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BMAT-Next (Rehabilitation Model): Bridging Nursing Safety and Physical Therapy Functionality

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ABSTRACT

Falls and immobility remain major threats to hospitalized and community-dwelling older adults. In the United States, approximately 14 million adults aged 65 and older, roughly one in four, fall each year, making falls the leading cause of fatal and non-fatal injury in this population. Hospitalization further exacerbates this risk: older inpatients spend 57–83% of their stay in bed and frequently experience functional decline related to immobility.

The original Banner Bedside Mobility Assessment Tool (BMAT) provided a valuable nurse-driven framework for classifying mobility into four levels Sit, Stretch, Stand, and Step and linking each level to Safe Patient Handling and Mobility (SPHM) equipment. This improved bedside decision-making and reduced injuries by standardizing lift selection and promoting early mobility. However, BMAT's Level 4 grouped all ambulatory patients into a single category, regardless of endurance, cognitive-motor performance, or gait stability under fatigue. Research on mobility assessment has demonstrated that such broad scoring can obscure meaningful fall-risk indicators and limit predictive value.

BMAT-Next (Rehabilitation Model) was developed to address these gaps while retaining BMAT's familiar structure. Levels 1–3 remain unchanged, while Level 4 is expanded into three sublevels: 4A (Endurance), 4B (Cognitive-Motor Reaction), and 4C (Fatigue Stability). BMAT-Next also formalizes "Safe Mode" protocols for medically complex patients and introduces explicit physical therapy (PT) consultation guidance embedded within the electronic health record (EHR). These enhancements maintain the nurse-driven workflow but add rehabilitative precision that supports predictive fall prevention and structured discharge planning.

This article presents an opinion-based, conceptual framework grounded in clinical experience, proposing an expanded BMAT model to enhance functional mobility assessment, fall-risk stratification, and patient recovery planning.

Keywords: *Bedside Mobility Assessment Tool, BMAT, BMAT-Next, Safe Patient Handling, Geriatric Rehabilitation, Interdisciplinary Care*

1. BACKGROUND

1.1. Falls, immobility, and the need for functional mobility assessment

Evidence shows that decreased mobility after a fall or hospitalization can lead to significant loss of muscle mass and strength, contributing to persistent functional decline and reduced participation in daily activities long after discharge [13]. Among hospitalized older adults, each day of immobility is associated with an estimated 1.5% to 3% reduction in muscle mass and approximately a 5% loss of muscle strength, outcomes that are linked to longer hospital stays, sustained functional decline, and limited social participation even two years

after discharge [13]. Fall risk in older adults is influenced by both intrinsic factors—such as gait impairments, balance deficits, sensory changes, and chronic illness—and extrinsic factors, including poor lighting and environmental hazards [8]. Concept analyses and observational studies on "safe mobility" emphasize that hospitals must both encourage movement and prevent the harms of immobility and falls [7].

Traditional functional measures such as the Barthel Index or Functional Independence Measure (FIM) quantify basic function but are not designed for rapid bedside screening or for guiding day-to-day SPHM decisions. Similarly, common fall-risk tools emphasize historical or clinical risk factors rather than real-time mobility performance [1]. Physical therapists play a key role in fall prevention by assessing mobility and balance, developing individualized exercise programs, and connecting older adults with proven community-based interventions such as Tai Chi, the Otago program, and other multicomponent exercise approaches [8]. The literature consistently emphasizes the need for standardized, functionally meaningful mobility assessments in everyday clinical practice, especially because many older adults lose mobility during hospitalization despite strong evidence that early, structured activity can improve recovery and outcomes [8].

The original BMAT addressed this gap through a brief, nurse-administered, task-based screen that directly guides safe patient handling [13].

1.2. Purpose of This Study

The purpose of this study is to introduce the BMAT-Next (Rehabilitation Model), explain how it addresses the limitations of the original BMAT, and demonstrate its potential clinical impact. This article outlines how BMAT-Next enhances both safety and functional rehabilitation in hospitalized adults, focusing on its impact on mobility, fall prevention, and overall recovery outcomes.

This manuscript is presented as an opinion-based, conceptual article grounded in clinical experience. It does not seek to modify or replicate proprietary BMAT protocols, but rather proposes an expanded rehabilitative framework intended to enhance clinical decision-making, fall-risk identification, and patient-centered mobility planning.

2. Contributions and Limitations of the Original BMAT

BMAT 1.0 and 2.0 guide nurses through four sequential tasks Sit & Shake, Stretch & Point, Stand, and Step to determine Mobility Levels 1-4 and pair each level with appropriate SPHM equipment such as full-body lifts, sit-to-stand devices, or cane, walker, or crutches [2]. Validation studies demonstrated high inter-rater reliability and improved confidence among nursing staff [4]. BMAT 2.0 also clarified weight-bearing and bed-rest guidelines and added "Safe Mode" options for higher-risk patients [2].

However, some important limitations emerged, particularly related to the broad Level 4 classification:

- **Compressed Level 4 ("all-in-one independence"):** Any patient who could walk a short distance regardless of endurance, reaction time, or gait stability was labeled Level 4 [4]. This meant a frail older adult who fatigued quickly and a robust community ambulator were documented identically.
- **Limited assessment of higher-order mobility domains:** BMAT emphasized basic strength, sitting balance, and short-distance gait. It did not evaluate dual-task ability (walking while counting/talking) or post-exertional stability, despite evidence that these are critical determinants of fall risk and community mobility [6].
- **Lack of PT referral thresholds:** Although BMAT complemented therapy services, it did not specify when abnormal findings should trigger a PT referral leading to inconsistent consultation patterns [3].

- **Limited guidance for medically complex patients:** While BMAT 2.0 advised clinicians to choose the "safest method," it did not provide structured alternatives for patients with orthostatic symptoms, severe pain, or neurological instability [5].

These limitations highlighted the need for a more detailed and rehabilitation-focused mobility framework.

To place BMAT-Next in context, Figure 1 summarizes the evolution of the BMAT framework from the original 2013 tool through BMAT 2.0 to the current rehabilitation-focused model.

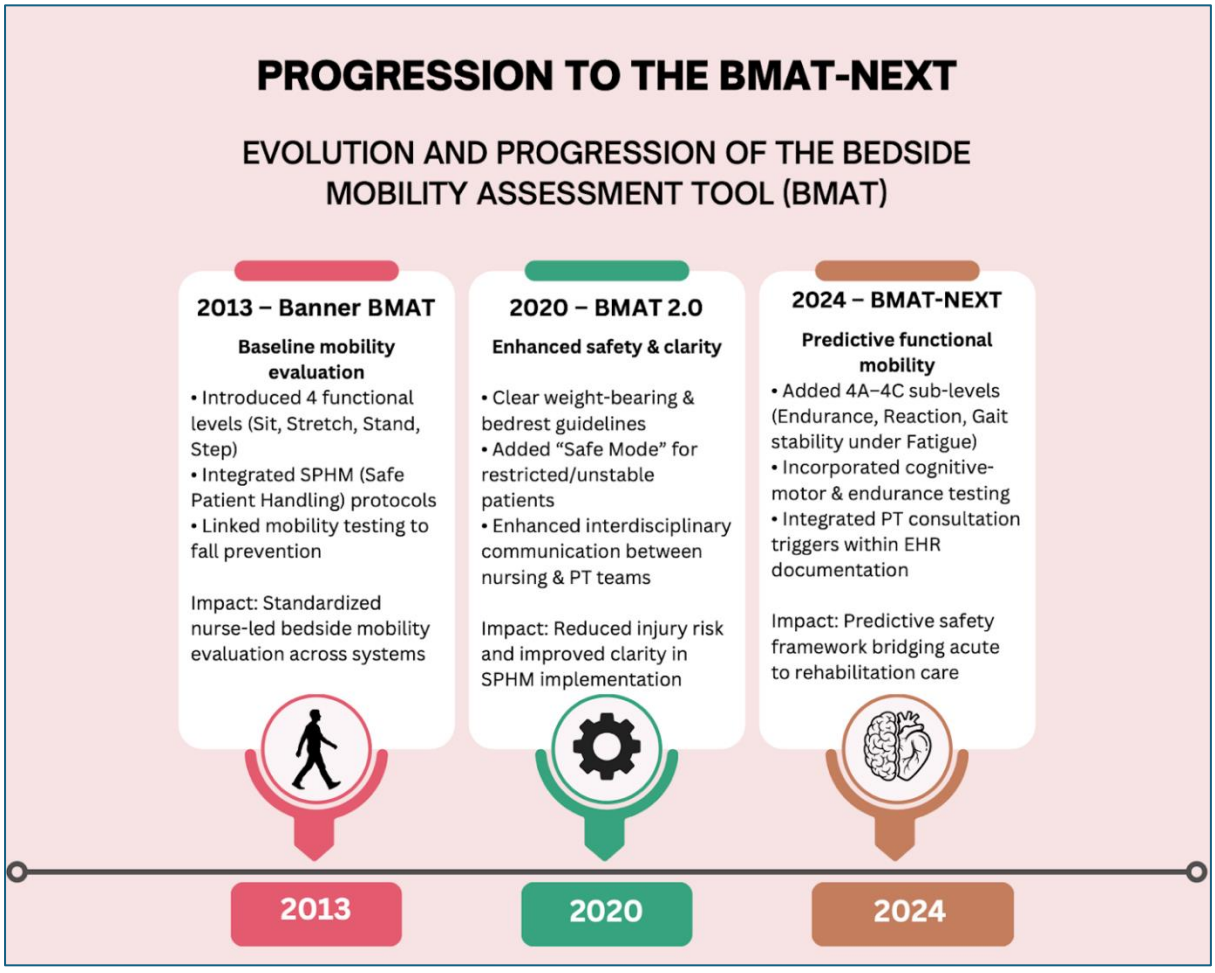

Figure 1. Evolution of the Bedside Mobility Assessment Tool (BMAT) from 2013 to 2024. The original BMAT established baseline nurse-led mobility evaluation, BMAT 2.0 enhanced safety and clarity, and BMAT-Next adds endurance, cognitive-motor, and fatigue-stability testing with integrated PT consultation triggers.

3. Conceptualization of BMAT-Next

The BMAT-Next (Rehabilitation Model) is a novel framework developed by the author to expand the functional and predictive capabilities of the original BMAT.

BMAT-Next (Rehabilitation Model) was developed with four primary objectives:

- Preserve BMAT's validated four-level structure.
- Differentiate higher-level mobility performance by subdividing Level 4 into endurance, cognitive-motor, and fatigue-stability domains.
- Formalize Safe Mode protocols and PT consultation thresholds.
- Align mobility assessment with evidence-based fall-prevention and rehabilitation practices, including strength, balance, and gait training [10].

4. Structure of BMAT-Next

4.1. Levels 1-3 (Preserved)

- Level 1 - Sit & Shake: trunk control, sitting balance, cognitive readiness.
- Level 2 - Stretch & Point: lower-extremity strength, range of motion, anti-gravity control.
- Level 3 - Stand: upright tolerance and supported weight-bearing.

SPHM equipment recommendations remain unchanged [2].

A side-by-side comparison of the original BMAT structure and the expanded BMAT-Next model is shown in Figure 2.

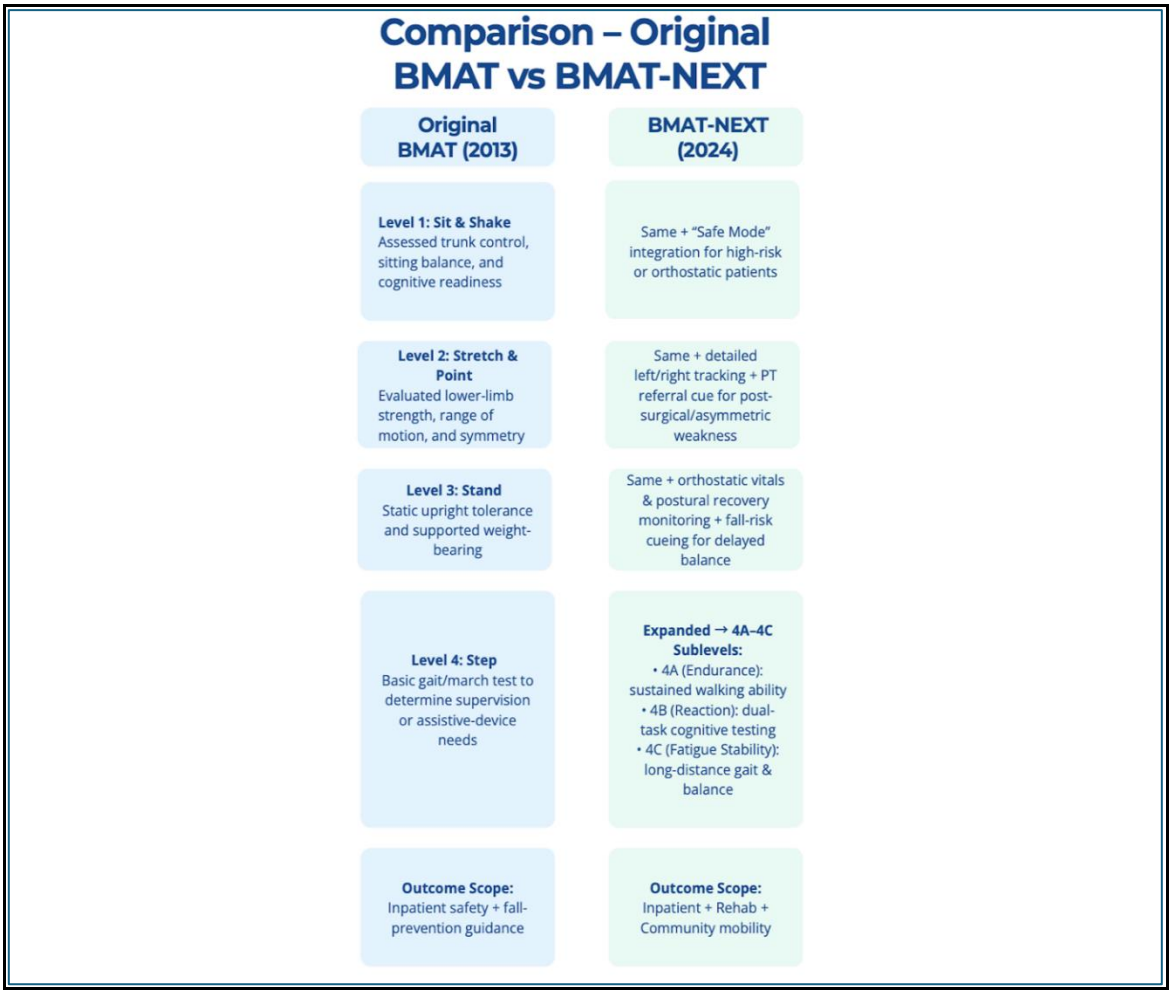

Figure 2. Comparison of the original Banner BMAT (2013) and BMAT-Next (2024). Levels 1-3 are preserved, while Level 4 is expanded into sublevels 4A-4C. Additional features include Safe Mode options, orthostatic and postural monitoring, and explicit PT referral cues, extending the outcome scope from inpatient safety to rehabilitation and community mobility.

4.2. Levels 4A-4C: Expanded Functional Mobility

Level 4 in the original BMAT was too broad, making it hard to see which patients had endurance limits, slowed reactions, or instability with longer walking. The new 4A-4C sublevels separate these problems so they can be addressed more safely.

- **Level 4A - Endurance**
  - Walk 80-100 feet or for 2 minutes.
  - Pass: consistent gait without dyspnea or fatigue.
  - Indicates short-distance independence but limited endurance.
- **Level 4B - Cognitive-Motor Reaction**
  - Perform 4A with a simple cognitive task.
  - Fail: slowed responses, veering, stopping.
  - Indicates dual-task vulnerability and elevated fall risk.
- **Level 4C - Fatigue Stability**

- Walk 5-6 minutes.
- Fail: instability, path deviation, unexpected rests.
- Distinguishes community-safe walkers from those needing supervision.

These sublevels convert Level 4 into a graded continuum and align more closely with functional tools like FIM and AM-PAC while still being fast to administer [12].

The full operational version of BMAT-Next, including level definitions, pass/fail criteria, Safe Mode alternatives, SPHM equipment recommendations, and PT triggers, is summarized in Table 1.

BMAT-NEXT (Rehabilitation Model)- Expanded 4-Level Bedside Mobility Assessment Tool (BMAT) with Extended Level 4 Subcategories 4A-4C

Level & Focus	Test Description & Criteria	Pass Conditions	Fail Conditions	Recommended SPHM Equipment	PT Consultation Guidance	"Safe Mode" Protocol (if standard test not possible)	Fall-Prevention Strategies	Final Mobility Level Classification
Level 1 - Sit & Shake (Seated balance & cognition)	From semi-reclined bed, ask patient to sit upright and rotate to sit at bedside. Then ask patient to reach out and grasp your hand across their midline. Assesses trunk strength, balance, and ability to follow commands.	Patient sits upright at edge of bed and maintains balance for 30–60 seconds. Reaches across midline and shakes examiner's hand.	Cannot sit upright unsupported, loses balance, or unable to reach out.	Total lift (mechanical lift with sling) for all transfers. Friction-reducing device for repositioning.	If tolerance unclear or trunk weakness persists, consult PT for early mobility assessment.	If strict bed rest or bilateral non-weight-bearing, do not attempt. Instead classify as Level 1. Elevate head of bed gradually to assess tolerance if safe.	Bed in lowest position, wheels locked. Bed/chair alarms. Call bell within reach. Floor mats. 2+ staff for repositioning.	**Mobility Level 1: Total Dependence** – full assist required.
Level 2 - Stretch & Point (Lower limb strength & control)	From bedside sitting, ask patient to straighten knee and point/flex ankle x3. Repeat with other leg if possible. Assesses quadriceps and ankle control.	Patient can extend knee and perform ankle pumps on at least one leg.	Cannot perform on either leg.	Sit-to-stand lift if at least one leg weight-bearing. Total lift if no weight-bearing. Wheelchair for transport.	If asymmetry or post-surgical restrictions present, consult PT for individualized progression.	If one leg restricted (cast, post-op order), test other leg. If asymmetrical strength, use stronger limb. If unsafe, test in supported bed sitting.	Wheelchair brakes locked. Non-skid footwear. Frequent ankle pumps. Never leave patient unattended at edge of bed.	**Mobility Level 2: Moderate Assist** – has some leg strength but cannot stand unsupported.
Level 3 - Stand (Standing strength & initial weight-bearing)	Ask patient to stand from bed/chair, using arms or device if needed. Hold standing for ~5 seconds. Assesses ability to bear weight and postural stability.	Patient rises to full stand and holds stable for ≥5 seconds.	Cannot stand fully, or unable to maintain standing.	Non-powered or powered sit-to-stand device. Gait belt during attempts. If device needed, remains Level 3.	Consult PT for patients with poor balance, orthostatic symptoms, or delayed postural recovery	If partial weight-bearing, allow supported stand. If orthostatic concern, dangle at bedside first.	1–2 staff present. Gait belt and wheelchair close by. Brakes locked. Remove clutter. Bed/chair alarms.	**Mobility Level 3: Minimal Assist** – can stand with minimal assistance or device, not independent.
Level 4 - Step (Enhanced)	From standing, ask patient to march in place, then step forward and back with each foot. Assesses dynamic balance and weight-shifting.	Patient marches and steps with steady balance, no support needed.	Loses balance or unable to step back safely, requires assistive device.	No lift needed if passed. If failed, use walker or cane and gait belt with a wheelchair follow for distance ambulation.	If patient demonstrates fatigue, delayed reaction, or instability during initial step or march test, consult PT for gait assessment and individualized safety plan.	If patient restricted from stepping back, omit that part. If unsafe, test side-to-side shifts or heel lifts with support.	Remove clutter. Non-slip footwear. Staff supervision. Night lighting for ambulation.	**Mobility Level 4: Modified Independence** – ambulates short distances without assistive devices. Stand by assist advised.
Level 4A - Endurance (Integrated Subcategory)	Instruct patient to walk 100 ft or for 2 minutes continuously. Observe posture, gait, and fatigue signs.	Walks distance/time without significant fatigue or gait deterioration.	Fatigue before completion, gait instability with distance, or unsafe vitals.	No lift needed. No assistive device for limited distances: for distance ambulation, use AD and gaitbelt as appropriate with wheelchair follow for safety.	If patient fatigues before completing the expected walking distance or exhibits cardiovascular or postural intolerance, consult PT to evaluate endurance limitations and establish a progressive ambulation program.	If unable, test marching/stepping for 1–2 minutes at bedside. Break into short intervals if needed.	Encourage rest breaks. Gait belt for ambulation. Monitor for fatigue, dizziness, orthostatic signs.	**Mobility Level 4A: Independent mobility with Limited Endurance** – can walk independently short distances, tires with distance ambulation.

Level 4B - Reaction Time (Integrated Subcategory)	While walking, give sudden commands (e.g., "stop," "turn"), or apply gentle balance challenge. May also dual task (e.g., talk while walking).	Responds promptly and steadily, maintains balance, recovers quickly.	Delayed or poor response. Stumbles, needs support, or confused by commands.	No lift needed. Use assistive device if it was part of prior functional level; gait belt remains required. Perform with standby staff for safety.	If patient exhibits delayed command response, impaired balance recovery, or poor dual-task performance, consult PT for cognitive-motor integration and reaction-training strategies.	If unsafe, perform commands in seated position or assume fail. Avoid physical perturbation if risky.	Advise against multitasking while walking. Ensure supervision in unpredictable environments. Clear lighting and grab bars in halls.	**Mobility Level 4B: Independent mobility with Supervision for Complexity –** safe in controlled settings, but slower reactions in dynamic ones.
Level 4C - Gait Stability Under Fatigue (Integrated Subcategory)	Ask patient to walk continuously for 5–6 minutes (hallway or loop). Observe for gait changes, balance, and fatigue effects.	Maintains steady gait and balance even when tired. Handles turns safely.	Gait worsens with fatigue, instability appears, or needs to stop early.	No additional equipment beyond patient's baseline device.	If patient demonstrates decreased coordination on uneven surfaces, or shows instability with prolonged ambulation, consult PT for advanced balance retraining and safe-discharge readiness evaluation.	If prolonged walking unsafe, break into shorter monitored intervals. Monitor vitals closely.	Ensure home/unit environment free of tripping hazards. Educate patient to rest if fatigued. Encourage balance/endurance exercises.	**Mobility Level 4C: Full Independence (Community Level) –** safe under all conditions, including fatigue and dynamic challenges.

Table 1. Expanded Bedside Mobility Assessment Tool (BMAT-Next).

This enhanced version of the BMAT preserves the original four-level Banner Health structure while expanding Level 4 into three functional subcategories (4A-4C). The table outlines Levels 1-3 and sublevels 4A-4C with corresponding test items, pass/fail criteria, Safe Mode alternatives, recommended Safe Patient Handling and Mobility (SPHM) equipment, and standardized physical therapy (PT) consultation guidance.

5. Safe Mode Protocols

BMAT-Next adds structured Safe Mode alternatives at each level for medically complex patients:

- Orthostatic or hemodynamically unstable patients assessed via supported transfers.
- Post-surgical patients evaluated with modified ranges or protected weight-bearing.

Safe Mode ensures every patient receives a classification and specific handling plan addressing concerns raised in safe-mobility literature [7].

6. PT Consultation Guidance and EHR Integration

The PT Consultation Guidance within BMAT-Next helps standardize when nurses should refer patients to physical therapy based on specific mobility-related signs observed during the assessment.

Consultation triggers for each level:

- **Level 1 - Sit &Shake:** If trunk weakness or tolerance issues are noted, consult PT for early mobility assessment to enhance trunk stability and promote early mobilization.
- **Level 2 - Stretch & Point:** If leg strength asymmetry or post-surgical restrictions are present, consult PT for individualized exercises to restore balance, strength, and support post-operative recovery.
- **Level 3 - Stand:** For patients with poor balance, orthostatic symptoms, or delayed postural recovery, consult PT to address balance impairments and improve postural stability for standing.
- **Level 4 - Step:** If fatigue, delayed reactions, or instability occur during walking, consult PT for gait assessment and safety planning, including strengthening exercises and balance training.
- **Level 4A - Endurance:** If the patient fatigues before completing the walking distance or shows cardiovascular or postural intolerance, consult PT for endurance evaluation and a progressive ambulation plan.

- **Level 4B - Reaction Time:** If delayed responses or poor dual-task performance are observed, consult PT for cognitive-motor training to improve reaction times and balance recovery.
- **Level 4C - Gait Stability Under Fatigue:** If the patient shows instability on uneven surfaces or with prolonged walking, consult PT for advanced balance retraining and a safe-discharge readiness evaluation.

These consultation triggers are integrated into the EHR system, automatically suggesting PT referrals. This aligns with frameworks such as the VA Mobility Screening and Solutions Tool [6] while preserving original BMAT coding.

7. Clinical Significance

BMAT-Next offers a structured, interdisciplinary mobility framework that supports safer patient handling, enables earlier and more appropriate physical therapy involvement, and enhances discharge readiness. By addressing mobility limitations that the original BMAT could not differentiate, BMAT-Next helps mitigate functional decline and fall risk factors that remain persistent threats to older adult health during hospitalization.

8. DISCUSSION

8.1. How BMAT-Next Addresses Original Limitations

- Resolves Level-4 heterogeneity by differentiating endurance, cognitive-motor performance, and fatigue stability.
- Strengthens predictive safety by identifying early fatigue, dual-task slowing, and post-exertional instability - key precursors to falls [9].
- Standardizes PT referral thresholds to improve consistency and timely rehabilitation involvement [11].
- Supports medically complex patients with clearly defined Safe Mode pathways [7].
  - The overall safety impact of BMAT-Next, relative to earlier versions of the tool, is illustrated in Figure 3 along a continuum from reactive to predictive mobility safety.

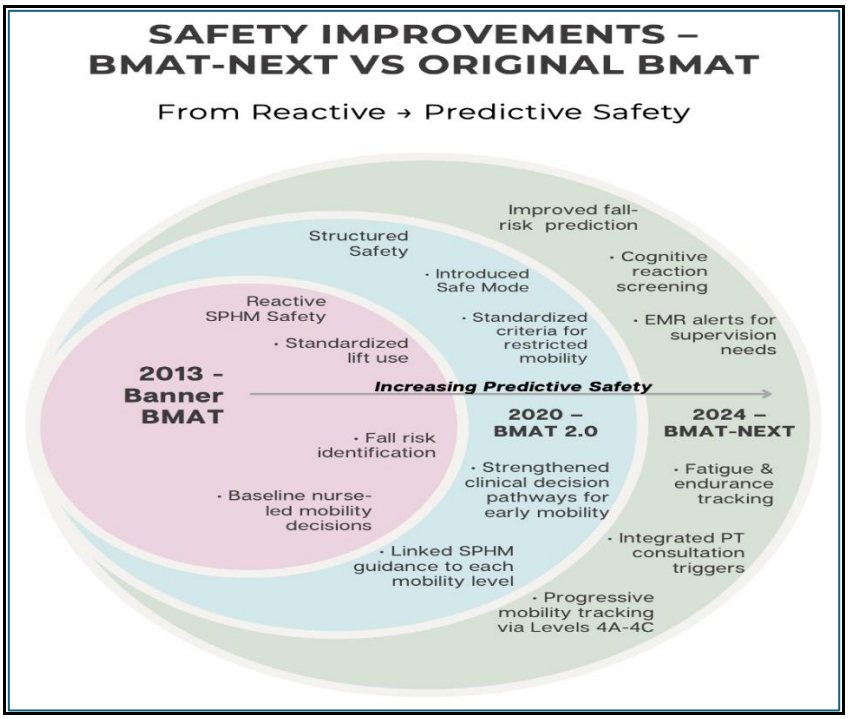

Figure 3. Safety improvements across the BMAT evolution. The original BMAT emphasized reactive SPHM safety and baseline mobility decisions; BMAT 2.0 added structured safety through Safe Mode and clearer weight-bearing criteria; BMAT-Next further advances predictive safety with fatigue and endurance tracking, cognitive-reaction screening, EMR alerts, and integrated PT consultation triggers.

9. Relationship to Other Tools

BMAT-Next is designed to complement, not replace, tools such as FIM, AM-PAC, or traditional fall-risk scales [12].

It offers:

- A rapid nurse-administered screen
- Direct linkage to SPHM equipment
- Meaningful functional granularity (4A-4C)

10. Implications for Orthopedic and Geriatric Rehabilitation

BMAT-Next supports:

- Early mobilization with objective progression markers
- Accurate discharge planning
- Unit-level program evaluation using 4A-4C distribution
  - These elements align with current recommendations for coordinated mobility programs across the continuum of care [11].

11. Future Directions

Research is needed to:

- Validate BMAT-Next across diverse patient populations.
- Analyze its predictive value compared with BMAT and fall-risk tools.

12. CONCLUSION

The original BMAT standardized nurse-led mobility assessment and improved patient handling safety. However, its broad Level 4 limited the ability to detect real-world functional differences.

BMAT-Next (Rehabilitation Model) preserves BMAT's simplicity while expanding its scope. By incorporating sublevels 4A-4C, structured Safe Mode pathways, and PT consultation triggers, it bridges the gap between nursing safety protocols and rehabilitation-focused functional assessment.

Declaration by Authors

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