Optimizing delirium care in the era of Age-Friendly Health System

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Abstract

Delirium is a significant geriatric condition associated with adverse clinical and economic outcomes. The cause of delirium is usually multifactorial, and person-centered multicomponent approaches for proper delirium management are required. In 2017, the John A. Hartford Foundation and the Institute for Healthcare Improvement (IHI) launched a national initiative, Age-Friendly Health System (AFHS), promoting the use of a framework called 4Ms (what matters, medication, mentation, and mobility). The 4Ms framework's primary goal is to provide comprehensive and practical person-centered care for older adults and it aligns with the core concepts of optimal delirium management. In this special article, we demonstrate how a traditional delirium prevention and management model can be assessed from the perspective of AFHS. An example is the crosswalk with the Hospital Elder Life Program (HELP) Core Interventions and the 4MS, which demonstrates alignment in delirium management. We also introduce useful tools to create an AFHS environment in delirium management. Although much has been written about delirium management, there is a need to identify the critical steps in advancing the overall delirium care in the context of the AFHS. In this article, we suggest future directions, including the need for more prospective and comprehensive research to assess the impact of AFHS on delirium care, the need for more innovative and sustainable education platforms, fundamental changes in the healthcare payment system for proper adoption of AFHS in any healthcare setting, and application of AFHS in the community for continuity of care for older adults with delirium.

KEYWORDS

Age-Friendly Health System, delirium, Hospital Elder Life Program

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Christine Waszynski and Esther S. Oh have contributed equally to this work.

The current article combined a summary of lectures and discussions from the 2022 American Delirium Society Annual Meeting's Pre-Conference Session and a review regarding the topic of the Age-Friendly Health System and optimal delirium management.

For affiliations refer to page 8

INTRODUCTION

Delirium is an acute disorder of attention and cognition that is highly prevalent, affecting almost 30% of hospitalized older adults in general medicine and over 75% of those in the intensive care unit settings.[1] In the United States, more than 2.6 million older adults develop delirium annually with associated healthcare expenditures of more than $164 billion.[2] Patients who experience delirium are at greater risk of institutionalization and mortality,[3] and more evidence has been accumulated demonstrating the association of delirium with long-term cognitive decline and incident dementia.[3–6] The cause of delirium is often multifactorial, and person-centered multicomponent approaches to prevent and manage delirium are needed to address delirium effectively.

In 2017, the John A. Hartford Foundation and the Institute for Healthcare Improvement (IHI) launched a national initiative, Age-Friendly Health System (AFHS).[7] The AFHS initiative introduced a framework called the 4Ms (what matters, medication, mentation, and mobility) that any healthcare system can use to address multiple aspects of the older adults' individual abilities, needs, values, and goals to build an ideal ecosystem to address delirium.

The foundation of AFHS includes the following "an essential set of evidence-based practices which causes no harm and aligns with What Matters to the older adult."[7] The two key drivers of AFHS are: specifying the 4Ms for each older adult (assess) and incorporating the 4Ms into interprofessional care delivery and documentation (act on). The team should assess what they are already doing with respect to care practices for each of the 4Ms and identify areas for improvement.

The 4Ms framework's overarching goal is to provide comprehensive and practical person-centered care for hospitalized older adults. This framework also aligns with the core concept of the optimal management of delirium, which is often multifactorial and requires more comprehensive multicomponent approaches to identification, prevention, and treatment.

Therefore, the American Delirium Society held a preconference for AFHS in June 2022, to review the core concepts of AFHS and its implication for optimal delirium management. Experts in delirium management and AFHS shared practical examples of using AFHS and discussed the current knowledge gaps. This paper summarizes and builds on the content discussed during the preconference and suggests future directions for optimal management of delirium in the context of AFHS.

Key points

- Age-Friendly Health System's (AFHS) 4Ms (what matters, mobility, medication, and mentation) can be used as a practical and comprehensive framework for optimal delirium management in the hospital and the community and further build an age-friendly ecosystem.
- AFHS 4Ms in delirium management can be readily adopted through several useful tools, including integration of AFHS 4MS in the EHR system, interprofessional education, and estimation of financial benefit using the return-on-investment calculator.
- More additional work to support the application of AFHS to delirium management needs to be conducted.

Why does this paper matter?

A practical and comprehensive person-centered multicomponent care strategy for delirium management is critical to provide high-quality care for older adults and prevent any harm. AFHS 4Ms are simple and versatile but still comprehensive enough that any healthcare system can build customized strategies upon; therefore, they have a high potential to provide framework for optimal delirium management.

AFHS IN DELIRIUM PREVENTION AND MANAGEMENT

Because of its frequency and adverse outcomes, delirium is a key concern for AFHS. In this section, we will discuss how AFHS is related to programs providing optimal care for delirium prevention and management.

HELP and AFHS

The Hospital Elder Life Program (HELP) was developed in the mid-1990s and published in a landmark article in 1999.[8] It represents the earliest AFHS model implemented in hundreds of hospitals around the world. Since its inception, HELP has provided person-centered, optimized care for older hospitalized adults and presents a clear demonstration of how effective delirium prevention requires addressing all of the 4Ms.

Overview of HELP

HELP is a delirium prevention and management model,[9,10] which is one of the evidence-based care models used to develop the 4Ms. The HELP model[8,11] uses interdisciplinary clinical staff and trained volunteers to implement standardized intervention protocols targeted toward six well-known delirium risk factors: cognitive impairment, sleep deprivation, immobility, vision impairment, hearing impairment, and dehydration (see Supplemental Table 1). With staff training and support of nursing within an interdisciplinary team, HELP has consistently led to reduction in delirium, as documented in over 20 published clinical trials to date.[9,10] Importantly, previous studies have demonstrated that the effectiveness of delirium prevention is directly proportional to the number and completeness of the protocols received.[12] It is important to note that in addition to delirium prevention, HELP has demonstrated effectiveness for a broad array of other important related outcomes, including decreasing hospital falls,[9] cognitive and functional decline,[10,11] length of hospital stay,[13,14] decreased use of sitters,[15] institutionalization,[15] and hospital readmissions.[16] HELP has been adapted and implemented in multiple settings, including acute care, intensive care, palliative care, home care, inpatient rehabilitation, post-acute care, and long-term care/nursing home settings.

Alignment of HELP with AFHS

The crosswalk provided in Figure 1 details how the HELP protocols align with the 4Ms of AFHS. Many existing HELP sites have already achieved AFHS recognition. Moreover, many AFHS sites wishing to focus on delirium prevention have implemented HELP. Hospitals can gain assistance in their age-friendly journey through the AGS CoCare HELP (https://help.agscocare.org), which provides tools needed to achieve the 4Ms and implement a successful program. This includes business planning tools and materials to "make a case" for the program, standardized screening and enrollment instructions, standardized intervention protocols, data collection forms and instructions, and training tools including multimedia training modules for all staff roles. Importantly, HELP provides an online support community, monthly webinars, an annual continuing education conference, and HELP Centers of Excellence available to coach sites in implementing and sustaining a program.

Screening, prevention, management, and outcome measurement of delirium in AFHS

All of the recommended delirium screening tools from IHI are evidence-based, with many derived from the

HELP Protocols*	Age-Friendly Health Systems 4Ms†			
	What Matters	Medication	Mentation	Mobility
HELP Core Interventions				
Standardized Patient Screening	✓	✓	✓	✓
Patient Enrollment Procedures	✓	✓	✓	✓
Daily Visitor Program	✓	✓	✓	✓
Orientation Protocol	✓	✓	✓	✓
Therapeutic Activities Protocol	✓	✓	✓	✓
Sleep Enhancement Protocol	✓	✓	✓	✓
Early Mobilization Protocol	✓	✓	✓	✓
Vision Protocol			✓	✓
Blindness Protocol			✓	✓
Hearing Protocol			✓	
Feeding Assistance Protocol			✓	
Fluid Repletion Protocol			✓	
Chaplaincy Protocol	✓		✓	
Delirium Protocol	✓	✓	✓	✓
Dementia Protocol	✓	✓	✓	✓
Psychoactive Medications Protocol	✓	✓	✓	✓
Discharge Planning Protocol	✓	✓	✓	✓
Optimizing Length of Stay Protocol	✓	✓	✓	✓
Discharge Protocol	✓	✓	✓	✓
Post-Discharge Assistance and Telephone Follow-Up	✓	✓	✓	✓
HELP Interdisciplinary Interventions				
Interdisciplinary Team (IDT) Rounds	✓	✓	✓	✓
Geriatrics Consultation	✓	✓	✓	✓
Community Linkages	✓	✓	✓	✓
NICE‡ to HELP Nursing Interventions				
Pain Management Protocol	✓	✓	✓	✓
Aspiration Prevention Protocol		✓	✓	
Prevention of Catheter Associated UTI Protocol			✓	
Constipation Protocol		✓	✓	✓
Hypoxia Protocol			✓	✓

FIGURE 1 Crosswalk of Hospital Elder Life Program (HELP) protocols with 4Ms (what matters, mobility, medication, and mentation). *AGS CoCare®: HELP Program January 2023: https://help.agscocare.org. †IHI Age-Friendly Health Systems January 2023: http://www.ihi.org/Engage/Initiatives/Age-Friendly-Health-Systems/Documents/IHIAgeFriendlyHealthSystems_GuidetoUsing4MsCare.pdf Age-Friendly Health Systems is an initiative of The John A. Hartford Foundation and the Institute for Healthcare Improvement (IHI) in partnership with the American Hospital Association (AHA) and the Catholic Health Association of the United States (CHA). Figure used with permission from IHI-AFHS. ‡NICE = National Institute for Health and Care Excellence.

widely used Confusion Assessment Method (CAM),[17] including the UB-CAM instrument, which has a mobile app.[18] A comprehensive list of over 30 delirium tools can be found at the Network for Investigation of Delirium: Unifying Scientists (NIDUS; https://deliriumnetwork.org/measurement/adult-delirium-info-cards) and American Delirium Society websites (https://americandeliriumsociety.org/education/screening-tools). IHI recommends screening for delirium in the acute care setting at least every 12 hours.

HELP is one of the 17 evidence-based care models that were examined in developing the 4Ms framework.[19] While HELP is one of the programs that can be used for developing an age-friendly hospital system, the 4Ms framework can also be incorporated with other existing

programs to develop both delirium prevention and management plans that are optimal for each care setting. There are many other site examples, resources, and a comprehensive toolkit available from IHI to optimize delirium care within AFHS. These resources can be accessed on their website and in a book on age-friendly care.[7,20] The resources provide step-by-step instructions for the implementation of delirium care and quality improvement methods. These include assessment tools and workflow diagrams for 4Ms and delirium care, examples of plan–do–study–act cycles and worksheets, tips on how to support and organize a team for care, and measure the impact of delirium and age-friendly care.

IHI provides a guide for understanding both process and outcome measures for delirium care, and includes measurement principles, to conduct small tests of change in your health system. Some of the AFHS measures relevant to delirium include the number of patient interactions for individuals 65 years of age and older receiving age-friendly care, 30-day all-cause readmission rates, average length of stay, percentage of patients 65 and older with positive results on a delirium assessment, satisfaction with care, and concordance with what matters. Additional measures to consider for delirium include the number of delirium-free days, delirium severity, healthy days at home, delirium-related distress and caregiver burden, and delirium complications such as falls, pneumonia, and use of antipsychotics.[21–23]

Examples of addressing 4Ms in creating "best practice" for delirium care

The AFHS provides the framework to address the four core domains for optimal care for older adults, which is comprehensive but also practical for implementation. Furthermore, the 4Ms framework allows each healthcare system to utilize its own resources to build specific strategies to address 4Ms. This section introduces examples of projects addressing 4Ms in creating the environment for optimal delirium care.

Example 1: Maine medical center using HELP to implement the 4Ms

HELP at Maine Medical Center was among the first MaineeHealth programs to implement 4Ms care, which were implemented in general medicine and surgical wards. The synergy between the two programs is highly evident. *Mentation* is incorporated into enrollments (e.g., CAM, Mini-Cog) and volunteer visits (orientation). *Medication* review and interventions are completed at the time of enrollment

and during interdisciplinary team (IDT) rounds two times per week. *Mobility* is similarly prioritized at IDT rounds, and the team works closely with physical therapy and bedside nursing on a daily basis to graduate patients through different levels of mobility with volunteers. *What matters* is addressed through two questions: "What Matters most to you during this hospitalization?" and "What Matters most for your overall healing?" A What Matters tool is also built into the EHR to be available to the care team and volunteers for guiding their selection of activities, engagement, and motivation.

Example 2: Case study of 4Ms in action for delirium superimposed on dementia

Delirium serves as an exemplar of the importance and necessity of assessing and acting on the 4Ms as a set. A 2022 published case study of an older adult who experienced delirium superimposed on dementia (DSD) illustrates how the 4Ms work together. In this case study, an older woman experienced DSD after being prescribed oxybutynin in the face of an unrecognized dementia.[24] Knowing if the older adult has an underlying dementia and promoting delirium prevention and recognition is key to optimal management of DSD (*mentation*). Involvement of family caregivers is especially important in recognizing delirium in an older adult with underlying cognitive impairment. Knowing *what matters* to the older adult, for example, what makes them feel calm or happy, is part of managing expressions of behavior in both dementia and delirium.[24,25] Avoiding high-risk *medications*[26] and focusing on *mobility* has both immediate and long-term benefits to mentation and is a core intervention for delirium.[27] The 4Ms framework emphasizes assessing and acting on delirium in a way that is reliable, equitable, and sustainable.

Example 3: Expansion of current geriatric care model into AFHS 4M model

In 2003, Hartford Hospital in Connecticut began a nursing education program based on the Nurses Improving Care for Healthsystem Elders (NICHE) program after recognizing the knowledge and practice gap in geriatric-focused nursing approaches in the acute care setting. A core group of nurses were recruited and nominated as Geriatric Resource Nurses (GRNs) for their units and offered facility-specific geriatric-focused prerecorded classes and NICHE GRN modules. The education program quickly expanded and was added to core curriculum for all graduate nurse residency participants. In 2017,

Hartford Hospital established a grounding strategy for the interprofessional delirium pathway built on the combined NICHE-based education and AFHS framework, resulting in a 40% reduction in delirium days and $6.5 million estimated annual savings related to delirium prevention and mitigation.[28] Notably, a key to the program's adoption and success was a willingness to embrace both the AFHS and NICHE framework. Hospital leadership and administration valued geriatric care as a priority based upon their previous experience with the critical role of GRNs in patient care. This approach to combine already established NICHE with the newly introduced AFHS framework allowed for rapid adoption of AFHS in the institution. A crosswalk between NICHE and AFHS has been well-documented demonstrating how NICHE resources are aligned with AFHS principles.[29,30]

The additional learnings that apply to all three cases include: (1) enlisting champions at all levels including family caregivers; (2) gaining administrative support and aligning delirium and AFHS care with strategic initiatives; (3) conducting small tests of change to codesign and fit delirium care into staff workflow and increase staff buy-in; (4) use of the EHR to schedule delirium screening; (5) aligning delirium care with what matters; and (6) sharing stories and case studies with staff to illustrate the success and power of good delirium and age-friendly care.

CREATING AFHS ENVIRONMENT FOR OPTIMAL DELIRIUM MANAGEMENT

AFHS integration into electronic health records

Electronic health records (EHR) integrated with AFHS 4Ms domains is a powerful tool for delirium prevention and management with the capacity to provide reminders, alerts, and tracking for compliance with the 4Ms. Specifically, each patient's goals (*what matters*) and activity with graphed summaries (*mobility*) can be recorded in the EHR. Moreover, EHR can leverage automated alert systems for potentially inappropriate or deliriogenic medications (*medication*) and provide reminders for regular delirium screenings (*mentation*). The IHI provides detailed instructions on embedding 4Ms into the two most commonly used commercial EHR systems, Cerner and EPIC.[30] Although nascent, recent work has investigated the use of artificial intelligence for detection of delirium based on the data, which can be automatically obtained from the EHR.[31,32] Natural language processing may offer the capability to process the clinician's note text to detect delirium when routine screening is not feasible.[31]

Interprofessional delirium education in AFHS

Delirium education comes in many forms. Traditional methods include classroom lecture, online voice-over power point, and case-based discussion. Enhanced learner engagement results from demonstration, hands-on practice, and bedside coaching. Previous studies among the nurses showed increased knowledge and confidence in delirium assessment from traditional educational model, but behavioral changes and improved clinical outcomes could be achieved when the education model was combined with interactive learning.[33-35] Simulation has recently become a popular strategy for education of healthcare professionals which fosters teamwork and critical thinking. Interactive education on delirium care positively affects the knowledge, skills, confidence, and attitudes of healthcare professionals and has led to demonstrable positive outcomes including decreased use of deliriogenic medications, mortality, length of hospital stay, and delirium days in those who did develop delirium.[36] An escape room is an innovative hands-on approach that highlights an empathy-building experience while facilitating interprofessional collaboration, coordination, and communication through the use of puzzles, clues, and prompts.[37]

Financial aspects of delirium management in AFHS

The integration of the 4Ms into a hospital's operating system has the potential to deliver a financial return by lowering the overall cost of care due to reduced delirium incidence and related complications. Making this case can help garner the support of those in the administrative suite for age-friendly care. Therefore, IHI provides an intuitive and user-friendly return on investment (ROI) calculator[30] that the users can estimate the total cost avoided by lowering the length of stay or hospital-acquired complications from reduced delirium incidence, total cost required to implement 4Ms, and overall net financial benefit (Figure 2). Furthermore, it allows the user to compare two scenarios, determine the magnitudes of key variables that will result in achieving the user's target ROI, and perform sensitivity analysis to produce the range of ROI depending on the range of the key variables.
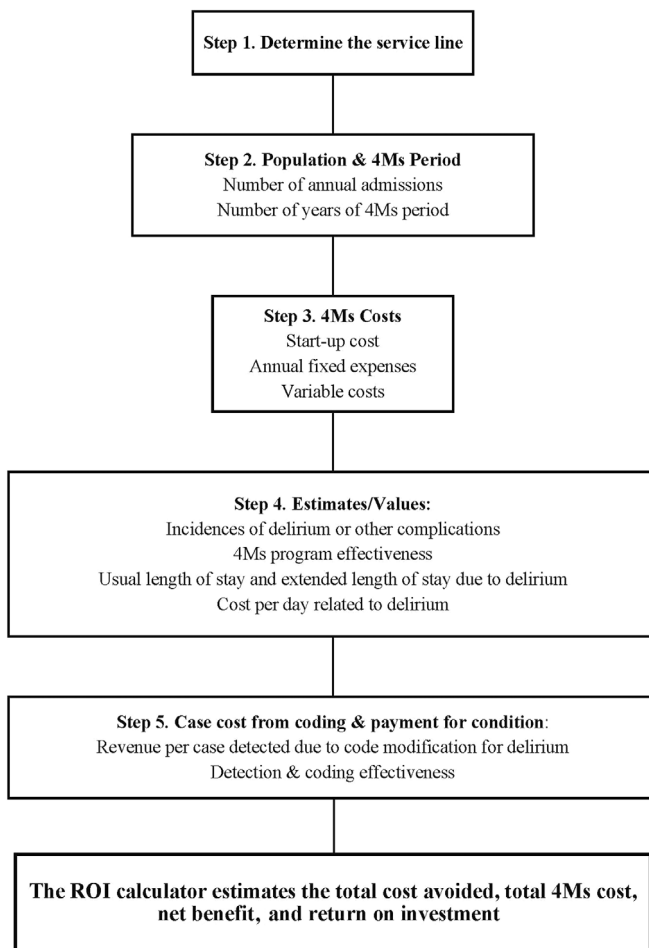
FIGURE 2 Steps of using Return on Investment (ROI) calculator. The resulting estimate of ROI is found to be higher when the following conditions prevail: (i) the incremental cost of providing age-friendly care is smaller; (ii) the incidence of delirium before the introduction of age-friendly care is higher; (iii) the effectiveness of such care in avoiding and reducing this incidence is greater; and (iv) the daily cost of a hospital stay is more expensive. https://www.ihi.org/Engage/Initiatives/Age-Friendly-Health-Systems/Pages/Resources.aspx.

Delirium in AFHS and health equity

Delivery of equitable care to all older adults is an important part of the AFHS,[38] but there are still very few studies that have examined health equity in the context of delirium care. One study of over 560 older adults undergoing major noncardiac surgery showed that the area deprivation index, a marker of neighborhood poverty and other disadvantages, was associated with incident delirium and delirium severity. In this study, residing in the most disadvantaged neighborhood (top 5 percentile) was associated with twofold risk of incident delirium and with greater delirium severity compared with the least disadvantaged areas.[39] Recently, there has been a study

that examined health equity factors in relation to the 4Ms framework. Although delirium was not specifically examined in this study, females were more likely to be on medications that are considered high risk[40] by IHI for their potential to increase the risk of delirium, including benzodiazepines and antidepressants.[41]

There have also been efforts to understand the role of individual-level indicators of health equity in relation to delirium, especially in regard to race and ethnicity. One study of hospitalized older adults examined whether race influences the agreement between delirium screening results by research staff compared with clinical documentation by providers and found no differences between African American and mostly White patients.[42] One study examining the incidence and prevalence rates of delirium did not find differences between African American and White patients after adjusting for demographic and socioeconomic factors, disease severity, and comorbidity.[43] An in-depth understanding of social determinants of health will not only be important in identifying specific risk factors and groups that are at higher risk of developing delirium but would also be critical in designing customized delirium interventions that are impactful.[44]

DISCUSSION

AFHS 4Ms address the core aspects of high-quality care for older adults, especially for optimal delirium management (Figure 3). However, there are still several knowledge gaps and important future directions to be explored.

First, research is needed to build stronger evidence of the protective effect of the comprehensive 4Ms on delirium prevention and management. To date, studies demonstrate that addressing individual Ms improves the quality of delirium care. For example, *mobility*—promoting mobility during hospitalization or *medication*—avoiding high-risk medication, such as anticholinergics or benzodiazepine, significantly optimizes delirium care. In addition, there is heterogeneity in the outcome metrics used to assess individual Ms and most are limited to important but simple or one-dimensional measure. For example, although the ROI calculator is an excellent tool to estimate the financial saving in delirium prevention using the 4Ms, further cost-effectiveness analyses are needed to estimate the indirect cost associated with longitudinal quality of life improvement. Importantly, different stakeholders in the adoption of AFHS may place value on different outcomes. Alignment of key outcomes across stakeholders with precise definitions of measurement and timeframes for reassessment could guide researcher and clinician efforts to produce stronger and

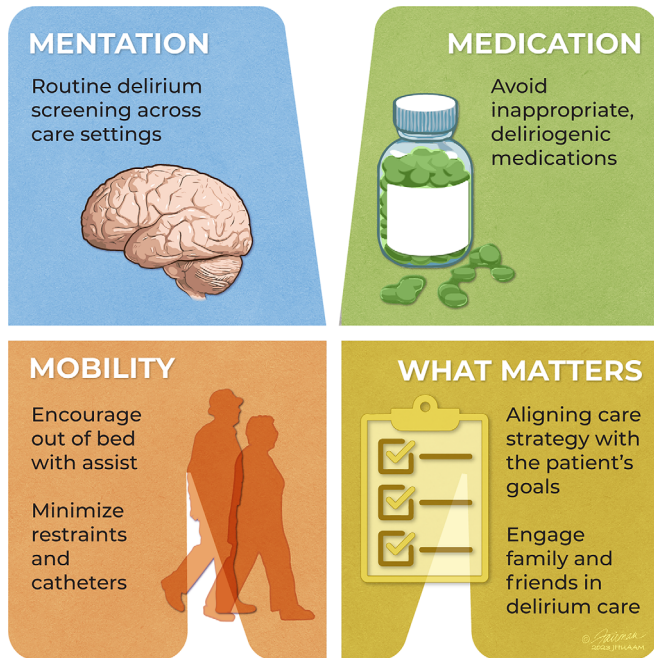## OPTIMAL DELIRIUM MANAGEMENT
AGE-FRIENDLY HEALTH SYSTEM 4Ms

MENTATION

Routine delirium screening across care settings

MEDICATION

Avoid inappropriate, deliriogenic medications

MOBILITY

Encourage out of bed with assist

Minimize restraints and catheters

WHAT MATTERS

Aligning care strategy with the patient's goals

Engage family and friends in delirium care

FIGURE 3 Optimal delirium management with Age-Friendly Health System 4Ms (what matters, mobility, medication, and mentation).

higher impact evidence to increase adoption rates of the AFHS 4Ms.[45]

Second, the development of innovative and sustainable interprofessional education programming is needed to integrate AFHS into practice for optimal delirium care. Shifting from an approach where each profession operates in a silo to an interprofessional approach with efforts and communication across health professionals is critical to successful prevention and management of delirium in AFHS.[46-48] While this paper previously described the potential of hands-on education program using a simulation or escape room platform, further importance should be placed on early incorporation of interprofessional education. A novel path forward could be leveraging the values of the AFHS 4Ms for optimal delirium management as a basis for interprofessional courses, seminars, and workshops attended simultaneously by several disciplines (e.g., physicians, nurses, pharmacists, physical therapists, and social workers) in early phases of education at the undergraduate and graduate school level. This can facilitate the adoption of appropriate and effective communication and cooperation patterns and habits early in new professionals' careers.

Third, a foundational change in the healthcare payment system is needed to support the adoption of comprehensive high-value care for older adults such as AFHS

4Ms. Prevention and delirium management for older adults in the hospital is highly complex and requires a person-centered approach consisting of efforts and resources from an interprofessional team. While research suggests AFHS may be cost-effective, further adoption and the sustainability of AFHS faces barriers from the current US fragmented payment structure that focuses rigid predetermined dichotomous outcomes in individual condition (e.g., prescription of specific medication for a single medical condition) without considering the complete case of the person. While these methods may work at a population level, they run counter to person-centered care, which is critical to AFHS.[49] There have been efforts to change the payment system to meet such comprehensive care needs, including value-based purchasing, bundled payment, or accountable care organizations.[50,51] However, systemic payment structure change will still take time. An immediate step could be the formation of dedicated conferences and working groups across the multiple stakeholders of the healthcare system to discuss the alignment of novel payment incentives and reimbursement practices with the cost-effective values of AFHS. Such meetings could provide a guide for financial reimbursement programs to incentivize AFHS as a systematic change in the US healthcare system that is facing a drastic increase in the number of older adults it serves.

Finally, future research support and guidance from dedicated grant-makers are needed to assess the application of the AFHS core values into the community to build a comprehensive Age-Friendly Health Ecosystem. Optimal delirium management does not end at discharge from acute or post-acute care settings as those who experience delirium may have persistent or recurrent delirium symptoms post-discharge and are at increased risk of dementia and depression.[52-54] Moreover, evidence suggests persons with dementia may develop delirium outside of the hospital setting.[54] The AFHS provides a framework of principles for expansion into the community including outpatient, nursing home, home health, rehabilitation, and pharmacy centers. In this age-friendly ecosystem, non-pharmacologic person-centered care based on what matters most to older adults could be applied for optimal delirium prevention, maximizing equitable care for all older adults, as well as mitigating rehospitalization, physical or cognitive impairments.

CONCLUSION

We reviewed the core concepts of AFHS 4Ms, its clinical implication for optimal delirium management, examples of creating AFHS environments for delirium management, current knowledge gaps, and future directions.

AFHS 4Ms share the similar values of person-centered non-pharmacologic care for optimal delirium management with HELP and other delirium care models and can be applied in any healthcare setting. It can be also incorporated with existing resources, such as EHR or education methods to be fully integrated into everyday practice. Furthermore, the AFHS 4Ms should be applied beyond the hospital setting for continuous high-quality delirium care even after acute or post-acute care discharge. Although there are still knowledge gaps, need for integration in education, and support from the healthcare payment system for sustainability, AFHS 4Ms provide a critical framework for optimal delirium management.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Supplemental Table 1. HELP Program Intervention Protocols—Description of the interventions of HELP program (adapted from Inouye SK et al., *JAGS*. 2000;48:1697–1706).

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