Assessing Geriatric Competencies in Residents: Validating the 5Ms Dimensions

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ABSTRACT

Background Despite undergraduate training in geriatric care, gaps persist throughout residency, highlighting limitations of current assessment methods in evaluating medical expertise across geriatric dimensions.

Objective We developed a case-based assessment using the geriatric 5Ms framework (Mind, Mobility, Medications, Multicomplexity, Matters Most), aligned with undergraduate objectives and North American internal medicine milestones. We present feasibility data and preliminary validity evidence of using the geriatric 5Ms framework to evaluate residents' geriatric medical expertise.

Methods During a 2023 mandatory academic session at a single site, 68 first- to third-year internal medicine residents were randomly assigned to complete assessment and management plans for 3 of 6 geriatric cases within 1 hour. Two blinded educators rated performance on 5Ms dimensions and non-geriatric medical expertise using a 3-level rating scale (0 to 2). We collected feasibility data (logistical integration, participation rates, time to design cases, rate responses) and validity evidence, based on Messick's framework, in part through a post-assessment questionnaire.

Results Sixty-five residents completed 3 cases each, and 3 residents completed 2 cases each, resulting in 201 total cases, each integrating all 5Ms dimensions. Scores across the 5Ms dimensions ranged from 0.8 to 1.3, indicating partial assessment and management. All 5Ms dimensions (mean=1.1, SD=0.3) scored significantly lower than non-geriatric medical expertise (mean=1.5; SD=0.3; $t(64)=9.58$; $P<.001$). Interrater reliability was moderate to strong (ICC=0.67-0.85, $P<.001$). Most residents rated the cases (59 of 67, 88%; mean=4.4; SD=0.7) and the assessment (56 of 67, 84%; mean=4.1; SD=0.7) as representative of clinical practice.

Conclusions A case-based assessment using the geriatric 5Ms framework demonstrated feasibility and preliminary validity for evaluating residents' geriatric medical expertise.

Introduction

The aging population and evolving accreditation requirements compel residency programs to prepare residents to assess and manage older patients with complex, multimorbid conditions.[1-3] Despite clearly defined undergraduate objectives for the care of older adults,[4] gaps persist throughout residency,[5-9] highlighting the shortcomings of current assessment methods in incorporating geriatric dimensions into the evaluation of medical expertise.[10-12]

In 2017, American and Canadian experts introduced the geriatric 5Ms,[13] a clinical framework for person-centered care that integrates 5 dimensions: Mind (managing dementia, depression, and delirium), Mobility (eg, fall prevention), Medications, Multicomplexity (eg, managing comorbidities), and Matters Most (eg, establishing goals of care). The geriatric 5Ms framework supports a holistic, evidence-based approach to the medical, functional, and psychosocial complexities of aging.[14] The 5Ms dimensions have been integrated into educational curricula for medical students,[15] residents,[16] and non-geriatrician physicians,[17,18] enhancing residents' satisfaction,[19] self-efficacy,[19,20] and preparedness[21] to manage geriatric patients, while demonstrating feasibility for implementation in clinical settings.[22]

Current assessment methods often fail to capture residents' ability to assess and manage the multidimensional aspects of geriatric care. Goldberg et al[23] incorporated 4 of the 5Ms dimensions into a checklist design for a geriatric objective structured clinical examination (OSCE) case within their undergraduate curriculum; however, their study provided limited validity evidence supporting the use of the geriatric 5Ms framework for assessment purposes. To address this gap, we developed a case-based assessment using the geriatric 5Ms framework and collected feasibility data and preliminary validity evidence to evaluate residents' geriatric medical expertise.

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Editor's Note: The online supplementary data contains a case study and the questionnaires used in the study.

Methods

Setting and Participants

The study was conducted at Laval University, Canada, in 2023 during a mandatory academic half-day for

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first- to third-year internal medicine (IM) residents. Of 121 eligible residents, 68 (56%) attended and participated. Participation was limited to attendees. All had completed the Medical Council of Canada certification and met national objectives for geriatric care outlined in TABLE 1. While IM residents at Laval University frequently manage older adults during clinical rotations, the geriatric 5Ms framework had not been explicitly taught or assessed prior to this study. Our IM residency curriculum includes assessments for geriatric competencies, such as knowledge-based assessments, OSCEs, and entrustable professional activities.

KEY POINTS

What Is Known
Current assessment methods are limited in evaluating medical expertise across the key dimensions of geriatric care.

What Is New
A novel case-based assessment was developed using the geriatric 5Ms framework (Mind, Mobility, Medications, Multicomplexity, Matters Most), aligned with internal medicine training milestones. The assessment was piloted with internal medicine residents and showed feasibility in implementation and preliminary validity evidence for evaluating geriatric medical expertise.

Bottom Line
Program directors looking to assess residents' competency in geriatrics can consider using this novel tool.

Interventions

We developed a case-based assessment using the geriatric 5Ms framework (Mind, Mobility, Medications, Multicomplexity, Matters Most). An expert panel of 3 clinician educators—2 board-certified geriatricians (S.M., E.M.) and 1 board-certified internist (A.L.)—iteratively outlined the essential geriatric clinical tasks aligned with the 5Ms dimensions, informed by undergraduate objectives,[4] and North American IM milestones,[2,3] as summarized in TABLE 1.

The expert panel created 6 written cases that collectively cover all essential geriatric clinical tasks. Each case was designed to integrate all 5Ms dimensions and included a corresponding performance scoring rubric presented in TABLE 2. To allow comparison, we also assessed non-geriatric medical expertise (eg, identifying sepsis and adjusting antibiotics). The cases were developed to ensure both comprehensiveness and standardization, in line with best educational practices.[24] During a 4-hour in-person meeting, the panel thoroughly reviewed and refined the content, achieving consensus on preestablished assessment and management plans. By design, the cases were aligned with undergraduate objectives and prior assessments, expecting residents to demonstrate proficiency.

We designed the cases to simulate a range of clinical settings: 2 cases for the emergency department (Cases A and B), 2 for the inpatient ward (Cases C and D), and 2 for ambulatory care (Cases E and F). Each case (example in online supplementary data A), averaging 400 words, was uploaded to LimeSurvey (LimeSurvey GmbH) containing all relevant information typically found in a medical consultation for an older patient, including medical history, medication, social autonomy, current illness, physical examination, laboratory results, and imaging. The cases were pilot tested with family medicine residents, resulting in minor adjustments.

Outcomes Measured

Residents were randomly assigned to complete assessment and management plans for 3 of 6 geriatric cases within 1 hour. FIGURE 1 illustrates the study design. Residents independently wrote their assessment and management plans without access to external resources, simulating routine documentation in electronic health records. Residents were required to formulate their plans as they would during a typical clinical consultation, without relying on any predefined template. Residents were not informed that the geriatric 5Ms framework was used to design the cases and guide performance evaluation.

After completing all cases, residents filled out an online questionnaire, shown in online supplementary data B, that collected demographic data and information about prior geriatrics training. They also rated the perceived representativeness of the cases and assessment relative to clinical practice, as well as their self-reported confidence across the 5Ms dimensions, both using a 5-point Likert-type scale.

The assessment and management plans were randomly assigned to 2 blinded educators (S.M., A.L.), with each educator independently evaluating 60% of the data, including a 20% overlap to assess interrater agreement. Performance was scored using a 3-level rating scale (0 to 2): residents who failed to recognize a specific geriatric dimension were scored as 0 (absent), those who either assessed or managed the dimension appropriately, but did not do both, were scored as 1 (partial), and those who correctly assessed and managed the dimension appropriately were scored as 2 (complete). In case of disagreement, mean scores were used for analysis. This scale, based on the widely used CanMEDS Milestones for entrustable professional activity assessments,[25] was designed to facilitate a reliable assessment process for non-geriatrician faculty members.

Feasibility Data

Feasibility data were collected to evaluate the logistical viability of implementing the geriatric 5Ms framework

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TABLE 1
Alignment of Geriatric Clinical Tasks With the 5Ms Dimensions, Undergraduate Objectives, and North American Internal Medicine Milestones

5Ms Dimensions	Geriatric Clinical Tasks "Assess and manage [...]"	Undergraduate Objectives[a]	ACGME[b] and CanMEDS[c] Milestones
Mind	Depression, delirium, dementia	Given a patient with **depressed mood**, the candidate will diagnose the cause, severity, and complications, and will initiate an appropriate management plan. The candidate should pay particular attention to assessment of suicide risk and the potential need for urgent care. Given a patient with **delirium**, a candidate will recognize the syndrome, diagnose the cause(s), and initiate an appropriate management plan. Particular attention should be paid to the urgent nature of the condition. Given a patient with neurocognitive disorder (**dementia**), the candidate will identify potential causes, severity, and complications, and will initiate an appropriate management plan. In particular, the candidate will identify a deterioration in cognitive function and look for reversible risk factors. The candidate will differentiate early Alzheimer disease from other causes.	PC5: Creates and leads a comprehensive patient-centered management plan for the patient with highly complex chronic conditions, integrating recommendations from multiple disciplines[b] C EPA2: Assessing and managing patients with complex chronic conditions (includes dementia)[c] F EPA2: Managing patients admitted acute care settings with common medical problems and advancing their care plans (includes delirium)[c]
Mobility	Intrinsic risk factors for falling (eg, orthostatic hypotension), extrinsic risk factors for falling (eg, unsafe environment), needs for rehabilitation, needs for adaptations/assistance, avoidance of restraints and tethering devices	Given a patient who is at risk of **falls**, the candidate will identify contributing factors and initiate an appropriate management and prevention plan.	PC5: Creates and leads a comprehensive patient-centered management plan for the patient with highly complex chronic conditions, integrating recommendations from multiple disciplines[b] F EPA2: Managing patients admitted acute care settings with common medical problems and advancing their care plans (includes falls)[c] C EPA10: Implementing health promotion strategies in patients with or at risk for disease (includes falls)[c]
Medications	Safely deprescribing high-risk medications (eg, benzodiazepines, anti-cholinergics), optimal prescribing, prescribing cascade	To safely and effectively manage a patient presenting with a condition that requires prescription medication, the candidate will first undertake a thorough clinical assessment and then apply principles of evidence-based medicine and cost effectiveness in **prescribing**. The candidate will address polypharmacy and the options for deprescribing, as well as address the effect of comorbidities, current medications, liver and renal function, genetics, and age on the risks and benefits of prescribing the medication.	PC5: Creates and leads a comprehensive patient-centered management plan for the patient with highly complex chronic conditions, integrating recommendations from multiple disciplines[b] ME 5.2: Reconcile current and prior medication lists to enhance patient safety[c]

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TABLE 1
Alignment of Geriatric Clinical Tasks With the 5Ms Dimensions, Undergraduate Objectives, and North American Internal Medicine Milestones (continued)

5Ms Dimensions	Geriatric Clinical Tasks "Assess and manage [...]"	Undergraduate Objectives[a]	ACGME[b] and CanMEDS[c] Milestones
Multicomplexity	Atypical acute presentation, multiple chronic conditions, frailty, complex biopsychosocial situation, end-of-life condition	Given a **frail** elderly patient, the candidate will diagnose the cause, severity, and complications; will conduct an assessment of function and cognition; and will initiate an appropriate management plan that demonstrates an awareness of the importance of a multidisciplinary approach. Given a **dying** patient, the candidate will develop an appropriate palliative care plan that optimally controls pain and other symptoms, maintains human dignity, and recognizes the importance of family and social supports and the health care team's different roles. The candidate must know the provisions in Canada's law on medical assistance in dying (MAID), be prepared to discuss these provisions with patients, and act on such a request as appropriate. Given an older person in a state of distress or presenting with unexplained findings, the candidate will inquire about potential **elder abuse**. In particular, the candidate will determine the level of immediate risk, identify potential contributing factors, and outline an appropriate management plan.	MK1: Demonstrates a nuanced understanding of the scientific knowledge related to uncommon, atypical, or complex conditions[b] MK2: Demonstrates a nuanced understanding of emerging, atypical, or complex therapeutic options[b] C EPA1: Assessing patients with complex or atypical acute medical presentations[c] ME 2.4: Develop patient-centered management plans that address multimorbidity, frailty, and/or complexity of patient presentations[c]
Matters Most	Substituted consent, prioritizing among interventions or resources, patient's safety (eg, decision to relocate, stop driving, medication management by others)	Given the necessity for **patient consent**, the candidate will be able to take the necessary steps to obtain valid legal and ethical consent for the proposed action, taking into account issues related to decision-making capacity, information sharing, the form of consent, limitations, and exceptions to the requirement of consent. The candidate will notify the patient and/or the appropriate authorities in case of inability to **drive** and will anticipate medium- and long-term complications of the disorder (eg, psychosocial impact, **safety**).	PC5: Creates and leads a comprehensive patient-centered management plan for the patient with highly complex chronic conditions, integrating recommendations from multiple disciplines[b] F EPA6: Establish goals of care in collaboration with the patient and family[c] ME 2.4: Adapt guideline-based recommendations for care to the context of the patient's specific needs and priorities[c]

[a] Medical Council of Canada Objectives.
[b] Accreditation Council for Graduate Medical Education, Internal Medicine Milestones.
[c] Royal College of Physicians and Surgeons of Canada, Internal Medicine Competencies.
Abbreviations: ACGME, Accreditation Council for Graduate Medical Education; PC, patient care; C, core; EPA, entrustable professional activity; F, foundations; ME, medical expertise; MK, medical knowledge.

in residency assessments. Indicators included integration into a scheduled 1-hour assessment during an academic half-day, resident participation and completion rates, and the time required to design the cases and score responses using the rubric.

Initial Validity Data

Following Messick's contemporary validity framework,[26] we collected evidence from multiple sources: content validity (integration of the 5Ms dimensions

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TABLE 2
Scoring Rubrics and Sample Resident Responses for Case C Aligned With the 5Ms Dimensions and Non-Geriatric Medical Expertise

5Ms Dimensions	Sample Resident Responses	Scoring Rubrics		Score (/2)
		Assess	Manage	
Mind	Confusion *de novo*: Delirium in the context of [a] gram plus cocci bacteria. (Resident 63)	Delirium	Cerebral CT scan with contrast	1
		☑	☐	
Mobility	Falls likely second to altered level of consciousness, rule out head injury and/or injuries/fractures. Limit physical restrictions and consider placing a bed alarm to monitor the patient. (Resident 9)	Acute mobility disorder	Avoidance of restraints	2
		☑	☑	
Medications	Benzodiazepine contributes to delirium. Stop [name of benzodiazepine drug], stop [anti-nausea medication]. (Resident 12)	High-risk medication	Deprescribing plan	1
		☐	☑	
Multicomplexity	Ulcerated venous insufficiency wound malleolus D. Pain relief if a painful wound and wound care nurse consultation. Nutritionist consultation to optimize diet. (Resident 8)	Assess 2/3 multiple chronic conditions	Act on 2/3 multiple chronic conditions	1
		☐	☑	
Matters most	Impossible to specify the level of care at the moment, [the] patient appears in delirium. (Resident 6)	Capacity	Substituted consent	1
		☑	☐	
Non-geriatric medical expertise	Sepsis of undetermined origin with gram-positive cocci bacteremia. Endocarditis appears to be the most probable diagnosis to rule out. Perform an echocardiogram, chest-abdomen and pelvis CT scan + head CT with contrast. Repeat blood cultures. Add Vancomycin according to the antibiogram (consider oxacillin if there are intracranial abscesses). (Resident 21)	Endocarditis	Intravenous antibiotics	2
		☑	☑	

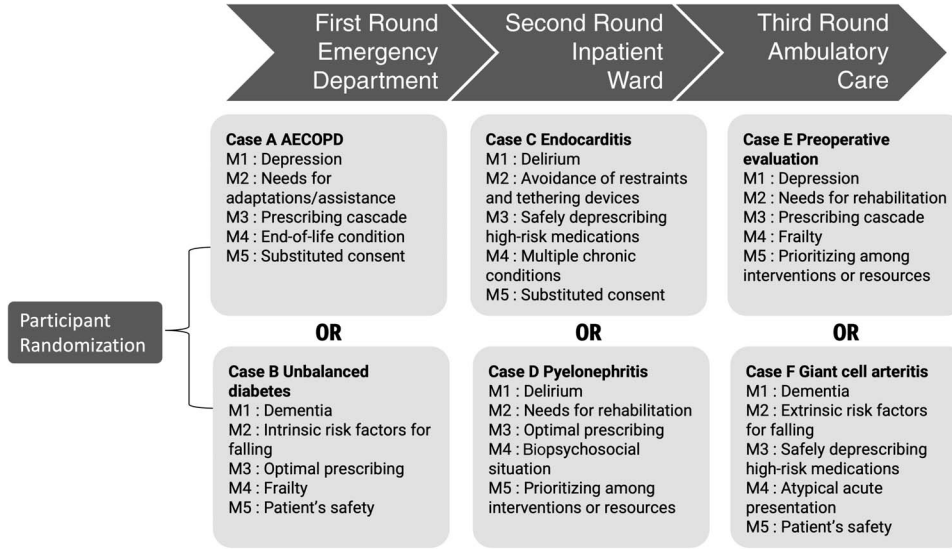

FIGURE 1
Study Design: Residents Randomized to Complete 3 Geriatric Cases, 1 Case Per Clinical Context

Abbreviations: M1, Mind; M2, Mobility; M3, Medications; M4, Multicomplexity; M5, Matters Most; AECOPD, acute exacerbation of chronic obstructive pulmonary disease.

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into cases and alignment with objectives and milestones), consequences (identification of competency gaps), internal structure (interrater agreement), and response process (presence of all 5Ms dimensions in residents' response, and perceived representativeness of cases and the assessment relative to clinical practice).

Statistical Analysis

We used jamovi (The jamovi project, version 2.6) for statistical analysis. We applied paired-sample *t* tests to assess the differences between the mean score of each 5Ms dimension and non-geriatric medical expertise. One-way independent analyses of variance (ANOVAs) were applied when calculating the differences in mean scores by residency level. We used an intraclass correlation coefficient to calculate interrater absolute agreement (2-way mixed-effects model).

The study was approved by the Research Ethics Committee of Laval University (approval number 2023-354/21-11-2023). Participating residents provided written consent. Study results were not used for residents' assessment and remained confidential.

Results

Sixty-eight IM residents attended the academic half-day session, and all agreed to participate in the study. TABLE 3 outlines the participants' characteristics. A total of 65 residents completed all 3 case scenarios within 1 hour (96% completion rate), and 3 residents left early due to on-call duties, completing 2 each, resulting in a total of 201 completed cases. Each of the 6 cases required approximately 5 hours to design. Scoring of all resident responses was completed by 2 educators within approximately 8 hours.

Each case integrated all 5Ms dimensions, and together, the 6 cases addressed 19 geriatric clinical tasks, 10 undergraduate objectives, and 15 geriatric competency milestones (TABLE 1). Residents scored between 0.8 and 1.3 across the 5Ms dimensions, indicating partial assessment and management of 5Ms dimensions. All 5Ms dimensions (mean=1.1, SD=0.3) scored significantly lower than non-geriatric medical expertise (mean=1.5; SD=0.3; $t[64]=9.58$; $P<.001$). ANOVA indicated no significant differences between first- and third-year residents, with the only exception observed being between second- and third-year residents for Matters Most, as shown in FIGURE 2. Interrater reliability was moderate for Mind at 0.67 (SE=0.11, $P<.001$), moderate for Mobility (0.78; SE=0.09; $P<.001$), moderate for Medications (0.69; SE=0.10; $P<.001$), strong for Multicomplexity (0.85; SE=0.07; $P<.001$), moderate for Matters Most (0.78; SE=0.08; $P<.001$), and strong for non–geriatric medical expertise (0.85, SE=0.08, $P<.001$). A post-hoc power analysis using G*Power v3 revealed insufficient statistical power to assess potential confounders, such as prior exposure to geriatrics rotations.

TABLE 3
Characteristics of Participants (N=67[a])

Characteristics	n (%)
Position	
First-year	30 (45)
Second-year	27 (40)
Third-year	10 (15)
Gender	
Female	38 (57)
Prior university training (completed or not)	
None	50 (75)
Residency program other than internal medicine	1 (1)
Occupational therapy	1 (1)
Pharmacy	3 (4)
Physiotherapy	5 (7)
Other	9 (13)
Institution of MD degree completion	
Laval University	38 (57)
McGill University	1 (1)
Montréal University	12 (18)
Sherbrooke University	12 (18)
Other	4 (6)
Previous exposure to geriatric education	
Mandatory geriatrics rotation during undergraduate clerkship	50 (75)
Optional geriatrics rotation during undergraduate clerkship	7 (10)
Mandatory geriatrics rotation during residency	15 (22)
Optional geriatrics rotation during residency	4 (6)
Prior explicit teaching or assessment of the geriatric 5Ms	5 (7)

[a] One resident did not complete the demographic questionnaire.

In the online post-assessment questionnaire, 59 of 67 residents (88%) rated the cases (mean=4.4, SD=0.7), and 56 of 67 (84%) rated the assessment (mean=4.1, SD=0.6) as sufficiently/very representative of clinical practice. Residents' self-reported moderate confidence across the 5Ms dimensions: Mind (mean=2.9, SD=0.7), Mobility (mean=3.3, SD=0.7), Medications (mean=2.7, SD=0.8), Multicomplexity (mean=3.2, SD=0.8), Matters Most (mean=3.6, SD=0.7), and all 5Ms (mean=3.1, SD=0.7).

Discussion

This study demonstrates the feasibility of implementing a case-based assessment using the geriatric 5Ms

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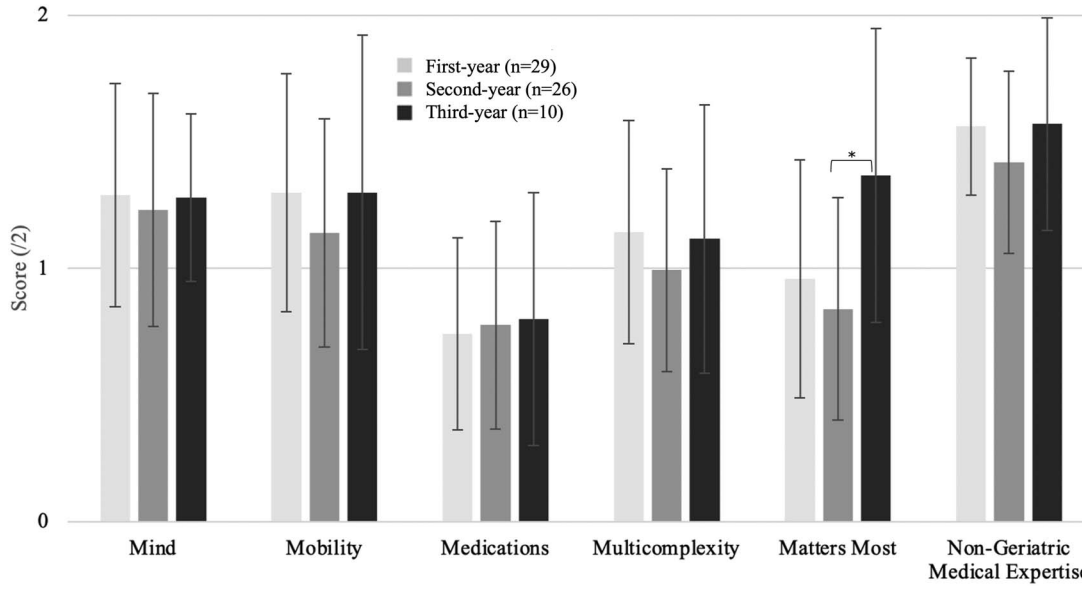

FIGURE 2
5Ms Dimensions and Non-Geriatric Medical Expertise Scores by Residency Level
Note: Significant difference between second- and third-year residents only for Matters Most mean score, ($F_{2,62} = 4.52$, $P<.01$).

framework for evaluating residents' geriatric medical expertise during a routine academic session. Content validity was supported by the deliberate integration of all five 5Ms dimensions into each case, with 6 cases covering 19 essential geriatric clinical tasks. The assessment revealed consistent underperformance across the 5Ms dimensions, highlighting meaningful competency gaps in geriatric expertise and supporting consequential validity. Interrater reliability was high across the 5Ms dimensions,[27] indicating robust internal structure. Finally, the presence of all 5Ms dimensions in residents' responses, along with strong perceived representativeness of the cases and the assessment relative to clinical practice, supported response process validity.

Existing assessment methods often fail to adequately integrate geriatric dimensions into evaluations of medical expertise,[10-12] despite the growing complexity and prevalence of older adults in clinical practice. In our study, IM residents consistently underperformed in geriatric medical expertise, as assessed using the geriatric 5Ms framework, emphasizing its value in assessment. This finding aligns with previous evidence suggesting that routine clinical exposure, even when embedded in rotations, may be insufficient to develop the competencies required for comprehensive geriatric care.[5-9] While the 5Ms dimensions have been adopted for curriculum design and teaching,[15-22] their integration into assessment remains limited.[23]

Furthermore, the discrepancy between residents' self-reported confidence and observed performance reflects broader concerns about the misalignment between self-assessment and actual competence.[28] Collectively, these findings underscore the importance for objective, structured performance assessments that explicitly incorporate geriatric dimensions to facilitate meaningful feedback, guide remediation, and promote the delivery of age-friendly care.

Limitations of the current study include the familiarity of our expert panel with geriatric dimensions, competency milestones, and resident assessment, which may have expedited the process; replication in other settings may require additional time or faculty development. Additionally, reliance on written cases may not fully capture the complexities of real-world clinical practice[29] or broader competencies, such as communication and collaboration. The absence of explicit instruction on the geriatric 5Ms framework likely influenced performance scores, though this reflects the current state of many residency programs. Finally, while the single-site design limits generalizability, our findings lay the groundwork for future multisite validity studies.

Future research could expand the validity evidence of the geriatric 5Ms framework by assessing undergraduates, junior residents (first- to third-year) and senior residents (fourth- to fifth-year), with expected progression across stages in 5Ms dimensions-based training curricula. Validity could be further confirmed by applying the framework to other assessment modalities (eg, OSCEs, workplace observations, multisource feedback), enhancing its generalizability. Given its use in evaluating intervention effectiveness, future studies could explore how 5Ms dimensions-based assessments impact clinical outcomes, such as whether prescriptions become more appropriate during inpatient rotations.

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Conclusions

A case-based assessment using the geriatric 5Ms framework demonstrated feasibility and preliminary validity for evaluating residents' geriatric medical expertise.

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