

Pursuing Diagnostic Excellence for Delirium at Banner Health

Background

Banner Health and Age-Friendly Care

Banner - University Medical Center Phoenix (BUMCP) is a 746-bed non-profit, acute care teaching hospital that is part of Banner Health and affiliated with University of Arizona College of Medicine - Phoenix. BUMCP is a safety net hospital, integrated delivery system, and nationally recognized academic medical center. As Arizona's largest hospital and a member of the state's largest health system, BUMCP focuses on coordinated clinical care, pioneering medical research, and educating tomorrow's medical professionals to provide transformative health care for patients.

Arizona has 1.2 million residents aged 65 and older, accounting for 17 percent of the total state population.¹ In 2020 BUMCP was recognized as an Age-Friendly Health Care System – Committed to Care Excellence.

Age-Friendly Health Systems is an initiative of The John A. Hartford Foundation, the Institute for Healthcare Improvement, and the American Hospital Association. Age-friendly care:

- Follows an essential set of evidence-based practices: the 4Ms – What Matters, Medication, Mentation, and Mobility (see Figure 1);
- Causes no harm; and
- Aligns with What Matters to the older adult and their family or other caregivers.

Delirium

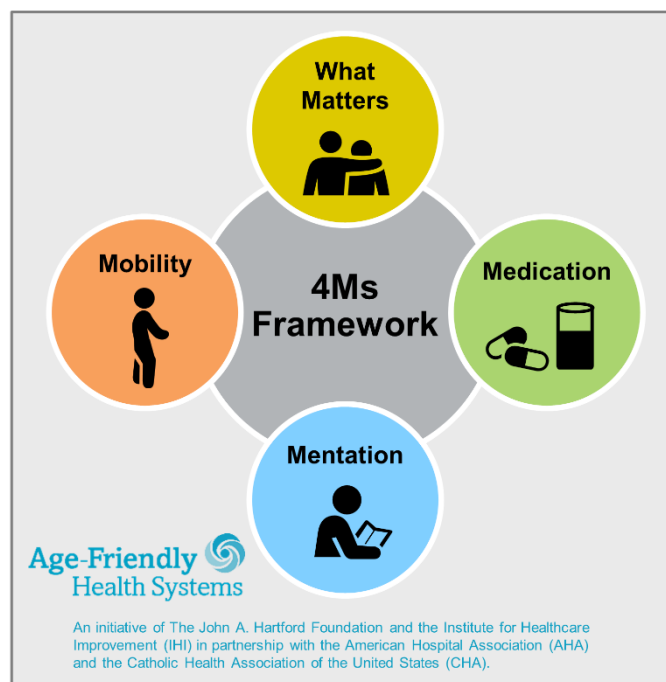
Preventing, identifying, and treating delirium are critical challenges in the inpatient setting. In health care systems across the country, early delirium detection remains a challenge.² Delirium can manifest as sudden confusion, drowsiness, restlessness, and/or agitation.³ It affects an individual's function, eating, and swallowing; increases risks for infection; and can lead to increased length of stay and to mortality.

Delirium (part of mentation) is interconnected with what matters to older adults, the medication they take, and their mobility. Prevention and treatment includes oral hydration; orientation to time, place, and situation (or validation for those with dementia); good sleep practices; access to personal adaptive equipment; and avoiding high-risk medication. There is no approved medication for delirium treatment, and most medications worsen delirium.

Importantly, preventing delirium requires early identification and a systematic approach to management.

In 2024, Banner Health was one of seven health systems selected by IHI for the Diagnostic Excellence – Age-Friendly Health Systems (DxEx – AFHS) Seed Grant Program, supported by the Gordon and Betty Moore Foundation and JAHF. Grantees test new interventions and practices to improve diagnosis for older adults, aligned with the 4Ms.

Figure 1. 4Ms Framework of an Age-Friendly Health System



For related work, this graphic may be used in its entirety without requesting permission. Graphic files and guidance at ihi.org/AgeFriendly

Approach

The team at BUMCP conducted an internal analysis of delirium diagnosis, which found that nurses used the modified brief Confusion Assessment Method (bCAM) tool available in the EHR for delirium assessment with greater than 95 percent of all adult inpatients. However, a positive assessment for delirium occurred in fewer than 3 percent of uses, and delirium was documented by clinicians in only 11 percent of adult inpatients. Research shows that the expected prevalence of delirium for hospitalized patients is between 20–30 percent, with higher rates among older adults.⁴

Nimit Agarwal, MD, MBA, Division Chief, Geriatric Medicine and Age-Friendly Health System Initiative Co-Lead, says that it was important to BUMPC to improve diagnosis of delirium by all clinicians. Agarwal says, “We were looking for something simple. We did not want to ask nurses to do anything additional. We were trying to use technology to solve this problem.”

The team found that nurses’ routine medical assessment of patients already included three components (a neurological assessment, orientation assessment, and verbal assessment) that could indicate cognitive impairment and potential delirium. The team named this combined assessment the Neurological Orientation & Verbal Response Assessment for Delirium (NOVAD), a tool which is now implemented in the Oracle (formerly Cerner) electronic health record (EHR) at Banner Health. The tool leverages existing data in the EHR, which avoids the burden of additional documentation. Initially, the tool was validated retrospectively using 2020 admissions data.⁵ The seed grant provided an opportunity to make early detection of delirium using NOVAD at Banner Health a systematic approach.

Loren Bouchard, Chief Development Officer for Banner Health Foundation, explains that at a large system it can be challenging to find the right stakeholders and elevate a project amongst many priorities. “The spirit of the grant aligns with one of Banner Health’s core values, which is to courageously innovate,” says Bouchard. “We were able to get support from leadership that this was a big issue — worth digging deeper.”

Building a Team

Sumit Agarwal, MBBS, MBA, Senior Director, Clinical Opportunity Development, says that the team views delirium as similar to sepsis, because early alerts and structured interventions improve clinical outcomes like length of stay and mortality. Agarwal explains, “We have a structured approach to implementation of clinical change to issues like this called a Clinical High Reliability Group (CHaRGe). CHaRGes use a systematic process to bring experts from nursing, physicians, social work, pharmacy, and clinical informatics.” The group sets a priority and then uses a “DDI” approach: define, design, and implement.

For delirium, the Geriatrics, Palliative and Ethics CHaRGe led and defined the delirium clinical practice — including screening and assessment expectations and care pathways — under the leadership of Nimit Agarwal. Then, during design phase, they added NOVAD as a live, real-time alert at BUMCP with intention to expand across Banner. The project started in the Acute Care for Elders (ACE) unit and then expanded across the hospital, with about 400 triggers each month.

To avoid alert fatigue, the team routed the alert to the appropriate clinician, kept it actionable rather than interruptive, phased the rollout unit, and monitored trigger volume.

The team set an aim: Increase delirium detection by 50 percent within 3 months of implementation of NOVAD in Cerner.

Integrating All 4Ms

Sumit Agarwal, says, “As we defined the delivery of care in a systematic fashion, we connected this work to all the other aspects of age-friendly care.” For example, on the Acute Care for Elders (ACE) Unit:

- **What Matters:** Detecting delirium early protects what matters most to older adults, such as staying oriented, communicating with their family, and going home at their prior level of function.
- **Medication:** Banner’s work with Oracle in the EHR includes identifying high-risk medications from the American Geriatric Society (AGS) Beer’s criteria.⁶
- **Mentation:** The NOVAD work focuses on delirium detection. Identifying patients with dementia and

depression is another important aspect of mentation management.

- **Mobility:** Early safe mobility is important to prevent and manage delirium. At Banner Health, the team uses an initiative called Mobility Optimizes Virtually Everything (MOVE) as an intervention following NOVAD alerts. The team has now launched MOVE 2.0, which helps mobilize patients who are at higher risk (Bedside Mobility Assessment Tool [BMAT] Level 2 or 3) who need more support. The NOVAD tool helps connect delirium efforts to quality improvement for mobility, by both identifying delirium as a barrier to safe mobility and identifying appropriate resources to support mobility.

The team had particular concerns about hypoactive delirium. Symptoms can include lethargy and slow movements and speech (in contrast to hyperactive delirium, which includes agitation and restlessness). “These patients are easily missed,” says Nimit Agarwal, “Because they are lying in bed, not engaging.”

During rounding on the ACE unit, a geriatric navigator RN and Nimit Agarwal identified an older adult patient who was lethargic and withdrawn, lying in bed and saying very little. The change was a sudden departure from his baseline state as described by his family, and he had fluctuating attention. They suspected that rather than depression, his symptoms might be a result of hypoactive delirium. They asked, “What brings you joy?”

The older adult did not respond. However, his wife said he loved watching basketball and missed playing basketball with his kids. “We put a basketball channel on TV,” says Agarwal. “Then, we got a regular basket from the supply closet, crumpled scrap paper to make balls, and asked him to make hoops.” The patient perked up immediately. He was able to move from bed to sit in a chair and start to play.

Outcomes

- **Increased staff awareness:** “People are now using the word delirium,” says Nimit Agarwal.
- **Increased detection.** NOVAD identified 44 percent of adults as delirium positive – far more than the baseline detection rate of 2 percent using bCAM. Even after accounting for false positives, the team still exceeded initial aim of a 50 percent increase (to 3 percent).

- **More data.** Metrics are shared weekly and monthly using the PowerBI business intelligence tool and Tableau. These data-driven visualizations are shared with caregivers and nursing staff to educate and empower them in early delirium detection.

The team conducted and published an observational study examining the performance of NOVAD.⁵ They found the tool had 87 percent sensitivity and 78 percent specificity for delirium detection.

Lessons Learned

- **Find the tool that best suits your infrastructure and workflow.** One barrier the team ran into was implementation challenges in trying to use the CAM. With support from the IHI Age-Friendly Health Systems team and from Oracle, they identified the 4AT screening tool as a practical substitute that would work better for their situation.
- **Use clear language and avoid assumptions.** Ageism can contribute to dismissing symptoms as “just getting confused.” Older adults with dementia may have existing symptoms, but if their behavior changes from baseline, that can be an indicator of dementia.
- **Work with your EHR.** Direct collaboration with Oracle was key to successfully implementing the NOVAD tool.
- **Age-friendly care means knowing the person.** Understand what matters. Ask on every single admission. Document it so the whole care team is aware of what the older adult wants from their care.
- **Use existing data.** The simplicity of a tool that uses three universally-charted variables set the team up for sustainability.

Another issue is that in Oracle, interdisciplinary plans of care (IPOC), such as plans related to delirium or mobility care, are nursing orders for non-pharmacological interventions. Specific nursing orders such as “cluster care at night” (combining monitoring/intervention into a single visit overnight while patients are sleeping) are not orderable in Oracle by the physician, which creates a gap in implementation of non-pharmacological interventions from day to day. The team is working on a technical solution to make the NOVAD process more efficient.

The emergency department (ED), intensive care unit (ICU), and non-ICU care require tailored approaches with core

standardization. The team is defining the process flow for care in each of these settings.

Next Steps

The team expressed interest in the creation of a registry to track performance on delirium diagnosis across health systems, in order to help organizations understand where they are, set targets, and improve using the finite resources available. Team members would also like to see delirium diagnosis tools built into different EHR platforms.

Beyond the end of the grant, Banner Health is working to integrate this tool into its broader health care delivery system, a network of academic, community, and critical access hospitals as well as outpatient clinics across six states.

Banner Health has experience with spreading age-friendly best practices. It was one of 30 US health systems convened by IHI over 18 months from 2024–2025 in the Age-Friendly System-Wide Spread Collaborative. This learning and action community focused on fully embedding the 4Ms system-wide, to have an equitable impact on older adults across all their sites and settings of care. A growing

list of resources from this work are available at ihi.org/agefriendly.

The Institute for Healthcare Improvement is grateful to Banner Health team who devoted their time and passion to this work. Specifically, we would like to thank Nimit Argarwal, MD, MBA; Sumit Agarwal, MBBS, MBA; Loren Bouchard; and Will Holland, MD, MHA for their leadership in improving delirium diagnosis and strengthening age-friendly care at Banner Health and in the Age-Friendly Health Systems movement.

What Is an Age-Friendly Health System?

Becoming an Age-Friendly Health System entails reliably providing a set of four evidence-based elements of high-quality care, known as the “4Ms,” to all older adults: What Matters, Medication, Mentation, and Mobility.

Visit: ihi.org/AgeFriendly

References

¹ AZ Maricopa Association of Governments. [Age Friendly Arizona and Older Adult Demographics](#).

² Sanga SK and Ansryan LZ. [Early identification and delirium recognition in acute care: A quality improvement initiative](#). *Geriatric Nursing*. May–June 2025; 63:630–634.

³ American Delirium Society. [Delirium Awareness Flyer](#)

⁴ Inouye SK, Westendorp RGJ, Saczynski JS. [Delirium in elderly people](#). *Lancet*. 2014; 383(9920):911–922

⁵ Hendrie K, Rangan P, Agarwal SK, Pagali S, Khan B, Kidwai S, Agarwal N. [Neurological Orientation and Verbal Assessment of Delirium-Hospital Clinical Decision Support Tool](#). *Journal of Medical Systems*. 2025. May 13;49(1):62.

⁶ Age-Friendly Health Systems. [Guide to Electronic Health Record Requirements for Adoption of the 4Ms: An Implementation Guide for Health Systems with Oracle Examples](#). March 2026.