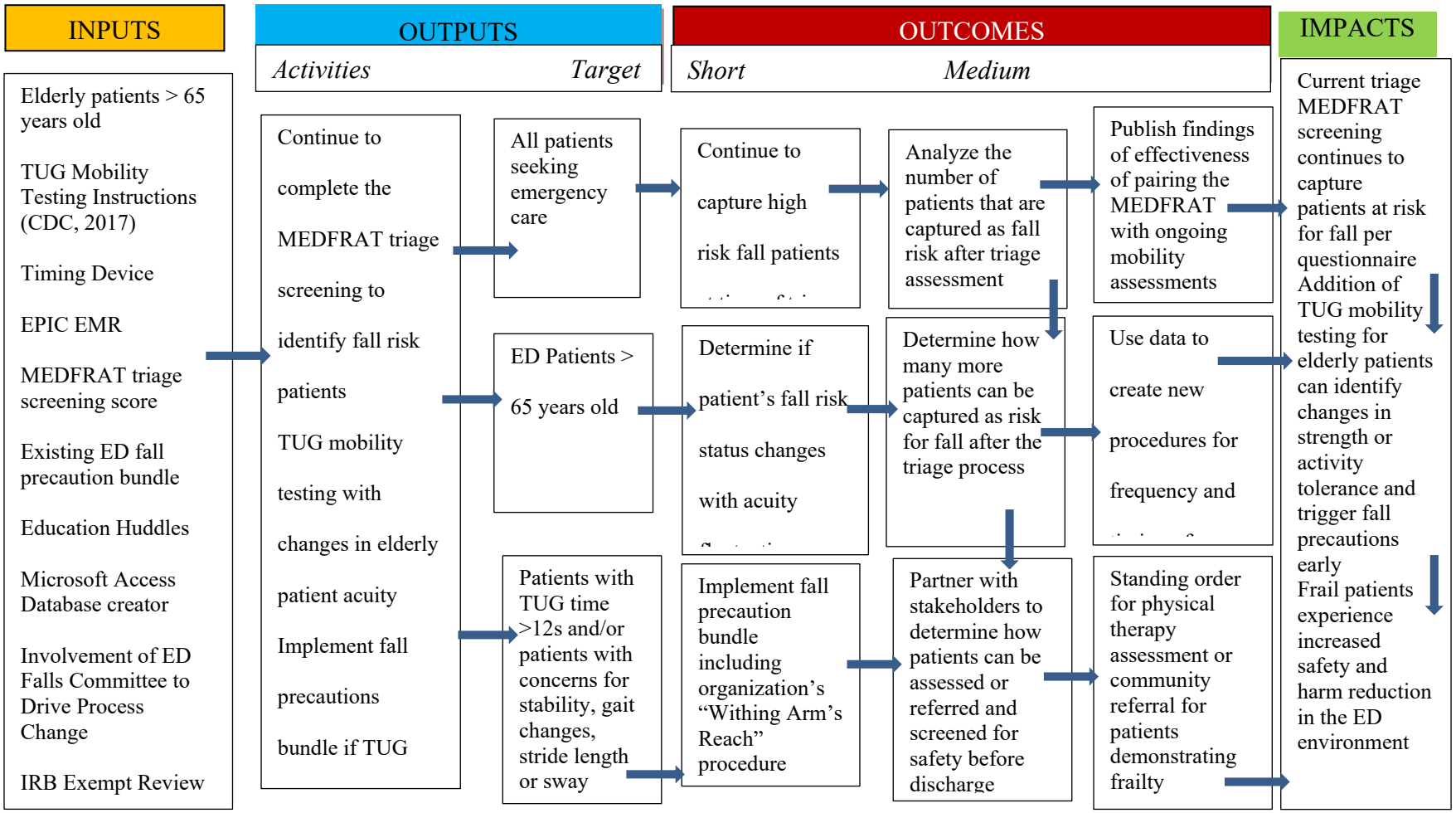
The Health Current Board of Directors can expand the reasons why healthcare providers and others may access your health information in the future as long as the access is permitted by law. That information is on the Health Current website at healthcurrent.org/permitted-use.

You also may permit others to access your health information by signing an authorization form. They may only access the health information described in the authorization form for the purposes stated on that form.

Appendix G

Project Logic Model

Goals: The purpose of this evidence-based quality improvement project is to implement Timed Up and Go (TUG) mobility testing in addition to the current Memorial Emergency Department Fall Risk Assessment Tool (MEDFRAT) in the Emergency Department (ED) on adults 65 years old and older. Prolonged or changing TUG times indicate frailty and indicate the patient is at greater risk for falls.



Assumptions: The MEDFRAT is a valid and reliable triage screening tool to capture patients at risk for falls (Flarity et al., 2013). However, falls are multidimensional, and a single tool cannot capture all patients at risk (Strini, 2021). For this reason, patients continue to experience falls during their ED visit. Elderly patients are particularly vulnerable to more severe injury from falls including head injuries, fractures, and facial injuries (Choi et al., 2019). The addition of the reliable TUG test can quickly determine the patient's need for supervision during ambulation (Podsiadlo & Richardson, 1991). The staff will participate in TUG screenings for acuity changes on all patients 65 years or older.

Appendix H

Budget Worksheet

Benefit-Cost Ratio Formula

Net benefit / Total cost = Benefit-cost ratio

< 1 = negative impact; > 1 = positive impart

Calculation

$13,000.00 = #REF!

BCR

Direct Costs	Dollars	Hours	Indirect Costs		Potential Funding		Total Costs		BCR		ROI	
Project Director	5000	100	Paper	50	Mayo CCATS Small	6650	**Direct**	6450	1.95	1 fall	95.50%	1 fall
CNS $50/hr	300	6	Printing	50	NIH Grants	6650	**Indirect**	200	9.77	5 falls	877.40%	5 falls
QS $50/hr	300	6	Posters	100	Oak Park-River For	2000	***Prevention c**	13000	19.55	10 falls	1854.90%	10 falls
NES $50/hr	300	6	Timers (24)	50	Sandra Wilson Mer	5000						
Informatics $50/hr	300	6										
Statistician	200	4										
	6400	128		250		20300		6650				

KEY: BCR - Benefit-Cost Ratio; **CNS** - Clinical Nurse Specialist; **NES** - Nursing Education Speciaist; **QS** - Quality Specialist; **ROI** - Return on Investment; **TUG** - Timed Up & Go mobility test

Return on Investment Template

(Total Benefit - Total Program Costs) / Total Program Costs X 100 = % ROI

Calculation

($13,000.00 − $6,650.00) / $6,650.00 X 100 = 95.5% ROI

Appendix I

Results Summary

Summary of Data

	Overall (N=243)
TUG	
1 - 12	195 (80.2%)
More than 12	48 (19.8%)
MEDFRAT Group	
N-Miss	1
None	164 (67.8%)
Low	51 (21.1%)
Moderate	14 (5.8%)
High	13 (5.4%)
MEDFRAT Score	
N-Miss	1
Mean (SD)	0.810 (1.553)
Range	0.000 - 8.000
Age	
N-Miss	3
Mean (SD)	76.300 (7.488)
Range	65.000 - 97.000
Sex	
Choose not to disclose	1 (0.4%)
F	118 (48.6%)
M	123 (50.6%)
Other	1 (0.4%)

Appendix J

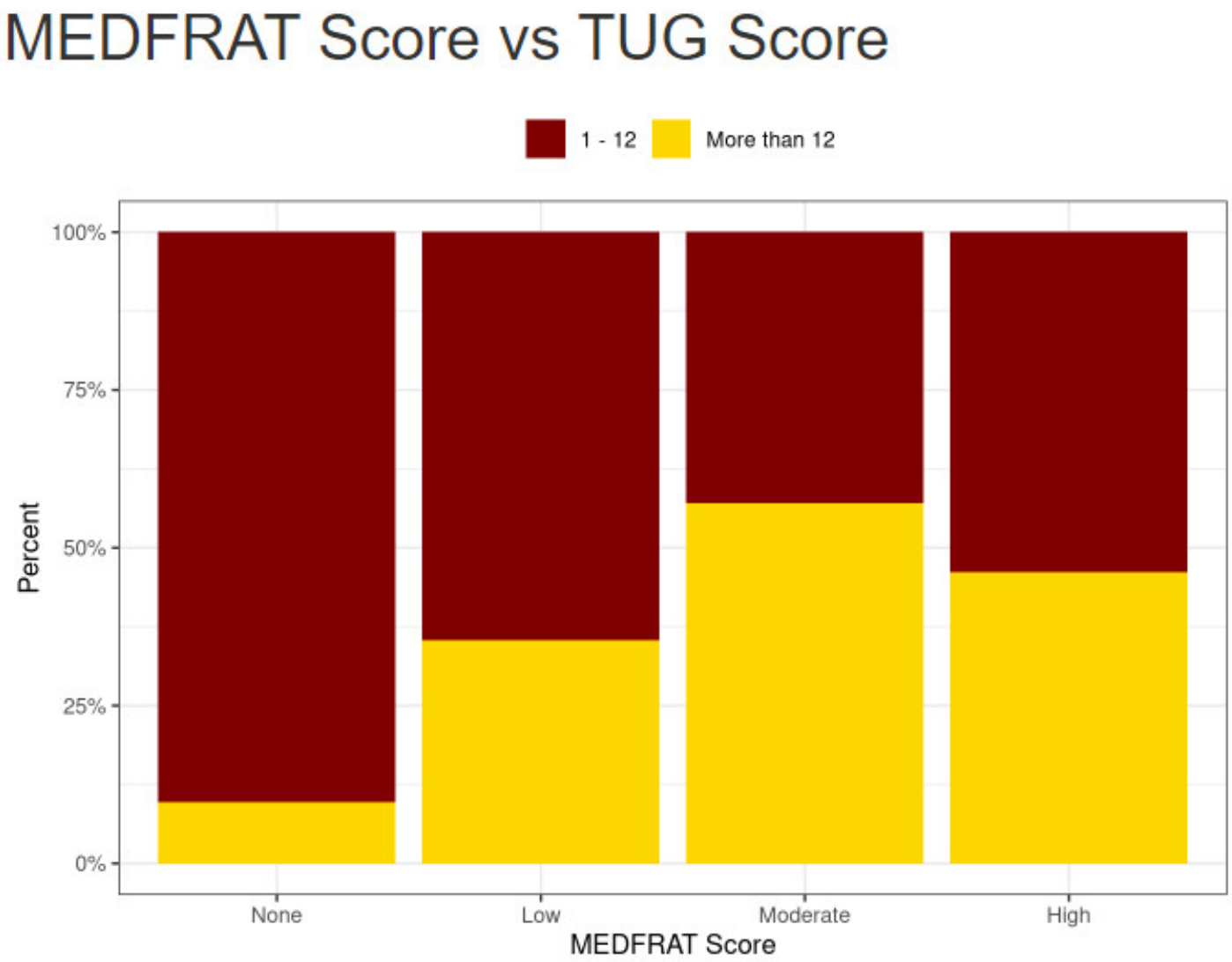
TUG and MEDFRAT Comparison

TUG and MEDFRAT Comparison

	1 - 12 (N=195)	More than 12 (N=48)	Total (N=243)	p value
MEDFRAT Group				< 0.001
N-Miss	1	0	1	
None	148 (76.3%)	16 (33.3%)	164 (67.8%)	
Low	33 (17.0%)	18 (37.5%)	51 (21.1%)	
Moderate	6 (3.1%)	8 (16.7%)	14 (5.8%)	
High	7 (3.6%)	6 (12.5%)	13 (5.4%)	
MEDFRAT Score				< 0.001
N-Miss	1	0	1	
Mean (SD)	0.515 (1.214)	2.000 (2.124)	0.810 (1.553)	
Range	0.000 - 6.000	0.000 - 8.000	0.000 - 8.000	
Age				< 0.001
N-Miss	2	1	3	
Mean (SD)	75.093 (7.075)	81.255 (7.155)	76.300 (7.488)	
Range	65.000 - 96.000	67.000 - 97.000	65.000 - 97.000	
Sex				0.455
Choose not to disclose	1 (0.5%)	0 (0.0%)	1 (0.4%)	
F	90 (46.2%)	28 (58.3%)	118 (48.6%)	
M	103 (52.8%)	20 (41.7%)	123 (50.6%)	
Other	1 (0.5%)	0 (0.0%)	1 (0.4%)	
Altered Mental Status				0.317
N-Miss	194	45	239	
Yes	1 (100.0%)	3 (100.0%)	4 (100.0%)	

Appendix K

Results Graph


MEDFRAT Score vs TUG Score
1 - 12
More than 12
100%
75%
50%
25%
0%
Percent
None
Low
Moderate
High
MEDFRAT Score