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Banner Mobility Assessment Tool for Nurses: Instrument Validation

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The purpose of this study was to validate a tool created to assess mobility in hospitalized patients because existing tools for quickly assessing patients' mobility status at the bedside are not adequate. A patient's mobility status can influence treatment, patient handling and transfer decisions, and outcomes, including fall risk. Utilizing a mobility assessment can provide reliable information to improve patient safety and prevent complications of immobility. A research study was designed to evaluate the reliability and validity of the Banner Mobility Assessment Tool (BMAT), developed from combining existing tools. Instrument validation was conducted using an expert panel to assess content validity. A contrasted-groups approach and expert agreement was used to determine construct validity. Inter-rater reliability was determined by having 4 observers simultaneously completing the assessment on the same group of patients. Findings indicate the BMAT has adequate construct validity ($\chi^2 = 22.68$, $P < 0.001$), indicating the BMAT is able to discriminate differences between patient groups. Construct validity through expert agreement also indicated an 81% agreement ($\kappa = 0.75$) supporting BMAT construct validity. Additionally, the BMAT was determined to be reliable with 93% agreement ($\kappa = 0.91$) between multiple observers. The study provides initial evidence to support the BMAT as a valid instrument for use in assessing a patient's mobility status at the bedside. Further studies could add knowledge in determining patients' mobility status and its effectiveness as a factor used to assign safe patient handling equipment and prevent patient falls.

Keywords: mobility assessment, patient assessment, safe patient handling

Introduction

Hospitalized patients who spend an extended period of time in bed can suffer a variety of unintended consequences, including loss of muscle strength at a rate of 20% per week of immobility, contractures, psychological disturbances, constipation, peptic ulcer development, skin breakdown, and nosocomial pneumonias.[1] Moreover, many hospital hazards such as falls, functional decline, and pressure ulcers are predicted by *low mobility*, defined as being limited to bed or chair.[2]

Although a patient's mobility status is recognized as important to address, especially in regards to a reduction in fall risk,[3-5] nurses are not always able to assess a patient's mobility status accurately at the bedside. Existing tools for assessing patients' mobility status are limited by the time, effort, and provider level needed to conduct the assessment. Additionally, very few tools exist for conducting assessment on hospitalized patients' mobility. A valid bedside mobility assessment tool easily administered by nurses in the acute care setting is needed to monitor a patient's progress accurately and provide appropriate care. The purpose of this study was to validate a tool created for use by bedside nurses to assess mobility in hospitalized patients.

Background

Assessing Mobility

Traditionally, physical therapists (PTs) have been responsible for completing mobility and gait assessments and consulting with nursing staff. Although nurses have continuous surveillance of the patient, the PT guides the mobility plan of care and progress, creating a disconnect between actionable items for nursing and the desire to increase mobility. Additionally, PT consultation does not occur for every hospitalized patient and can occur at different points during a patient's hospital stay. Because of the importance of mobility during hospitalization, nurses need to take a more active role in assessing and managing patient mobility.

In addition to the detriment to the patient, immobility presents a risk of injury to healthcare providers. As nursing workloads continue to increase, hospitalized patients

have higher levels of acuity but shorter hospital stays, making them more dependent than ever on nurses for assistance with mobility needs.[6] With a lack of proper assessment, nursing staff frequently rely on the patient or a family member to report the patient's ability to stand, transfer, and ambulate, potentially resulting in increased risk for the patient and provider. To combat injury, nurses can utilize safe patient handling equipment but must be able to identify the patient's mobility in order to do this.

Literature Review

A review of the literature was conducted to search for validated instruments used by nurses for assessing patient mobility. The OVID database was searched with keywords *mobility* and *nursing assessment* and was limited to recent publications (>2009) and English language. The CINAHL and Medline databases were searched using the search terms *mobility*, *assessment*, *nursing*, and *hospital*, limited to academic journals, recent publications (>2009), and English language. The search resulted in the review of 129 articles for content. Articles were excluded if they were not hospital-based, were assessments of falls or pressure ulcers that did not include mobility, or were otherwise not topic related. Nonrelated topics included assessments and screenings of dementia, transitional care programs, leadership transition, and nursing professional development studies.

In total, investigators evaluated 8 articles that identified or reviewed 17 mobility assessment/protocols in relation to the development of a daily nurse-driven mobility assessment. The Barthel ADL Index, a validated tool for measuring activities of daily living,[7] was considered for its sensitivity to measuring improved function, but the tool was not applicable to daily nursing assessment associated with patient mobility. Another validated instrument commonly used is the Hierarchical Assessment of Balance and Mobility (HABAM).[8] The HABAM is suitable for everyday clinical use to measure changes in mobility and balance but does not assess all levels of mobility, as it does not require the patient to be able to stand. Four publications related to the creation and validation of the de Morton Mobility Index (DEMMI) were evaluated.[9-12] The DEMMI is a mobility instrument used to evaluate acute care elderly patients and was developed to overcome limitations of the Barthel ADL Index and HABAM. The goal of the DEMMI matches the needs of daily nurse assessments of patient's mobility but does not link to any interventions or safe patient handling equipment. Additionally, the assessment is a 15-item questionnaire, which inhibits daily bedside use.

Finally, published mobility programs were evaluated to determine how their assessment was conducted. Pashikanti and Von Ah[13] reviewed 9 studies on early mobilization in acute care medical-surgical patients. Many of the mobilization protocols included informal, nonvalidated assessments of mobility or did not describe the assessment component of the protocol, except for one study[14] that utilized the Barthel ADL Index as an assessment instrument. Finally, Perme[15] developed a 4-phase early mobility program to progress patient walking; however, the assessment was initiated and completed by a physical therapist prior to beginning the program, limiting how nurses can use this tool as a daily assessment.

In addition to the extensive literature review, experiential knowledge of existing tools was evaluated by the investigators, who were familiar with 3 mobility assessments used in some hospitals: the Quick 3,[16] the Egress Test,[17] and the Timed Up and Go Test.[18] While each of these assessment tools is being used currently in hospitals, they have limitations and didn't meet identified needs. These tools were either inadequate in use with dependent patients or with their ability to progress the patient to an accurate assessment level when a patient is standing. Moreover, limited or no guidance is given on associated safe patient handling equipment.

BMAT Development

The Banner Mobility Assessment Tool (BMAT) (Table 1) was developed to address the limitations of currently existing tools, can be conducted daily at the bedside by a registered nurse, and identifies equipment and tools needed to safely handle and transfer the patient based on their mobility assessment level. The purpose of the BMAT is to instruct the nurse on how to guide the patient through a 4-step functional task list in order to identify the level of mobility the patient can achieve. The nurse then uses the assessment to make a determination of the patient's level of mobility (eg, Mobility Level 1) and recommends equipment and tools needed to safely lift, transfer, and mobilize the patient. The BMAT was developed through deconstructing 2 existing assessments[16,17] and recreating a tool that includes 4 functional task levels. Building on the Quick 3, the BMAT adds a fourth assessment level to evaluate mobility while standing, which is the third step of the Egress Test. Additionally, the BMAT adds items to address weight-bearing status and gives guidance regarding mobility level for patients with "strict bed rest" and those with restrictions for bilateral weight-bearing.

The development of the BMAT included input from bedside nurses, physical therapists, occupational therapists, and risk management at a multihospital health system in the Southwest. The initial assessment tool was evaluated by nurses from multiple specialty units. Based on their feedback, a modified assessment tool was disseminated for use at a single facility in the health system.

TABLE 1

BANNER MOBILITY ASSESSMENT TOOL FOR NURSES
Note: Always default to the safest lifting/transfer method (eg, total lift) if there is any doubt in the patient's ability to perform the task.
• Assessment Level 1 – **Sit and Shake** Task: From a semireclined position, ask patient to sit upright and rotate to a seated position at the side of the bed; may use the bed rail. Note patient's ability to maintain bedside position. Ask patient to reach out and grab your hand and shake, making sure patient reaches across his/her midline. Pass = complete Assessment Level 2 Fail = Patient is Mobility Level 1; use total lift with sling and/or positioning sheet and/or straps, and/or use lateral transfer devices such as rollboard, friction-reducing (slide sheets/tube) or air-assisted device. If patient has "strict bed rest" or "bilateral non-weight-bearing" restrictions, do not proceed with the assessment; patient is Mobility Level 1.
• Assessment Level 2 – **Stretch and Point** Task: With patient in seated position at the side of the bed, have patient place both feet on the floor (or stool) with knees no higher than hips. Ask patient to stretch one leg and straighten the knee, then bend the ankle/flex and point the toes. If appropriate, repeat with the other leg. Pass = complete Assessment Level 3 Fail = Patient is Mobility Level 2; use total lift for patient unable to weight-bear on at least one leg; use sit-to-stand lift for patient who can weight-bear on at least one leg.
• Assessment Level 3 – **Stand** Task: Ask patient to elevate off the bed or chair (seated to standing) using an assistive device (cane, bed rail). Patient should be able to raise buttocks off bed and hold for a count of five. May repeat once. Pass = complete Assessment Level 4 Fail = Patient is Mobility Level 3; use nonpowered raising/stand aid (default to powered sit-to-stand lift if no stand aid available) or use total lift with ambulation accessories or use assistive device (cane, walker, crutches). If patient passes Assessment Level 3 but requires assistive device to ambulate or cognitive assessment indicates poor safety awareness, patient is Mobility Level 3.
• Assessment Level 4 – **Walk** (march in place and advance step) Task: Ask patient to march in place at bedside, then ask patient to advance step and return each foot. Patient should display stability while performing tasks. Assess for stability and safety awareness. Pass = Patient is Mobility Level 4/modified independence = no assistance is needed to ambulate; use your best clinical judgment to determine need for supervision during ambulation. Fail = Patient is Mobility Level 3

METHODS

A research study was designed to assess the reliability and validity of the BMAT in use. The research design was based on previously published literature validating an assessment tool.[19] The study was a prospective, nonexperimental design that addressed 3 areas: content validity, construct validity, and reliability. A contrasted-groups approach, inter-rater assessments, and expert-agreement approach were used with appropriate data collection and analysis for each methodology.

Setting and Sample

The study utilized a 342-bed acute care facility in the western United States, which is part of a larger 23-hospital health system. Prior to implementation of the BMAT, there was no standardized mobility assessment or safe patient handling program used. Inpatient unit staff received education and competency validation, and the BMAT was being used as the standard of care for eligible patients for approximately 6 months prior to the research study.

The sample included nurses and patients that were regularly using the BMAT as part of their standard of care, thus patient consent was not attained. Patient populations that would not use the BMAT in their standard care, such as sternal precaution patients, bilateral-restricted weight-bearing patients, cognitively impaired patients who could not follow directions, and some surgical patients (ie, total hip, sternotomy, large abdominal incisions, and lumbar surgery), were excluded. A handout was given to patients to inform them of the data collection and to notify them that no identifying information was being collected. With the exception of their BMAT score,

patient data was not included in the study. The study received institutional review board approval from the organization.

Data Collection and Findings

Content Validity

A panel of national experts who were not employed at the health system and not involved in the development of the BMAT was used to assess the content validity. Five experts were chosen for their experience with mobility in acute care patients and bedside practice, as well as knowledge of and experience with mobility and safe patient handling. Each was asked to analyze the BMAT and give voluntary feedback on the objectivity, appropriateness, relevance, and clarity of each of the 4 assessment and mobility levels, as well as the overall tool.

Construct Validity

Construct validity was assessed through a contrasted-groups approach. Two groups, ICU and medical-surgical patients, were assessed and scores compared to determine if the BMAT is sensitive to discriminating different levels of mobility. In total, 20 ICU patients and 20 medical-surgical patients were assessed by a single rater using the BMAT. BMAT scores were recorded and a chi-square test was used to look at the differences in distribution of BMAT scores between the 2 groups of patients. A Pearson chi-square of 22.68 ($P < 0.001$) indicated a significant difference between the groups, suggesting the BMAT is able to discriminate differences between patient populations.

Construct validity was also assessed with an expert-agreement approach. A PT, an expert in mobility, completed a mobility assessment alongside the bedside registered nurse who was using the BMAT. The nurse conducted the mobility assessment of the patient using the BMAT, while the PT silently observed the patient and determined a mobility level from a PT evaluation, indicating if the patient is a maximum assist level, moderate assist level, minimal assist level, or independent. Overall, 55 patient mobility evaluations were collected from various units (medical-surgical, intensive care, and progressive care). The nurse's BMAT mobility level was compared to the PT's mobility level for each patient to determine percent of agreement, measured as percent of scores where raters agreed. Statistical analysis indicated substantial agreement was achieved with an 81% agreement ($\kappa = 0.75$). Feedback from the PT indicated that the majority of the discrepancy came from nurses overestimating the patient's mobility level (ie, nurses rated the patient a level 4 while the PT determined they were a minimal assist or level 3). The discrepancy in agreement indicates that nurses might overestimate the patient's mobility level. To decrease the risk of falls, as patients increase activity, it is important to assess their current mobility status to better assure safe mobility. Additionally, the tool indicates that patients should be rated the lowest level of mobility they are able to successfully complete. The investigators agreed that further education would help to decrease the variation.

Inter-Rater Reliability

Three registered nurses who participated in nursing shared governance were asked to assist in data collection to assess inter-rater reliability of the BMAT. The nurses assessed a group of 20 patients at random using the BMAT protocol over 1 day. After verifying with the bedside nurse that the patient was being assessed currently using the BMAT, the group of nurses entered a patient's room, explained their purpose, and assessed the patient's mobility. So that a single nurse did not bias the findings, the 3 nurses took turns conducting the assessment, with 1 nurse conducting the assessment and the other 2 silently observing. After conducting the assessment, the nurses recorded only the mobility level of the patient. Nurses could also indicate on their data collection sheet if they believed the patient should have been asked to advance to the next mobility level, if the nurse conducting the assessment stopped before the recorder believed they should have. The nurse's mobility levels were compared to each other, and a 93% agreement level was achieved ($\kappa = 0.91$), suggesting significant agreement. Of the 3 raters, 2 nurses indicated patients should have advanced to the next level of assessment in 2 instances (Table 2).

Table 2

Summary of Statistical Findings

Test	Pearson Chi-Square	Level of Agreement	Kappa
Construct Validity–Contrasted Groups	22.68 ($P < 0.001$)	-	-
Construct Validity–Expert Agreement	-	81%	0.75
Inter-rater Reliability	-	93%	0.91

Discussion

A patient's mobility status can influence treatment, patient handling and transfer decisions, and patient outcomes, including risk of falling. Hospitalized patients spend the majority of their hospitalization in bed, often coping with inadvertent negative effects of immobility. Elderly people who have a fear of falling resort to activity restriction resulting in a self-imposed decrease in mobility, which may further increase risk of falls.[20] Patients who fall tend to have numerous interacting risk factors. To be effective, interventions should be focused on the needs of individual patients.[21] Many hazards associated with hospitalization, such as falls, functional decline, and pressure ulcers, are related to decreased mobility.[2] Because of the negative consequences associated with immobility and falls, empowering nurses to take a more active role in assessing and managing their patients' mobility is important.

The research study concludes that initial assessment of the BMAT finds satisfactory validity and inter-rater reliability for use with nurses. Currently, the health system has incorporated the BMAT into electronic documentation, which guides the nurse through the assessment levels and, based on responses, recommends appropriate safe patient handling equipment options. Additional outcomes associated with the mobility assessment have also been monitored. Of note, staff injuries prior to and after implementation of the BMAT decreased, suggesting an association with an increase in more consistent use of safe patient handling practices. Future evaluation of hospital data and evaluation of the implementation of BMAT use with safe patient handling equipment is needed.

The implications for practice and policy include more standardized assessment and decision making, more consistent and appropriate use of safe patient handling equipment, and increased awareness of a patient's mobility status and fall risk. The assessment is completed on admission, every shift, and with change in patient status. Nurses who are using the BMAT currently report that it is a useful tool. They report knowing always to default to the safest lifting/transfer method if there is any doubt in the patient's ability to perform an assessment task and to utilize their PT colleagues appropriately.

Limitations and Future Evaluation

The study was limited to a single facility currently using the tool and was not designed or intended for use with certain patient groups or outpatient departments (eg, emergency department). The study assessed reliability and validity for the tool as administered by registered nurses but did not account for patient characteristics. Although there was a high level of agreement, nurses may be overestimating a patient's ability to walk, compared to a trained PT assessment. The use of the assessment tool, however, brings awareness to the patient's mobility level; whereas without an assessment, the nurse may solely use his or her judgment in determining mobility status. Additionally, reliability findings might have been lower had the nurses conducted independent blinded tests of the patient. Future research using the BMAT will provide additional knowledge related to the usefulness and implications of the tool. While this paper does not delve into caregiver injuries associated with patient handling, the research study site monitored staff injuries prior to and after implementation of the BMAT. A decrease in injuries was noted, suggesting an association with an increase in more consistent use of safe patient handling practices.

Nursing Implications

In this study, a mobility assessment tool for nurses was validated. The difference between patient groups based on the unit on which they were placed suggests the tool performs equally well across patient groups and nursing skill levels. Implementing comprehensive and sustainable safe patient handling practice throughout a hospital system is a tremendously challenging change in culture involving many components. Additionally, organizational change, such as staffing levels, may affect the ability to initiate and sustain a change in practice.

Implementation of the BMAT can be enhanced with focus groups and/or audits to help identify problems nurses have with conducting and documenting the mobility assessment and following through on using recommended safe patient handling equipment. Communication between caregivers will need to be monitored to assure that all staff are aware of equipment that should be used and that appropriate equipment is used consistently (eg, when transferring a patient to and from a diagnostic area).

Although only initial patient ambulation was investigated, a nurse-driven mobility protocol and order set focused on increasing ambulation and decreasing risk of falls bears further investigation. Since creation of the BMAT, literature supporting mobility protocols[22] has been published, suggesting this type of approach in conjunction with the BMAT may be beneficial. Organizations should be mindful of including an appropriate, feasible, and valid assessment tool when designing and implementing a mobility protocol.

Conclusion

Valid nurse-administered bedside mobility testing for the acute care hospital population is limited. The inadvertent negative impact of immobility on patients increases the importance of safe mobility during hospitalization. Determining a patient's mobility status as part of a daily nursing assessment, using a validated tool, and addressing the need to use safe patient handling equipment can potentially influence fall risk and decrease the risk of injury to caregivers.

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The authors declare no conflict of interest.

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In addition to the extensive literature review, experiential knowledge of existing tools was evaluated by the investigators, who were familiar with 3 mobility assessments used in some hospitals: the Quick 3,[16] the Egress Test,[17] and the Timed Up and Go Test.[18] While each of these assessment tools is being used currently in hospitals, they have limitations and didn't meet identified needs. These tools were either inadequate in use with dependent patients or with their ability to progress the patient to an accurate assessment level when a patient is standing. Moreover, limited or no guidance is given on associated safe patient handling equipment.

BMAT Development

The Banner Mobility Assessment Tool (BMAT) (Table 1) was developed to address the limitations of currently existing tools, can be conducted daily at the bedside by a registered nurse, and identifies equipment and tools needed to safely handle and transfer the patient based on their mobility assessment level. The purpose of the BMAT is to instruct the nurse on how to guide the patient through a 4-step functional task list in order to identify the level of mobility the patient can achieve. The nurse then uses the assessment to make a determination of the patient's level of mobility (eg, Mobility Level 1) and recommends equipment and tools needed to safely lift, transfer, and mobilize the patient. The BMAT was developed through deconstructing 2 existing assessments[16,17] and recreating a tool that includes 4 functional task levels. Building on the Quick 3, the BMAT adds a fourth assessment level to evaluate mobility while standing, which is the third step of the Egress Test. Additionally, the BMAT adds items to address weight-bearing status and gives guidance regarding mobility level for patients with "strict bed rest" and those with restrictions for bilateral weight-bearing.

The development of the BMAT included input from bedside nurses, physical therapists, occupational therapists, and risk management at a multihospital health system in the Southwest. The initial assessment tool was evaluated by nurses from multiple specialty units. Based on their feedback, a modified assessment tool was disseminated for use at a single facility in the health system.

TABLE 1

BANNER MOBILITY ASSESSMENT TOOL FOR NURSES
Note: Always default to the safest lifting/transfer method (eg, total lift) if there is any doubt in the patient's ability to perform the task.
• Assessment Level 1 – **Sit and Shake** Task: From a semireclined position, ask patient to sit upright and rotate to a seated position at the side of the bed, may use the bed rail. Note patient's ability to maintain bedside position. Ask patient to reach out and grab your hand and shake, making sure patient reaches across his/her midline. Pass = complete Assessment Level 2 Fail = Patient is Mobility Level 1; use total lift with sling and/or positioning sheet and/or straps, and/or use lateral transfer devices such as rollboard, friction-reducing (slide sheets/tube) or air-assisted device. If patient has "strict bed rest" or "bilateral non-weight-bearing" restrictions, do not proceed with the assessment; patient is Mobility Level 1.
• Assessment Level 2 – **Stretch and Point** Task: With patient in seated position at the side of the bed, have patient place both feet on the floor (or stool) with knees no higher than hips. Ask patient to stretch one leg and straighten the knee, then bend the ankle/flex and point the toes. If appropriate, repeat with the other leg. Pass = complete Assessment Level 3 Fail = Patient is Mobility Level 2; use total lift for patient unable to weight-bear on at least one leg; use sit-to-stand lift for patient who can weight-bear on at least one leg.
• Assessment Level 3 – **Stand** Task: Ask patient to elevate off the bed or chair (seated to standing) using an assistive device (cane, bed rail). Patient should be able to raise buttocks off bed and hold for a count of five. May repeat once. Pass = complete Assessment Level 4 Fail = Patient is Mobility Level 3; use nonpowered raising/stand aid (default to powered sit-to-stand lift if no stand aid available) or use total lift with ambulation accessories or use assistive device (cane, walker, crutches). If patient passes Assessment Level 3 but requires assistive device to ambulate or cognitive assessment indicates poor safety awareness, patient is Mobility Level 3.
• Assessment Level 4 – **Walk** (march in place and advance step) Task: Ask patient to march in place at bedside, then ask patient to advance step and return each foot. Patient should display stability while performing tasks. Assess for stability and safety awareness. Pass = Patient is Mobility Level 4/modified independence = no assistance is needed to ambulate; use your best clinical judgment to determine need for supervision during ambulation. Fail = Patient is Mobility Level 3

METHODS

A research study was designed to assess the reliability and validity of the BMAT in use. The research design was based on previously published literature validating an assessment tool.[19] The study was a prospective, nonexperimental design that addressed 3 areas: content validity, construct validity, and reliability. A contrasted-groups approach, inter-rater assessments, and expert-agreement approach were used with appropriate data collection and analysis for each methodology.

Setting and Sample

The study utilized a 342-bed acute care facility in the western United States, which is part of a larger 23-hospital health system. Prior to implementation of the BMAT, there was no standardized mobility assessment or safe patient handling program used. Inpatient unit staff received education and competency validation, and the BMAT was being used as the standard of care for eligible patients for approximately 6 months prior to the research study.

The sample included nurses and patients that were regularly using the BMAT as part of their standard of care, thus patient consent was not attained. Patient populations that would not use the BMAT in their standard care, such as sternal precaution patients, bilateral-restricted weight-bearing patients, cognitively impaired patients who could not follow directions, and some surgical patients (ie, total hip, sternotomy, large abdominal incisions, and lumbar surgery), were excluded. A handout was given to patients to inform them of the data collection and to notify them that no identifying information was being collected. With the exception of their BMAT score,

patient data was not included in the study. The study received institutional review board approval from the organization.

Data Collection and Findings

Content Validity

A panel of national experts who were not employed at the health system and not involved in the development of the BMAT was used to assess the content validity. Five experts were chosen for their experience with mobility in acute care patients and bedside practice, as well as knowledge of and experience with mobility and safe patient handling. Each was asked to analyze the BMAT and give voluntary feedback on the objectivity, appropriateness, relevance, and clarity of each of the 4 assessment and mobility levels, as well as the overall tool.

Construct Validity

Construct validity was assessed through a contrasted-groups approach. Two groups, ICU and medical-surgical patients, were assessed and scores compared to determine if the BMAT is sensitive to discriminating different levels of mobility. In total, 20 ICU patients and 20 medical-surgical patients were assessed by a single rater using the BMAT. BMAT scores were recorded and a chi-square test was used to look at the differences in distribution of BMAT scores between the 2 groups of patients. A Pearson chi-square of 22.68 ($P < 0.001$) indicated a significant difference between the groups, suggesting the BMAT is able to discriminate differences between patient populations.

Construct validity was also assessed with an expert-agreement approach. A PT, an expert in mobility, completed a mobility assessment alongside the bedside registered nurse who was using the BMAT. The nurse conducted the mobility assessment of the patient using the BMAT, while the PT silently observed the patient and determined a mobility level from a PT evaluation, indicating if the patient is a maximum assist level, moderate assist level, minimal assist level, or independent. Overall, 55 patient mobility evaluations were collected from various units (medical-surgical, intensive care, and progressive care). The nurse's BMAT mobility level was compared to the PT's mobility level for each patient to determine percent of agreement, measured as percent of scores where raters agreed. Statistical analysis indicated substantial agreement was achieved with an 81% agreement ($\kappa = 0.75$). Feedback from the PT indicated that the majority of the discrepancy came from nurses overestimating the patient's mobility level (ie, nurses rated the patient a level 4 while the PT determined they were a minimal assist or level 3). The discrepancy in agreement indicates that nurses might overestimate the patient's mobility level. To decrease the risk of falls, as patients increase activity, it is important to assess their current mobility status to better assure safe mobility. Additionally, the tool indicates that patients should be rated the lowest level of mobility they are able to successfully complete. The investigators agreed that further education would help to decrease the variation.

Inter-Rater Reliability

Three registered nurses who participated in nursing shared governance were asked to assist in data collection to assess inter-rater reliability of the BMAT. The nurses assessed a group of 20 patients at random using the BMAT protocol over 1 day. After verifying with the bedside nurse that the patient was being assessed currently using the BMAT, the group of nurses entered a patient's room, explained their purpose, and assessed the patient's mobility. So that a single nurse did not bias the findings, the 3 nurses took turns conducting the assessment, with 1 nurse conducting the assessment and the other 2 silently observing. After conducting the assessment, the nurses recorded only the mobility level of the patient. Nurses could also indicate on their data collection sheet if they believed the patient should have been asked to advance to the next mobility level, if the nurse conducting the assessment stopped before the recorder believed they should have. The nurse's mobility levels were compared to each other, and a 93% agreement level was achieved ($\kappa = 0.91$), suggesting significant agreement. Of the 3 raters, 2 nurses indicated patients should have advanced to the next level of assessment in 2 instances (Table 2).

Table 2

Summary of Statistical Findings

Test	Pearson Chi-Square	Level of Agreement	Kappa
Construct Validity–Contrasted Groups	22.68 ($P < 0.001$)	-	-
Construct Validity–Expert Agreement	-	81%	0.75
Inter-rater Reliability	-	93%	0.91

Discussion

A patient's mobility status can influence treatment, patient handling and transfer decisions, and patient outcomes, including risk of falling. Hospitalized patients spend the majority of their hospitalization in bed, often coping with inadvertent negative effects of immobility. Elderly people who have a fear of falling resort to activity restriction resulting in a self-imposed decrease in mobility, which may further increase risk of falls.[20] Patients who fall tend to have numerous interacting risk factors. To be effective, interventions should be focused on the needs of individual patients.[21] Many hazards associated with hospitalization, such as falls, functional decline, and pressure ulcers, are related to decreased mobility.[2] Because of the negative consequences associated with immobility and falls, empowering nurses to take a more active role in assessing and managing their patients' mobility is important.

The research study concludes that initial assessment of the BMAT finds satisfactory validity and inter-rater reliability for use with nurses. Currently, the health system has incorporated the BMAT into electronic documentation, which guides the nurse through the assessment levels and, based on responses, recommends appropriate safe patient handling equipment options. Additional outcomes associated with the mobility assessment have also been monitored. Of note, staff injuries prior to and after implementation of the BMAT decreased, suggesting an association with an increase in more consistent use of safe patient handling practices. Future evaluation of hospital data and evaluation of the implementation of BMAT use with safe patient handling equipment is needed.

The implications for practice and policy include more standardized assessment and decision making, more consistent and appropriate use of safe patient handling equipment, and increased awareness of a patient's mobility status and fall risk. The assessment is completed on admission, every shift, and with change in patient status. Nurses who are using the BMAT currently report that it is a useful tool. They report knowing always to default to the safest lifting/transfer method if there is any doubt in the patient's ability to perform an assessment task and to utilize their PT colleagues appropriately.

Limitations and Future Evaluation

The study was limited to a single facility currently using the tool and was not designed or intended for use with certain patient groups or outpatient departments (eg, emergency department). The study assessed reliability and validity for the tool as administered by registered nurses but did not account for patient characteristics. Although there was a high level of agreement, nurses may be overestimating a patient's ability to walk, compared to a trained PT assessment. The use of the assessment tool, however, brings awareness to the patient's mobility level; whereas without an assessment, the nurse may solely use his or her judgment in determining mobility status. Additionally, reliability findings might have been lower had the nurses conducted independent blinded tests of the patient. Future research using the BMAT will provide additional knowledge related to the usefulness and implications of the tool. While this paper does not delve into caregiver injuries associated with patient handling, the research study site monitored staff injuries prior to and after implementation of the BMAT. A decrease in injuries was noted, suggesting an association with an increase in more consistent use of safe patient handling practices.

Nursing Implications

In this study, a mobility assessment tool for nurses was validated. The difference between patient groups based on the unit on which they were placed suggests the tool performs equally well across patient groups and nursing skill levels. Implementing comprehensive and sustainable safe patient handling practice throughout a hospital system is a tremendously challenging change in culture involving many components. Additionally, organizational change, such as staffing levels, may affect the ability to initiate and sustain a change in practice.

Implementation of the BMAT can be enhanced with focus groups and/or audits to help identify problems nurses have with conducting and documenting the mobility assessment and following through on using recommended safe patient handling equipment. Communication between caregivers will need to be monitored to assure that all staff are aware of equipment that should be used and that appropriate equipment is used consistently (eg, when transferring a patient to and from a diagnostic area).

Although only initial patient ambulation was investigated, a nurse-driven mobility protocol and order set focused on increasing ambulation and decreasing risk of falls bears further investigation. Since creation of the BMAT, literature supporting mobility protocols[22] has been published, suggesting this type of approach in conjunction with the BMAT may be beneficial. Organizations should be mindful of including an appropriate, feasible, and valid assessment tool when designing and implementing a mobility protocol.

Conclusion

Valid nurse-administered bedside mobility testing for the acute care hospital population is limited. The inadvertent negative impact of immobility on patients increases the importance of safe mobility during hospitalization. Determining a patient's mobility status as part of a daily nursing assessment, using a validated tool, and addressing the need to use safe patient handling equipment can potentially influence fall risk and decrease the risk of injury to caregivers.

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