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Into Practice

Standard work for room entry: Linking lean, hand hygiene, and patient-centeredness ☆

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ABSTRACT

Background: Healthcare-associated infections are costly and fatal. Substantial front-line, administrative, regulatory, and research efforts have focused on improving hand hygiene.
Problem: While broad agreement exists that hand hygiene is the most important single approach to infection prevention, compliance with hand hygiene is typically only about 40%[1].
Goals: Our aim was to develop a standard process for room entry in the intensive care unit that improved compliance with hand hygiene and allowed for maximum efficiency.
Strategy: We recognized that hand hygiene is a single step in a substantially more complicated process of room entry. We applied Lean engineering techniques to develop a standard process that included both physical steps and also standard communication elements from provider to patients and families and created a physical environment to support this.
Results: We observed meaningful improvement in the performance of the new standard as well as time savings for clinical providers with each room entry. We also observed an increase in room entries that included verbal communication and an explanation of what the clinician was entering the room to do.
Implications: The design and implementation of a standardized room entry process and the creation of an environment that supports that new process has resulted in measurable positive outcomes on the medical intensive care unit, including quality, patient experience, efficiency, and staff satisfaction. Designing a process, rather than viewing tasks that need to happen in close proximity in time (either serially or in parallel) as unrelated, simplifies work for staff and results in higher compliance to individual tasks.

1. Background

The U.S. Department of Health and Human Services estimates that 1 out of every 25 patients in U.S. hospitals has a healthcare-associated infection, at a cost of billions of dollars and tens of thousands of lives each year.[2,3] While broad agreement exists that hand hygiene is the most important single approach to infection prevention, compliance with hand hygiene is typically only about 40%,[1] and more recent data suggests this may be a substantial over-estimate of actual performance.[4] What remains unknown: why does perfect hand hygiene compliance remain so difficult for many institutions to obtain and sustain?

Substantial front-line, administrative, regulatory, and research efforts have focused on improving hand hygiene. Efforts have including peer feedback, isolated introduction of electronic monitoring technology, immediate-feedback programs by trained observers, and multimodal programs, among other approaches.[5–12] To our knowledge, however, hand hygiene has almost always been viewed as an isolated task. In the process of applying Lean engineering techniques to our intensive care units, we began to recognize that hand hygiene is a single step in a substantially more complicated process of room entry. This provided the opportunity to use industrial engineering techniques to redesign the entire process of room entry, focusing not only on improving hand hygiene and contact precautions, but also on embedding standard work around communicating with patients and their families.

2. Organizational context

Beth Israel Deaconess Medical Center (BIDMC) is an urban, tertiary care medical center affiliated with Harvard Medical School. The hospital has 649 licensed beds, including 440 medical–surgical, 77 critical care, and 60 OB/GYN beds. BIDMC provides a full range of emergency services including a Level 1 Trauma

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Center with over 50,000 inpatient discharges and 56,000 Emergency Department (ED) visits annually.

BIDMC places formal institutional emphasis on continuous improvement. This emphasis is evident both in formal documents and in the organization's receipt of awards focused on improvement, including the American Hospital Association McKesson Quest for Quality Prize and the Eisenberg Patient Safety Award. For several years prior to the work described in this report, BIDMC developed an internal group with dedicated expertise in Lean thinking, which also integrated other industrial engineering and process improvement methodologies. This Office of Business Transformation facilitated improvement projects aligned with BIDMC's strategic priorities and conducted classes and other learning opportunities to teach Lean problem-solving techniques. At the time of this project, about 90% of the medical center's leadership had participated in an intensive, multi-week Lean Study Group course that covered Lean philosophy, management, and tools.

3. Problem: hand hygiene is a task embedded in the complex, surprisingly high-volume process of room entry

Healthcare has given surprisingly little thought to the process of entering a patient's room. There are two issues that suggest that failing to account for the entire process may be a problem. First, entering a room includes at least four key tasks: (1) performing hand hygiene, (2) donning contact precaution equipment, (3) transporting materiel such as medications, central line supplies, etc., and (4) greeting and communicating with patients and families. To date, healthcare has generally focused on these as separate tasks, rather than as an integrated whole. Second, entering a patient's room is an industrial-scale, high-volume process. We conducted traffic studies at BIDMC and estimated that providers entered rooms 7,200 times every day in the ICUs, more than 2.5 million times per year in one hospital's ICUs. At the University of Chicago, we recently documented more than 100,000 room entries or exits in one month in a single ICU.

Together, these issues suggested the opportunity for improvement using Lean techniques. One of the key tenets of Lean is to go to gemba, the place where the work is actually done. When we did this and viewed room entry as an entire process rather than as disconnected tasks, additional problems became apparent. The process of room entry, when looked at in detail, is actually quite complex. Staff enter a room, often times while holding many supplies, perform hand hygiene and maintain clean hands before touching the patient, don personal protective equipment (PPE), and ensure patient privacy by closing the door or curtain. We found that the environment in our ICU rooms did not support the series of steps required to enter a patient's room. Hand sanitizer dispenser placement was inconsistent, making it impossible to create muscle memory for our staff, resulting in constant searching and wasted motion. Similarly, personal protective equipment (gloves, masks, gowns) were inconsistently placed. As the process of room entry was dissected, it became clear that in many rooms it was biomechanically impossible to do all of the aforementioned steps with the current layout.

Another key focus of Lean is to understand value from the perspective of the customer. We therefore engaged with members of the BIDMC ICU Patient and Family Advisory Council (ICU PFAC), which is comprised of former ICU patients and ICU patient family members. Interestingly, while they cared very much about safety and hand hygiene, they were most concerned with the way in which healthcare workers greeted them. The discussion with members of the ICU PFAC solidified the understanding of the problem: not only would an examination of and standardization of the room entry process result in enhanced patient safety, but it could also be tailored to take advantage of 7000 opportunities for patient-centeredness every day.

For these reasons, we embarked on using formal Lean techniques to redesign the entire process of room entry in intensive care.

4. Solution: use formal Lean techniques to re-engineer room entry

4.1. Organizational alignment

First, we achieved organizational alignment by ensuring that the effort to design a standard room entry process was supported and resourced at the highest level of BIDMC leadership and formally reflected as an Annual Operating Plan goal. The Annual Operating Plan is a formal statement of the top-level annual organizational goals and is aligned with the strategic plan. This project listed as a top goal in the quality and safety domain of the Annual Operating Plan in both 2013 and 2014. This organizational decision facilitated coordination between the Department of Health Care Quality, ICU leadership, Infection Control, frontline clinical staff and the Office of Business Transformation. Additionally, the design and deployment of a Lean Daily Management System was a key focus in the Continuous Improvement domain of the 2014 Annual Operating Plan. Using this project, the MICU was one of the first inpatient units to pilot local-level daily measures and huddles.

4.2. Adapting 3P techniques to the ICU and room entry workflow

3P is traditionally known as Production Preparation Process, and was developed as a method for designing new products in a way that optimizes design time and manufacturability while meeting customer's real needs. The methodology has evolved and been adapted to be applied to other design processes, e.g. production redesign without change to the product (often referred to as 2P – Production Preparation), and facilities design. The key to 3P is that all stakeholders are on the team that designs the new process/product/or environment concurrently to get the best results. Another key characteristic of this methodology is that it is used when designing from scratch when no process currently exists, when making large changes to a process that has not been well defined, or when dramatic changes are required of the current process.[13]

After initial current state analysis revealed that no defined process for room entry existed, and that the current physical environment was a barrier to key steps in the process, we determined that the room entry design was a perfect candidate for 3P. Our approach was to use the 3P framework to design the perfect process, and then design the environment to support that process within some physical constraints. The application of the 3P methodology is explained in detail below.

4.3. Tactical deployment of 3P in a busy ICU

Using Lean techniques in an ICU environment can be challenging, and so in this section we describe some of the successful approaches from this project. First, we identified a pilot area and formed our team. We chose an 8-bed Medical Intensive Care Unit (MICU) because:

- the physician and nursing leadership in that area were engaged
- they were already a high performer of hand hygiene, according to the organizational standard product usage measure (consistently performing between 90–100%)
- the unit uses a closed-physician model, meaning that all patients generally have a single attending physician.

We chose to include only MICU staff, who enter the rooms the most, in the initial scope of this project: MICU attendings, fellows,