The Perinatal Patient Safety Project (PPSP) consisted of a multitude of approaches borrowed from many theories, disciplines, and industries. Its purpose was to create high-reliability perinatal units through the use of human factors techniques and systems improvements. The concept of high reliability was borrowed from the United States Navy, NASA, and similar organizations that operate highly complex systems with few errors over a long period of time. The error rate for these organizations is five to six sigma quality performance (Table 1). They recognize the criticality of the quality of their performance and that humans are inherently fallible and procedures and practices need to be in place to trap the inevitable errors. An example of this high level of quality performance is the United States airline industry, which operates consistently at six sigma.

Key to their performance is the concept of human factors techniques: briefings, assertion, situational awareness, and recognition of red flags. Within these techniques is a sound framework of communication and teamwork.

What is the significance of communication and teamwork in an industry such as the airlines, and how does that apply to health care? Years ago, when the airlines were converting from propeller-driven aircraft to jet engines, there was the assumption that the high reliability of the jet engine would eliminate aircraft crashes. However, accidents continued to occur. Accident investigations revealed that the vast majority of accidents were not caused by the aircraft. Rather, they were the result of the communication and teamwork of those in the cockpit. Identified barriers to effective accident-avoiding actions included fear of speaking up, hierarchical power, etc. In health care, these same issues have been identified by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). Their database of 2966 significant events from across the nation (from 1995 to 2004) has revealed that 65% of these had communication as a primary contributing factor.1

Articles by Eric Knox, MD, and Kathleen Rice Simpson, RN,2-5 that contained conclusions based on an analysis of medical-legal cases from...
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250 hospitals collected over ten years by MMI, an insurance company, supported the need for improved communication in labor and delivery (L&D) and outlined specific criteria for high-reliability perinatal units. These criteria, built into PPSP, are:

- “Safety first” is the hallmark of the unit’s culture.
- Team contribution is valued.
- Communication is structured and rewarded.
- MD responds when called by an RN.
- Emergencies are rehearsed.
- L&D is viewed as “potentially dangerous” (ie, to guard against complacency).
- Fetal and maternal wellness are defined.
- Evidence-based protocols are used.
- What does this have to do with KPNC Region and the Perinatal Patient Safety Project (PPSP)? When the project was initiated, the medical-legal costs of birth injuries were dramatically increasing even though the birth injury rate had remained stable over the past ten years. In addition to the medical-legal costs of birth injuries, other costs associated with birth injuries included the physical, emotional, and financial costs to the patient and family, emotional, and reputational costs to the health care providers and staff, and reputational and financial costs to KP.

Reviewing the KPNC’s data, it was determined that the volume of births in KPNC was large (32,000 births per year at 11 KP hospitals in 2002). There was collaborative practice between obstetricians and midwives and easy access to a perinatologist for consultation if needed. Ninety-two percent of prenatal patients are seen in the first trimester, and 90.6% of women were screened for preterm labor. Data analysis of birth injuries by the KPNC Region Division of Research clarified that birth injuries were (and still are) rare, as determined on the basis of a large number of births. Further analysis indicated significant variation between medical centers that was not explained by their high-risk patient mix.

Although the health care industry recognizes the criticality of perfect performance, the industry’s quality capability is considered to be between two to four—well below the five- to six-sigma performance of high-reliability organizations. Review of the perinatal literature indicated that the issues identified nationally were identical to those being experienced in KPNC. Some of the recurring systems-related problems included inadequate or inaccurate communication at shift reports, signouts, and hand-offs and problems with assertion and escalation of communication, task fixation and overload, team culture, and hierarchy.

In the opinion of Julie Nunes, RN, MS, CPHRM, Director of Regional Risk Management, the traditional corrective action approach to significant events resulting from birth injuries would not result in high-reliability performance. Armed with these data and new concepts, Julie Nunes (PPSP principal investigator), Bruce Merl, MD (PPSP co-investigator), Gabriel Escobar, MD (PPSP co-investigator), Sharon McFerran, RN (PPSP project manager), and Paul Preston, MD, (Human Factors and Critical Events Team Training educator for PPSP), developed a performance improvement approach based on human factors and systems improvements with the goal of developing high-reliability perinatal units. The project initially piloted its approach at four KP

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<th>Table 2. Kaiser Permanente Northern California Perinatal Patient Safety project (PPSP) members</th>
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<td><strong>PPSP Senior Project Manager</strong></td>
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<td><strong>PPSP Patient Care Services Liaison</strong></td>
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<th>KP leaders at PPSP pilot sites</th>
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medical centers (Hayward, San Francisco, Santa Teresa, and Walnut Creek). The 2004 Lawrence Patient Safety Award for 2004 was presented to the participants in the piloting of this project (Table 2). Based on the success of the pilot sites, the project was replicated in 2004 at the KP Redwood City, Sacramento, South Sacramento, and Vallejo Medical Centers and in 2005 at the KP Fresno, Oakland, Santa Clara, and Santa Rosa Medical Centers. Also, in 2004, the program began to be replicated programwide under the direction of Karen Mazzocco, RN, JD, Senior Project Manager for National Risk Management.

The project was based on “safety first” for the patients, physicians, and other staff. To create the culture of safety, a multidisciplinary team—including representatives from across the continuum of perinatal care—was assembled at each site. Before their first meeting, the team (and as many others from the perinatal continuum of care as possible) attended a four-hour human factors training session. In addition to addressing the basic human factors concepts, topics such as accident causation, dynamics of human error, and the effects of fatigue were presented.

The team’s first actions were to implement the use of SBAR (Table 3), a structured communication format borrowed from the United States Navy, and assertion (Figure 1). SBAR is an acronym that stands for Situation, Background, Assessment, and Recommendation. Every- one within the continuum of care needed to be included in the training and implementation plan. These techniques were important to clearly and concisely communicate patient information, especially during an emergency. The chain-of-command policy was also reviewed and, if needed, modified to reflect the complex nature of the perinatal environment. This policy needed to be current and organizationally appropriate for use when needed to advocate for the patient’s safety, especially those who cannot speak for themselves.

Critical to the functioning of a multidisciplinary team was the acceptance of the “Just Culture Statement.” The intent of this statement was to begin to open the lines of communication so that problems could be identified and corrected. This document held employees free from discipline if they discussed problems and errors. The only exceptions were if the employee was under the influence of drugs or alcohol, if the action taken was intended to cause harm, or if the action was deemed egregiously negligent.

Using the template of a high-reliability perinatal unit as outlined by Knox and Simpson,7 the need for a single clear operating style was identified. Based on a definition approved by the KPNC Perinatology Peer Group, a definition of fetal well-being was adopted to provide the physical criteria for when the nurse must call a physician and specified that the physician must come when called by a nurse. Other actions taken included clarifying the fetal heart rate tracing terminology differences between physicians and nursing (Figure 2).

A major innovation within PPSP was the development and implementation of Critical Events Team Training (CETT). The basis of this training approach was that teamwork and communication may reduce the frequency of emergencies in L&D but can never completely eliminate them. To address emer-

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<th>Table 3. Components of SBAR communication</th>
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<td><strong>Use:</strong> SBAR is a structured communication format used to enhance the predictability of information transfer.</td>
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<td><strong>Acronym:</strong></td>
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<td>• Situation (Why am I calling?)</td>
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<td>• Background (What will the provider need to know?)</td>
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<td>• Assessment (What is my evaluation of the patient’s status?)</td>
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<td>• Recommendation (What is it that I want or need from the physician?)</td>
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gencies when they arise, the team must work together and perform at a high level. From the Anesthesiology Department, which has been conducting drills for emergencies for the past few decades, the team has learned that critical skills erode when events are rare and when drills are not performed and that teamwork in emergencies is critical. It was also clear that during L&D emergencies, various disciplines that must come together and function at a high level as a team had never been trained as a complete team. Their training had always been in their own discipline’s silo.

Using mannequins to simulate actual L&D events, CETT is a method of practicing for emergencies within the Medical Center’s L&D rooms and obstetric operating suite. The simulations include participants functioning in their appropriate roles and diagnosing and managing the situation as they would if it were real. The training environment focuses primarily on communication and systems and, to a lesser degree, on the technical aspects of performance. The simulations are videotaped, and the tape is used to augment the debriefing. Immediately upon completion of the simulation, the videotape is erased to assure confidentiality and to maintain the blame-free learning environment. All opportunities for improvement identified during the debriefing are documented and are given to the multidisciplinary team to address.

CETT was conducted at all four pilot sites and is continuing to be conducted as new sites become involved in PPSP. The success of CETT has been recognized, and a CETT Train-the-Trainer session was developed and is now being offered to all KP Regions.

As birth injuries are rare events, the effect of this project on birth injuries will take a long time to determine. It will take years to accumulate a sufficient number of birth injuries to determine a declining trend. The Safety Attitudes Questionnaire

NOTE: This process may result in “overcatching” problems but is considered important for patient safety.
As birth injuries are rare events, the effect of this project on birth injuries will take a long time to determine.

(SAQ)\textsuperscript{7} has been used as a short-term measure for this project’s success. The SAQ was administered before and after the project at all KPNC perinatal units. Because KP’s goal is to constantly improve in all areas of patient care, all 11 medical centers’ SAQ scores improved during the period of assessment of the pilot sites. The pilot sites, however, significantly outperformed the nonpilot sites in every category measured, ie, job satisfaction, perceptions of management, safety climate, stress recognition, teamwork climate, and working conditions.

The importance of the activities first implemented by PPSP in 2002 was validated by JCAHO in 2004.\textsuperscript{8} After evaluating their national database of birth injuries, JCAHO stated that hospitals must:

- Teach the staff to work together and communicate more effectively.
- Conduct clinical drills with debriefings to identify opportunities for improvement.
- Develop clear guidelines for fetal monitoring.
- Use standardized terminology to communicate fetal heart rate tracings.
- Review policies regarding the availability of key personnel for emergency situations.

The PPSP did a lot of things right. The PPSP Regional Steering Committee focused on rapidly sharing information between medical centers. The pilot sites were allowed to implement the desired changes their way as well as to identify and improve problems of their own choosing. PPSP conferences were held to share the concepts broadly. Quality protection was provided by structuring the PPSP to report to the Quality Committee. The PPSP structure modeled its values of trust and respect of all disciplines, leadership commitment, clear communication, teamwork, empowerment, conflict resolution, innovation, and holding the gains (Figure 3).

Acknowledgments

The Perinatal Patient Safety Project (PPSP) was funded by a Garfield Memorial Fund grant and support was provided by The Permanente Medical Group Associate Executive Director and Kaiser Foundation Hospitals Quality Department.

Sponsors of this project included:
- Co-chairs of the KPNC Quality Oversight Committee (QOC)
- Perinatal Council (Patient Care Services)
- Risk Management and Patient Safety Committee (a subcommittee of the Quality Oversight Committee)
- Chiefs of Obstetrics Committee
- Chiefs of Anesthesiology Committee
- Maternal-Child Health Leaders Committee

References


Suggested Reading

- Helmreich RL. On error management: lessons from aviation. BMJ
The Permanente Journal/ Spring 2005/ Volume 9 No. 2

clinical contributions


The Learners

In a time of drastic change it is the learners who inherit the future.
The learned usually find themselves equipped to live in a world that no longer exists.

— Eric Hoffer, 1902-1983, American social philosopher