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PROCESS IMPROVEMENT TO ENHANCE QUALITY

in Large Volume Labor and Birth Unit

Abstract

Background: The goal of the perinatal team at Mercy Hospital St. Louis is to provide a quality patient experience during labor and birth. After the move to a new labor and birth unit in 2013, the team recognized many of the routines and practices needed to be modified based on different demands.

Methods: The Lean process was used to plan and implement required changes. This technique was chosen because it is based on feedback from clinicians, teamwork, strategizing, and immediate evaluation and implementation of common sense solutions. Through rapid improvement events, presence of leaders in the work environment, and daily huddles, team member engagement and communication were enhanced. The process allowed for team members to offer ideas, test these ideas, and evaluate results, all within a rapid time frame. For 9 months, frontline clinicians met monthly for a weeklong rapid improvement event to create better experiences for childbearing women and those who provide their care, using Lean concepts. At the end of each week, an implementation plan and metrics were developed to help ensure sustainment. The issues that were the focus of these process improvements included on-time initiation of scheduled cases such as induction of labor and cesarean birth, timely and efficient assessment and triage disposition, postanesthesia care and immediate newborn care completed within approximately 2 hours, transfer from the labor unit to the mother baby unit, and emergency transfers to the main operating room and intensive care unit.

Results: On-time case initiation for labor induction and cesarean birth improved, length of stay in obstetric triage decreased, postanesthesia recovery care was reorganized to be completed within the expected 2-hour standard time frame, and emergency transfers to the main hospital operating room and intensive care units were standardized and enhanced for efficiency and safety. Participants were pleased with the process improvements and quality outcomes.

Clinical Implications: Working together as a team using the Lean process, frontline clinicians identified areas that needed improvement, developed and implemented successful strategies that addressed each gap, and enhanced the quality and safety of care for a large volume perinatal service.

Key words: Labor and birth; Lean; Process improvement; Rapid improvement event.

Mercy Hospital in St. Louis has a large volume perinatal service with approximately 8,800 births per year. In 2013, the service moved to a 75,000 square foot unit on three floors of a new hospital tower. After several months in the new space, a number of unit operations and clinical processes were identified by the leadership team that could benefit from improvement, efficiency, and streamlining. Goals were to enhance the patient experience while providing excellent clinical care. With help from the process improvement department, teams of nurses were formed to begin working on various aspects of care. The Lean process was used as a foundation to plan, implement, and evaluate needed change. We used

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Lean as our method for quality improvement because it involved active participation of frontline clinicians, such as nurses, unit secretaries, technicians, and physicians, and was based on the premise that rapid improvement in multiple care processes could be achieved by teamwork and collaboration. After reviewing the entire patient experience process and areas of opportunity, timely admission of women scheduled for induction of labor, efficient and timely patient flow and disposition through the maternity welcome center and obstetric (OB) triage unit, a more efficient process for the perioperative unit including preparation for cesarean birth and the recovery period, and patient transfers to the main surgical department and the adult intensive care units (ICUs) were selected by the group for process improvement (Table 1).

Lean as a Quality Improvement Process

The Lean process is often used in healthcare to promote quality by streamlining operations and eliminating waste so there can be production of more services of higher value but with use of fewer resources and less effort (Toussaint & Berry, 2013). Value is based on the customers' perspective (Graban, 2008), which for a perinatal service is the childbearing woman and her family. Childbearing women value the experience they have during their pregnancy, labor, birth, and postpartum, which must be founded on safe, high-quality care that is consistent with the latest evidence and national standards.

Leading by maintaining a presence where the work is being done and using daily huddles and metrics are part of the continuous improvement process recommended by Lean (Lazarus, 2011). This management philosophy is often referred to as Lean leadership and is different from a more traditional management approach in which the leaders or managers are often viewed, and see themselves, as having all the answers. In a Lean leadership environment, those who perform the work are considered the experts. This respect for the coworker is what creates the foundation for continuous improvement (Toussaint & Gerar, 2010).

Using data to be able to objectively assess the current state and then to measure changes in targeted areas of improvement are important aspects of the Lean quality enhancement process. Measurement and appropriate metrics are keys to successful Lean strategies because they allow the clinical team and the leadership team to empirically evaluate the modifications that have been initiated and add rigor to the process of determining their potential value and efficacy (Kumar, 2012) (Table 2).

On-Time Initiation of Scheduled Induction of Labor

Scheduling procedures such as induction of labor was selected for improvement because it was a source of patient and physician dissatisfaction and the backlog of patients waiting to get in caused operational issues for the labor and birth unit. It was recognized that labor induction was often the woman's first interaction with the hospital setting and we wanted that experience to be pleasant and with minimal anxiety. Data indicated that between 47% and 66% of women having inductions were called in on time over the 5 months prior to initiating the project; the goal was 100%. The team identified parameters for what "on time" means based on periods throughout the day for morning, afternoon, and evening schedules and set a goal for patients to arrive within 60 minutes of the call to come in and the induction to start within 60 minutes of patient arrival. There are 12 slots available on weekdays and 4 on weekends for scheduled induction of labor. On most days, all of these slots are filled. The number of women presenting with spontaneous labor or complications of pregnancy can quickly result in high census; therefore, devoting nursing resources and using a temporarily empty room for an elective procedure sometimes becomes a lower priority for the charge nurse designated to allocate rooms and patient assignment. Yet scheduled procedures represent a significant aspect of the care we provide and it was recognized that there was work to be done in this area.

Routine care processes such as scheduled labor induction and cesarean birth were frequently not started on time for various reasons.

Methods

Nurses and other participants familiar with the current scheduling process met over a week to discuss challenges and prepare a gap analysis. Six barriers were identified that were inhibiting timely initiation of induction: there was a longer than ideal length of time waiting for physicians to return pages to get orders for the induction, patients were not always given accurate information about what to expect the day of their scheduled induction, there was no standard process for the admission in the electronic medical record (EMR) and no standard location for accessing the induction schedule, resources were not being used to fullest potential, and there was delay in scheduled cases due to required laboratory data and results.

Solutions were offered by the team to make the entire scheduling process faster. To decrease the amount of time waiting for returned pages for orders, physicians would enter induction orders into the EHR prior to arrival of the patient. There had been an expectation of physician order entry when the EHR had been implemented several years prior, so this was an opportunity to fully make it work. Informational pamphlets *What to Expect the Day of Your Induction* were developed for use in physician offices and preadmission phone calls were made to women the day prior to their scheduled

procedure to review the process and answer any questions. To create a more streamlined process once patients arrived, nurses reviewed the consent forms and patients signed them during the admission process, validating the discussion previously held with the attending physician and the woman. An online scheduling tool replaced the paper format and allowed the schedule to be adjusted to accommodate volume. For example, the number of slots for morning and evening times was modified. These suggestions were implemented on a trial basis and then made permanent once they were found to be successful.

Results

There was a 42% reduction in the time from when the patient arrived in the welcome center for their scheduled induction to the time their induction was started. Previous to the event, the average time from the patient arriving at the welcome center to induction start time was 104 minutes. After the event, it was 60 minutes. Start time was considered the time the induction agent was started, for example, Cervidil, oxytocin. Ninety-eight percent were started on time once the strategies were fully implemented. We were able to sustain this improvement over time.

Women having scheduled procedures expect that they will be started on time. Sharing information with them the day prior about potential challenges such as the unpredictable nature of other women presenting in spontaneous labor may be helpful. Working with physician colleagues to identify and resolve their role in induction delays was successful in promoting needed change.

Maternity Welcome Center and OB Triage: Appropriate and Efficient Patient Assessment, Treatment, and Disposition

The maternity welcome center was developed as a greeting and initial triage area for all pregnant women presenting for care, including scheduled procedures. The center is located directly off of the main entrance of the hospital and open on a 24/7 basis. All pregnant women who present are greeted, immediately triaged, and have a medical screening examination (MSE) in one of four private interview rooms by a qualified registered nurse (RN) as per the Emergency Medical Treatment and Labor Act (EMTALA) guidelines (United States Department of Health and Human Services, Centers for Medicare & Medicaid Services, 2009). The EMTALA guidelines require an MSE to be conducted by a qualified medical person, which could be a physician, certified nurse midwife (CNM), or a labor RN (Angelini & Mahlmeister, 2005). At Mercy, RNs must have ≥5 years of experience as a labor nurse to be assigned as the welcome center RN. Registration occurs during this process, in which the RN or patient care associate (PCA) gathers insurance information, reviews the privacy regulations, and obtains the patient's personal information. Based on findings from the MSE, the woman is transported to the appropriate clinical site (OB triage, antepartum unit, perinatal testing center, labor and birth unit, or the emergency department). Consultation with a CNM if necessary will occur prior to a hand-off report to another nurse or resident physician in training or attending physician. After the assessment and registration process, all patients are escorted by a direct patient care provider nurse or PCA if they will not be staying in the OB triage area.

Table 1. Process Improvements to Enhance Quality Maternity Care

On-time initiation of scheduled induction of labor
On-time initiation of scheduled cesarean birth
Timely and efficient assessment and triage disposition
Postanesthesia care and immediate newborn care completed within approximately 2 hours
Transfer from the labor unit to the mother baby unit
Emergency transfers to the main OR and ICU

Table 2. Results of Quality Improvement Processes

Metric	Before RIE	After RIE
Labor induction (called in on time)	47%	98%
Cesarean birth cases (started on time)	52%	74%
Postanesthesia recovery times (2-hour goal)	29%	50%

Note: RIE = rapid improvement event.

Responsibilities of the RN in the welcome center include: overall accountability for the welcome center and OB triage staff for the shift, seeing all patients who present, EMR documentation of initial assessment and further assessment every 30 minutes until disposition, ongoing communication with the labor and birth charge nurse, OB triage nurses, CNMs, and OB resident physicians in training, assignment of patient to nurses and to rooms, and active management of patient disposition.

Use of CNMs during the OB triage process has been well documented in the literature (Angelini, Stevens, MacDonald, Wiener, & Wieczorek, 2009) and has been in place on our service since 1999. As we have continued to expand, we have been careful to adhere to *Best Practices in Obstetric Triage* (Angelini & Howard, 2014). We studied patient volume trends over time and adjusted our staffing to meet those needs. The primary function of the OB triage unit is to assess the patient and her fetus, evaluate her reason for presentation, and determine a plan of care within 2 to 3 hours, followed by appropriate and timely disposition. Patient satisfaction is associated with length of stay (LOS) or time waiting in OB triage (Paul, Jordan, Duty, & Engstrom, 2013). A CNM-managed OB triage unit can improve satisfaction and reduce LOS (Paul et al.).

Methods

A team of nurses, PCAs, and CNMs met over the course of a week to discuss challenges in the welcome center

and OB triage unit and envision possible solutions. Barriers to achieving the best care possible included patient wait times related to transfers to other areas and room turnover, inconsistent report process, no medical aliases (names given to women presenting with trauma who are unable to communicate), lack of scripting and signature service (expectations created by the hospital to improve the patient experience, e.g., warmly welcome patient to facility, personally connect with them, continually inform them), failure to enforce guidelines between labor and birth department and the emergency department, staffing shortages at high volume times, lack of easily accessible IV supplies, and admitting patients during EHR downtime.

Staff and patient feedback indicated that LOS in triage was often longer than ideal; therefore, average triage LOS was evaluated. Mean LOS starting from being placed in a triage room to disposition was 2 hours and 20 minutes. Approximately 43% of women stayed <2 hours, 36% <3 hours, and 21% >3 hours. The team agreed that an average of 2 hours and 20 minutes was acceptable but the goal was set for mean LOS to be 1 hour and 45 minutes and to reduce the number of women in triage >3 hours.

Obstacles to decreasing LOS were waiting for multiple processes and people to complete needed tasks, that is, waiting for: a room to transfer the patient, laboratory or test results, physicians to return pages for orders, resident physicians to see patients, food trays being delivered, and patients eating. There was also confusion about how to get appointments in the perinatal testing center, transportation there, how to enter orders for the center, and interpreting results and where to find them in the EHR. Nurses noted they were spending a large amount of time looking for wheelchairs for patients, finding supplies when unfamiliar with the unit, and going through the admission process.

The team suggested changing the process of room assignment to decrease waiting related to transfer. The patient's nurse now calls the charge nurse of the desired unit directly. Stat versus routine laboratory testing times were shared to inform the team and patients about length of time expected to get laboratory results. Physician contact numbers were updated to ensure best number to reach each provider. Stocking food on the OB triage unit rather than having to order food eliminated significant delays. Expectations were developed on the time frame for resident physicians to evaluate patients, if they were involved with their care. A standard process was initiated for patient appointments and transfers to the perinatal testing center. Nurses from the labor and birth unit decided to bring wheelchairs with them when picking up patients from triage. A tip sheet was created to help new staff or nurses unfamiliar with the unit to find supplies and ensure all duties are covered. The EHR admission flow sheet was updated to include the information that was strictly needed for a triage patient. For patients who needed to be transferred to another unit, the flow sheet made it easy to add needed information. Any equipment that was not functioning properly was fixed by the maintenance team. The team suggested an "all hands on deck" approach, which would decrease room turnover allowing anyone working in the unit to help prepare rooms for housekeepers to clean. Scripting was developed to help provide a welcoming and patient-friendly environment in person and over the phone. Standardization of patient transfers to and from the perinatal testing center and the emergency department was initiated. Medical aliases were created and a single point of entry, one phone number to reach the welcome center front desk nurse, was put in place. An IV supply cart was developed. Over the week, these suggestions were trialed. A daily metric graph was created to post in the triage unit. Each day, the previous day's data were posted on average LOS and longest LOS to help everyone see if they were successful after implementing solutions and had managed to resolve any bottlenecks in the moment.

Results

It was estimated that by making appointments for patients in the perinatal testing enter, 1 to 3 hours LOS per patient was saved. Not looking for wheelchairs to transfer patients to the labor and birth units saved approximately 5 to 8 minutes, 1 hour per patient was saved by not offering patients a meal from the hospital menu, rather serving them food immediately from unit stock for patients. The updated physician contact number database decreased steps to find the correct number and frustration among physicians. Average LOS for a patient in triage was approximately 2 hours and 20 minutes including all patients with outlying extended LOS after these strategies were implemented. Patient satisfaction related to their experience in OB triage improved.

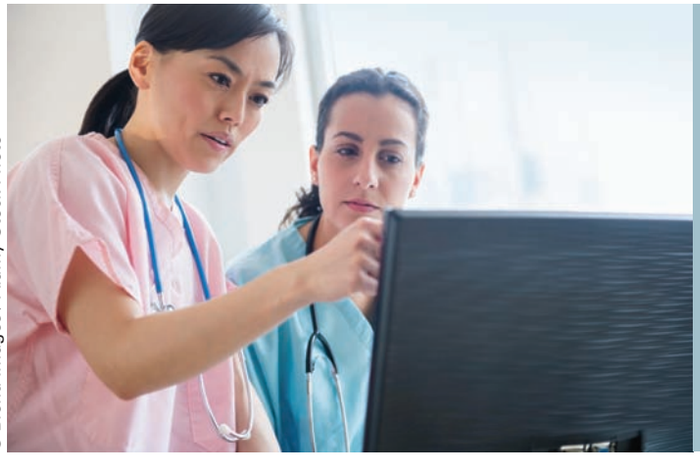
Perioperative Services: On-Time Initiation of Scheduled Cesarean Birth

Scheduled cesarean birth constitutes a significant portion of the women who give birth at Mercy. The team felt that the process could be streamlined to increase patient satisfaction and decrease anxiety by minimizing wait times, unexpected delays, and unnecessary processes. A group of nurses, and others involved in perioperative care met over a week. Anesthesia providers participated as needed.

Methods

Data revealed that the operating room (OR) was ready by the scheduled surgery time 80% of the time, 52% of scheduled cesareans started on time, and 36% of postanesthesia recovery periods lasted 2 hours with more than half lasting significantly longer. The goal was for the OR to be ready for surgery 100% of the time, 100% of scheduled cases would start on time, and 100% of postanesthesia recovery would be completed within 2 hours (as appropriate to the condition of the mother and baby). In setting goals, the team determined that "on time" meant the OR was ready for surgery and the patient was in the OR at their scheduled time. The team first focused on cesareans before attempting to improve timing of the postanesthesia recovery period.

We found that the main reason scheduled cesareans did not start on time was due to physician availability; 48%



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Front-line clinicians working together in teams were able to successfully improve numerous care processes and unit operations.

of the time the physician was not at the bedside to start the case and 30% of late case starts were due to "add on" cases that "bumped" scheduled cases. Reasons for the remaining cases being delayed were due to inadequate epidural blocks or patients arriving late. Other barriers faced in the perioperative area included incomplete surgical checklists, tubes not available to send blood work to the laboratory through the hospital's pneumatic tube system, repetitive and unnecessary steps in the process, infant security system issues, and inappropriate staffing.

The group suggested the creation of an "Add On Team" comprised of nurses who were already staffed to help in the OR. Their primary role was changed to assist in cases that were last minute or added on, not scheduled. This reassignment allowed scheduled cases to still begin on time and another team of staff members to take the last minute case safely. Follow-up education about the importance of completing the surgical checklist was provided to the nurses. A sign in log was created to improve accountability for physicians to ensure they arrived on time and were available in the OR for their scheduled cases. Those that were late and caused their case to start late were not allowed to choose the optimal time slots to schedule cases for 1 month. To create a streamlined process at the start of the day, the perioperative charge nurse assigned nurses, OB technicians, and resident physicians to the first three cases of the day. For newborns anticipated to require care or resuscitation by NICU nurses and neonatologists, the perioperative nurse caring for the newborn in the OR would call the NICU once the patient arrived in the OR before the case started. A phone number was placed on all pneumatic tube stations to call when more tubes were needed. Standardization of processes was developed to eliminate unneeded steps in preparing the OR, EHR documentation, and calling needed personnel. Time slots of the scheduled cesareans were adjusted to better fit the demand of the unit. This adjustment also increased satisfaction among physicians and patients because it added more slots to the morning and afternoon hours.

Results

We found that 45 minutes per patient could be saved when the surgical checklist was completed, tubes were available in the tube station to send specimens to the laboratory in a timely manner, all team members were available at the start of the case, standardized processes were followed, and there were no issues related to the infant security systems (such as security tags applied and electronic information entered correctly and timely). Once everyone was on board with the changes, OR cases were started 74% of the time and we were able to sustain this change over time. We continue to strive for 100% of cases starting on time; however, some of the barriers such as "add on" cases and emergencies are beyond the control of the team.

Postanesthesia Recovery Completed in a Timely Manner

Recommended and goal postpartum recovery period length is approximately 2 hours from delivery of the placenta for vaginal birth and 2 hours after arriving in the postanesthesia care unit for cesarean birth. Prolonged recovery periods were causing a holdup in the overall process of care. When recovery delays occur, it adds on to the time it takes to turn over the room and prepare it for the next patient, which in turn causes patients to be held in OB triage rooms, creating a backup there as well and causes delays in being able to call in women for scheduled induction of labor. During recovery, mother care is provided by the labor nurse and baby care is provided by a nursery admission nurse; both occurring at the bedside of the mother. The goal was to create a more efficient recovery process to reduce recovery times while still adhering to clinical standards and providing nursing care specific to the needs of the mother and baby.

Methods

Data analysis before the event showed that only 29% patients had a recovery period of 2 hours. Average recovery was 173 minutes, almost an hour longer than needed for most women. The team determined that the start of the recovery period differed from vaginal birth to cesarean birth. Vaginal birth recovery started with the delivery of the placenta, whereas recovery after a cesarean section started when the mother is admitted to the postanesthesia recovery area.

Numerous reasons for longer than ideal recovery periods were identified by the team and included; lack of available rooms on mother baby units, no transportation assistance, pain management issues for some women after cesarean, waiting for an anesthesia provider to discontinue and remove the epidural catheter, patients not always medically ready for transfer, nurses not able to give or receive report due to patient care, waiting for lunch or dinner trays, delay in newborn admission, and mother baby nurses not always available to accept a patient transfer. Each of these factors presented challenges and required close collaboration with the mother baby nurses to devise solutions that worked for both units. One solution was to decrease phone calls between units so that the recovery nurse and the nursery admission nurse together call to provide report to the mother baby nurse that will be accepting the couplet transfer. This decreased multiple phone calls and time spent covering similar information between the nurses. The recovery nurse and nursery nurse verify the correct newborn identification bands before transfer rather than after, eliminating extra time during the handoff on the mother baby unit.

Removal of epidural catheters from labor epidurals was a task previously limited to anesthesia providers but determined to be within the scope of practice of RNs; therefore, nurses were given education on how to do so including safety practices, and patient transfers were no longer delayed for this reason. Checklists were created to ensure that all parts of the recovery period were addressed. A centralized station was created to decrease time and steps. All items required to complete the recovery process such as paperwork (e.g., patient charge sheet and information written in birth book), EHR documentation, blood work, specimens, and charge sheets were now turned in in one place rather than the five separate places previously. The staffing coordinator assigned all of the mother baby rooms for patient transfer rather than the charge nurses, which decreased time for assignment significantly.

Results

An average of 48 minutes per patient was saved after implementing all solutions suggested by the team. The number of footsteps taken by nurses was decreased significantly, for example, from 621 steps to 112 steps, representing over an 80% reduction. Dual report from the recovery nurse and nursery admission nurse together to the mother baby nurse saved 15 minutes. Avoiding the wait from the anesthesia provider to remove the epidural catheter before transfer eliminated between 15 and 90 minutes. Overall, after these strategies were implemented, recovery being completed within approximately 2 hours immediately postpartum improved from 29% to 50%. We continue to work on this process.

Transfers to the ICU or Main OR

Although it is rare to transfer a patient to the ICU or the main hospital OR from the labor and birth unit, when it does occur, it is usually an emergency. Because it is not an everyday practice and involves high-risk patients, there was a need to ensure that a safe and efficient process was in place. The patient's support system was also kept in mind when considering this process improvement. The team quickly realized that there was no standardized method, including who to call and what equipment was needed to go along with the patient, when transferring these high-risk patients, so there was often miscommunication and confusing handoff reports between the units. The goal was to develop a standardized process when transferring a patient to the ICU or main OR that included better communication between the multidisciplinary teams, a list of appropriate contacts on each unit, a clear understanding of the needs of each unit, what an ideal handoff report between units should be, and necessary equipment to be available at all times. Representatives from the ICU and main OR participated in this week-long process improvement initiative.

Methods

The team identified barriers related to transfers to the main OR as not knowing when a case is scheduled or what room to transfer the patient to, not having a standardized list of supplies needed to transfer a patient to the OR, going to multiple places to get supplies, and various admission processes in the OR. Transfers to the ICU also did not involve standard processes or handoffs. Further barriers included lack of knowledge of appropriate contacts and phone numbers to use in an emergency, no process for assisting the patient's support group, losing or leaving patient belongings behind, and unsure of nurses' role in emergency situations. Both transfers required allocation of nurses' from the labor and birth unit and have significant implications for staffing. For example, during surgery for a pregnant woman in the main OR, a labor nurse is needed to monitor fetal status. If the case involved a cesarean birth, a nurse for the baby was required and perhaps the NICU team if the baby was anticipated to need resuscitation. When a pregnant woman is transferred to the ICU, a labor nurse is needed to monitor fetal status if the fetus will be monitored via electronic fetal monitoring intermittently or continuously.

After much discussion and brainstorming, the group developed several suggestions for improvement. The surgery team was asked to call the labor and birth charge nurse at least 12 hours prior to a scheduled case. For those patients scheduled for a case who were coming from home, the surgery team was asked to call the labor and birth charge nurse upon patient arrival. The charge nurses on the labor and birth unit learned to use the electronic OR grease board and maintained a calendar of scheduled main OR cases to help make staffing decisions. Education was provided to labor nurses on how to admit a newborn in the EHR while in the main OR. A list of needed supplies, such as neonatal resuscitation equipment, blood draw items, and paperwork, for main OR cases was created and taped to the supply cart. The newborn warmer and cart were placed in the same closet on the labor and birth unit to ensure all equipment is located in one place and always stocked. An audit tool was developed so these supplies could be checked periodically. A tip sheet was created for transfers to the ICU and a multidisciplinary huddle was

planned for all transfers from the ICU. A "badge buddy" (laminated card fit to attach to nurses' ID badges) was made with all emergency phone numbers and tips for nurses to keep with them at all times. Education about patient belongings and assisting friends and family when a patient is transferred to another unit was provided. Resident physicians were reminded to update nurses of all orders, especially for high-risk patients transferred to other units within the hospital.

Results

Before the suggested changes were made, the team conducted a test run of transferring a patient to the main OR and getting all needed supplies and noted it took about 45 minutes. After the solutions were implemented, it took 20 minutes. The team considered that a significant decrease in time, which was vital during an emergency.

6S: Sort, Set in Order, Shine, Standardize, Sustain, and Promote Safety

This project focused on cleaning and organizing the entire labor and birth unit. Even though the unit was new and spacious, over the first year and a half, disorganization and clutter had been introduced in selected areas. There are over 300 clinicians involved in patient care with varying degrees of neatness and organization. The team wanted to make sure that needed equipment, supplies, and paperwork were always available and easily accessible. Dirty and cluttered work areas also made it difficult for coworkers to function and caused patients and guests to perceive the unit poorly. A clean and safe environment is vital to the day-to-day function of the unit and its equipment. The team discovered at the beginning of the week that there were a number of marks on the walls, old paperwork in cabinets, broken equipment, and supplies and equipment difficult to find and access in closets. There was no known standard process for broken equipment or storage of equipment. Even the staff break room needed an overhaul.

Figure 1a. Equipment closet before 6S (disorganized and difficult to access equipment)
Figure 1b. Equipment closet after 6S (tape was applied to the floors to designate spaces for specific equipment in specific locations)

Methods

The team spent 5 days performing a 6S, which stands for sort, set in order, shine, standardize, sustain, and promote safety. The first step in their process was to sort all the needed things from the unneeded things on the unit. Those things they no longer used or needed were either thrown away or donated. For example, old forms that had not been used in years that seemed to have moved from the old unit to the new were found and discarded. Next the team worked on setting things in order; organized such that the most used items were located up front and easiest to access, whereas the least used items were placed in the back of closets. In the equipment closets, tape was applied to the floors to designate spaces for specific equipment in specific locations (Figure 1a and b). This helped to keep the closets from being overfilled and made it easy to see if something was in use, because it was not in its designated spot, and to look in another closet. Equipment was easier to access without the clutter.

The team worked on shining or deep cleaning the unit. Marks were scrubbed off walls, counters were wiped down, old food was thrown away, and clutter disappeared. Labels were placed on drawers, cabinets, and equipment so that anyone could easily locate items and replace them. The hardest part of this type of project is sustainment. In the equipment rooms, pictures of what the room looks like when everything is in the correct spot were hung and a poster on the door served as a reminder to make sure that equipment is returned to the right place. (*We are a team. Keep it clean. If you use something from this room, please return it to its home*.) Quick audit tools that nurses could perform were developed for daily and weekly checks to prevent paperwork and clutter from accumulating and to make sure equipment rooms stay organized. Safety represents the sixth "S" and is the byproduct of the first 5 "S's" in this process.

Results

The team was amazed by the feeling of ownership in their unit and fulfillment after just a few days of cleaning. Staff immediately commented on the ease of retrieving equipment from the closets and returning equipment to the appropriate location. A year after the event, the equipment closets are still clutter free and all equipment is located in the desired area.

Communication of Results of Each Quality Improvement Process

During each weeklong event, everyday ended with a report to key leaders such as the nurse manager, executive director of nursing, women's services, and the physician chairman of the department of obstetrics and gynecology. A daily report during rapid improvement events is vital

because it helps guide the team through the week. During the report, there are opportunities for all to ask questions and seek clarification. For example, the team may have suggested a solution that is inconsistent with hospital policy or standards of care, or the team may have suggested solutions that are well beyond the budget; the leaders can share their concerns and offer alternatives. This meeting allows the team to highlight all of their hard work and solutions to a large audience that often includes, in addition to those already listed, the chief operating officer, chief nursing officer and other department leaders.

Standardization

Standard work is a foundation of Lean principles and patient safety. Standardization can be accomplished by listing a specific process step by step to ensure that it is performed the same way every time to minimize chance of error and variability in the process and serve as an education tool for new team members. Throughout each rapid improvement event, a lack of standardization was identified at some point, if not various points, in the process. For example, during the process to improve OB Triage, we realized there was significant variation in admission via EHR (8 minutes compared to 30 minutes). At first pass, one may think it was just the nurse and how fast or slow they asked the questions; however, upon further review, it was found that the nurses were oriented differently by their preceptors (even though they had attended a standardized EHR class prior to beginning clinical orientation) and thus went through a different process when admitting a patient. Once the team agreed on the easiest and most efficient way to fully admit a patient into the EHR, each step was listed, nurses were educated and standardized process for admission was available on the unit for referral. As a result, the OB triage admission process took about 8 to 15 minutes, but was still complete and thorough.

Sustainment and Role of the Leader

The leader plays a critical role of owning the rapid improvement event and all aspects of planning, process change, follow-up, and sustainment. This leader is typically the accountable director or manager responsible for the unit or area undergoing the improvement effort. Often, the goals of this leader are in direct alignment with the improvement effort. Some examples include volume growth, financial improvement, or reduction of wait times or other customer-centric goals. The leader generally defines the scope of the project. This is an important factor when developing the team and facilitator. The scope includes the start and stop of the process being evaluated, but also the nonnegotiables, such not adding people, dollars, or time.

Data are critical to being able to have a comprehensive understanding of the problem and the goals for success. Ongoing measurement is invaluable to guiding next steps. The leader is also responsible for removing any barriers the team may experience during the event and implementation, and to allow the team to test new ideas and proposed strategies. During the rapid improvement event, solutions and ideas are generated quickly. Two critical characteristics of the leaders are flexibility and open mindedness. Trusting the team and the process makes a difference in the overall success. Once changes have been planned and implemented, the leader has the difficult job of sustainment and measuring ongoing success in collaboration with the team.

Clinical Implications

- Efficiency in processes common to labor and birth units such as scheduled labor induction and scheduled cesarean birth enhance satisfaction.
- Improving the processes of transferring women during emergent situations to the main OR and to the ICU promote patient safety.
- Decreasing unnecessary length of stay in the postanesthesia care unit and the OB triage unit resolved multiple issues with patients backing up in other areas of the perinatal service.
- Frontline nurses who are engaged in the day-to-day work of the labor and birth unit are the ideal participants in successful quality improvement projects.
- The LEAN process can facilitate improvements in the healthcare setting.

The Role of the Facilitator

As a facilitator, it is important to recognize that each team works together differently and to help them to function as best they can. Teams go through stages of understanding the process, looking critically at the work they perform every day, accepting that change needs to occur, frustration and uncertainty that sustainment will take place, and pride in their success. Understanding and expecting the ups and downs and supporting the team are key roles of the facilitator. Inevitably, some suggested solutions will not work. What seems like a great idea during the meeting does not always translate into feasible or successful practice; however, as long as the team knows that is part of the quality improvement process, they are willing to try another solution.

Conclusion

Rapid improvement events are valuable because they engage frontline clinicians with direct knowledge of the work as participants to develop strategies for success. These events follow a standardized methodology for problem solving. The focus is to observe the process and develop ideas to streamline as much as possible while maintaining or improving quality. This group work does not require sophisticated methods, rather teamwork, collaboration, and support from the leaders, guided by experts in the Lean process. The immediate testing of potential solutions and gathering data to quantitatively measure success are added benefits of this method. Unlike more traditional quality improvement processes that can take months and even years of planning and implementation before results are known, the rapid improvement events are designed to identify

problems, develop potential solutions, evaluate results, and use those data to change practice and improve care. We found that participation of frontline clinicians supported and validated by their leaders were vital aspects of the success of our various projects and have continued to allow further quality improvement by nurses. ✣

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