

# Using a Learning Health Care System to Advance Nursing and Patient Care

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In a learning health care system (LHS), clinical operations are integrated with research to support investigative endeavors that address real-world clinical questions, including those focused on nursing care. At a southern university medical center, an established LHS has helped to facilitate the examination of practice innovations prior to system-wide implementation and enables nurse leaders to provide solutions to clinical practice and patient care issues.

The Institute of Medicine (IOM) has identified the value of a learning health care system (LHS) as a system in which science, informatics, and culture are aligned for continuous improvement and innovation, incorporating best practices and new knowledge to improve patient care.<sup>1</sup> The IOM report on the LHS was the first formal product of a roundtable on evidence-based medicine that reported on a 2-day workshop held in July 2006, convened to identify a broad range of issues important to re-engineering clinical research to optimize health care delivery to promote effectiveness and efficiency.<sup>2</sup> And this concept has continued to evolve and expand. In a LHS, clinical operations are integrated with research to support investigative endeavors that address real-world clinical questions, including those focused on nursing care. At a southern university medical center, an established LHS facilitates the examination of practice innovations prior to system-wide implementation and enables nurses to provide solutions to clinical practice and patient care issues.

The LHS platform at Vanderbilt University Medical Center was established in 2017 with the goal of creating generalizable knowledge. This differentiates the LHS platform from other programs that have adopted a quality improvement paradigm.<sup>3</sup> By supporting pragmatic clinical trials at the intersection of research, operations, and clinical care, the LHS platform advances models and processes of care through carefully designed, rigorous study.<sup>4</sup> The focus is on optimizing the quality, safety, efficiency, and value of health care within the health care system<sup>5</sup> by promoting the elevation of evidence-based best practice recommendations.

## PROCESS

Research concepts find their way to the platform through varied avenues, but all find a first stop in workshop space. The LHS offers workshops to help guide the discussion of a project's proposed intervention, measurements, and study design. This is accomplished with an eye toward pragmatism, appropriate structuring, rigor, and reproducibility. Potential LHS projects are then discussed at a monthly interprofessional committee meeting that includes nursing and

## KEY POINTS

- **Establishing a learning health care system can facilitate the examination of practice innovations prior to system-wide implementation and enables nurses to provide solutions to clinical practice and patient care issues.**
- **Nurse leaders can help to support and champion nurse led initiatives as part of a learning health care system.**
- **The benefits of a learning health care system include multiprofessional collaboration to explore the impact of potential initiatives aimed at improving patient care and enhancing the quality of care.**
- **Nurse leaders play a key role in supporting and advocating for the use of a learning health care system to advance nursing and patient care and support research.**

**Table 1.** Examples of Leaning Health Care System Studies Relevant to Nursing Care

Study Focus	Study Design	Results	Impact on Nursing Care
<i>Examining the impact of a follow-up telephone call program as a readmission reduction initiative (Yiadam et al., 2020)<sup>6</sup></i>	Pragmatic randomized controlled real-world effectiveness trial of 3054 medical patients discharged home, randomized to the telephone call program (n = 1534) or usual care discharge (n = 1520)	There were no differences in 30-day inpatient readmissions, emergency department revisits, or mortality between telephone call and usual care groups.	The results of the study helped to evaluate the use of a nurse telephone follow-up to reinforce use of the discharge plan and enabled the health system to better utilize nursing care resources.
<i>Assessing the impact of chlorhexidine wipes in comparison to soap and water in preventing hospital-acquired infections (Noto et al., 2015)<sup>7</sup></i>	Pragmatic, cluster randomized, crossover study of 9340 patients admitted to 5 adult intensive care units	Soap and water were found to be just as effective as chlorhexidine wipes in preventing infections (composite of central line-associated bloodstream infections, catheter-associated urinary tract infections, ventilator-associated pneumonia, and Clostridium difficile infections).	The results of the study impacted nursing care with respect to patient bathing; institution-wide change to use chlorhexidine wipes was not implemented.
<i>Use of balanced crystalloids compared to normal saline for fluid administration (Semler et al., 2018)<sup>8</sup></i>	Pragmatic, cluster-randomized, multiple-crossover trial with 15,802 patients conducted in 5 intensive care units	The use of balanced crystalloids for intravenous fluid administration resulted in a lower rate of the composite outcome of death from any cause, new renal-replacement therapy, or persistent renal dysfunction than the use of saline.	As nursing care involves the administration of fluids, the study results helped to identify the value of balanced crystalloids compared to normal saline for critically ill patients.
<i>A proactive BIT and trauma informed care and de-escalation training of bedside nurses on decreasing disruptive patient behavior (Hasselblad et al., 2022)<sup>9</sup></i>	Pragmatic crossover design for 10 months on 2 clinical units	BIT intervention did not result in reducing documented disruptive behaviors. However, it did result in perceived improvement in the ability of nurses to provide care for patients exhibiting disruptive, threatening, or acting out behavior.	This trial highlights the value of testing administrative initiatives aimed at improving patient care. Originally planned for an institutional wide initiative, the results of the study helped to identify the best use of the BIT team.

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**Table 1.** (continued)

Study Focus	Study Design	Results	Impact on Nursing Care
<i>Does proning help improve patient oxygenation (Qian et al., 2022)<sup>10</sup></i>	This pragmatic, nonrandomized controlled trial was conducted at 2 academic medical centers during the COVID-19 pandemic. A total of 501 adult patients with COVID-19–associated hypoxemia who had not received mechanical ventilation were enrolled from May 13 to December 11, 2020.	Prone positioning offered no observed clinical benefit among patients with COVID-19–associated hypoxemia who had not received mechanical ventilation.	The results of the study helped to guide nursing care for patients with COVID-19, identifying that the use of prone positioning among patients with COVID-19 who require supplemental oxygen, but are not receiving invasive mechanical ventilation, may not be associated with patient benefits.
<i>Impact of an ICU recovery pilot program for survivors of critical illness (Bloom et al., 2019)<sup>11</sup></i>	Prospective, randomized pilot trial. Patients randomized to the ICU recovery program group were offered a structured 10-intervention program, including an inpatient visit by a nurse practitioner, an informational pamphlet, a 24 hours a day, 7 days a week phone number for the recovery team, and an outpatient ICU recovery clinic visit with a critical care physician, nurse practitioner, pharmacist, psychologist, and case manager.	Patients randomized to the ICU recovery program (n = 111) and usual care (n = 121) were similar at baseline. A total of 16 patients (14.4%) in the ICU recovery program group and 26 patients (21.5%) in the usual care group were readmitted to the study hospital within 30 days of discharge (p = 0.16). The composite outcome of death or readmission within 30 days of hospital discharge occurred in 20 patients (18%) in the ICU recovery program group and 36 patients (29.8%) in usual care group (p = 0.04).	The results of the study identified that a multidisciplinary ICU recovery program with nurse practitioner involvement was beneficial in preventing hospital readmissions.

*BIT, behavioral intervention team; ICU, intensive care unit.*

medical leaders, administrators, clinicians, methodologists, researchers, biostatisticians, and community members. As the partnership between research and operations has matured, when ideas for development and initiation of new clinical programs emerge, projects are immediately directed toward LHS to be fleshed out in workshops and designed in collaboration with the LHS methodologists and biostatisticians.<sup>4</sup> This early engagement promotes the open dialogue, team building, and development of shared vision essential to the success of projects meant to be woven into the fabric of an organization. Nursing leaders serve on the LHS committee and provide input on all phases of study design and implementation, including serving as principal and co-investigators of nursing focused studies.

## OUTCOMES

More than 50 studies have been supported by the LHS; several have focused on nursing-related care models and processes, including assessing the impact of nurse discharge follow-up phone calls, use of chlorhexidine wipes in comparison to soap and water in preventing hospital-acquired infections, the use of balanced crystalloids compared to normal saline for fluid administration, use of a proactive behavioral intervention team (BIT) and trauma informed care and de-escalation training of bedside nurses, and testing the impact of a new nursing model of care, among others (*Table 1*).<sup>6-11</sup> Nursing LHS projects in development include interventions to maximize patient mobility and reduce hospital-acquired pressure injury.

LHS-supported research enables nurse leaders to identify important clinical issues that could be formally studied without disrupting bedside care, as well as opportunities for clinical nurses to learn and be engaged in research studies. Collectively, a LHS can expand nursing research capacity and can improve clinical quality, increase patient satisfaction, improve health equity, and reduce costs for the health care system.

## LESSONS LEARNED

Based on our experiences participating in a LHS environment, nurse leaders play an important role, including supporting nurses who bring forth an idea for potential study. One specific example of a recent LHS supported study focused on evaluating the implementation of a BIT in reducing patient disruptive behavior.<sup>9</sup> The “Disruptive bEhavior manageMENT ANd prevention in hospitalized patients using a behaviORal intervention team” (DEMEANOR) study was a pragmatic, cluster, crossover trial conducted on 2 adult medical surgical units. The primary outcomes

were documented behavioral interventions to manage disruptive, threatening, or acting out behavior, and nursing staff self-reported comfort with managing patients with disruptive, threatening, or active out behavior.<sup>12</sup>

A total of 3800 patients hospitalized on the 2 units met the criteria for inclusion. Of those, 1841 (48.4%) were exposed to the BIT intervention, which consisted of proactive comprehensive psychiatric assessment with a focus on safety, cognitive assessment, medical comorbidity, and current medications by a psychiatric mental health advanced practice nurse and social worker with psychiatrist consultation, and 1959 (51.6%) were in the control group.

A total of 11,132 individual behavioral issues associated with 203 patient encounters were evaluated. No differences were found in the use of behavioral interventions, violence control measures, risk or injurious behavior, or sitter use between patients exposed to BIT and the control group/unit. However, nurses (82 pre and 48 post) rated BIT as the most beneficial support they received to manage patients exhibiting disruptive, threatening, or acting out behavior.<sup>9</sup> Nurses also perceived less physical abuse and a decrease in situational anxiety in managing disruptive patients. These findings are interesting and important in light of the continued emphasis on promoting a safe work environment for nurses and decreasing workplace violence.<sup>9</sup> As a result of the study, the BIT was retained to provide consultation to nurses on select units with higher numbers of patients with behavioral comorbidities.

As one example of an LHS-supported study impacting nursing care, this initiative showcases the impact of imbedding a LHS within a health system. Nurse leaders can help to support and champion nurse-led initiatives as part of a LHS. The benefits of a LHS include multiprofessional collaboration to explore the impact of potential initiatives aimed at improving patient care and enhancing the quality of care. Nurses as key implementers within an organization are truly entrenched in health care processes with investment in patient outcomes. Their role is pivotal in ensuring appropriate translation of research findings into clinical practice and are essential to integration and uptake of evidence into practice changes. As such, it has also helped to support the health system’s Magnet® renewal applications in showcasing nurse involvement in evidence-based practice and research initiatives. In bringing together health system leaders, frontline clinicians, technology support, researchers, and others, an LHS helps to optimize health care delivery to promote effectiveness and efficiency. Nurse leaders play a key role in supporting and advocating for the use of a LHS to advance nursing and patient care and support research.

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