Diagnostic Excellence Through Partnership with Older Adults and Caregivers

Background

Penn State Health Milton S. Hershey Medical Center (Penn State), headquartered in Hershey, Pennsylvania, and The Cedars, located in Portland, Maine, are unique organizations serving diverse populations of older adults.

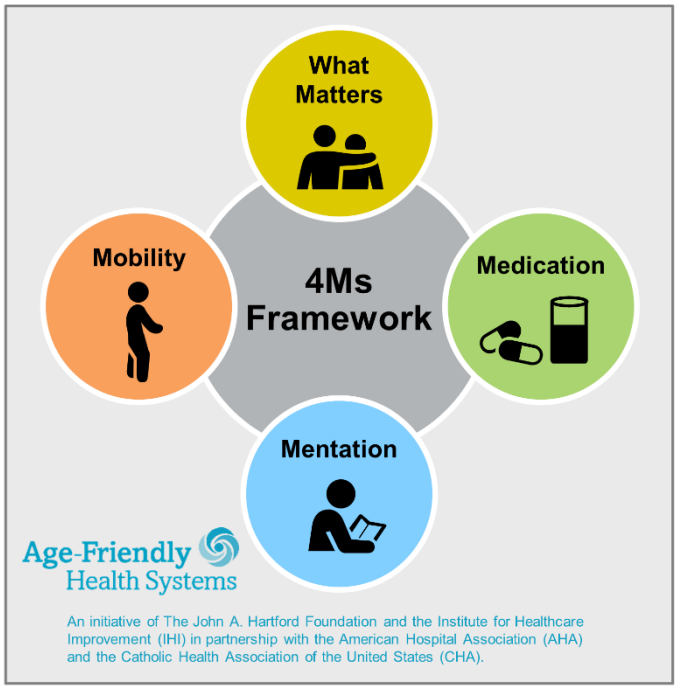
Penn State, the largest hospital in Penn State Health System, is a 619-bed non-profit, tertiary, research and academic medical center serving central Pennsylvania. In FY2025, 36.8 percent of all discharges were adults age 65 and over and 12.7 percent were age 80 and over. The organization launched a series of foundational initiatives to transform care for older adults. In 2023, Penn State was recognized as an Age-Friendly Health System — Committed to Care Excellence. What began as a series of focused projects evolved into a culture shift prioritizing whole-person care.

The Cedars is a comprehensive, non-profit older adult living community, founded in 1929 as the Jewish Home for Aged to serve people of all faiths and backgrounds. It offers a full continuum of living and health care options including independent living, assisted living, assisted living memory care, rehabilitation, skilled nursing care, and community-based services. Their mission of innovating for healthy aging includes a commitment to the Household Model of care that empowers direct care staff and positions the resident and their family as key partners in care delivery. In 2024, The Cedars 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.

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



In 2024, Penn State and The Cedars were among 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.

Penn State observed a **14 percent reduction in total medications at discharge** as of December 2025. Nearly 30 percent of these patients had at least one potentially inappropriate medication discontinued.

From April to September 2025, in the SNF population at The Cedars, the **30-day rehospitalization rate decreased from 16.7 percent to 2.4 percent**.

Approach

Both Penn State and The Cedars entered the work with organizational cultures committed to quality improvement and leadership invested in changes designed to partner with older adults and those who matter to them.

Penn State

Medication safety was the cornerstone of Penn State's goals to improve quality of care for older adults. Previous efforts included targeted alerts to reduce potentially inappropriate medications (PIMs) and high-risk drugs, which affect all 4Ms and heighten the risk of falls, delirium, fractures, and other harm. Existing deprescribing efforts were often clinician-driven at the point of order entry, disconnected from patient, caregiver, and interprofessional needs.

To maximize older adult engagement, the organization built on prior successes in antimicrobial stewardship and the use of human-centered design (HCD). First, a multi-disciplinary team was formed with members from geriatric medicine, hospital medicine, internal medicine, the pharmacy, nursing, and the community, including older adults and caregivers.

The team crafted SMS text messages for clinicians with individualized information about patient medications and history. The messages started with building awareness of identification of polypharmacy (use of five or more medicaions) in the inpatient setting.

Guided by the HCD principle of empathy, the Penn State team launched a months-long effort to capture what mattered to stakeholders via focus groups, interviews, and surveys. They engaged older adults, family and caregivers, hospitalists, nurses, residents, pharmacists, and community members. The team withheld their own assumptions so that older adults, caregivers, and interprofessionals would drive solutions for deprescribing and age-friendly care.

The Cedars

The team at The Cedars identified rehospitalization rates from the skilled nursing facility (SNF) as a priority, given the impact on both patient outcomes and health care costs. The organization's rates exceeded the state and national benchmarks. Additionally, the organization's planned efforts to increase occupancy and expand the Short Stay Rehabilitation program were expected to increase inpatient acuity levels, exacerbating rehospitalization risk.

The team focused on better understanding and addressing what matters most to older adults and using resident goals to guide clinical decision-making and individualized care planning. They also engaged experts to inform the design.

During planning, The Cedars engaged clinical staff, department heads, medical leadership, patients, and families and caregivers to build awareness, gather input, and foster shared ownership. After establishing a clear governance structure, the organization created a Patient and Family Advisory Committee with defined roles, meeting cadences, and accountability mechanisms to ensure sustained momentum. The majority of the committee members were older adults and family or caregivers who had experienced a SNF stay at The Cedars.

Diagnostic Excellence

The two organizations were committed to accurate, timely, and patient-centered diagnosis. While each organization focused on different steps in the diagnostic process, the implementation strategies were similar and included organizational readiness, existing diagnostic safety concerns, and clear action plans to address gaps.

Penn State

Penn State focused on information integration and interpretation for diagnosis of polypharmacy. Alerts provided to clinicians included recommendations to document polypharmacy and to use the polypharmacy diagnosis code to improve documentation accuracy. Medication risk identification was embedded into workflows to improve clinical decision-making. Older adult and family input was essential to developing meaningful, actionable solutions that incorporated the patients' interest in and concerns about polypharmacy.

Aims included:

- Reduce overall medication count by 20 percent among hospitalized adults age 80 and over that receive the intervention.
- Increase documentation of polypharmacy and inclusion of polypharmacy Z-code in billing.
- Create patient-centered solutions to promote empowered deprescribing in the inpatient setting through HCD.

The Cedars

The Cedars focused on building systematic processes for accurate, timely, and equitable identification of clinical deterioration and rehospitalization risk in the SNF population. The LACE index (Length of stay, Acuity, Comorbidities, Emergency presentations within prior 6 months) was used as the primary risk stratification tool for proactive identification and enrollment of high-risk patients into a prevention program before or immediately upon admission. The INTERACT program provided a framework for early detection of clinical changes, with Stop and Watch providing direct care staff with a structured mechanism to identify and communicate changes in condition. SBAR (Situation-Background-Assessment-Recommendation) was used for standardized, actionable communications among clinical team members. The system learned from prior errors and near misses related to delayed or missed diagnoses that contribute to unplanned readmissions.

Aims included:

- Reduce the SNF unplanned rehospitalization rate to 15 percent or lower and maintain this improvement
- Ensure timely and reliable use of evidence-based, standardized screening and assessment practices and establish interdisciplinary team reviews by day three of admission.

The 4Ms

Each organization used the 4Ms to steer their work, educating all team members on age-friendly care. Older adults and families and caregivers provided practical improvements based on their experience of each M.

What Matters

Penn State: Each alert is individualized to the patient. What Matters is integrated into alert design, deprescribing guidance, and the initial nursing assessment.

The Cedars: Including older adults and caregivers at every state of the care journey, from admission through discharge planning, ensures that individual goals and preferences guided care decisions.

Medication

Penn State: Real-time alerts prompt the health care team to recognize PIMs and deprescribing opportunities and to consider whether medications align with patient goals and functional needs.

The Cedars: The team implemented rigorous reconciliation protocols within three hours of admission, ongoing medication reviews, and targeted discharge of medication education for patients transitioning to the community.

Mentation

Penn State: Deprescribing guidance included PIMs known to impact delirium, depression, and dementia in older adults. Highlighting medications that elevate delirium risk helps clinicians identify and address contributors to cognitive decline.

The Cedars: The team used validated tools including the PHQ-9 for depression, CAM for delirium, and BIMS for cognitive screening, with results directly informing individualized care.

Mobility

Penn State: The team flagged medications associated with falls and fractures, such as opioids. The project lead, Amy Westcott, MD, MHPE, MBA, geriatrician and professor in the Department of Medicine, noted, “We were consistently seeing falls, delirium, and other preventable complications that were closely tied to prescribing inertia and challenges in managing polypharmacy.”

The Cedars: Structured therapy schedules, standardized functional assessments, and rehabilitation services education focused on recognizing and responding to functional decline.

Patient and Family Engagement

Penn State

The team used a structured, stakeholder-driven lens to develop sustainable solutions aligned with real-world workflows and what matters to older adults and their families and caregivers. The research team included a community member who has experience as a caregiver and patient. A community group was also started to seek ongoing feedback.

Penn State conducted interviews, journey mapping, and stakeholder engagement. This empathy phase of HCD uncovered insights concerning caregiver reliance, communication gaps, medication burden, and trust in clinicians. These ideas informed prototypes for education tools, care-management support, and a PIM Liaison role integrated into existing workflows. This organization also adapted My Health Checklist to create a short, inpatient-specific tool that captures all 4Ms.

A community member engaged during the process said, "I was impressed during the community interviews how much the general population was engaged… We could feel at end of interviews that we were doing the right things -- and asking questions concerning drugs being prescribed was the right thing to do."

The Cedars

From the start, patient partnership was designed into every aspect of the rehospitalization prevention program. At the organizational level, the Patient and Family Advisory Committee brought lived experience and diverse perspectives to program design, implementation, and continuous improvement. The committee's deep involvement directly shaped clinical practices and operations. Meetings followed a structured format that included data review, education on age-friendly care, and facilitated discussions to elicit input. Tangible results include a "Quick Guide" for admissions, enhanced medication reconciliation, redesigned staff identification, and patient access to care plan documentation.

Individual patient-level engagement included patient-centered admission processes, participation in interdisciplinary team meetings, shared care planning, and systematic assessment of what matters most to each older adult to guide care and transition planning. Early on, The Cedars implemented real-time satisfaction surveys on days 3 and 10 during the SNF stay, as well as post-discharge surveys on days 7 and 21, providing continuous feedback for quality improvement. Social determinants of health including transportation, isolation, and health care literacy are systematically assessed and addressed as integral components to support equitable, personalized care journeys and transition to the community.

Outcomes

Penn State

When patients received SMS outreach, the organization observed a 14 percent reduction in total medications at discharge as of December 2025, representing a measurable decrease in medication burden. Of these patients, nearly 30 percent had at least one PIM discontinued. Preliminary data analysis shows a 21 percent reduction in PIMs, with opioids and benzodiazepines being the medications most frequently deprescribed, reflecting an impact on high-risk prescribing. SMS alert content and workflows were continuously refined through rapid Plan-Do-Study-Act (PDSA) cycles, improving clarity, applicability, and usability. The decrease in medications also reduced anticholinergic and overall medication burden.

HCD methods generated new tools and roles that helped improve efficiency and effectiveness of deprescribing workflows across the inpatient experience. The work gained momentum, leading to broader integration efforts and increased engagement from operational and clinical leaders.

Interviews with older adults and caregivers included comments such as: "I just take so many pills," "They just discharged him at night," and "I trust them… and I don't tell them, 'Hey I don't want that.'" These insights were synthesized into a patient journey map that visualizes the real-world experience of navigating polypharmacy during hospitalization, revealing opportunities for future sustainable deprescribing interventions.

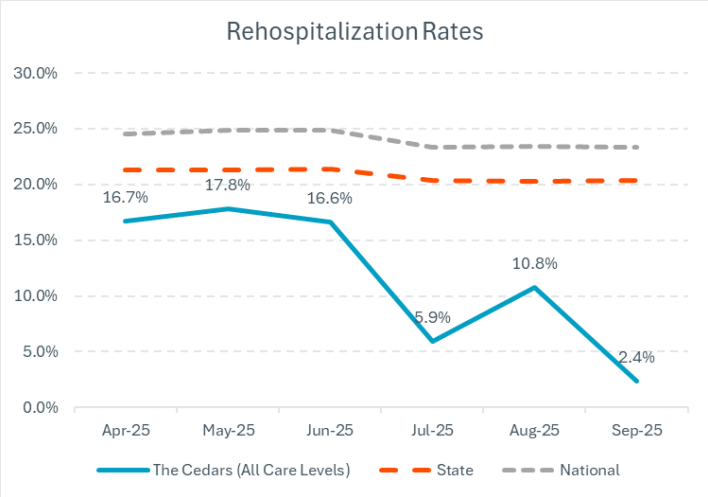
The Cedars

In April 2025 (at the start of the project), the 30-day rehospitalization rate in the SNF population was 16.7 percent. By September 2025, the rate was down to 2.4 percent, a transformation that represents real lives improved (Figure 2). The Cedars achieved 100 percent screening for all 244 admissions using the LACE index, supporting proactive interventions to address risk.

Nursing staff achieved 100 percent compliance with medication reconciliation within three hours of admission and staff reached 100 percent completion of PHQ-9 depression and CAM delirium screenings. Staff reported that centering on patients' values and preferences gave their work deeper meaning and purpose. When therapists, nurses, social workers, and others noted how their individual contributions connected to a resident's specific

goal, like attending a grandson's graduation, their work felt more collaborative and impactful.

Figure 2. SNF Rehospitalization Rates at The Cedars



Lessons Learned

The Penn State team noted:

- Deprescribing cannot focus solely on medication lists — it must address **the needs of patients, caregivers, and clinicians** simultaneously to be meaningful and sustainable.
- **Human-centered design** plays a critical role, revealing system gaps that would never surface through clinical data alone.
- Secure messaging offers timely, workflow-aligned **clinical decision support**. When delivered at the right moment, these alerts help clinicians act without adding burden.
- Sustainable deprescribing requires a **multi-modal approach** — combining education, workflow redesign, and the development of new roles — to support long-term change.
- Begin with deep empathy and broad stakeholder engagement, combining **data-driven approaches with patient-centered design**. Aligning all interventions with the 4Ms ensures that efforts remain anchored in what matters most.

The Cedars team shared:

- A **patient and family advisory group** can shape the project's direction, challenge assumptions, ensure the focus remains on what truly matters to residents, and create feedback loops for relevant and sustainable improvements.
- There is power in designing **systematic, coordinated care**. Many best practices were in place before this project (e.g., medication reviews, therapy evaluations, cognitive screening), but these practices happened in silos, without a shared understanding of the patient's goals. The 4Ms Framework provided a common language and organizing principle for collaboration.
- **Timely intervention** is everything. When the team completed screening and interventions within the targeted timeframes, outcomes improved dramatically. Delays of even a few days could potentially increase rehospitalization risk.
- **Data transparency and review** drives improvement and accountability**.** Monthly data reviews with the project team and advisory committee created a rhythm of continuous learning and adjustment.
- Use **quantitative data and qualitative feedback**. Honoring both data and lived experience made the quality improvement efforts more robust and human-centered.

Angela Hunt, PT, MS, MLA, Chief Innovation Officer and the project team leader, said, "The physical therapist doesn't just work on strength; she's helping Mr. Anderson* achieve his goal of walking his daughter down the aisle. The pharmacist isn't just reducing pill burden; he's eliminating medications that cloud Mrs. Chen's mind so she can enjoy conversations with her grandchildren."

Next Steps

Beyond the project timeline, Penn State plans to integrate tools into electronic health record workflows, pharmacy dashboards, and geriatric quality metrics, and expand deprescribing interventions to outpatient transitions and skilled nursing facilities. The team will continue to integrate HCD methods and refine tools and roles.

The Cedars team plans to codify the 4Ms as the standard of care for all older adults, integrating age-friendly care into staff onboarding and develop advance training pathways. The team will establish regular reporting of 4Ms process measures (e.g., completion of timely assessments) and

outcomes measure (e.g., rehospitalization rates, fall rates, satisfaction scores). The Cedars is assessing whether the Patient and Family Advisory Committee will continue as part of the permanent governance structure to review quality data, provide input on new initiatives, give feedback on policies and procedures, and serve as a bridge between leadership and the resident the family community.

**Residents' names have been changed.*

Acknowledgments

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The Cedars: Angela Hunt, PT, MS, MLA; David Polisner, MD; Susan Dionne-Jones, RN, MSN; Brian DesPres, OTR/L, MBA, MLA; and Leah Hayes, RN, MSN.

IHI and the teams are grateful to the community members, including older adults, families, and caregivers, who continue to bring their expertise and personal experience to this work.

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