

Poster

# Technology and Dynamic Pathways: How to Improve Nursing Care, Documentation, and Efficiency

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## Abstract

**Background:** Approximately 60% of adverse events in skilled nursing facilities are likely preventable. This provides an opportunity to improve care and decrease costs for ill, and especially aged, patients. The primary line of defense against adverse events in these facilities are the nurses caring for these patients each day. Nurses are responsible for recognizing early warning signs of illness and preventing falls and other complications. The care of patients with multiple comorbidities requires nurses to attend to an often overwhelming set of interacting details.

**Objective:** Our goal is to operationalize standards of care that can be implemented by nursing staff at skilled nursing and long-term care facilities in a manner complementing their natural workflow and facilitating patient interaction and shift documentation. To improve point of care patient management, nurses require a mobile solution that can guide their patient care unobtrusively.

**Methods:** Nurses at a Boston-area 100-bed skilled nursing/long-term care facility used our solution consisting of an app on a mobile device together with a Web-based administration and reporting system. Our custom software running on an iPod Touch device implements an adaptive methodology for succinctly guiding nurses through a systematic review of systems, a physical exam, a fall risk protocol, and other assessments suitable to their roles in the nursing facility. Dynamically created checklists that prescribe appropriate and immediate nursing interventions are automatically presented to the nurses following each assessment based on the data collected. The software utilizes behavioral “nudges” to nurse-users to minimize errors and improve speed of data entry. Additionally, a custom content creation system allows for high-level abstraction of protocol logic, enabling real-time improvement and customization of complex protocol algorithms without the need for error-prone software programming. These methods facilitate automated reporting that aids the structured thought processes of providers and caregivers.

**Results:** Pilot results were acquired using qualitative surveys and free-form interviews. Nurses reported a high facility after only an initial 15-minute training session. All nurses confirmed that having access to an efficient and mobile care facilitation device improved the likelihood of identifying patient complications. They also felt that a mobile documentation system lowered error rates by encouraging real-time documentation. Furthermore, systematic data gathering provided an improved level of documentation both in terms of comprehensiveness and clarity. Nurses claimed the system increased efficiency and lowered the overall time required for combined patient assessment and documentation. Most importantly, staff satisfaction was highly positive, encouraging continued usage of the intervention.

**Conclusions:** Technological interventions at skilled nursing facilities, when implemented to address the point-of-care needs of nursing personnel, can positively impact quality improvement goals, empower nursing staff, and improve patient care. The suite of tools developed here enables the operationalization of standards of care with sufficient comprehensiveness to address a sufficient portion of the complexity faced in daily nursing duties. We conclude that access to real-time protocols has a highly beneficial effect on nursing care.

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**KEYWORDS**

medical informatics; mHealth; nursing; standard of care

This poster was presented at the Connected Health Symposium 2016, October 20-21, Boston, MA, United States. The poster is displayed as an image in [Figure 1](#) and as a PDF in [Multimedia Appendix 1](#).

Figure 1. Poster.

**Technology and dynamic pathways**  
How to improve nursing care, documentation and efficiency

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**Background**

**The Nursing Care Challenge**

Approximately **in 5** Medicare Beneficiaries is readmitted within of being discharged from the hospital

**Over 2/3** of Medicare Beneficiaries have 2 or more chronic conditions

Nurses are the primary line of defense

**60% of adverse events in SNFs (often resulting in hospital readmissions) are preventable.<sup>1</sup>**

**Challenges**

- Patients with multiple co-morbidities requires nurses to attend to an enormous set of interacting details.
- Recommended that 80% of nurses obtain a bachelor's degree (vs < 40%, and far fewer in Nursing Homes).<sup>2</sup>

**The need for care standardization**

**Nurses face an uphill battle to provide optimal care**

- Nurses deal with **3 – 14 interruptions per hour**, increasing the potential for medical errors<sup>3</sup>
- Many nurses in long term care have only an associate's degree and may be unprepared for caring for complex chronic conditions
- Among the most common regulatory violations by nursing homes in 2012:<sup>4</sup>
  - o Provide necessary care for highest practicable well-being
  - o Provide services that meet professional standards
  - o Keep clinical records that meet professional standards

... 22 percent of Medicare patients who stayed in a nursing facility for 35 days or less experienced harm as a result of their medical care. An additional 11 percent suffered temporary injury. ... Medicare spent \$2.8 billion on hospital treatment in 2011 because of harm experienced in nursing facilities.<sup>5</sup>

**How a standardized checklist of protocols can help**

- ✓ Checklists proven to help reduce error in multiple healthcare settings<sup>6</sup>
- ✓ Recording information immediately reduces the risk of forgetting or reporting inaccuracies
- ✓ All nurses follow the same standards, regardless of education
- ✓ All patients receive care according to the latest published nursing protocols
- ✓ Allow for improvement in measures for which nursing homes commonly receive citations

**References**

1. Levinson, D.R. (2014). Adverse events in skilled nursing facilities: National incidence among Medicare beneficiaries (083-06-11-00370). Washington, DC: Office of the Inspector General, U.S. Department of Health and Human Services. Retrieved from <https://oig.hhs.gov/oeo/083-06-11-00370.pdf>
2. The Business Case for Having At Least 80 Percent of Nurses Hold Bachelor's Degrees (2014, October 7). Retrieved from <http://www.nursingworld.org/practiceandresearch/2014/10/the-business-case-for-having-at-least-80-percent-of-nurses-bach.html>
3. Center for Medicare and Medicaid Services. Chronic Conditions among Medicare Beneficiaries. Chartbook, 2012 Edition. Baltimore, MD, 2012.
4. Kohnon B.L., Adelman M. (2012). Interruptions and multitasking in nursing care. J. Comm. J. Qual Patient Saf. 20(3): 126-132.
5. Orszulak, G. (2012). The 10 Most Common Nursing Home Violations. Retrieved from <http://www.medicare.gov/publications/10-most-common-nursing-home-violations>
6. Galanter, A. (2009). The checklist manifesto: How to get things right. New York, NY: HarperCollins Books.
7. Thomas, K. (2015, April 14). In Race for Medicare Dollars, Nursing Home Care May Lag. The New York Times.

**Our Solution: A "Protocol Engine"**

**Proprietary protocol engine platform**

Distributes sophisticated protocols and checklists to nurses at the patient bedside.

**The Nurse Experience**

- Easily keep track of patients
- Break down protocols into simple questions
- Standardized answers, while leaving flexibility
- Automatic checklists for follow-up tasks
- Alerts when dangerous condition is indicated

Protocols by Dr. Terry Buttaro:
 

- Review of Systems
- Physical Exam
- Fall Prevention
- Daily Quick Check
- ... and others

- Provides checklist for care
- Facilitates positive nurse-patient interactions
- Focuses attention onto patient
- Handles all details of assessments
- Automates documentation to cut down on errors
- All care and documentation resulting from use of this app meets professional standards

**Pilot Study**

**Setting**

- LPNs in a 100-bed Skilled Nursing/Long Term Care Facility.
- Nurse Practitioners in primary care and LTCs.

**Training**

- Nurses began using the app after only 15 minutes of general instruction.

**Methods**

- Nurses used software in a natural clinical setting.
- Preliminary efficacy was assessed with qualitative questionnaires.

**Results**

Fast learning curve and natural patient experience. "It was very easy to use and [the patient] did not find it distracting at all."

Protocol successfully identified complications. "I never would have thought to ask him about that..."

Raised the bar on quality, comprehensiveness and clarity of documentation

Dramatically reduced time spent recording patient assessment, improving overall efficiency. "It is an incredible time saver!!!"

**Conclusions**

- Nurses are very open to digital technology that helps them do their jobs.
- Systematic protocols are well-received, lifting the cognitive burden of information overload and distraction.
- This technology is a time-saver, rather than an added burden.

**Ongoing Projects**

- Facilitate quality improvement in lowest-performing nursing homes (as identified by CMS)
- Digital nursing education initiative

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**Multimedia Appendix 1**

Poster.

[\[PDF File \(Adobe PDF File\), 3MB-Multimedia Appendix 1\]](#)

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