

Reducing preventable birth injuries and liability claims through evidence-based care, enhanced teamwork



Premier Perinatal Safety Initiative
Phase I Summary
2008-2010



Findings: Focused, consistent adherence to delivering bundles of care and using disciplined teamwork and communications processes can reduce the incidence of perinatal harm. These hospitals have also seen a corresponding reduction in liability claims and awards.

The vast majority of U.S. childbirths result in healthy infants and healthy mothers. However, when a rare serious adverse event occurs, it is devastating for infants, mothers, families and care providers.

Though some of these rare events are unavoidable, triggered by pre-existing conditions or other risk factors, estimates suggest 30 percent are preventable.¹ One study of liability claims found that the primary preventable obstetrical adverse events were associated with communication gaps between healthcare providers.²

The harm occurring to mothers or babies can also lead to court cases with enormous liability verdicts. National statistics show that, over the last 18 months, multiple cases of newborns suffering brain injuries have led to verdicts of more than \$20 million each. Consequently, over half of the typical hospital's risk management budget is spent in the labor and delivery area³. In a recent survey, 58 percent of obstetrician-gynecologists said they changed how they practiced due to the risk or fear of being sued.⁴

Ongoing care of infants injured at birth also places significant financial exposure on parents, the healthcare system, insurance companies and public agencies.

Premier Perinatal Safety Initiative Participants

Illinois

- Methodist Medical Center of Illinois (Peoria) * S

Kentucky

- Baptist Hospital East, part of Baptist Health (Louisville) M

Massachusetts

- Baystate Medical Center, part of Baystate Health (Springfield) * M

Minnesota

- Fairview Ridges Hospital, part of Fairview Health Services (Burnsville) M
- University of Minnesota Medical Center, Fairview, part of Fairview Health Services (Minneapolis) * S

New Mexico

- Presbyterian Hospital, part of Presbyterian Healthcare Services (Albuquerque) M

Ohio

- Bethesda North Hospital, part of TriHealth (Cincinnati) * M
- Good Samaritan Hospital, part of TriHealth (Cincinnati) * L
- Summa Akron City Hospital, Summa Health System (Akron) * M

Tennessee

- Indian Path Medical Center, Mountain States Health Alliance (Kingsport) S

Texas

- Texas Health Harris Methodist Hospital Fort Worth (Fort Worth) M
- Texas Health Presbyterian Hospital Dallas (Dallas) L

Washington

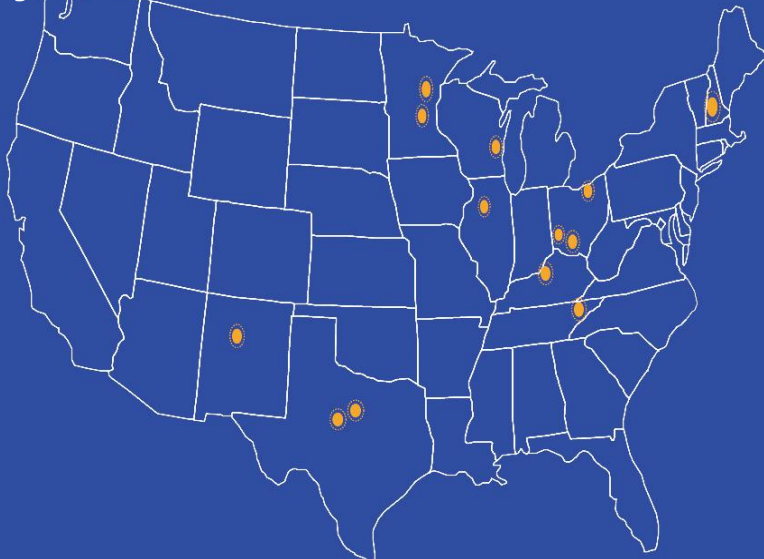
- St. Joseph Hospital, part of PeaceHealth (Bellingham) S

Wisconsin

- Aurora West Allis Medical Center, Aurora Health Care (West Allis) M

(S) – Small birth volume 1000-2499 births
 (M) – Medium birth volume 2500-5000 births
 (L) – Greater than or equal to 5000 births
 (*) – Academic teaching status

Figure 1



Deliveries that involve complications are also more expensive for our healthcare system. Maternal admissions with complications are about twice as costly as stays without complications, and admissions with pregnancy and delivery-related complications account for \$17.4 billion in annual U.S. hospital costs.⁵ In addition, hospital stays with pregnancy-related complications tend to be longer (2.7–2.9 days) than without complicating conditions (1.9 days).⁶

With approximately 4 million babies born annually in the U.S., it's no surprise that childbirth is the number one reason for hospital admissions.^{7,8} Nearly a quarter of all hospital discharges are either mothers or newborns.⁹

Given the high volume of deliveries, as well as the rare yet potentially devastating emotional and financial impact of birth-related adverse events, optimizing obstetrical care is a must.

Premier Perinatal Safety Initiative

Launched in 2008 by the Premier healthcare alliance, the Premier Perinatal Safety Initiative (PPSI) is one of the largest and most sophisticated perinatal improvement initiatives of its kind. When the initiative was launched, little empirical evidence existed about the effectiveness of methods to improve perinatal patient safety, and few scientifically-designed initiatives existed studying the relationship between improved patient safety and reduced obstetrical events. While other healthcare providers and organizations have implemented obstetrics improvement projects, the ability to measure or gauge success has proven to be difficult.

The goals of the PPSI are:

1. Lower the incidence of certain infrequent, though serious, injuries that could result in a wide range of harmful outcomes, including birth asphyxia and permanent neurologic disability;
2. Better define preventable perinatal harm;
3. Identify care practices that can result in improved outcomes; and
4. Measure the financial value of these care improvements, including evaluation of whether harm reductions lead to fewer liability claims and less costly pay-outs.

Participants include 14 of the country's leading hospitals (Figure 1) large and small, teaching and non-teaching, system-based and stand-alone, with employed and non-employed physicians – representing 12 states, in which approximately 250,000 babies will be delivered over the collaborative's five years (2008-2012).

Liability risk, costs impacting patient access to care

The increasing risk of medical liability coupled with the high cost of liability insurance has Ob-Gyns and hospitals nationwide making changes to how – and even whether – they practice or offer birthing services.

According to a September 2012 survey by the American Congress of Obstetricians and Gynecologists (ACOG)¹⁰ of more than 9,000 board-certified members of ACOG:

- Among practicing obstetricians, 13.5 percent stopped performing vaginal birth after cesarean delivery, 8 percent decreased the number of total deliveries and 5 percent discontinued the practice of obstetrics altogether.
- Among practicing gynecologists, 12 percent decreased gynecologic surgical procedures with 5 percent no longer performing major gynecologic surgery.

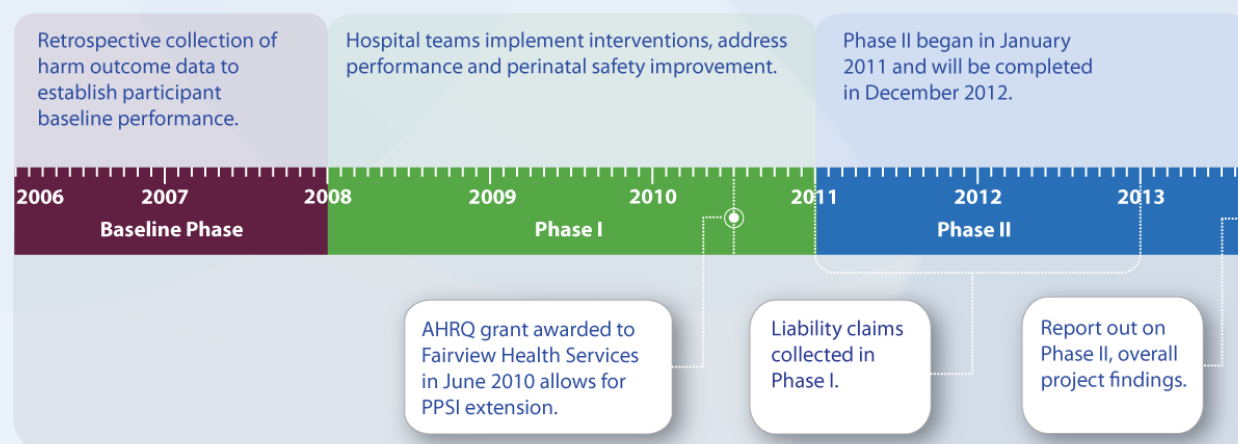
Previous ACOG surveying suggested that, on average, 90 percent of ACOG board-certified members have been sued while practicing, and Ob-Gyns can expect to be sued 2.7 times on average while practicing.¹¹

Similarly, fewer hospitals nationwide are offering birthing services in part due to liability exposure. For instance, Pennsylvania has seen a net loss of 43 hospital obstetric units over the last several years. The Philadelphia area in particular has been drastically affected by concerns presented by medical liability. Since 1997, 19 hospital maternity units have closed in the area,¹¹ with another set to close as soon as the end of 2012, citing an annual loss of \$1 million on just 1,000 annual deliveries.¹²

Similarly, the number of hospitals performing obstetrics in Alabama has declined from 58 in 1980 to 32 in January 2011, according to a report by the University of Alabama. And in New York City, since 2003 at least five hospitals have ceased providing maternity care.¹³

Figure 2

Premier Perinatal Safety Initiative Timeline



The PPSI offers a large database of information about perinatal care at participating hospitals, allowing them to track their progress toward developing high-reliability teams, monitoring the degree of compliance to clinical care bundles and tracking the incidence of perinatal harm.

The initiative is unique due to the broad mix of participating hospitals and their birth volumes, and in the availability of and access to detailed information on obstetrical liability claims. For these reasons, the lessons learned from the PPSI are valuable and applicable to a wide range of hospitals across the country.

The focus of the PPSI is to help participating hospitals prevent five significant clinical issues. Research has shown that these recurring issues are responsible for the majority of perinatal harm and associated costs, including obstetric professional liability claims.¹⁴ These include:

- Failure to recognize an infant in distress;
- Failure to initiate a timely cesarean birth;
- Failure to properly resuscitate a depressed baby;
- Inappropriate use of labor-inducing drugs; and
- Inappropriate use of vacuum or forceps.

The initiative is also evaluating participant claim/lawsuit information to determine if lowering the rate of harm has also lowered the number of claims filed or the amounts paid to resolve them. Data concerning the participating hospitals' malpractice claims and payouts for perinatal injury have been and will continue to be compiled and analyzed by liability insurer American Excess Insurance Exchange, RRG (AEIX), which is managed by Premier Insurance Management Services Inc. (PIMS), a wholly owned subsidiary of Premier. (For more information on Initiative background and methods, see the Appendix.)

PPSI Timeline

The PPSI is comprised of three phases (Figure 2).

The Baseline Phase consisted of the retrospective collection of harm outcome data from 2006 and 2007 to establish a baseline of performance for participants.

During Phase I, which ran from initiation in January 2008 through December 2010, hospital teams implemented interventions and actively worked on performance and perinatal safety improvement across approximately 145,000 births.

Phase II began in January 2011 and will be completed in December 2012. Phase II of the project has been funded by a grant from the Department of Health & Human Services' Agency for Healthcare Research and Quality (AHRQ), which was awarded to PPSI participant Fairview Health Services with the data analysis being conducted by PIMS, Fairview and the University of Minnesota School of Public Health.

Two Powerful Tools to Improve Perinatal Care

Experts have found that miscommunication and other preventable factors contribute to the harm sustained by some mothers and newborns during labor and delivery.¹⁵ They believe that many of these injuries can be prevented through the use of high-reliability healthcare teams. Leveraging knowledge gained from previous initiatives, including a Premier/Institute for Healthcare Improvement (IHI)/ Ascension Health collaboration, participating hospitals use two powerful methods to create high-reliability healthcare teams: increased adherence to evidence-based care bundles and enhanced communication and teamwork.

Increased adherence to evidence-based care bundles

Research has shown that grouping essential processes together in care bundles helps clinical staff remember to take all the necessary steps to provide optimal care to every patient, every time.¹⁶ Although many hospitals have long followed some or all of these individual care practices to improve outcomes in childbirth, the key is consistently using all the practices in concert. These care bundles (Table 1) were developed by IHI in adherence to published best practices and national standards established by leading maternity healthcare groups, such as the American College of Obstetricians and Gynecologists (ACOG) and Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN).

Requirements for each bundle differ but have the same objective: standardize clinical processes and reduce variation in practices. Care bundle provision is scored in an "all-or-none" fashion; the care team must provide all elements of care in the bundle to be given credit for its use when auditing medical records.

For example, the goal of one care bundle is to reduce the risks associated with augmenting labor, particularly the use of the drug oxytocin, commonly used to accelerate a slow labor. This bundle has four elements that must be used consistently. If a team neglects to document an estimate of the fetal weight before administering the medication, for example, it would not receive credit for the work, even if team members successfully implement the three other elements of the bundle.

Table 1

Bundles and Bundle Components

Elective Induction

- Gestational age ≥ 39 weeks
- Normal fetal status (per NICHD tiers) prior to onset of oxytocin
- Pelvic exam prior to the onset of oxytocin
- Recognition and management of tachysystole

Augmentation

- Documentation of estimated fetal weight
- Normal fetal status (per NICHD tiers)
- Pelvic exam prior to the onset of oxytocin
- Recognition and management of tachysystole

Vacuum

- Alternative labor strategies considered
- Patient prepared
- High probability of success
- Maximum application time and # of "pop-offs" predetermined and documented
- Cesarean and resuscitation teams available at delivery

Premier Perinatal Safety Initiative

Enhanced communications and teamwork

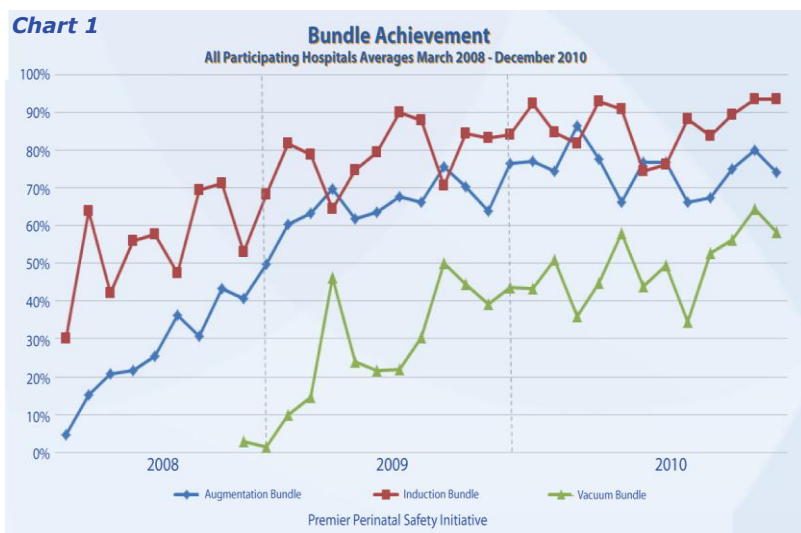
Failures in teamwork and communication account for 70 percent of sentinel events in obstetrics.¹⁷ Recognizing this, the Joint Commission, ACOG, and the Institute of Medicine all acknowledge that teamwork and communication are a critical element of patient safety.^{18,19,20} Improved teamwork has been shown to reduce preventable adverse events, such as uterine rupture and neonatal death.²¹

The PPSI is designed to increase teamwork and effective communications among perinatal teams. To be prepared to take appropriate action during worst-case scenarios, especially during emergency situations and patient hand-offs between team members, participating hospitals have implemented proven strategies and conducted simulations for certain high-risk protocols. These strategies and tools include TeamSTEPPS®, SBAR and use of mannequins in simulation exercises.

Team STEPPS is a teamwork system designed to improve the quality, safety and efficiency of healthcare.²² Originally developed by the Department of Defense in collaboration with AHRQ, the goal of TeamSTEPPS is to produce highly effective medical teams that optimize the use of information, people, and resources to achieve the best clinical outcomes for patients. This system can be implemented in various healthcare settings to improve communication and other crucial teamwork skills among healthcare professionals.

Designed initially for the military, the U.S. Navy Nuclear Submarine Service used the Situation Background Assessment Recommendation (SBAR) standard communication tool as an effective situational briefing strategy. Using SBAR, team members communicate relevant case facts in a respectful, focused and effective manner. Often used during nurse-to-physician communication or during hand-offs such as at the change of shift, SBAR can be especially effective in urgent situations.

PPSI participants also use simulation exercises featuring actresses and mannequins to increase their teamwork and communication skills and to practice using these skills during perinatal crisis situations. The role of the mother is played by either an actress or a state-of-the-art mannequin, while the baby is a mannequin. Actresses and/or mannequins react as real patients during the birthing process. The teams practice responding to perinatal emergencies ranging from maternal hemorrhage to life-threatening infant distress. De-briefing with the team provides critical information to guide further care and communications.



Phase I Project Results

Improvements in care bundle compliance

Using the all or nothing scoring method, PPSI hospitals significantly improved compliance with care bundles over the course of Phase I (Chart 1). On average:

- Augmentation bundle compliance increased 118 percent, from 33 percent to 72 percent
- Elective Induction bundle compliance increased 52 percent, from 58 percent to 88 percent
- Vacuum bundle compliance increased 467 percent, from 9 percent to 51 percent

Performance improvements on these bundles have continued into Phase II of the project (2011- 2012).

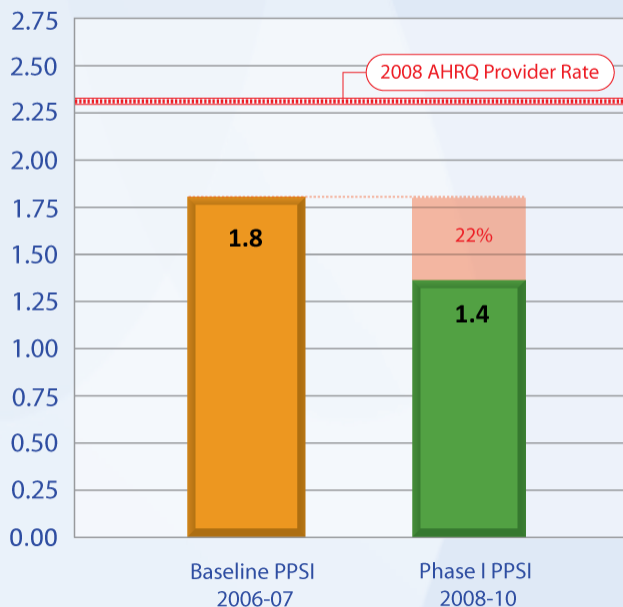
Harm reductions

PPSI hospitals reduced the annual adverse outcome index rate, which measures the number of mothers and neonates with one or more of the ten identified adverse events as a proportion of total deliveries, from 54 adverse events per 1,000 births to 50 adverse events per 1,000 births, a decrease of 7.5 percent. This reduction equates to approximately 48 fewer adverse events annually or 144 fewer events during Phase I of the initiative. In addition, by the end of Phase I, 11 of the 14 PPSI teams were below the target benchmark rate, derived from the top performers completing a nationally recognized team training program.

Chart 2

Annual Instances of PSI 17 (birth trauma)

(per 1,000 deliveries)



2008 AHRQ Provider Rate, a national comparative rate measuring perinatal

Premier Perinatal Safety Initiative (PPSI)

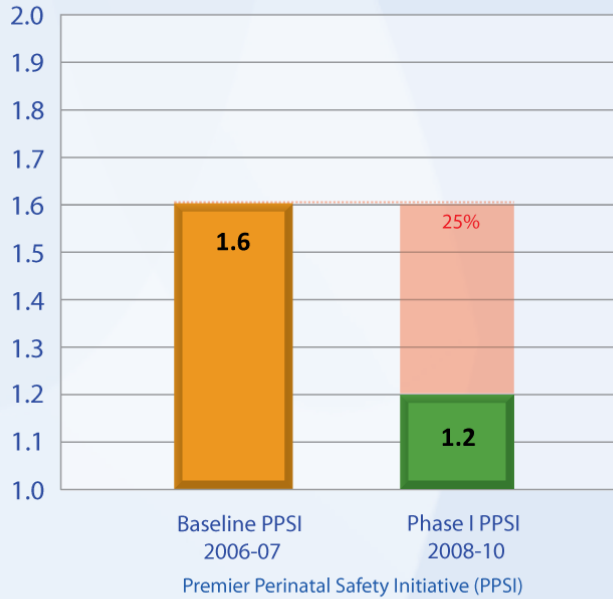
Reduced neonatal complications

PPSI hospitals reduced the annual instances of PSI 17 (neonatal birth trauma), which can range from minor bruising to nerve or brain damage, by 22 percent from 1.8 per 1,000 births to 1.4 per 1,000 births (Chart 2). This equates to approximately five fewer instances annually, or 15 fewer across Phase I. In addition, at the end of Phase I all 14 PPSI teams were below the 2008 AHRQ Provider Rate, a national comparative rate measuring perinatal harm.²³

Chart 3

Annual Instances of Neonatal Birth Hypoxia and Asphyxia

(per 1,000 deliveries)

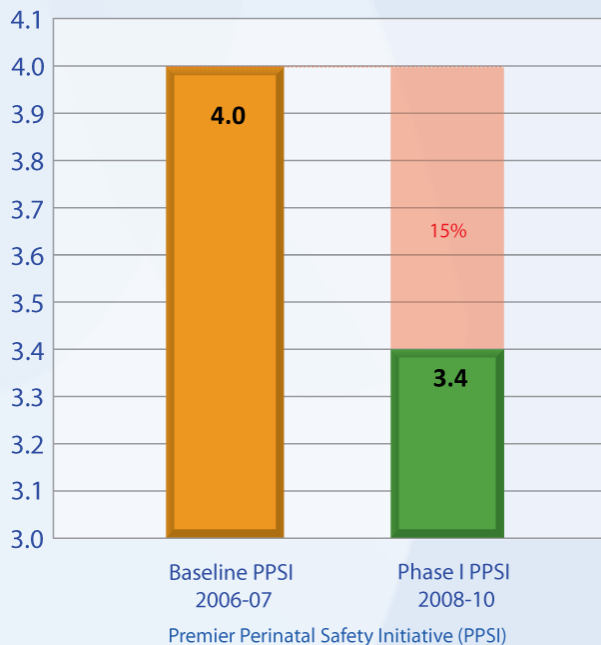


PPSI hospitals reduced the annual instances of birth hypoxia and asphyxia, which can cause infant brain damage, by 25 percent from 1.6 per 1,000 births to 1.2 per 1,000 births (Chart 3). This equates to approximately five fewer instances annually, or 15 fewer across Phase I. Injuries stemming from hypoxia and asphyxia can be the most severe, and can lead to the highest liability awards.

Chart 4

Annual Instances of Complications from Administration of Anesthesia during Labor/Delivery

(per 1,000 deliveries)



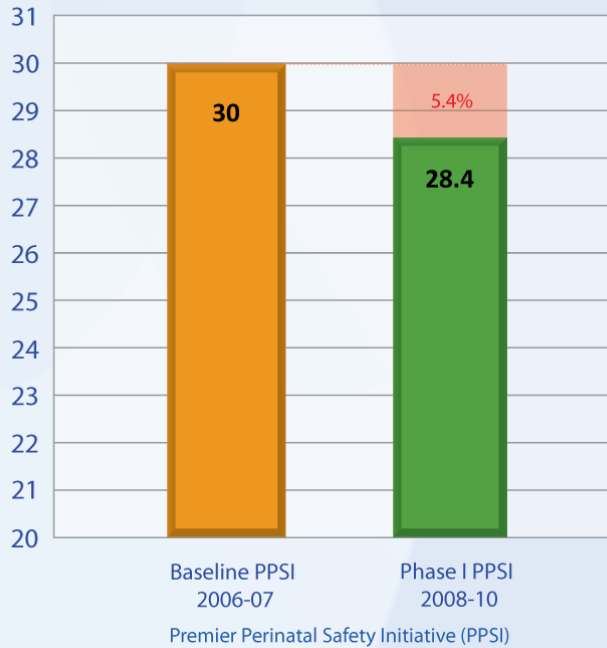
Reduced maternal complications

PPSI hospitals reduced the annual instances of complications during the administration of anesthesia during labor and delivery, which include cardiac arrest and other cardiac complications, by 15 percent from 4 per 1,000 births to 3.4 per 1,000 births (Chart 4). This equates to approximately seven fewer complications annually, or 21 fewer across Phase I.

Chart 5

Annual Instances of Maternal Postpartum Hemorrhage

(per 1,000 deliveries)



PPSI hospitals reduced the annual instances of postpartum hemorrhage, the most common cause of perinatal maternal death in the developed world, by 5.4 percent, from 30 per 1,000 births to 28.4 per 1,000 births (Chart 5). This equates to approximately 19 fewer instances annually, or 57 fewer across Phase I.

Potential for reducing liability

The costs of defending and paying losses for injuries during labor and delivery are higher than for all other types of malpractice claims. A Washington state study of closed claims between 2008 and 2010 indicated “newborn” cases had a loss average of \$2.4 million, with defense costs averaging more than \$1 million²⁴. An Ohio study of claims closed through 2010 demonstrated that physicians paid on average \$495,000 per OB loss, while hospitals paid \$863,939—nearly four times higher than all other types of losses²⁵. Current through June 2012, AEIX data demonstrated that while OB claims may be less than 10 percent of the total claims filed against a hospital annually,

they can account for 25 percent or more of the total losses paid to patients for all claims resolved by payment.

Data from PPSI hospitals indicate a decrease in the number of liability claims filed annually since project inception in 2008, compared to the baseline period of 2006 to 2007. From 2006 to 2010, the number of OB claims filed per delivery at hospitals in the initiative has decreased by 39 percent, compared with a decrease of 10 percent at hospitals that did not participate in PPSI (Figure 3).

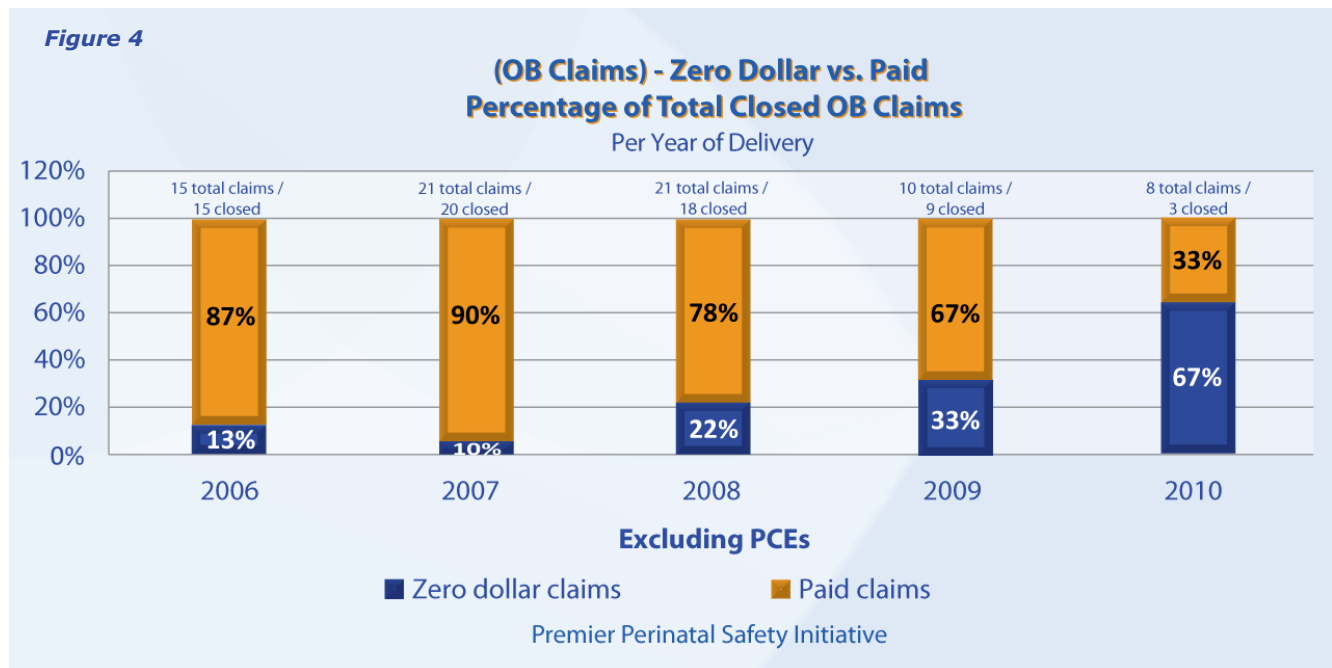
Figure 3

OB Department Only Annual Claims per 1,000 Deliveries

Per Year of Delivery



Data also indicate that fewer claims are being filed and a higher percentage of new claims filed against PPSI hospitals are being resolved without payment compared with claims filed during the baseline period. Filed claims in the baseline years (15 and 21 claims filed) fell in the latter years of the project (10 and 8). Also, approximately 13 percent of claims resolved without payment during the baseline period and a higher percentage resolved for no payment in the latter years of the project (Figure 4).



It is important to note that obstetric liability claims are often not filed until two years following injury, and many state laws allow a longer time to file claims on behalf of minors. In addition, it may take several years for claims to resolve when loss is paid by trial or settlement. Although it is premature to draw firm conclusions on obstetric claims and associated loss trends for injuries occurring after project inception, initial data indicates that providing more consistent clinical care can reduce serious injuries while making claims more easily defended based on quality of care rendered.

Forthcoming Findings

PPSI Phase I data demonstrate that the efforts of individual hospital teams can improve perinatal safety and reduce perinatal harm. Phase II of the initiative was designed to further improve the quality of patient care and reduce patient harm and measure results. This includes:

- Assessing hospital bundle compliance and associated outcomes; for instance:
 - Which measures are more impactful in driving positive outcomes?
 - Is there a favorable relationship between bundle compliance and reduced incidence of primary cesarean section rate and maternal death?
 - Is there a threshold of standardization needed before outcomes are generally improved?
 - Which resources are needed to improve outcomes?
 - What is the incremental change in outcomes produced as a result of those resources?
- Examining the role of hospital culture in improving results; for instance:
 - How do culture changes play a role in reducing harm?
 - Did teams that improved certain culture measures also see significant improvement in bundle compliance and harm reduction?
 - Was a certain culture measure more predictive of improvement than others?

- Further examination of two additional areas of harm:
 - Weighted Adverse Outcome Score (WAOS), which measures the acuity of the adverse events relative to the entire population of deliveries.
 - Severity index, which measures the total severity of the types of adverse events for those patients with more than one event.

Premier will begin analysis of Phase II results when the PPSI concludes in December of 2012. Results from Phase II, and from the entire initiative, will be made public in the fall of 2013.

Conclusion

Although rare, serious perinatal adverse events have significant physical, emotional and monetary consequences for all involved. Some of these adverse events are preventable through improved teamwork and communication among care providers.

PPSI is one of the largest and most sophisticated perinatal improvement initiatives of its kind, which includes 14 of the country's leading hospitals that utilize a large database of information about perinatal care at participating organizations. Because of the mix of hospitals and the robustness of the PPSI database, the lessons learned from the initiative are valuable and applicable to a wide range of hospitals across the country.

Participating hospitals, supported by previous research and an expert advisory committee, applied two powerful tools to improve perinatal care: increased adherence to evidence-based care bundles and enhanced communications and teamwork.

Over the course of the initiative's first phase, participating hospitals demonstrated improvement in compliance with care bundles, reduction in harm as measured by the average adverse outcome index, and reduction in the incidence of neonatal birth trauma. By the conclusion of Phase I, all participating hospitals achieved a perinatal harm rate that was lower than the 2008 AHRQ Provider Rate. Participating hospitals also reduced the incidence of birth hypoxia and asphyxia which can cause infant brain damage, anesthesia-related complications and postpartum hemorrhage.

Data also indicate that fewer obstetrical liability claims were filed against participating hospitals and a greater proportion of new liability claims were dismissed without loss payment compared with the baseline period.

Phase II of the initiative will focus on improving performance in all areas, as well as examining hospital bundle compliance and associated outcomes, and the role of hospital culture in perinatal performance improvement.

Appendix

Background

PPSI project design and assessment goals were set in November 2007 after involving leadership representatives from IHI, AHRQ, the National Perinatal Information Center (NPIC) and additional national obstetrics-related professional organizations.

A pre-project onsite High Reliability Perinatal Safety Assessment (HRPSA) was conducted for each participating hospital. Participants were provided with a baseline report against which they could monitor and track performance. Monthly team conference calls, quarterly webinars and access to a perinatal web portal allow participants to view current topics, share best practices, update team data and view team success. A second follow up HRPSA is being performed in 2012, which will allow teams to mark their progress in the project and prioritize further improvement goals.

To monitor progress toward the initiative goals, hospital progress reports on the reduction of harm were provided to teams and hospital leadership on a quarterly basis. To prevent a decline in patient safety improvement efforts and support the continued engagement of the healthcare team, participant hospitals shared the results of the monthly bundle chart audits with the entire perinatal unit staff and delivering practitioners.

Variables and Measures

Input measures

PPSI participants used two tools to gather data on input measures: the HRPSA and the Hospital Survey of Culture of Safety (HSOPSC) developed by AHRQ.

PIMS developed the HRPSA for the collaborative based on evidence-based clinical practices, the most current standards of practice set forth by the Joint Commission, guidance from a variety of physician and nurse professional organizations, and “high reliability” standards from other published works on this topic. The HRPSA consists of 48 items regarding perinatal safety policies and practices needed to ensure a high reliability environment for perinatal safety.

The assessment team gathered information to determine which patient safety practices the hospital and the perinatal unit had in place, and whether those practices were consistent with characteristics often observed in high reliability perinatal services. These characteristics include:

- An organizational culture where patient safety is promoted, supported and understood throughout the organization
- Strong interdisciplinary leadership
- Professional team interaction that promotes the communication of important patient information and expedites the prompt delivery of medical attention during emergencies
- Multidisciplinary rehearsal of emergencies
- Adoption of common language to describe fetal well-being during labor among all healthcare providers
- Policies and procedures which are supported by national professional standards, evidence-based medicine and best practices supporting patient safety
- Standardization and simplification of clinical protocols and unit operations

To measure subjective impressions of the culture of safety at each intervention hospital, obstetricians, pediatricians, anesthesiologists, nurses and ancillary staff at each hospital were asked to complete the HSOPSC before the project launched and the onsite reliability assessment was performed. These results established

their baseline culture of safety measure. A two-year follow-up survey was administered at each hospital in 2010, followed by a third follow-up survey in 2012.

The HSOPSC reports the organizations' safety culture using twelve dimensions:

1. Teamwork within units
2. Supervisor/manager expectations and actions promoting patient safety
3. Organizational learning – continuous improvement
4. Management support for patient safety
5. Overall perception of patient safety
6. Feedback and communication about error
7. Communication openness
8. Frequency of events reported
9. Teamwork across units
10. Staffing
11. Handoffs and transitions
12. Nonpunitive response to errors

Process measures: care bundles

Care bundles are collections of processes needed to effectively and safely care for patients undergoing particular treatments with inherent risks.¹³ Several evidence-based interventions proven to individually improve patient care are 'bundled' or applied together as a group to improve patient care outcomes.¹³

IHI identified two bundles - the elective induction bundle and augmentation bundle - and subsequently released the vacuum delivery bundle. Each bundle consists of four to five evidence-based clinical care elements (see Table 1). These three bundles were used as process measures in the initiative. Each bundle was scored as an "all or none" measure for these chart audits though data was collected on each bundle element to help teams identify areas for improvement in terms of overall bundle compliance.

Outcomes measures

An expert panel was convened in October 2007 before the initiative started to identify outcomes measures for use in the PPSI. The panel consisted of the research team and experts from ACOG, AWHONN, IHI, AHRQ and NPIC; physicians and nurses from Premier hospitals; and Premier employees.

The panel reached consensus on two outcomes measures: the adverse outcome index (AOI) and patient safety indicators (PSIs).

The adverse outcome index (AOI)

The AOI was developed by a panel of experts for a team training initiative sponsored by the Department of Defense and the Harvard Risk Management Strategies Foundation Team Performance Plus (TPP).¹⁴⁻¹⁷ The index is designed to measure the volume and magnitude of ten types of adverse events that can occur during or around the delivery process (Table 2) and may expose an obstetrical team to malpractice liability for harm occurring to the mother or neonate.

A related outcome measure index providing a weighted estimation of the AOI, called the weighted adverse outcome score (WAOS), was also used to evaluate the effects of teamwork on obstetrical care. The WAOS is constructed from the set of ten weighted outcome measures from the AOI, and is a summary metric representing the average adverse event score per delivery.¹⁹ Unlike other obstetrical outcome measures, the WAOS weighting system adjusts for the severity of adverse events.²⁰

Table 2: Adverse Events of the AOI and their Weights

Complication	Weight
Maternal death	750
Intrapartum neonatal death of a neonate > 2500 grams (excluding cases with a congenital anomaly or fetal hydrops)	400
Uterine rupture	100
Unexpected internal or external maternal transfer to an ICU for a postpartum complication	65
Birth trauma	60
Return to OR or labor and delivery	40
Admission of neonate > 2500 grams and > 37 weeks to NICU within one day of birth for > 24 hours (excluding cases with a congenital anomaly or fetal hydrops)	35
APGAR 5 < 7 (excluding cases with a congenital anomaly or fetal hydrops)	25
Maternal blood transfusion	20
3rd or 4th degree perineal laceration.	5

Lastly, the severity of the adverse events was also measured using the Severity Index (SI), which measures the total severity of the types of adverse events for those patients with more than one event.¹⁶

Patient safety indicators (PSIs)

PSIs are measures of potential adverse events or complications experienced by patients that could be prevented by system changes at the provider or organizational level.^{21,22} They were developed by investigators at the University of Stanford as part of the third generation of AHRQ Quality Indicators. They were originally released in March of 2003, and have since been used extensively to help hospitals predict and reduce adverse events.²²

PSIs consist of 27 indicators, including 20 provider-level indicators of complications occurring during hospitalization and seven area-level indicators.²² Five PSIs from the AHRQ PSI set were identified for use in this initiative (see Table 3). Ten perinatal complications were identified by the expert panel (listed in Table 4).

Table 3: AHRQ Patient Safety Indicators

PSI Number	Description
1	Complications of anesthesia
5	Foreign body left during procedure
7	Selected infections
16	Transfusion reaction
17	Injury to neonate

Table 4: Selected Perinatal Complications

ICD-9 Code	Complication
668.xx	Complications of administration of anesthesia during L&D
642.0x	Hypertension complicating pregnancy, childbirth and the puerperium
998.4	Foreign body accidentally left during delivery procedure
666.0-666.2 or PC 3998	Postpartum Hemorrhage (deliveries only)
779.0	Convulsions in newborn (inborns only and all neonates)

769	Respiratory distress syndrome in the newborn (inborns only and all neonates)
997.01	CNS complications in newborn (inborns only and all neonates)
343.x	Infantile cerebral palsy (inborns only and all neonates)
770.8x	Other newborn respiratory problems after birth (inborns only and all neonates)
768.x	Intrauterine hypoxia and birth asphyxia (inborns only and all neonates)

Data Collection

All inborn deliveries (i.e., deliveries in which the neonate is born at the hospital) at the participating hospitals' perinatal units between January 2008 and September 2010 were included in the data collection by NPIC. In addition, perinatal outcomes data for two years prior to the PPSI (January 2006 to December 2007) were collected to establish a baseline performance for each team. Table 8 shows the variables, measurements, sources of data for this initiative and the data collection approaches.

Table 5: List of Variables for Analysis & Data Sources

	Variable Name	Measure/ Index	Data Source	Hospital
Patient Harm	1) Weighted Adverse Outcomes Scale (WAOS)	Adverse Outcome Scale	MDC 14 data, ICD-9 data, demographic data from EMR	Both comparative and collaboration hospitals included
	2) Severity Index (SI)	Adverse Outcome Scale	MDC 14 data, ICD-9 data, demographic data from EMR	
	3) Adverse Outcomes Index (AOI) ⁴³	Adverse Outcome Scale	MDC 14 data, ICD-9 data, demographic data from EMR	
	4) AHRQ Patient Safety Indicators (PSI) <i>a. Birth Trauma (PSI 17)</i> <i>b. Complication of Anesthesia (PSI 11)</i> <i>c. Foreign body accidentally left during procedure (PSI 5)</i> <i>d. Selected Infections (PSI 7)</i> <i>e. Transfusion Reaction (PSI 16)</i>	Yes / No	MDC 14 data, ICD-9 data, demographic data from EMR	
Interventions	1) Elective Induction Bundle	Yes / No	Chart audit	Collaborative hospitals only
	2) Augmentation Bundle	Yes / No	Chart audit	
	3) Vacuum Bundle	Yes / No	Chart audit	
	4) Interdisciplinary team training	Not measured	Not applicable	
Reliability Assessment	1) High Reliability Perinatal Safety Assessment (HRPSA)	Tools uses a 48 item inventory	On-site assessment	Collaborative hospitals only
	2) AHRQ Hospital Culture of Patient Safety Survey	AHRQ 12 dimension survey	Self-administered-site survey	

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Incorporated in 1987, PIMS is an Illinois for-profit corporation wholly owned by Premier Inc. PIMS provides contracted management services for American Excess Insurance Exchange, Risk Retention Group (AEIX), and is attorney-in-fact for Premier Insurance Exchange, Risk Retention Group (PRx). PIMS also serves as program manager offering enhanced sponsored programs with leading commercial insurers through a comprehensive portfolio of property, casualty and employee benefit products. Other services include providing claims and risk management assessments and education offerings regarding medical professional liability for hospitals and their physicians. For more information, visit <https://www.premierinc.com/risk/tools-services/pims/index.jsp>.

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Les Meredith, 858.509.6529, Les_Meredith@PremierInc.com

Rebecca Price, 704.816.6598, Rebecca_Price@PremierInc.com