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**RECOMMENDATIONS TO IMPROVE MATERNITY CARE  
IN MASSACHUSETTS**

**REPORT OF THE EXPERT PANEL IN OBSTETRICS**

Convened by the Betsy Lehman Center for Patient Safety  
and Medical Error Reduction  
Massachusetts Department of Public Health

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## **Acknowledgments**

I would like to express my deepest appreciation to the members of the Expert Panel in Obstetrics and task group members for the significant work that went into this project. Halfway into the work of the panel, the project sustained significant budget cuts that required the panel to re-define the scope of the project. Despite these cuts, the report that resulted provides important guidance to improve the care and outcomes of mothers and newborns in maternity hospitals across the Commonwealth. I especially want to thank Dr. Fred Frigoletto, Chair; and Bonnie Glass, RN, MN, Vice Chair, who provided overall guidance to the panel. I also would like to thank Dr. Katherine Flaherty, who directed the project; Andy Dzagis from UMASS Memorial Hospital who conducted literature searches; and the following who assisted in launching the project – Leslie Kirle, Diana Ong, Rita Buckley and a team of experts in evidence-based methodologies from the Tufts Medical Center that included Dr. Joseph Lau, Director; Dr. Ethan Balk, Dr. Stanley Ip, Dr. Gowri Raman and Dr. Katrin Uhlig. Finally, I would like to thank the Department of Public Health and Betsy Lehman Center staff, especially Tracy Gay, Carla Cicerchia, Lisbeth Balligan and Eileen McHale for their diligent efforts in coordinating and facilitating the work of this project.

Nancy Ridley, MS, Director  
Betsy Lehman Center for Patient Safety and Medical Error Reduction

## Preamble

High quality clinical care provided in the safest way possible is the goal for obstetrical programs in Massachusetts. In an effort to reach this end, the Betsy Lehman Center for Patient Safety and Medical Error Reduction assembled a multidisciplinary expert panel to examine the current issues which have the potential to further enhance the fine perinatal outcome data already recorded in our state. The discipline of obstetrics is broad and deep in its scope requiring the panel to establish the areas upon which it would concentrate. This was one of the most difficult tasks that confronted the panel. Factors including resources, time, importance, and interest led us to focus our work on the components of obstetrical care occurring in the critical time period around Labor and Delivery. The particular subjects included: electronic fetal heart rate monitoring, induction of labor, staffing and communication, requirements for safe cesarean delivery, and maternal hemorrhage.

Task groups were formed in each of these areas based on the expertise and interest of the panel members following which a task group chair was selected. An agenda and time line were developed for each group and by means of face-to-face meetings, conference calls, literature searches, and subsequent open discussions with the expert panel, input by all panel participants was received and contributed to each task group report. This work took place during an 18 month period leading to the production of the final integrated report.

From the extensive body of information accumulated, which is robustly referenced, the panel submitted recommendations that are at the heart of high performance clinical care in this discipline. These recommendations are timely, important, documented issues of quality and safety for the mother, fetus, and newborn. Of similar interest to the panel was the concern that this kind of care be provided in a culturally sensitive, family oriented setting, respectful of the racial/ethnic diversity in Massachusetts.

It is with gratitude, respect, and much appreciation that we recognize the many hours of devoted work that the Task Groups and the respective Task Group Chairs contributed to this report. It is with pride that we submit it and trust it will be a significant contribution to maternal and child well being. Without that effort and the oversight of the expert panel this monograph would not have been born. Finally, the BLC staff and project director, who never let us get behind in our assignments, contributed the glue that held us together. For this we are ever grateful.

Fredric Frigoletto, MD  
Chair

Bonnie Glass, RN, MN  
Vice Chair

**Report of the Expert Panel in Obstetrics  
Massachusetts Department of Public Health  
Betsy Lehman Center for Patient Safety and Medical Error Reduction**

**Executive Summary**

In March 2008, the Betsy Lehman Center for Patient Safety and Medical Error Reduction (BLC) at the Massachusetts Department of Public Health (MDPH) convened an Expert Panel in Obstetrics to look at issues of patient safety and quality in Obstetrics across the Commonwealth. The mission statement of the panel was:

*Under the auspices of the Betsy Lehman Center for Patient Safety and Medical Error Reduction, the Expert Panel in Obstetrics will review the existing state of the art in selected areas of obstetric quality and safety, including existing and developing best practice approaches; make evidence-based recommendations to improve care quality and safety; and identify areas for further research and collaboration.*

The panel was chaired by Fredric Frigoletto, MD from Massachusetts General Hospital and Bonnie Glass, RN, MSN from South Shore Hospital, and included membership from a broad range of hospital and health care organizations with expertise in Obstetrics and quality and safety from across the Commonwealth.

The panel focused its work in the Labor and Delivery (L&D) area, and established task groups that produced reports on the following topics:

- Electronic Fetal Monitoring
- Induction
- Staffing and Communications
- Cesarean Sections
- Maternal Hemorrhage

In addition, a subcommittee of the panel conducted a preliminary survey with L&D staff to identify the diverse populations seen; cultural, religious and linguistic issues encountered in the care of these patients; and training and resources available.

**Recommendations of the Panel**

Each task group developed one or more recommendations to improve the care and management of L&D patients in Massachusetts hospitals related to its topic area. The recommendations follow:

1. **Electronic Fetal Monitoring (EFM)** – All 47 maternity hospitals in Massachusetts should:
  - Adopt the new NICHD/AWHONN/ACNM/ACOG (see glossary of acronyms) approved definitions, terminologies, interpretation and management for EFM;
  - Develop educational programs related to the new guidelines; and
  - Establish processes to evaluate the implementation of the new guidelines, including maternal and neonatal outcomes.
2. **Timing of Elective Delivery** - Elective delivery of normal, singleton gestation newborns should not be planned to occur prior to 39 weeks.
3. **Staffing and Communications** –L&D units in Massachusetts hospitals should ensure that clinicians are well rested, and that communications between providers is optimal. Specifically:
  - Minimum standards and policies should be developed that ensure that all obstetrical providers have access to coverage arrangements that allow adequate rest; as needed, adjustments in work load and work hours that are consistent with current research should be made; pilot projects for the implementation of this recommendation are encouraged.
  - Hand-offs of patient care should be conducted in a structured & consistent manner.
  - The prenatal record should be available when the patient arrives in L&D.
4. **Cesarean Delivery** – To address cesarean delivery, the following are recommended:
  - A trial of labor after prior cesarean delivery should be offered to eligible women in Massachusetts, with counseling services and resources, including referral centers, made available, as needed.
  - Although cesarean delivery in Massachusetts is generally safe, there are identified elements and techniques that will optimize safety and outcome that are presented that should be followed.
  - Additional data, possibly collected through the birth certificate, should be available to inform analyses investigating causes of the rising rate of cesarean delivery in Massachusetts.
5. **Maternal Hemorrhage** - Each maternity hospital in the Commonwealth should have clinical guidelines and protocols for the recognition and management of maternal hemorrhage.

In addition to the clinical recommendations above, the panel recommended the development of process and outcome measures to evaluate their implementation and effect; an ongoing role for the BLC and MDPH in supporting and evaluating these efforts; enhancements to the birth certificate data to monitor progress; and further research in the topic areas.

The provider surveys on diversity indicated much racial/ethnic diversity in Massachusetts L&D units, with Hispanic patients being the largest group, followed by Black and Asian/Pacific Islander women. Those interviewed reported some cultural, linguistic and other issues in caring for these patients, but there is no uniformity of policy and procedures or training in diversity issues. Based upon these preliminary interview results, the panel recommends that a more comprehensive assessment of all maternity hospitals in Massachusetts regarding these issues be conducted, with the goals of identifying best practices and strategies for improving care.

### **Next Steps**

Each maternity hospital in the Commonwealth should review the recommendations in the report, prioritize them based on their status at the hospital and develop plans to address them. In collaboration with the maternity hospitals, the BLC and MDPH should develop plans and processes to assist hospitals in implementing the recommendations, and measuring their effects.

## **I. Background**

### **A. Planning for the Expert Panel in Obstetrics**

In the spring of 2007, the Betsy Lehman Center for Patient Safety and Medical Error Reduction (BLC) at the Massachusetts Department of Public Health (MDPH) began a planning project on patient safety in Obstetrics (OB). The goals of the planning project were to: 1) identify current issues in OB quality and safety, 2) identify potential topic areas for consideration by a panel of Massachusetts experts to be convened by the BLC, and 3) identify individuals who might serve on this expert panel.

Several approaches were used in this planning phase. A preliminary literature review of OB quality and safety was conducted using the web-based Google and Google Scholar. Other website searches also were conducted to identify OB quality and safety work, particularly in quality organizations, on the national and local level. OB malpractice and disparities in OB quality and safety specifically were targeted in the reviews. Telephone interviews were conducted with identified quality and professional organization leaders, maternity hospitals obstetrical and administrative staff, and payers.

Through the planning phase, a number of topics areas, general and specific, to improve OB quality and safety were identified. These included: 1) disparities; 2) cesarean sections and vaginal births after cesarean section, 3) managing the second stage of labor, 4) team training and communications, 5) pre-term deliveries, 6) near misses, 7) patient participation and decision-making, 8) nursing, and 9) measurement of OB quality and safety. These topic areas were presented to the panel for consideration at the first meeting.

### **B. Organization and Management of the Panel**

The panel was modeled after two prior expert panels convened by the BLC – one on bariatric surgery and another on healthcare-associated infections. The model is a 30-35 member panel comprised of consumers, and clinical, administrative and quality experts from Massachusetts hospitals and professional organizations. The panels develop reports with recommendations to improve quality and safety in their clinical areas. The work of the panel is organized through task groups covering specific topic areas. The group is chaired by clinical leaders, is supported by research and management consultants, and meets regularly over a 12-18 month period.

The BLC convened the Expert Panel in Obstetrics in March 2008. Fredric Frigoletto, MD, the Associate Chief of Obstetrics and General Gynecology at the Massachusetts General Hospital (MGH), was the panel chair, and Bonnie Glass, RN, MSN, the Director of Parent-Child Services at South Shore Hospital, was the Vice Chair. The panel membership included consumers, and administrators, obstetrical leaders and quality and safety experts from private and public hospitals and health care organizations across the Commonwealth. Obstetricians, obstetrical nurses, anesthesiologists, nurse midwives, neonatologists, pediatricians, researchers and others with an active role in perinatal care were included.

Task group chairs also were selected. These included: Robert Barbieri, MD, Brigham and Women's Hospital; Jeff Ecker, MD, Massachusetts General Hospital; Henry Klapholz, MD, Metrowest Medical Center; Aviva Lee-Parritz, MD, Boston Medical Center; and Dale Magee, MD, private practice, Massachusetts Medical Society and UMASS Memorial Medical Center. In the winter of 2009, Dr. Klapholz stepped down as chair of his group; and Roxane Gardner, MD, BWH and the Center for Medical Simulation assumed this role.

To support the panel, the BLC hired several consultants, including a public health professional with expertise in maternal and child health, a project manager, a medical librarian, and a team of experts in evidence-based methodologies from the Tufts Medical Center. An executive committee to oversee the panel also was established. Membership on the committee included the panel Chair, the Vice Chair, BLC staff, and the project's consultants, including two physicians from the Tufts group. The executive committee held regular conference calls or meetings. The target date for the completion of the panel's work was the summer of 2009. A listing of the panel and task group members, and the BLC and MDPH staff who participated in the project may be found in Appendix I.

Over the period March 2008 through September 2008, the panel met four times. During these meetings, the panel developed its mission statement, selected the topics areas and set up task groups. A member of the Tufts team was assigned to each of the task groups to help guide the review of the literature and apply evidence-based methodologies in developing the recommendations.

In October 2008, however, the panel sustained significant cuts due to the Commonwealth's budget situation. These cuts resulted in the loss of the contract with the Tufts group and the project manager. The panel then had to re-define its scope of work to draw on work done to date, in consideration of the more limited available resources. This report reflects the revised scope of work.

## **II. Mission Statement and Task Groups**

### **A. Mission Statement**

One of the first tasks carried out by the panel was the development of a mission statement. The members adopted the following statement:

*Under the auspices of the Betsy Lehman Center for Patient Safety and Medical Error Reduction, review the existing state of the art in selected areas of obstetric quality and safety,\* including existing and developing best practice approaches; make evidence-based recommendations to improve care quality and safety; and identify areas for further research and collaboration.*

Given its broad mandate, a challenge of the panel was to determine how to focus the work in a way that could make a contribution to OB patient safety and quality in Massachusetts with the project's resource and time constraints. Unlike the previous two panels, which focused on narrower topic areas, this panel covered an entire clinical discipline. After some discussion and consideration of issues across the course of pregnancy (including the antenatal, intra-partum and post-partum periods), the panel decided to focus on the intra-partum period – in Labor and Delivery (L&D).

## **B. Task Groups**

Within the area of L&D, the panel established task groups in the following topic areas:

- Electronic Fetal Monitoring
- Induction
- Staffing and Communications
- Cesarean Sections
- Critical Care and Anesthesia

Beginning in July, 2008, the task groups began their work through monthly conference calls. The groups were asked to develop at least one evidence-based recommendation or guideline that was based on a systematic review of the literature, but were also given the opportunity to propose additional recommendations, opinions and other systematic reviews for inclusion in the Expert Panel in Obstetrics report. In their work, the task groups were asked to consider a number of cross-cutting issues, as appropriate.

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*\* Definition of patient safety - freedom from accidental injury; ensuring patient safety involves the establishment of operational systems and processes that minimize the likelihood of errors and maximizes the likelihood of intercepting them when they occur (Institute of Medicine) <sup>1</sup>.*

These included: access to the appropriate level and location of care; patient and family participation in decision-making and informed consent; disparities; outcomes, such as maternal and neonatal mortality and morbidity; and data and reporting. With the revised scope adopted in October 2008, however, the task groups were advised that they could narrow the scope of the literature reviews, and also that their reports did not have to be restricted to a systematic, evidence-base review, but could also be consensus-based.

In addition to the clinical areas indicated above, the panel also convened a subcommittee to specifically look at issues of caring for diverse populations in L&D. This sub-group developed and conducted a preliminary survey with L&D staff to identify the different populations, issues encountered in the provision of care, and staff training and resources.

Following is a summary of the range of issues considered and approaches taken in the task groups to decide their specific foci.

## **1. Electronic Fetal Monitoring (EFM)**

The EFM Task Group initially considered four topics, including:

- Selection of patients entering labor who should be monitored and appropriate length of monitoring
- Development and promotion of the use of a standardized checklist (in review of fetal tracing) to improve perinatal outcomes
- Educational requirements to ensure updated competency in interpretation of electronic fetal monitoring tracing
- Promotion of the use of central monitoring

To assist in the selection of the topic focus, the assigned Tufts expert and medical librarian conducted preliminary literature searches on the various topics for review by the task group members. The group ultimately decided to focus on the new collaborative guidelines developed by NICHD/AWHONN/ACNM/ACOG.<sup>2</sup>

## **2. Induction**

The Induction Task Group discussed the following as potential topics:

- A clinical scoring system to identify a week (between 37-42 ) in which induction will provide the best outcome
- Elective delivery not before 39 weeks gestation in uncomplicated pregnancy
- Appropriate indications (risk factors to be considered, such as gestational age and pelvic exam) for scheduled induction
- Counseling for potential risks of elective induction

- Institutional resources for offering elective inductions (e.g., anesthesia)
- Appropriate criteria for “failed induction” to reduce the risk of unnecessary cesarean section
- Appropriate dose of misoprostol for use in elective induction in women with uncomplicated pregnancy

Through a multi-voting ballot process, the group decided to focus on elective delivery after 39 weeks gestation in uncomplicated pregnancy. It was thought that this was an important topic that could have an effect on maternal and neonatal outcomes, but also be implemented with minimal difficulties compared to others under consideration.

### **3. Staffing and Communication**

In selecting its focus, the Staffing and Communication Task Group began with a wide range of topic areas that included team communications, conflict resolution, disclosure of medical errors, cultural sensitivity, linguistic competence, communication skills, staffing issues and lack of resources. The group then focused further to consideration of the following:

- Clear communications of treatment plan to staff, patient, and family
- Methods for resolution of conflicts on patient care management
- Optimal staffing level, and clear accountability of all relevant staff at all times
- Prompt disclosure of medical errors and adverse outcomes/events to patient and family
- Linguistic competence, cultural competence and sensitivity in patient care
- Structured communication (including handoffs and nonverbal communication) for all labor and delivery staff
- Regular assessment of communication skills
- Work hours and fatigue
- Hand-offs
- Availability of prenatal records in Labor & Delivery

After discussion and some literature reviews, the task group prioritized three areas: 1) work hours and fatigue, 2) hand-offs and 3) availability of prenatal records.

### **4. Cesarean Section (C-section)**

The C-section Task Group considered a wide range of topics, including:

- Elective c-sections before 39 weeks
- Appropriate indications for vaginal birth after delivery (VBAC)
- Time span within which unplanned c-sections should be performed
- Schedule of antibiotic prophylaxis in c-section
- Appropriate action to be taken in prolonged second stage of labor
- Contraindications for c-section
- Guidelines for prophylaxis for deep vein thrombosis

Much discussion took place among members regarding the above possible topics, but the task group eventually focused on the appropriate indications for trial of labor after c-section (TOLAC) and VBAC. It was thought that existing guidelines do not adequately address the issue of TOLAC and that there is no consensus about which women should undergo a trial of labor. The group also decided, however, that the report should include some consideration of the c-section rates and safety in the performance of these procedures because of the high numbers performed annually and the significant increases in them in the Commonwealth and across the country over the past decade.

## **5. Critical Care and Anesthesia**

This task group focused on the topic of maternal hemorrhage as an important topic in L&D, and considered the following aspects:

- Definitions of maternal hemorrhage, including severity grading
- Risk assessment for postpartum hemorrhage
- Management of women with increased risk of postpartum hemorrhage
- Appropriate emergency response for severe obstetric hemorrhage, including a coordinated system of response

With cuts in the project budget, however, it was decided to disband this task group. But in recognition of the importance of this issue, a subgroup developed a report that focused on practical guidelines for Massachusetts maternity hospitals in addressing maternal hemorrhage. This report is included in the task group report section.

## **III. Task Group Reports**

Below are the reports from each of the task groups and the maternal hemorrhage group. As appropriate, the reports include: 1) background information, including a statement of the problem and summary of literature and/or supporting guidelines; 2) recommendations; 3) measurements to evaluate the effects of the recommendations; and 4) recommendations for future research and/or action.

### **A. Electronic Fetal Monitoring**

#### **1. Background**

##### **Current Status**

The use of intra-partum EFM was originally intended for women deemed at high risk for adverse fetal/neonatal outcomes, and not for routine use in women considered at low risk

for such events.<sup>3</sup> The widespread application of EFM technology largely preceded the rigorous scientific evaluation and validation in support of its use. Intra-partum EFM has largely replaced other methods of clinical observation and data collection, becoming a universal standard by default. Despite the lack of evidence regarding routine use in high risk pregnancies, low risk pregnancies and positive impact on outcomes, the U.S. Preventive Services Task Force of 1996 acknowledged that intra-partum EFM is widely used and has become a standard of care in the United States.<sup>4</sup> Like other areas of the country, Massachusetts also adopted this standard, with a lack of uniformity and standardization of the terminology, interpretation and documentation of electronic fetal monitoring within L&D units across the Commonwealth.

Sandmire noted in 1990 that the anticipated benefits in reducing cerebral palsy and perinatal mortality, especially in high risk pregnancies, had not materialized over the prior two decades.<sup>5</sup> Since the 1970's, the widespread use of EFM and inconsistencies in its interpretation has created undesirable side effects, including inappropriate operative interventions, such as cesarean sections, increased liability for obstetrical providers and hospitals, and increasing costs of obstetric services. Such is the case today in 2009. Multiple factors are contributing to these undesirable side effects, including the following:

- Lack of uniform EFM terminology and definitions
- Inconsistent education within and between the disciplines of obstetrics, midwifery and nursing
- Disparities in knowledge, interpretation and application
- Disparities in documentation in the patient's medical record
- Disparities in clinical experience and expertise
- Differentials in the nurse/nurse midwife/physician relationships
- Institutional culture
- Inconsistencies in study design which prevent replication of research findings
- Lack of clarity for patients and their families about the advisability, risks vs. benefits, or necessity of routine EFM and its role in clinical practice

These factors were part of the rationale for the NICHD (National Institute of Child Health and Human Development) Research Planning Workshop's proposed standardization of EFM terminology and definitions.<sup>6</sup> NICHD terminology proposed in 1997 had largely been ignored by many obstetrical providers until the Joint Commission Sentinel Alert of 2004<sup>7</sup> underscored the need to develop clear guidelines for fetal monitoring of potential high-risk patients, including nursing protocols for the interpretation of fetal heart rate tracings; and educate nurses, residents, nurse midwives, and physicians to use standardized terminology to communicate abnormal fetal heart rate tracings. Unequivocal support for the NICHD terminology and definitions was expressed by American College of Obstetricians and Gynecologists (ACOG) in its Practice Bulletin on Intra-partum Fetal Heart Rate Monitoring released in December 2005.<sup>8</sup>

In April 2008, a workshop convened by ACOG, NICHD and the Society for Maternal-Fetal Medicine (SMFM) led to major changes in the categorization of electronic fetal monitoring heart rate tracings and nomenclature for describing normal, abnormal, and indeterminate fetal well-being.<sup>2</sup> This three-tiered system for categorizing fetal heart rate tracings provides a relative “snapshot” assessment of fetal status at that moment in time, and general management principles based on classification of the tracing. ACOG’s position was further strengthened by its most recent document of July 2009, reviewing nomenclature for FHR assessment; reviewing data regarding the efficacy, strengths and shortcomings of EFM; and describing the three-tiered system for EFM classification.<sup>9</sup> This document replaced the clinical practice guidelines of December 2005. All obstetrical providers are strongly encouraged to adopt and use this three-tiered system, facilitating greater uniformity in evaluation and management of the obstetric patient.

### **History and Scientific Rationale for EFM**

Initially pioneered by Edward Hon in the United States and also by Kurt Hammacher<sup>10</sup> (inventor of the first non-invasive fetal monitor) in Germany in the late 1950’s and 1960’s, the technology and utilization of electronic fetal heart rate monitoring has been driven, not so much by clinical efficacy, as by scientific experimentation, medico-legal concerns and some common sense. Unfortunately, these drivers do not always converge in a manner that results in appropriate clinical action, and worse yet, despite periodic triumphs, occasionally leads to harm.<sup>11,12</sup> A brief review of the history and scientific rationale for this technology is essential in order to develop a rational scheme for clinical applicability.

The development of semiconductors and digital technology in the 1950’s gave rise to the ability to perform precise measurements of time intervals with compact equipment resulting in availability of analog to digital conversion of physiologic signals and subsequent storage of timing information that was, until that time, impossible. Because of his expertise with electronics, Dr. Edward Hon, an obstetrician, was able to develop a machine that could accurately determine the time interval between R waves of the QRS complex of the ECG and hence define what was referred to as “beat-to-beat” or instantaneous heart rate. Beat-to-beat fluctuations in this rate became commonly referred to as “variability”. Initially unrecognized to be of significance, it soon became clear that this rapid fluctuation of heart rate, seen in fetuses as well as adults, emanated from higher centers in the central nervous system and today has additionally been correlated with anxiety states, sleep states and even mental retardation.<sup>13,14</sup> Abnormalities of cerebral cortical function due to hypoxia, acidosis, ischemia, infarction or congenital absence could manifest itself in aberrations of normal variability patterns seen in most fetuses.<sup>15,16</sup>

Many attempts at quantification of variability have been proposed including simple averaging over a fixed interval, root mean square calculations, maximum deviation from the baseline,

statistical variations including non-linear analysis, power density, and even Fourier spectral analysis.<sup>17-21</sup> None have proven to be clinically useful and are currently not part of standard fetal monitoring terminology. Generally accepted estimations of variability have primarily relied on observer “eyeball” estimations. Inter-observer variations in estimations of variability therefore are great and such variations are further modified by the user’s experience. This makes it virtually impossible to rely on “eyeball” quantification and further makes it more difficult for the beginning clinician (nurse or physician) to appropriately assess any given fetus.

Adding to the dilemma of quantitatively estimating variability derived from the internal fetal monitor, we are faced with the additional artifact imposed by external Doppler ultrasound derived fetal heart rate tracings.<sup>22</sup> The early days of fetal monitoring were replete with cases where external monitors showed artifactual variability whereas a properly placed fetal electrode revealed a tracing totally devoid of appropriate variability. This has been corrected to a great extent by the use of autocorrelation introduced by the Hewlett Packard Company and then adopted by other vendors. The issue of meaningful quantification still remains however.

Periodic long term changes in heart rate, defined initially as late decelerations, early decelerations and variable decelerations, were soon correlated with specific physiologic phenomena. Variable decelerations were attributed to vagal responses primarily due to umbilical cord compression, early decelerations to head compression and vagal nerve stimulation, and late decelerations to utero-placental insufficiency. It was this last category that raised the most concern for fetal well-being.<sup>23-25</sup>

There was good experimental evidence for such concern. Excellent correlation between late decelerations and fetal and neonatal acidosis was repeatedly demonstrated.<sup>26-29</sup> Variable decelerations with prompt return to baseline showed more normal physiologic parameters than variable decelerations with a slow recovery (suggesting hypoxia occurred during the time the cord was compressed). Animal data showed that reduction in uterine blood flow resulted in gradual drops in heart rate that could be correlated to fetal PO<sub>2</sub> as well as fetal pH. It was demonstrated that there was a relationship between fetal PO<sub>2</sub> and baseline rate and that this rate started to fall when the PO<sub>2</sub> fell below a certain threshold. During uterine contractions, as uterine blood flow decreased, fetal PO<sub>2</sub> could fall below this threshold resulting in a gradual slowing of the fetal heart. This generally occurred 10 to 20 seconds later than the onset of the uterine contractions hence the term “late deceleration”. These decelerations, being related to fetal hypoxia, were proportional in depth and duration to the intensity and duration of contractions and repeated with each contraction. Since every fetus has a unique fetal-placental-uterine exchange unit, the time it took to begin such a deceleration would vary. Marginally operating fetal-placental units where the operating point was near that threshold would show these changes soon after the onset of a contraction whereas better fetal-placental units would show more delayed changes or none at all. Some of these changes were attributable to vagal changes and most to direct fetal myocardial depression from reduced PO<sub>2</sub> and acidosis.<sup>30-33</sup>

It was also clear from experimental evidence in sheep, that hypoxia reduced flow to the cerebral hemispheres as cerebral auto regulation of arterial blood declined.<sup>34</sup> Reduction in carbohydrate metabolism was also shown to occur in the face of hypoxia with the resultant increase in brain lactate and acidosis.<sup>35</sup> Significant brain damage could be demonstrated by occluding uterine arteries and replicating fetal hypoxia due to uterine contractions.<sup>36</sup> Furthermore, strong correlations of fetal birth pH could be shown between the type of deceleration, with late decelerations being highly correlated to reduced birth pH and Apgar scores while absent decelerations were well corrected with the highest Apgar scores and pH. When one added the presence or absence of variability to the type of deceleration, even stronger associations could be found.<sup>37-38</sup> To make matters more confusing, baseline characteristics such as tachycardia or bradycardia were considered by some authors to be ominous while to others they were of no clinical importance.

In an attempt to utilize external Doppler technology for monitoring prior to labor it became clear that variability could not be reliably ascertained since, as stated earlier, much of what was noted to be variability might be an artifact of the technique. Since these artifacts reflect themselves in beat-to-beat variations but not necessarily as changes over several seconds, the concept of fetal reactivity was born. This referred to accelerations in fetal heart rate rising more than 15 beats per minute and lasting over 15 seconds as measured from the baseline. Although these definitions were somewhat arbitrary there was some data to justify those limits. Clinical studies of reactivity and birth PH confirmed the correlation in humans as well as animal experiments.<sup>39,40</sup>

Unfortunately, lack of widespread appreciation for the pathophysiology of these changes resulted in major misinterpretations of their significance despite the clear experimental evidence as well as clinical studies showing lowered Apgar scores and cord Ph. These differences in perceived effects on the fetus occurred across a spectrum of observers including many of the leading “experts” and teachers of fetal monitoring.<sup>41</sup> Various other subtleties such as the presence of “shoulders” on either side of a variable deceleration, poorly defined terms such as short and long term variability and “saltatory” and sinusoidal patterns added yet more complexity to the interpretation of any given tracing and yet another layer of confusion with regard to clinical significance.<sup>42</sup> Not only could the “experts” not agree on the meaning of a tracing, experts and non-experts alike could not even agree on the interpretation of any given tracing.<sup>43,44</sup>

Although the science still stands, the failure to demonstrate efficacy in well controlled randomized trials of fetal monitoring in low risk populations in whom the incidence of fetal hypoxia and acidosis is small, it is currently unclear that this technology does little more than raise the cesarean section rate considerably with only occasional benefit. Poor standardization of fetal monitoring nomenclature, vague understanding of the underlying pathophysiology by many users and failure to provide adequate communication between providers has compounded any attempt to assess its true utility in reducing morbidity and mortality. Until all providers use a common language to identify fetal jeopardy such technology will do little more than promote the use of potentially harmful interventions and further increase the rate of c-sections.

## 2. EFM Recommendation

Based upon the above, the EFM Task Group makes the following recommendation in support of a uniform approach to electronic fetal monitoring terminology, interpretation and management among perinatal clinicians in the Commonwealth:

*All 47 maternity hospitals in Massachusetts should adopt the new NICHD/AWHONN/ACNM /ACOG approved definitions, terminologies, interpretation and management for electronic fetal heart monitoring; develop educational programs related to the new guidelines; and establish processes to evaluate the implementation of the new guidelines, including maternal and neonatal outcomes.*

The group anticipates that implementation, including education and the identification of outcomes to be monitored, should take about one year. A sample of educational resources in EMF terminology and interpretation, and strategies for sustaining uniformity of its use are provided in Appendix II. The task group also recommends that the following immediate and long-term professional and patient-related issues be addressed in the implementation:

### **Immediate Professional and Patient-related Issues**

- A strong role for the hospitals' perinatal committees in the adoption of the EFM recommendation (Massachusetts hospital licensure regulations require that each maternity hospital has a perinatal advisory committee.<sup>45)</sup> The group also recommends that the following be represented on this committee:
  - Obstetrical quality committee chair or designee
  - Obstetrical chief or the L&D director
  - L&D nurse manager
  - Midwifery service director
  - Chief or director of the newborn service
  - L&D clinical nurse specialist and/or perinatal nurse educator
  - Obstetrical anesthesia director/anesthesia representative
  - Hospital risk manager
  - Marketing director or designee
- Provision of consistent and accurate information about the advisability, risks vs. benefits, necessity and role of EFM, to patients
- Requirement of an "evidence of completion" form for clinicians to verify they have completed a hospital's approved EFM coursework
- Development of an evaluation report one year after full implementation to assess both outcome and process measures

## **Long-term Professional and Patient-related Issues**

- Ongoing role for the hospital perinatal committee to support, monitor the progress of and report results on regular basis
- Incorporation of successful course completion into the processes for competency validation, credentialing and privileging

### **3. Measurement**

To evaluate the effect of the proposed EFM recommendation, the EFM Task Group recommends the following process measures initially:

- Staff compliance with timely completion of the hospital's approved EFM coursework.
- Assessments to determine whether staff are all using the same language and interpreting their finding in a standardized way; and whether patients and their families are receiving consistent and accurate information about EFM that is health literacy appropriate. This could be done through staff and patient surveys.
- Assessment of appropriate use and documentation of NICHD terminology and interpretation in the L&D record. This could be done through charts audits conducted by the hospital-based quality assurance department, with training recommendations based on findings.

In order to carry out the above, acceptable levels of compliance for both the staff training and the record reviews would need to be defined; and the processes and location in the patient's chart of documentation would need to be established.

The task group also recommends that hospitals measure the impact of the EFM recommendation through outcome measures, such as those indicated below. The group recognizes, however, that more research may be needed before these can be selected.

- Apgar scores at 5 minutes for term (>2500grams, ≥ 37weeks gestation) singleton births, no congenital anomalies.
- Intra-partum death of term, singleton infants (no congenital anomalies).
- Neonatal death of term, singleton infants (no congenital anomalies).

### **4. Recommendations for Further Action or Research**

The EFM Task Group proposes the following actions and future research:

- An ongoing role for consultative services to provide expertise in reviewing and revising EFM guidelines, developing and providing education and training, and measurement resources
- A statewide conference sponsored by the BLC and the MDPH at the end of the first year of implementation to share experiences and outcomes. Such a conference could be open to the public in support of transparency and family-centered care
- Identification of state and federal funds to support consultative services, education and training, and the provision of annual statewide perinatal safety conferences, including EFM and other topic
- Expanded use of the birth certificate data; if needed, changes to the birth certificate to collect additional data
- As indicated in the measurement section above, additional research to determine the best outcomes measure for the EFM recommendation; consider pilot studies in a small number of hospitals

## **5. Summary**

The Electronic Fetal Monitoring Task Group strongly supports the use of the NICHD/AWHONN/ACNM/ACOG approved standard electronic fetal monitoring terminology, pattern recognition, evaluation and management by all members of the obstetrical team caring for women during L&D. Provider and patient-based educational interventions about EFM are needed to convey the strengths and limitations of its use, affirming that interpretation of fetal heart rate tracings provides point-in-time assessment of fetal status and poorly predicts which newborns will ultimately develop long-term problems such as cerebral palsy. Broad-based support for a consistent and systematic approach to interpretation and management of electronic fetal heart rate tracings will facilitate precise communication between obstetric providers and their patients, and allow for a more evidenced-based approach to clinical management of labor in each of the 47 maternity hospitals in the Commonwealth of Massachusetts.

### **B. Induction**

#### **1. Background**

Elective delivery prior to 39 weeks gestation has been found to be associated with an increased risk of adverse neonatal outcomes and in the case of elective induction may be associated with an increased risk of cesarean delivery in nulliparous women.

## **Adverse Neonatal Outcomes Are Associated with Elective Delivery Prior to 39 weeks Gestation**

Delivery prior to 39 weeks gestation is associated with an increased risk of neonatal respiratory complications such as respiratory distress and transient tachypnea of the newborn. For example, in one retrospective review of 28,578 vaginal deliveries, the risk of newborn respiratory complications decreased from 37 weeks to 39 week 6 days (39w6d) gestation.<sup>46</sup> The rate of newborn respiratory complications per 1,000 births across these gestational ages was: 37w0d to 37w6d- 12.6, 38w0d to 38w6d-7.0, 39w0d to 39w6d-3.2. In the same study, a subgroup of 2341 cesarean deliveries without labor and 2370 cesarean deliveries following labor showed the same pattern of increasing risk of neonatal respiratory complications with decreasing gestational age from 39 weeks to 37 weeks.

In a prospective study of 13,258 elective repeat cesarean deliveries in the United States a relationship between increasing rates of neonatal complications with decreasing gestational age was observed.<sup>47</sup> In this study, 36% of the repeat cesarean deliveries were performed between 37 and 39 weeks of gestation, 49% at 39 weeks and 15% after 40 weeks. As compared with births at 39 weeks gestation, births at 37 weeks and 38 weeks were associated with an increased risk of the primary outcome that included a composite measure of respiratory complications, treated hypoglycemia, newborn sepsis and admission to a neonatal intensive care unit. For example, compared to delivery at 39 weeks gestation, the odds ratio for respiratory distress syndrome was 4.2 and 2.1 for delivery at 37 weeks and 38 weeks respectively (95% confidence intervals, 2.7 to 6.6 and 1.5 to 2.9). Compared to delivery at 39 weeks gestation, the odds ratio for newborn sepsis was 2.9 and 1.7 for delivery at 37 weeks and 38 weeks respectively (95% confidence intervals, 2.1 to 4.0 and 1.4 to 2.2). Elective delivery at 37 and 38 weeks appears to be associated with increased neonatal complications compared to delivery at 39 weeks.

## **Increased Risk of Cesarean Delivery with Scheduled Induction of Labor in Nulliparous Women with an Unfavorable Cervix:**

Of all deliveries in the United States approximately 20% to 25% are initiated with a scheduled induction of labor. Many scheduled induction of labors do not result in a successful vaginal birth but rather a cesarean delivery. Many factors increase the risk of cesarean delivery in women undergoing a scheduled induction of labor. These factors include: nulliparity, unfavorable cervix as indicated by a Bishop score  $\leq 5$ , maternal age  $\geq 30$  years, body mass index  $> 30$  kg/m<sup>2</sup> and fetal weight  $\geq 3500$  gm. In one prospective study of nulliparous women undergoing induction, a Bishop score of  $\leq 5$  was associated with an increased risk of cesarean delivery compared to women with a Bishop score  $> 5$  (Odds ratio 2.32, 95% confidence interval 1.66 to 3.25).<sup>48</sup> Scheduling elective induction of labor in nulliparous women with an unfavorable cervix may increase the risk of cesarean delivery compared to the spontaneous onset of labor. In one

retrospective population-based study of nulliparous women in Belgium, the investigators estimated that for every 29 elective inductions, 1 extra cesarean delivery occurred (95% confidence interval, 23.4 to 39.4).<sup>49</sup> In one process improvement study a clinical protocol was implemented that required nulliparous and multiparous women to have a Bishop score of 8 and 6, respectively, prior to initiating an elective induction. Implementation of the protocol was associated with a reduction in the rate of cesarean delivery among nulliparous women undergoing elective induction from 35% to 14%.<sup>50</sup>

### **Ascertainment of Gestational Age and Fetal Maturity**

Ascertainment of gestational age and fetal maturity is critical in making decisions about inductions. Clinical criteria that indicate fetal maturity include: 1) a reliable ultrasound measurement indicates a gestational age equal to or greater than 39 weeks, 2) fetal heart tones have been documented for 30 weeks by Doppler or 20 weeks by non-electronic fetoscope, or 3) 36 weeks has elapsed since a serum or urine human chorionic gonadotropin pregnancy test was positive.<sup>51</sup> Ultrasound measurements that can be reliably used to determine gestational age include a crown-rump length measured between 6 to 11 weeks gestation or fetal measurements (e.g. biparietal diameter, femur length, abdominal circumference) at 12 to 20 weeks of gestation.

## **2. Induction Recommendation**

From the above research, the Induction Task Group proposes the following recommendation:

*Elective delivery of normal, uncomplicated singleton gestations should not be planned to occur prior to 39 weeks gestation.*

This recommendation applies to both elective induction of labor and repeat cesarean delivery. Induction of labor is defined as the stimulation of uterine contractions to accomplish delivery prior to the onset of spontaneous labor. Elective delivery refers to a normal pregnancy without a recognized medical condition that would warrant delivery prior to 39 weeks.

Medical conditions that may warrant delivery prior to 39 weeks gestation include: preeclampsia, eclampsia, hypertension, diabetes, renal disease, chronic pulmonary disease, premature rupture of the membranes, chorioamnionitis, intrauterine fetal demise, fetal compromise, fetal growth restriction, placental abruption, placenta previa, and other causes of pregnancy associated bleeding. For repeat cesarean delivery, the presence of a prior classical uterine incision or a history of uterine rupture may warrant scheduled delivery prior to 39 weeks. In some cases, circumstances such as distance from the hospital or a history of fast labors may warrant delivery prior to 39 weeks. These situations should be a minority of scheduled deliveries. In situations where there is no recognized medical condition that warrants delivery prior to 39 weeks,

consideration should be given to documenting fetal lung maturity before proceeding with the induction.

### **3. Measurement to Assess Effect of Recommendation**

The Induction Task Group recommends coordinating the evaluation of its recommendation with the work being planned by the Joint Commission. The Joint Commission is planning to assess the rate of elective deliveries scheduled before 39 weeks gestation beginning in 2010. Since all hospitals will be preparing relevant data for submission to the Joint Commission, the rate of elective deliveries prior to 39 weeks could be reported to the BLC. In turn, the BLC could assess the range and mean of elective induction rates prior to 39 weeks among Massachusetts birthing hospitals and provide feedback as appropriate. As of May 2009, the Joint Commission has not formally published their proposed methodology. However, they may plan on using the methodology developed by the Leapfrog group. This methodology is presented in Appendix III. Medical record audits may be necessary to ensure that the Joint Commission methodology is valid. For example, administrative data may not properly identify the correct gestational age or the presence of diseases that warrant induction prior to 39 weeks.

### **4. Recommendations for Further Research**

The task group also proposes the following recommendations for future research:

- Medical record audits to ensure that both gestational age and medically indicated inductions are accurately captured from existing administrative data-sets. Previously published research indicates that obstetric administrative data-sets are often inaccurate.<sup>52</sup>
- Use of a standard form to record the indication for induction of labor to increase the reliability of health care administrative data-sets and improve communication among providers and patients about the rationale for the induction. A form developed and used at Baystate Medical Center is presented in Appendix III.
- Use of the Institute for Healthcare Improvement induction bundle in all women undergoing induction of labor to standardize the induction process and reduce the rate of occurrence of uterine tachysystole and Category III fetal heart rate tracings.<sup>53</sup>
- Research on the impact of patient education on the rate of elective induction. Preliminary research suggests that many women do not know the reason for their induction, and may be unaware of the relative risks and benefits of elective

induction.<sup>54</sup> Standardized patient education materials may help to increase the understanding of the relative risks and benefits of induction. In turn, this may impact the rate of induction.

- Further study of membrane stripping as a non-pharmacologic method of stimulating the onset of spontaneous labor.  
If membrane stripping increased the onset of spontaneous labor, this might reduce the use of pharmacologic induction of labor. Alternatively, membrane stripping may represent a non-pharmacologic method of inducing labor. The effectiveness of membrane stripping and the optimal frequency of membrane stripping have not been extensively studied. A number of reports suggest membrane stripping does not stimulate the onset of labor.<sup>55,56</sup>

## **5. Summary**

The Induction Task Group recommends that elective delivery not be planned to occur prior to 39 weeks gestation because it is associated with an increased risk of adverse neonatal outcomes. In nulliparous women, elective induction in the presence of an unfavorable cervical exam probably increases the risk of cesarean delivery. The increased risk of adverse neonatal outcomes and the increased risk of cesarean delivery associated with elective induction prior to 39 weeks results in the increased utilization of health care resources without an improvement in public health.

### **C. Staffing and Communications**

#### **1. Background**

##### **Labor & Delivery in Perspective**

Admissions to L&D are usually unscheduled and occur 7 days per week, 24 hours per day. A patient's labor commonly goes beyond 12 hours and about a third of deliveries occur between midnight and 6 AM. Although the literature is mixed, there is some evidence that outcomes during nights, particularly those associated with fetal distress, may not be as good as during "normal waking hours."<sup>57,58</sup> Facilities providing obstetric care must plan for the fact that resources, including staff that is capable of handling obstetric emergencies, needs to be available 24 hours per day, 7 days per week. This includes staffing that is not only trained appropriately but also functioning optimally. In an environment in which care involves multiple departments and, often, more than one shift, continuity of information and plans must be a goal since they are critical for optimal patient care. Information gathered during prenatal care also needs to be available when a patient arrives in the labor and delivery suite.

## **Focus of Staffing and Communications Task Group**

Because staffing and communications entail numerous issues of importance, it was challenging for the task group to select its specific focus. Ultimately, the group decided on sleep and fatigue as its primary focus, but also looked at structured communication and hand-offs, and access to prenatal records.

Below is a summary of the background information examined by the group, including literature, actions taken by various industries and organizations, and some information about the status of these issues in the Commonwealth. Some of the literature also is summarized in a table in Appendix V.

### **Sleep and Fatigue**

Studies on human physiology have shown that performance deteriorates after prolonged wakefulness and work. This includes recall, reasoning, reflexes and fine motor skills as well as judgment. Studies of physicians in training have shown that those working traditional schedules with recurrent 24-hour shifts make more and more serious errors than those with more limited work hours,<sup>59,60</sup> have more attention failures at night,<sup>61</sup> and suffer more percutaneous injuries.<sup>62</sup> They also double their risk of a motor vehicle crash when driving home after 24 hours of work,<sup>60-63</sup> and show a deterioration in performance of both clinical and non-clinical tasks.<sup>64</sup> The effect is commensurate with the effect of a blood alcohol level of 0.05-0.10%, and judgment of impairment level may also be affected.<sup>65-66</sup> Nurses working shifts greater than 12 hours have been found to have more errors,<sup>67-68</sup> increased risk of need stick injury,<sup>69</sup> and decreased vigilance on the job<sup>68</sup> that is critical to their ability to serve as effective “patient safety nets.”<sup>70</sup> It also has been found that individuals (not specifically clinicians) experience a degradation in decision-making for up to 30 minutes after awakening.<sup>71-72</sup>

Some studies also have found concern among patients. A national survey of patients revealed that if they were informed that their treating surgeon had been on duty for 24 hours, two thirds would be very concerned and just under half would request another physician to provide their care.<sup>73</sup> Another study at three institutions found that nearly one-quarter of internal medicine inpatients surveyed were concerned about resident fatigue and about discontinuity of care due to patient handovers.<sup>74</sup>

### **Actions Regarding Work Hours**

Several fields that require a high level of performance have recognized the need for limiting the duration of work. Following are examples of the limits set by some industries:<sup>75-79</sup>

- Airline pilots: 16 hours & no more than 8 hours flying on domestic routes

- Truck drivers: 14 hours work & no more than 11 hours driving
- Rail industry: 12 hours
- European Work Time Directive: Applies across all occupations including physicians in training and practicing physicians: 48 hours per work week, 11 hours of rest per day and no more than 8 hours of night shift per 24 hours
- Accreditation Council of Graduate Medical Education (ACGME): 80 hour work week, 30 hour shift and 10 hours off between shifts

As concern has increased regarding fatigue and safety in the workplace, a number of health care organizations also have issued recommendations to make the stress of medical coverage more humane to professionals in health care and safer for patients. Some of these are summarized below.

**Institute of Medicine** (Resident Duty Hours: Enhancing Sleep, Supervision, and Safety)<sup>80</sup>  
Limit physicians in training to no more than 16 continuous hours of patient care without sleep.

**The Joint Commission** (Strategies for Addressing Health Care Worker Fatigue)<sup>81</sup>

Implementation Expectations Requirement 18A:

- The organization identifies fatigue as an unacceptable risk to patient care.
- The organization identifies tasks affected by levels of fatigue.
- The organization takes action to minimize the impact of fatigue on patient safety including consideration of: scheduling work hours and on-call periods to minimize fatigue; limiting working hours; identifying any tasks that may no longer be performed by individuals after extended duty hours or assessed to be at a performance degrading level of fatigue; and implementing annual "Fatigue Training" to provide up-to-date guidance on performance degradations that occur due to fatigues, and interventions that can reduce the potential for harm to patients.

**American College of Obstetricians & Gynecologists** (Opinion No. 398)<sup>82</sup>

“Because physicians may not be able to assess the degree of their own fatigue it may also be prudent for groups or departments to develop processes that provide backup care when physician fatigue may diminish the quality of care. There is no question that the human factor of fatigue can affect performance. Because of the issues of patient safety, fatigue should be addressed by all practitioners and efforts should be made to adjust work hours, work load, and time commitments to avoid fatigue when caring for patients. Physicians should not fear economic or other penalties for requesting assistance.”

**American Board of Obstetrics & Gynecology**<sup>83</sup>

“Fatigue may greatly affect health care provider’s skills and abilities, communication, and possibly outcomes. Each physician must recognize his or her limitations caused by fatigue that can occur from an excessively busy practice and impose limits. A safe and effective health care system must be structured to minimize error and confusion.”

## **Status of Work Hours in Massachusetts**

An informal survey of several hospitals and obstetrics departments in Massachusetts showed a variety of policies on work hours.<sup>84</sup> Many hospitals have no explicit policy for attending physicians. Hospitals do, however, follow the ACGME limitations on resident physician hours and some have policies regarding nursing. Controlled Risk Insurance Company (CRICO)/Risk Management Foundation, which provides malpractice insurance for many obstetricians in the Commonwealth, has guidelines for covered obstetric providers that place limitations on the number of patients in active labor that can be managed by a single provider as well as a requirement for back up to be available for times when the number of patients exceed the limit.<sup>85</sup> Obstetrics nursing guidelines specify ratios of one nurse to two patients in labor, and one-to-one for second stage, initiation of epidural or with obstetrical or medical problems;<sup>86</sup> and guidelines from the National Association of Neonatal Nurses recommend no more than 12 consecutive hours of continuous work.<sup>87</sup>

In departments of Neonatology, continuous coverage is most commonly limited to 24 hours. Physicians may or may not have the assistance of advanced practice nurses. There may or may not be back up coverage or a formal policy regarding the use of back up. Level III facilities require in-house coverage 24/7. In Anesthesia departments, call also is most often limited to 24 continuous hours. In larger institutions, residents or a nurse anesthetist may work with an anesthesiologist; and per state hospital licensure regulations cited previously, an around the clock in-house anesthesia is mandated for level III facilities. These facilities may have a dedicated obstetrical anesthesiologist on call.

A Massachusetts ACOG survey of OB groups found that call is taken from Friday night until Monday morning in some practices. Others cover for 12 hours at a time. The most commonly found arrangement, however, is to have a single physician cover for 24 hours at a time with no formal back-up coverage. About half of those reporting 24 hour shifts reported sleep deprivation for at least 24 hours at least once per month.<sup>88</sup>

## **Hand-offs and Availability of Prenatal Records**

Recognizing that limitations on working hours to minimize fatigue can lead to more transfers of patient care, it is critical that transfers include strong communications and clear plans. Incomplete or inaccurate communication during a transfer of patient care can be a source of error. Twenty percent of malpractice claims that resulted in serious harm or death of patients could be traced to poorly executed hand-offs.<sup>89</sup> Moreover, seventy percent of sentinel events in hospitals result from communication failures, and half occur during hand-offs.<sup>90</sup>

All members of the health care team should be aware of who the other members are and what their responsibilities are; and that appropriate members are updated when conditions change. In addition, shift changes provide an opportunity to re-evaluate the care plan and synthesize information. Structured hand-offs with standardized elements of relevant data and plans are most effectively transmitted person to person.

Two professional organizations have addressed handoffs in statements:

**American College of Obstetricians & Gynecologists**<sup>91</sup>

“Awareness of the importance and challenges of effective communication and implementation of effective communication processes, especially as it relates to hand-offs, will decrease errors that result in adverse events and provide a safer patient environment. Structured forms of communication, such as the Situation-Background-Assessment-Recommendation (SBAR) technique, should be considered.”

**Joint Commission** (National Patient Safety Goal Requirement 2-E)<sup>92</sup>

The organization’s process for effective handoff communication includes the following:

- Interactive communications allowing for the opportunity for questioning between the giver and receiver of patient information;
- Up-to-date information regarding the patient’s care, treatment and services, condition, and any recent or anticipated changes;
- A process for verification of the received information, including repeat-back or read-back, as appropriate;
- An opportunity for the receiver of the handoff information to review relevant patient historical data, which may include previous care, treatment, and services; and
- Interruptions during handoffs are limited to minimize the possibility that information would fail to be conveyed or would be forgotten.

Availability of the prenatal records also is important to ensure optimal care. Approximately 20% of the time a copy of the prenatal record is not available in L&D when the patient presents.<sup>93,94</sup> This percentage is likely higher in the case of preterm labor since many hospital protocols call for a copy of the prenatal record to be sent at 34-36 weeks gestation.

## **2. Staffing and Communications Recommendations**

Based on the background information above, the Staffing and Communications Task Group developed the following recommendations (based on Level A evidence – see Appendix V for a description of evidence rankings):

**1. To ensure that obstetrical clinicians are well rested when delivering patient care:**

- *Departments responsible for care on labor and delivery units, in collaboration with their medical and nursing staffs, should develop minimum standards and policies to ensure that all obstetrical care providers have access to coverage arrangements that allow staff to have adequate rest.*
- *Providers of obstetric care with patient care responsibility in L&D should adjust work load and work hours and time commitments to avoid fatigue when caring for patients in a manner that is consistent with best current research in this area.*
- *Because current research suggests that care givers should strive for no longer than 16 consecutive hours of being awake, shifts lasting longer than 16 hours should provide for at least 5 consecutive hours of sleep.*
- *Because the feasibility and specifics of developing these systems among diverse obstetrics departments is not well-defined, where possible, we encourage implementation of this recommendation, and pilot projects, using the measures defined in this document, to help translate this recommendation for departments with more limited resources.*

This recommendation may be met by: limiting shift time, cross coverage among groups, back-up protocols, and other arrangements that limit the duration and intensity of work.

**2. Hand-offs of patient care should be conducted in a structured & consistent manner. Specifically:**

- *Departments should have in place protocols for structured hand-offs that minimize the risks to patients and are designed to maximize continuity of information and patient care plans.*
- *All care givers should be identified and clear not only to the providers themselves but also to the patient (and their support).*
- *Communication should occur at the change of shifts as well as at times of significant change in patient's condition, transfer of care or changes in the acuity of unit.*
- *The content of the communication should include relevant history, physical and laboratory data as well as progress, plans and concerns regarding deterioration.*
- *Communication should include all relevant individuals.*

This second recommendation may be met by:

- Face to face interactions, whenever possible
- Text or electronic communications
- A set location and time for hand-offs to occur
- Structured content (e. g., use of checklists) to ensure that all relevant information is transmitted. Examples include: *SBAR* (Situation-Background-Assessment-Recommendation), uniform language and terminology, and minimizing abbreviations and acronyms
- Sufficient time to interact and clarify questions or concerns (e. g., overlap shift schedules)
- Ability to highlight the most acute or worrisome cases
- Pre-procedure briefings and multidisciplinary meetings
- Communication of all changes in a patient's care team and staffing to the patient and her support

**3. *The prenatal record should be available when the patient arrives in labor and delivery.***

This may be met by transferring a copy of the prenatal record to labor and delivery at 20 weeks, with updates at 28 and 36 weeks; and computerizing records that are accessible to labor and delivery staff 24/7.

**3. Measurement**

The Staffing and Communications Task Group recommends the following measures and strategies to assess effect of the recommendations:

- Survey of Massachusetts maternity hospitals by the BLC two years after the recommendation is released to determine what policies have been put in place, the degree to which there is compliance with these policies, and certain obstetric outcomes.
- Collection of the following data from the maternity hospitals to be reported to BLC (most are available through the birth certificate data):
  - Coverage arrangements of staff (maximum consecutive hours worked, etc.)
  - Maternal deaths
  - Maternal return to the OR or L&D
  - Maternal admission to the ICU
  - Maternal blood transfusions
  - 3<sup>rd</sup> & 4<sup>th</sup> degree tears
  - Uterine rupture
  - Intrapartum or neonatal deaths (>2,500 gms)
  - Birth trauma, such as Erb's palsy, vacuum or forceps injuries

- Unanticipated admission to the NICU of an infant >2,500 grams for more than 24 hours
  - Apgar score of <7 at 5 minutes
  - Cesarean delivery rate
- Patient experience surveys, such as Press Ganey, to track patient impressions regarding providers' familiarity with their data, plans and preferences, and communications skills
  - Surveys of clinician experience with these recommendations, including clinical results, lifestyles and professional satisfaction
  - Tracking the percent of patients for whom prenatal records are not available at presentation in L&D

#### **4. Recommendations for Further Research**

The Staffing and Communications Task Group proposes the following questions for further research:

- How does the time spent waiting in the hospital and the time spent at home figure into “consecutive hours” for the obstetrical provider?
- What factors may mitigate the effects of fatigue on memory, judgment, reflexes & motor skills?
- Do attending physicians have greater satisfaction with shorter call schedules?
- Are there specific outcomes that are affected by shorter call schedules?
- How do structured hand-offs affect specific outcomes in L&D?
- Is patient experience affected by shorter call schedules and more hand-offs?
- What is the effect of L&D environmental factors (noise, space, interruptions, etc.) and confidentiality factors on hand-offs?
- Is there added value in sending copies of prenatal record at the 3<sup>rd</sup> trimester?

#### **5. Summary**

These recommendations balance the tension between dealing with the ill effects of fatigue and the hazards of transferring care to others. Institutions need to establish goals and create policies and procedures that mitigate the effects of fatigue on patient care, make transfer of care safe, and ensure the availability of prenatal records in L&D. How organizations specifically address these issues will depend on their particular resources and needs.

It has long been recognized that fatigue, and even partial sleep deprivation, impairs performance. Fatigue may greatly affect health care providers' skills, abilities, communication, and possibly, outcomes. Although some questions specific to attending physicians and unique practice arrangements may exist, the evidence is available to suggest that a limit of 12-16 hours of

continuous work be established. This may mean that those working shifts that exceed this amount be given protected time during these shifts, or that shifts be re-configured to these limits. Collaborative arrangements among groups are to be encouraged. Structured hand-offs and the availability of prenatal records are necessary components of safe care.

Clear and complete hand-offs should mitigate the concerns of lack of continuity that may arise with shifts designed to ensure that patients are not cared for by providers whose performance is compromised by fatigue. As is always the case in medicine, circumstances may arise when the usual limits may compromise care and exceptions should be made.

There are few places in which the challenges of endurance and communication are more intense than the L&D suite. Successfully addressing these challenges is key to promoting safe labor and delivery for mothers and their infants.

## **D. C-section**

### **1. Background**

Both across the country and in Massachusetts, the c-section rate has risen dramatically over the last 10-15 years. In Massachusetts in 1995, 20.6 % of women were delivered by cesarean and this proportion was 33.7% in 2007 (Massachusetts Births 2007, Figure 1, Appendix VI). Many explanations have been offered for this rise<sup>95</sup> including:

- **Changes in characteristics of patients and their pregnancies**, such as increasing age and greater body mass index of those pregnant, and the rising frequency of multiple gestations.
- **Changes in practice patterns and recommendations for best practice** in obstetrics including, for example, evolving guidelines for the management of breech presentation and of trials of labor among women with prior cesarean delivery, and falling rates of operative vaginal delivery (vacuum and forceps).
- **Changes in patient and provider evaluation of risk** and threshold of concern judged appropriate for deciding to pursue cesarean delivery, changes perhaps influenced by the contemporary medical-legal climate. On the patient side, these changes are demonstrated in what seems to be a growing interest in (albeit with little actual use of) elective cesarean delivery on maternal request.<sup>96</sup>

Importantly, no one factor or change precisely tracks with the c-section rate. In Massachusetts, for example, the cesarean rate increased even after maternal age and the portion of multiple pregnancies peaked (in 2002 and 2004, respectively). Understanding this complicated pattern and exactly what factors have influenced the recent rise and which, if any, are amenable to

modification or intervention will take better data (e.g., recording body mass index (BMI) as part of birth certificate data, clearer identification of elective cesarean as distinct from cesarean delivery for which an indication is not identifiable from available data, accessible and detailed data on medical-legal claims), and we hope that the MDPH and other relevant agencies will allocate the interest and resources needed to obtain such information in the years ahead. Many of the needed data will be available when the revised (2003) Standard U.S. Birth Certificate<sup>97</sup> is adopted in Massachusetts over the next year.

Faced with the current rate of cesarean delivery and recognizing that the cesarean rate will (appropriately) never be zero, attention has been focused on safety-freedom from harm from the process of care-surrounding cesarean delivery. Fortunately, by the end of the 20<sup>th</sup> century, cesarean delivery in Massachusetts and elsewhere in the United States appeared to be safe as judged by global measures of maternal and neonatal outcome.<sup>98-99</sup> Recent changes in cesarean delivery rates have not been reflected in changes in maternal or neonatal mortality; the absolute rates of each have remained low and, in spite of small variation up or down year to year, are generally unchanged.<sup>98</sup>

In spite of the noted overall safety of cesarean delivery, some recent data and trends argue that opportunities for improvement may exist, or at least, deserve investigation. Reviewing 1998-2005 data from the Nationwide Inpatient Sample of the Healthcare Cost and Utilization Project, Kuklina and colleagues describe a cesarean-associated increase in severe maternal obstetric morbidity such as transfusion, renal failure, and important pulmonary complications including pulmonary embolism, need for ventilation and adult respiratory distress syndrome.<sup>100</sup> Others have described neonatal risks for respiratory and other morbidity in relation to the timing of planned cesarean delivery.<sup>47</sup> These data, coupled with the frequency with which c- sections are performed, compel those involved to ask what factors, systems and techniques are associated with optimal maternal and neonatal outcomes when cesarean delivery is undertaken.

The elements of safe cesarean delivery have been reviewed and discussed elsewhere and are summarized in Table 1, Appendix VI<sup>101,102</sup> Recommended elements include:

- **Pre-operative elements**, such as the timing of cesarean delivery (planned or emergent), prophylaxis against infection and thromboembolism, and pre-operative risk assessment
- **Intraoperative elements**, such as anesthetic and surgical technique
- **Post-operative elements**, such as diet, activity, and evaluation of unexpected complications

It is interesting to note that different reviews have reached different conclusions regarding the data supporting some elements and, therefore, the enthusiasm with which they can be recommended. Such disagreements and the many unanswered questions highlight opportunities for future research in this area. Ideally, future studies will be powered to detect important clinical

outcomes designed to provide high level evidence, but we recognize the challenges involved in recruiting large numbers of patients for studies, particularly randomized controlled studies, involving different approaches to childbirth. Unfortunately, while population based studies may be more feasible and may have the size, and thus power needed, they often lack the precision of measurement desired to resolve these clinical questions.

Recognizing risks for surgical and other complications is central to effecting safe cesarean delivery. Such risks may include:

- **Maternal medical conditions**, such as diabetes, heart disease, or obesity-that may make a woman less able to tolerate the process of surgery or impede recovery and healing.
- **Prior surgical experiences**, such as multiple prior cesareans or other laparotomies.
- **Current pregnancy complications**, such as placenta previa, placenta accreta, preeclampsia, or acute fatty liver of pregnancy.

Once risks for complications are identified, those planning a patient's cesarean delivery should anticipate, among other possibilities, the potential need for and local supply of blood products, and the need for and availability of specialist-consultants (e.g., general surgeons, critical care specialists). All these considerations will inform both decisions regarding timing if cesarean delivery is planned in advance of labor and efforts to assure that needed resources are available and accessible when delivery occurs. For those having a planned cesarean without a trial of labor, the later in gestation a cesarean delivery is planned the greater the chance that earlier spontaneous labor or rupture of membranes will require an unscheduled delivery. Although recent work has highlighted risks of planned cesarean delivery before 39 weeks,<sup>47</sup> in some cases the benefits of a timed approach and the ability to assemble needed resources that a scheduled delivery allows will be judged to outweigh such risks. In other cases, it may be appropriate to consider amniocentesis to document fetal lung maturity before proceeding with early delivery.

In addition to influencing timing of delivery, identified risks may direct particular patients to particular providers or centers better prepared to manage anticipated, potential complications. Such referral may be needed both for planned cesarean delivery as well as for those not planning cesarean delivery recognizing, of course, that an unplanned cesarean may become necessary over the course of labor.

Finally, in evaluating the safety of labor and delivery, many may be tempted to compare outcomes of vaginal delivery to those following cesarean section in an effort to determine which is safer. However tempting, this is not an appropriate comparison. Women having one type of delivery are different than those having another and so are their pregnancies; variables associated with the need or tendency to have each type of delivery confound an analysis by direct

comparison. Indeed, the capability to proceed with cesarean delivery is one element assuring safe labor and delivery care for women and newborns. If, for example, a woman has a placental abruption in the midst of labor, performing cesarean delivery can be life saving for mother and baby, but it would not be surprising if following such a cesarean delivery, transfusion is required.

### **Trial of Labor and Vaginal Birth After Cesarean Delivery**

In part because of its effect on both the c-section rate and the safety of labor and delivery for many women, the C-Section Task Group decided to focus on the issue of trials of labor after cesarean (TOLAC) and VBAC. The degree to which the option of TOLAC is elected and VBAC accomplished will influence the overall cesarean delivery rate, and indeed, declining rates of VBAC in Massachusetts (34% in 1996 and 8% in 2007) accounted for 45% of the rise in state cesarean rates between 1996 and 2007.<sup>98</sup>

As patients, counseled by providers, choose between TOLAC and repeat cesarean delivery, their decisions in many cases will center on an evaluation of the relative safety of the alternate paths. The risks of a trial of labor in comparison to a planned repeat cesarean delivery have been well described in several large cohorts.<sup>103-104</sup> These risks include a 1% risk of scar separation (dehiscence) that will in some, but not all cases, lead to important maternal or neonatal morbidity and mortality (e.g., 6% risk of neonatal death or encephalopathy following rupture (.06x.01=.06% overall), 4% risk of rupture associated hysterectomy (.04% overall).<sup>104</sup> Those choosing a trial of labor are at increased risk for maternal blood transfusion, hysterectomy, and pelvic organ injury in addition to an increased albeit very low absolute risk for severe neonatal complications such as stillbirth and hypoxic ischemic encephalopathy.<sup>104</sup>

These data have led some experts to describe a plan for repeat cesarean delivery as “safest for (the) baby.”<sup>105</sup> It is important to recognize, however, that arguing that a repeat cesarean is safest is not the same as saying that a trial of labor is unsafe, for the absolute risk of adverse outcome among those electing a trial of labor is, by most evaluations, low. Further, critics note that more minor, but more common morbidities (e.g., transient neonatal respiratory complications, postpartum maternal pain) were not considered in these studies and subsequent editorial calculus. In fact, many will and should choose TOLAC, and choices should be made in the context of a woman’s full reproductive life and plans. Risks for obstetric and surgical complications increase as the number of repeat cesarean deliveries increases, and thus for women planning many pregnancies after a first c-section, the balance of risks and benefits may tip more certainly in favor of TOLAC. For example, in one analysis, hysterectomy and blood transfusion were required in 2.41 v 0.41 % and 3.65 v 1.53% of fourth as compared to second cesarean deliveries.<sup>106</sup>

## Making Decisions Regarding Trials of Labor After Prior Cesarean Delivery

Three factors/considerations seem central to a patient's choice whether or not to undertake TOLAC:

- The chance of completing a vaginal birth (VBAC)
- The risk of complication
- The effect of the delivery plan on a patient's future health including reproductive health and the newborn's future health

## Evaluating the Chances of Vaginal Birth After Cesarean Delivery

Studies suggest that among all women undergoing TOLAC, approximately 65-75% will have a vaginal delivery (VBAC).<sup>103-104</sup> The chances of VBAC, however, can be refined for an individual patient. Studies have identified a number of variables that appear to influence the chance that a TOLAC will result in VBAC (data presented as absolute risks odds ratios for VBAC):<sup>107</sup>

- **Prior delivery characteristics:** Previous cesarean delivery not performed for dystocia (79 v 65%, OR 2.1) and last cesarean delivery > 2 years ago (75 v 68%, OR 1.4) each are associated with an increased chance of VBAC. As well, and in contrast to what some have argued, the number of past cesareans in one recent study<sup>109</sup> did not appear to influence the chances of having a VBAC ( groups with 1 v > 1 prior cesareans each had approximately a 75% chance).
- **Past pregnancy history:** Prior vaginal delivery before or after the index cesarean delivery is in many studies the strongest predictor of VBAC (87 v 61% ,OR 4.2). Interestingly, it does not appear to matter whether the prior vaginal delivery was before or after the index cesarean delivery.
- **Maternal characteristics:** BMI < 30 (80 v 68%, OR: 1.8) and the absence of maternal disease (e.g., diabetes, hypertension, asthma, kidney disease: absolute risks not reported, OR 1.2) are associated with higher rates of VBAC.
- **Fetal characteristics:** Birth weight < 4000 g (75 v 62%, OR 1.8) is associated with a higher rate of VBAC.
- **Variables related to current labor:** Spontaneous, unaugmented labor (81 v 71%, OR 1.7) in contrast to induced labor is associated with a higher rate of VBAC.

## Evaluating the Risk of Complications from TOLAC

The principle complication of concern in women with a prior c-section is rupture of the uterine scar, as this is the antecedent to many cases of TOLAC associated maternal and neonatal injury. Scar separation is a risk for transfusion, pelvic organ injury and hysterectomy in addition to adverse neonatal outcome.<sup>104</sup> Among all women undergoing TOLAC, large series show an

approximately 0.5-1% risk of uterine scar dehiscence<sup>104,110</sup> although one Canadian series reported a lower risk (0.3%).<sup>103</sup> Studies have identified a number of variables associated with uterine scar dehiscence:

- **Type of uterine scar:** A low transverse scar is associated with a lower risk of dehiscence than a high vertical (classical) scar (1 v 2-9 %).<sup>104,110</sup> Whether an unknown scar (prior records not available) is associated with a higher risk is uncertain. Some recent data argues there is not an increased risk<sup>104</sup> but this may be related to the fact that many, perhaps the majority, of unknown scars are low transverse and thus the rate is likely to approximate the risk in the low transverse group. Low vertical scars appear to have a similar risk of dehiscence as low transverse incisions.<sup>104,110,111</sup>
- **Number of prior scars:** A 2005 study of 25,000 women including 1,082 attempting TOLAC with two prior cesarean deliveries found that two prior cesareans was associated with a doubling of the risk of rupture (0.9 v 1.8%).<sup>108</sup> In contrast, a large 2006 study found no increase in the risk for rupture with two prior scars (0.9 v 0.7 %).<sup>112</sup> Each study reported that as compared with women with just one prior cesarean, women with two prior scars had increased risk of maternal morbidities such as need for hysterectomy and blood transfusion. Because the absolute risk of serious complications was low, however, each set of authors recommended that TOLAC remain an option in women with more than one prior cesarean.
- **Interpregnancy interval:** Some studies found an association between shorter interpregnancy interval (generally defined as < 6-12 months) and risk of rupture (2.7 v 0.9%, RR 2.7 for < 6 mo v > 6 mo).<sup>113-114</sup>
- **Induction of Labor:** Lydon-Rochelle<sup>111</sup> reported an increased risk of rupture when prostaglandins were used for labor induction but this risk has not been seen in other large series.<sup>104</sup> Series are similarly split regarding the risk of using pitocin for induction: Macones<sup>109</sup> found no association overall with oxytocin use but recognized an increased risk when higher maximum doses were used (> 20 mu/min associated with a 4 fold risk of rupture); Landon<sup>104</sup> found a small increase in risk with pitocin use overall. Risks may be lower when oxytocin is used for augmentation.<sup>110</sup> Faced with divergent data and a potential small absolute risk, ACOG recommends that use of prostaglandins for induction or ripening in women undergoing TOLAC “should be discouraged” and does not make a recommendation regarding the use of oxytocin.
- **Prior Vaginal Delivery:** Prior vaginal delivery is associated with a decreased risk of rupture ( absolute data not published, OR of 0.44 ).<sup>115</sup>

Review of the detailed maternal and neonatal morbidities and their relative frequencies in association with alternate plans for delivery in women with a prior cesarean delivery are beyond the scope of this review but can be found elsewhere.<sup>103,104,116</sup> Although the absolute risk of maternal and neonatal complications is low, data from large series demonstrate a reduced risk of serious neonatal and maternal morbidity in cohorts choosing repeat cesarean delivery in preference to TOLAC.<sup>103,104</sup> These studies have often used composite outcomes, have often not

studied more prevalent but less dramatic outcomes (pain, resumption of activities of daily living) and have focused on outcomes associated with the index pregnancy and not future health and reproductive outcomes.

### **Evaluating Effects of Choices on Future Health**

In choosing between TOLAC and repeat cesarean delivery, patients also need to consider the effect of a second c-section on their future health. Many of these effects are tied to outcomes of subsequent pregnancies, pregnancies delivered (presumably) by continued repeat cesareans. Risks of repeated cesarean deliveries include:

- **Abnormal placentation:** placenta accreta and percreta are associated with increasing number of cesareans, an association most marked in cases with concomitant placenta previa. In one series, for example, when placenta previa was present the incidence of accreta rose from 2.2 to 61% in first as compared with fourth cesarean deliveries.<sup>106</sup>
- **Perioperative complications,** such as transfusion, injury to pelvic organs, and need for hysterectomy, are associated with increasing number of cesareans perhaps as a result of abnormal placentation and reflected in increased intensive care unit admission. Scarring from prior cesarean deliveries (adhesions formation) may contribute to organ injury on subsequent repeat cesareans and such scarring can limit the speed with which delivery can be accomplished in urgent or emergent situations.
- **Adverse pregnancy outcomes,** such as ectopic pregnancy and miscarriage, have been reported to be increased following cesarean delivery in some studies although these associations are not as strong as those discussed above and the incremental risk of repeated cesareans not as clearly described.

The consequences of repeat cesarean delivery on non-reproductive future outcomes (e.g., pain, complications from any adhesions or scarring) are not well studied and reported. Some studies have suggested that cesarean delivery as compared to vaginal delivery is associated with a lower risk of later pelvic organ prolapse or incontinence, but not all studies find such associations and we are unaware of studies looking at such outcomes as a consequence of a decision to proceed with TOLAC or repeat cesarean.

Summarizing and synthesizing the risks and possible adverse outcomes briefly detailed above, the American College of Obstetricians crafted a list of recommendations advising in whom and how a TOLAC should be undertaken.<sup>110</sup>

Some object to these recommendations, particularly that the guideline requires that resources for emergency cesarean be “immediately available”, as this stipulation limits or effectively excludes certain hospitals from offering TOLAC. In as much as patients or insurers are linked to providers or facilities, these limitations in turn may limit who might choose TOLAC as an option, particularly in sites/settings where distance limits the number and type of facilities and providers that can be accessed. All these issues will be integral to counseling and planning for delivery

among women who have had a prior cesarean delivery and an approach to counseling and planning is detailed below.

### **Counseling and Planning Regarding TOLAC**

The patient and her provider will need to consider the data detailed above and all of the risks and benefits associated with the two alternate clinical pathways as they consider TOLAC. Not every patient will synthesize similar information and reach the same conclusion. Ultimately, it is the patients' prerogative to interpret the data's meaning. Different people will differently value alternate risks and benefits and accordingly may make alternate delivery plans.

In briefly considering the ethics of the decision involved, a principle-based approach argues that patients should be fully informed and offered the autonomy to choose among available options. In rare instances, some patients may be willing to accept risks that their providers are not, by for example, declining repeat cesarean delivery even when careful evaluation indicates a risk for uterine rupture higher than that usually tolerated (e.g., past classical c-section). Such a patient may find a 2-9% risk of rupture acceptable, or at least acceptable when balanced against alternatives that they may be eager to avoid. That is not the same as saying that all hospitals and providers are ethically obligated or operationally able to offer TOLAC and, in some cases, resources may lead some centers or providers not to offer TOLAC as an option. Regardless of a facility or provider's policy, no one can be forced to have a c-section. Deciding that a facility is unable to offer VBAC is not the same as saying that all women be forced to have c-sections even if they present in labor or at other times when transfer is judged inappropriate. Respect for autonomy requires that a patient can decline any recommended procedure.

If the provider or facility does not perform TOLAC, relationships with other regional providers and centers which do perform TOLAC will appropriately increase options available to patients and are encouraged, especially in areas where travel to centers offering such does not represent an undue burden. Massachusetts is a small state and there are a significant number of practices and facilities throughout the state which will accept patients desiring TOLAC. Early referral may suit some patients. Others might opt for a system of prenatal care close to the patient's home, with delivery further away at a site previously determined and prepared to assume the patient's care for the TOLAC.

The counseling process should begin at the first prenatal visit, or even pre-pregnancy (perhaps at the postpartum visit for the cesarean delivery, a well patient gynecology visit or preconception appointment). The information should be presented at an appropriate educational level, in the correct language, with useful aids and in a culturally sensitive manner. Using absolute numbers rather than relative risks has been shown to be helpful and tools are available for graphically presenting such information.<sup>117</sup> A thoughtful presentation of the sometimes complex risks and benefits may also include participation of the patient's family members or important others. Not only may friends and family contribute to the patient's understanding, but including others can help the patient remember the discussion for further consideration after the visit.

As discussed above, counseling may include consideration of the patient's individual risks. Such consideration necessarily requires a review of past records including the operative report(s) of

the past cesarean delivery. Such records may not be accessible in all cases but may be obtained in many. Many use estimated fetal weight in counseling patients considering a trial of labor and such estimations may be particularly germane when a prior c-section was performed for labor dystocia. Review of past pregnancy information and estimated fetal weight may help patients anticipate their chances of VBAC, and formal nomograms for prediction have been developed.<sup>118</sup> In contrast, although risk factors for uterine rupture have been identified and are similar to those predicting VBAC, no available model usefully predicts which individual patient will rupture, in part, because this complication occurs so rarely even among patients with statistically significant risk factors.<sup>118,119</sup>

Many patients' choices will be dominated by considerations regarding outcome of the current pregnancy. It is important for the woman to consider all of the ramifications of her choice including potential effects on future pregnancies that may, in the moment of a current second pregnancy, be "inconceivable."

Finally patients and providers should consider how decisions made regarding management of a pregnancy may affect outcomes from the choice made for TOLAC or repeat cesarean delivery. These choices included timing of delivery, elements of management at or past term (i.e., induction or not) and provision of a supportive environment for TOLAC (including, for example, labor support).

#### **4. Summary and Recommendations**

The C-Section Task Group makes the following conclusions and recommendations:

- *Trial of Labor After Cesarean*
  - *A trial of labor after prior cesarean delivery should be offered to eligible women in Massachusetts.*
  - *Counseling should consider an individual's chances of successful vaginal birth after cesarean delivery, complications from a trial of labor, and future reproductive plans in the context of a patient's preference for and valuation of alternate outcomes*
  - *Resources, including referral centers, should be made available to allow the safe conduct of such trials. The Commonwealth may facilitate this by identifying appropriate centers willing to accept and care for such patients.*
- *Cesarean delivery in Massachusetts, whether judged from the perspective of neonate or mother, is generally safe, but recommendations such as those detailed in Appendix VI underscore elements and techniques that will optimize safety and outcome.*
- *More data are needed to inform analyses investigations of the causes of the rising rate of cesarean delivery in Massachusetts.*

MDPH should improve the collection of needed data including maternal body mass indices, indication for cesarean delivery (with better identification of elective cesarean delivery on maternal request), and if a trial of labor was undertaken in women with prior

cesarean deliveries. Collection of such data will in part be facilitated by adopting 2003 revisions of the standard U.S. Birth Certificate which the Commonwealth is planning to do over the next year.

## **A. Maternal Hemorrhage**

### **1. Background**

Maternal peripartum hemorrhage remains one of the greatest risk factors for the pregnant and delivered woman, representing a large proportion of maternal mortality and peripartum complications.<sup>120</sup> Attention to improving hospital systems necessary for the care of women at risk for major obstetric hemorrhage is important in the effort to decrease maternal mortality.<sup>121</sup>

The original Critical Care and Anesthesia Task Group concluded that maternal hemorrhage was a significant clinical problem in obstetrics, the final common pathway to mortality and morbidity for several obstetrical complications and worthy of applying proven practices to improve maternal outcomes. The Massachusetts Department of Public Health Maternal Mortality and Morbidity Review Committee (MMMRC) expressed concern for the number of maternal deaths related to hemorrhage, called that to the attention of the BLC and collaborated with the expert panel members in the development of this section.

In Massachusetts in the ten year period covering 1997 – 2007, there were 18 maternal deaths related to hemorrhage. Fifteen of those deaths occurred within 30 days after delivery. Hemorrhage accounted for 7% of the reported maternal deaths in that year period.<sup>122</sup>

Conditions that can predispose women to maternal hemorrhage are uterine atony, placental abruption, placenta previa, placenta accreta/increta/percreta, retained placenta, surgical bleeding, uterine inversion, uterine rupture and coagulopathies associated with hypertension in pregnancy, sepsis, trauma, emboli, and fetal demise. All of these conditions can cascade to uncontrolled blood loss, DIC (disseminated intra-vascular coagulation) and dilutional coagulopathy. Because most of maternal deaths from hemorrhage occur in the hospital, it is believed to be a preventable cause of death.<sup>123</sup> Resuscitation of a patient with peripartum hemorrhage is similar to the resuscitation after traumatic injury.<sup>124</sup>

A literature search and survey of best practice showed that reduction of the incidence of maternal mortality from hemorrhage can be influenced by the following:<sup>124</sup>

- Consistent risk identification
- Immediate recognition of hypovolemia
- Swift, vigorous, systematic treatment

## 2. Maternal Hemorrhage Recommendations

In recognition of the potential for improving outcomes from maternal hemorrhage by adoption of established best practices, the following recommendations are made:

- *Each maternity hospital in the Commonwealth should have clinical guidelines and protocols for the recognition and management of maternal hemorrhage. For those hospitals creating these for the first time, a hospital-based task group that includes an obstetrician, anesthesiologist, pathologist, laboratory and obstetrical nurse should be established to develop them.*
- *The guidelines and protocols should include procedures that effectively address the clinical risk and management of peripartum maternal hemorrhage, including:*
  - Recorded maternal risk identification
  - Clinical definition of maternal hemorrhage
  - Life-threatening clinical indicators
  - Physiologic monitoring methods and parameters
  - Maternal hemorrhage response system
  - Identified clinical threshold for activating maternal hemorrhage response system
- *The maternal hemorrhage response system also should include the following:*
  - Designated rapid response team with Surgery, Anesthesiology, Radiology and the OR represented
  - Blood Bank readiness for massive transfusion
  - Laboratory readiness
  - Resuscitation support, including personnel, and equipment (patient and fluid warming devices, physiologic monitoring equipment and rapid blood/fluid infusing devices)
  - Structure for communication and teamwork
  - Support for the family
  - Algorithm to outline steps in the Maternal Hemorrhage Response System.
  - Clear description of roles and responsibilities for each element/person in the system, including person assigned for documentation
  - Routine practice drills with simulation and debriefing
  - Case review of activation of the maternal hemorrhage response system
  - Competency trainings
  - As needed, inter-hospitals arrangements to ensure highly functioning teams

Resources for creating and implementing clinical and systems guidelines at each institution are included in Appendix VII.

### **3. Measurement**

The following are recommended to assess whether hospitals have guidelines and protocols, and the effect of these guidelines and protocols on maternal hemorrhage. Specifically:

- Review of guidelines and protocols used at the maternity hospitals.
- Analysis of maternal hemorrhage cases reported to the MMMRC.
- Review of the use of blood and blood product utilization in Massachusetts for pregnancy related use.

### **4. Next Steps**

The following next steps are recommended:

- Establish mechanisms at the BLC or other MDPH departments to provide consultation for institutions seeking to develop or update maternal hemorrhage guidelines and protocols; and to collect and review of these materials across maternity hospitals in the Commonwealth.
- Conduct analyses of maternal hemorrhage cases in the Commonwealth, including those reported to the MDPH MMC, to identify factors (for example, conditions and interventions) that may predispose women to peripartum hemorrhage.
- Each maternity hospital should review the use of blood products in pregnancy-related cases within their institutions to assess the appropriateness of use, including the types and amounts of products used.

### **5. Summary**

Maternal hemorrhage is a potentially life-threatening event that could be avoided in some cases through the application of proven clinical guidelines and protocols. In Massachusetts, the maternity hospitals should have these in place, and systematic review should be conducted to evaluate their effectiveness.

## IV. Disparities

### 1. Background

In its 2003 publication *Unequal Treatment - Confronting Racial and Ethnic Disparities in Healthcare*, the IOM summarized what is known about racial and ethnic disparities in health care and identified a research agenda for better understanding the issues.<sup>125</sup> In obstetrics, there is well-established evidence of racial and ethnic differences in birth outcomes in the United States, and some evidence of differences in prenatal care utilization. There is very little literature, however, on disparities specific to OB quality and safety. With the recent increased focus on identifying and addressing racial and ethnic disparities in healthcare, both nationally and locally, it is expected that more research will emerge that studies disparities in quality and safety.

Massachusetts birth data were examined to determine the distribution of race/ethnicity among resident women in the state's L&D units.<sup>126</sup> The overall distribution may be found in Table 1 below.

**Table 1.**

<b>Race/Ethnicity of Residents Delivering at Massachusetts Maternity Hospitals in 2007</b>		
	N	%
American Indian, Non-Hispanic	87	0.1%
Asian/Pacific Islander, Non-Hispanic	5,706	7.5%
Black, Non-Hispanic	6,374	8.4%
Hispanic	10,790	14.2%
Other, Non-Hispanic	1,875	2.5%
White, Non-Hispanic	51,110	67.3%

As indicated in this table, 24,832 minority women delivered at Massachusetts maternity hospitals in 2007. These women represented about one third of the total resident deliveries. Hispanic women were the largest racial/ethnic group accounting for about 14% of the total resident deliveries. Asian and Black women each accounted for about 8% of the deliveries, and a mix of other groups comprised about 3%.

A distribution of the different groups by hospital level of care may be found in Table 2 below. Level 1 hospitals are community hospitals that generally provide care to low-risk mothers and infants; Level 2 hospitals have special care nurseries and provide care to those at moderate risk; and Level 3 hospitals provide the most advanced level of care to high-risk mothers and newborns. As noted in this table, the hospital of delivery varies by group. Whereas, almost two

thirds of Black women deliver at tertiary hospitals, less than half of Asian/Pacific Islander and Hispanic women delivered at Level 3 facilities. Hispanic women are more likely than Asian or Black women to deliver in Level 1 hospitals. Hospital of delivery undoubtedly is influenced by residence of the women. For example, the Level 3 hospitals are generally located in urban areas (6 in Boston, 1 in Springfield and 1 in Worcester) with larger Black populations. But there also may be other issues that affected the site of delivery.

**Table 2.**

<b>Hospital Level of Care</b>	<b>Racial/Ethnic Group</b>				
	<b>Asian/Pacific Islander</b>	<b>Black</b>	<b>Hispanic</b>	<b>Other</b>	<b>White</b>
Level 1	12.0%	10.7%	17.3%	16.9%	22.6%
Level 2	40.0%	25.6%	36.2%	26.5%	36.7%
Level 3	48.0%	63.7%	46.4%	56.6%	40.6%

Six hospitals, a combination of Level 1, Level 2 and Level 3 hospitals, had minority populations that accounted for 50% of their deliveries. These deliveries were at: Boston Medical Center (86%), Lawrence General Hospital (68%), Holyoke Hospital (54%), Tufts Medical Center (50%), Cambridge Hospital (50%) and Lowell General Hospital (50%). Six other hospitals - all Level 1 community hospitals, had minority populations that were less than 10% of the hospitals' total deliveries. These included Martha's Vineyard Hospital (<1%), Mary Lane Hospital (4%), North Adams (4%), Franklin (7%), Heywood (8%) and Jordan Hospital (8%).

Given the many different racial and ethnic groups seen in the L&D units across the Commonwealth, combined with the already identified differences in outcomes and the increasing focus on quality and safety and disparities, the panel undertook an exploratory study of a sample of Massachusetts maternity hospitals to learn about challenges in caring for patients of different races, cultures, religions and languages, and resources available to address these challenges. The goal was to identify themes and issues in caring for diverse populations.

Telephone interviews were conducted with physician medical leaders, nurse managers and staff nurses in L&D units across the Commonwealth. The interview tools used may be found in Appendix VIII. Twelve hospitals – three Level 1, three Level 2 and three Level 3, were targeted for interviews. The hospitals were selected based on geographic location, size and volumes of different racial/ethnic groups.

Interviews were completed with 7 physicians, 8 nurse managers and 3 staff nurses. Areas covered in the interviews included: descriptions of the populations seen; cultural, religious and language issues that staff encounter in caring for their populations; approaches in

identifying these issues; resources available to help address these issues, including cultural competency training and interpreter services; and staff assessments and suggestions about how to best address these issues.

## **2. Interview Findings**

### **Description of Patients**

Consistent with the racial/ethnic data above, staff reported significant diversity in their L&D units, and about one half reported a growth/change in these populations over the past five years. Overall, the interviewees reported having all of the racial/ethnic data above, although it was often difficult for them to estimate their percentages so these are not reported here. When asked about the languages of patients and providers in their L&D units, interviewees reported that patients spoke many languages, with languages spoken varying greatly across the hospitals; differing concentrations of different languages spoken; and compared with patients, fewer providers speaking languages other than English.

About 90% reported Spanish as one of their patients' primary languages. Portuguese (6), Haitian Creole (5) and Russian (5) were the next most frequently mentioned languages. Other languages noted were Cape Verdean Creole, French Creole, Chinese, Vietnamese, Arabic and Khmer. In terms of the relative volume of primary non-English speakers, two reported that these patients represented < 10% of the total L&D patients; 5 reported between 10-20%; 7 reported 25-50%; and 3 reported more than 50% (2 hospitals reported 75% and another 60%). The majority of L&D units sometimes or often encounter patients who cannot read English either because a different language spoken or literary level. All respondents (one did not answer this question) reported that they encounter patients who cannot read English, with about one quarter reporting seeing these patients often; and another quarter seeing them only rarely.

### **Issues in Caring for Diverse Populations**

Most L& D units reported encounters about cultural and/or religious issues that conflict with general practice, but generally only encounter these issues rarely. The most common issues are: use of blood products, availability of female providers, presence of extended families in L&D, and performing c-sections. Several respondents specifically mentioned issues that have come up with the use of blood products with patients who are Jehovah's Witnesses, a religious group that bans the use of these products. Several also mentioned the discomfort of some women, particularly those from the Middle East, with male providers. This has presented challenges in L&D when only male providers in groups are on-call. Another challenge for some units has been accommodating large extended families, who are typically involved in the birth processes in some cultures, in the available L&D space. Women's interest in having c-sections, particularly Brazilian and Indian women, when the providers did not think they were medically warranted, also was mentioned.

In addition to the issues above, interviewees reported a number of other general and specific issues in the care of diverse populations, including the following:

- Language is often a barrier that could be better addressed with better access to interpreter services; it was noted that the stress of delivery can make language – understanding and speaking, more difficult
- In addition to communication issues related to language, other communication issues were:
  - Some patients’ distrust of providers
  - Making sure patients understand what is going on and are comfortable expressing themselves, particularly around pain
- Need for more staff diversity and understanding and respect for different cultures
- Patients are sometimes not receiving prenatal care due to transportation and other issues
- Maintaining quality and safety
- Patient satisfaction

### **Policies and Procedures Related to the Care of Diverse Populations**

Most L&D units - generally the admitting nurse, do an assessment of care for diverse populations, but tools and content varies. Content includes: background of patient (for example, country of origin and length of time in this country), need for interpreter services, food and diet, religious customs, cultural issues and preferences.

Most reported having written protocols addressing care of diverse populations, but many are hospital-wide and very general. These, too, vary by hospital. Areas covered in their policies are: religions, cultural references interpreter services, and compassionate care.

### **Language Services**

As expected, compared to their patients, fewer staff members speak languages other than English, and the percentages of providers fluent in another language ranged from < 5% to 50% (with four interviewees indicating that they did not know). Similar to the patients, the most common language spoken by the providers was Spanish. Ninety percent of interviewees reported that at least one L&D staff member spoke Spanish. In addition to the patient languages above, providers also spoke the following languages – Farsi, French, Italian, Hindu and Polish, Turkish and Ukrainian.

The units rely on the interpreter services available at their hospitals. Most reported that access to the language services they need are generally available, although some reported difficulty accessing some of the languages that they rarely see at night and on weekends. Respondents most often use in-person, professional interpreters. The majority reported that they use these often. All reported some use of professional telephone interpreters, but more than one half use them rarely. All respondents use other hospital employees, with the frequency of use about equally distributed among rarely, sometimes and often. Only 3 respondents have never used adult family or friends of patients, but 2 reported doing this often. Eight respondents reported using patients’ children as interpreters, but only did this rarely.

In terms of perceived effects of language issues in L&D, the majority of the respondents (15) reported that language issues result in delays in obtaining informed consent, but most (11) reported that this happens rarely. The majority (11) also reported that these issues result in prescription or treatment errors and lower quality of care.

### **Staff Training**

Most respondents have participated in some training related to caring for diverse populations, and think that they and their staffs are well prepared to care for diverse populations. Not surprisingly, most feel the most prepared to care for those groups that they see most often, and the least prepared to care for those seen least frequently.

Although most have participated in some training, the content, frequency, methods and depth have varied significantly. Content has been general, or sometimes specific to populations seen in the hospital. The following topics have been included in trainings: religious beliefs, cultural sensitivity, cross cultural communications, access to interpreter services, diet, resources, inpatient and outpatient experiences of care, barriers to care and pain. The frequency of the trainings also have varied from one-time to regular, ongoing sessions. The formats used have included lectures, grand rounds and reading materials. Sessions have been in-person and on-line. Some have had pre- and post-tests. Some have provided Continuing Medical Education (CME) credits. Some hospitals incorporate these trainings in new hire orientation sessions, and/or the yearly fire drill sessions.

About one half of the respondents reported that they and/or their staffs could use some additional training in caring for diverse populations. The suggestions about the topics to be covered varied, but most were general. These included: communications; understanding and sensitivity to different cultures; more information about the hospital's specific populations, including their religious and cultural beliefs; patients views and expectations of the health care system, generally and childbirth specifically; cultural nutrition counseling; breastfeeding; domestic violence and pain management. Learning the patients' languages also was suggested. In addition, some recommended regular, refresher courses, but another suggested that it is more important to support and reinforce cultural competence in L&D than to provide additional trainings.

Finally, the respondents offered the following suggestions/comments to help understand the challenges in caring for diverse populations in L&D.

- More written materials, including discharge planning materials, available to patients in more languages
- Access to timely and appropriate interpreter services important
- Diversity and cultural competency reference materials available to staff
- More complete, in-service training tailored to L&D
- Cultural competency requirements
- Stronger recruitment and retention of bilingual/bicultural staff
- Embrace patients as they are

- Breastfeeding (check 4/5)
- Staff should have knowledge of key words in their patients' languages (for example, pain/no pain, hello)

### **3. Summary and Recommendations**

There is much racial/ethnic diversity in Massachusetts L&D units. In 2007, Hispanic patients were the largest minority group, followed by Black and Asian/Pacific Islander women. The smallest group was American Indian (< 1%). All maternity hospitals in Massachusetts perform deliveries of minority populations, and there has been recent growth in these populations at many of the hospitals. The percentage of these patients varied greatly across the hospitals. At several hospitals, minority populations accounted for 50% or more of the patients; at several other hospitals, however, the percentage of these patients was less than 10%.

The small number of interviews conducted provides preliminary information about the experiences and training of practitioners in the care of diverse populations in the L&D unit. Interviewees indicated cultural, linguistic and other issues in caring for these patients, although they generally indicated that these issues rarely conflict with general practice in L&D. There appears to be no uniformity of policy and procedures or training in diversity issues. Many interviewees provided concrete suggestions for improving the care to diverse populations.

Based upon the preliminary interview results, it is recommended that a more comprehensive assessment of all maternity hospitals in Massachusetts be conducted, with the goals of identifying best practices, and strategies for improving care to all of the Commonwealth's diverse populations.

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## **Appendices**

- I. Participants of the Expert Panel in Obstetrics
- II. Glossary
- III. Electronic Fetal Monitoring Materials
- IV. Induction Materials
- V. Staffing and Communications Materials
- VI. Cesarean Section Materials
- VII. Maternal Hemorrhage Materials
- VIII. Disparities Surveys

**Appendix I**  
**Expert Panel in Obstetrics Participants**  
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**Appendix II**  
**Glossary of Acronyms and Definitions**

**Acronyms**

<b>AWHONN</b>	Association of Women’s Health and Neonatal Nursing
<b>ACNM</b>	American College of Nurse Midwifery
<b>ACOG</b>	American College of Obstetrics and Gynecology
<b>DIC</b>	Disseminated Intravascular Coagulopathy
<b>EFM</b>	Electronic Fetal Monitoring
<b>IOM</b>	The Institute of Medicine
<b>L&amp;D</b>	Labor and Delivery
<b>NICHD</b>	National Institute of Child Health and Human Development
<b>SMFM</b>	Society for Maternal Fetal Medicine
<b>TOLAC</b>	Trial of Labor after Caesarean section
<b>TJC</b>	The Joint Commission
<b>TOL</b>	Trial of Labor
<b>VBAC</b>	Vaginal Birth after Caesarean section

## Definitions

<b>Acidosis</b>	More than normal amount of acid in the blood, lowered pH.
<b>Acute Fatty Liver of Pregnancy</b>	Degenerative changes in liver cells from cellular fat deposits. Rare complication of late pregnancy and early postpartum period characterized by jaundice severe hepatic dysfunction and renal failure.
<b>APGAR Score</b>	A scoring system used to evaluate newborns at 1 minute and 5 minutes after birth. The total score is achieved by assessing five signs: heart rate, respiratory effort, muscle tone, reflex irritability and color. Each of the signs is assigned a score of 0, 1 or 2. The highest possible score is 10.
<b>Biparietal diameter</b>	Radiologic or ultrasound measurement of plane between parietal bones in the fetal skull. Used to estimate fetal age.
<b>Bishop Score</b>	A pre-labor scoring system to assist in predicting whether an induction of labor may be successful.
<b>Chorioamnionitis</b>	An inflammation of the amniotic membranes stimulated by organisms in the amniotic fluid, which then becomes infiltrated by polymorphonuclear leukocytes.
<b>Coagulopathy</b>	A defect in blood-clotting mechanisms, inherited or acquired as a result of physiologic change or pathologic disease process.
<b>Congenital</b>	Born with, existing at or before birth.
<b>Deceleration</b>	Periodic decrease in the baseline fetal heart rate.
<b>Dystocia</b>	Difficult labor due to mechanical factors produced by the fetus or the maternal pelvis or due to inadequate uterine or other muscular activity.

<b>Early Deceleration</b>	Periodic change in fetal heart rate pattern caused by head compression; deceleration has a uniform appearance and early onset in relation to maternal contraction.
<b>Eclampsia</b>	A major complication of pregnancy. Cause unknown. Occurs more often in the primigravida and is accompanied by elevated blood pressure, albuminuria, oliguria, tonic and clonic convulsions and coma. It may occur during pregnancy or within 48 hours after childbirth.
<b>Femur length</b>	Measurement of the long bone of the upper leg, used to estimate fetal age.
<b>Fetal Maturity</b>	The ability of the fetal lung to oxygenate and ventilate effectively outside the womb. Readiness of the fetal lung can be assessed with invasive, e.g., amniocentesis, and non-invasive, e.g., ultrasound, tests.
<b>Gestation</b>	Period of intrauterine development from conception through birth.
<b>Gestational Age</b>	The number of complete weeks of fetal development, calculated from the first day of the last normal menstrual cycle.
<b>HELLP Syndrome</b>	A cluster of changes including hemolysis, elevated liver enzymes and low platelet count, sometimes associated with severe pre-eclampsia.
<b>Hypoxic-Ischemic Encephalopathy</b>	An abnormal neurobehavioral state in which the predominant pathogenic mechanism is impaired cerebral blood flow.
<b>Hypoxia</b>	Less than the normal content of oxygen in body organs and tissues.
<b>Infarction</b>	An area of tissue that is damaged or dies as a result of insufficient blood supply.
<b>Intrapartum</b>	The time from the onset of true labor until the birth of the infant and the delivery of the placenta.
<b>Ischemia</b>	A local, usually temporary deficiency of blood in some part of the body caused by vessel constriction or obstruction to blood flow.
<b>Late Deceleration</b>	Periodic change in fetal heart rate pattern caused by uteroplacental insufficiency; deceleration has a uniform shape and late onset in relation to maternal uterine contraction.

<b>Misoprostol</b>	Medication for cervical ripening and labor induction, Cytotec.
<b>Nulliparous</b>	A woman who has not delivered a viable fetus.
<b>Placenta Previa</b>	Abnormal implantation of the placenta in the lower uterine segment. Classification of type is based on proximity to the cervical os: <i>total</i> -completely covers the os, <i>partial</i> -covers a portion of the os, <i>marginal</i> - is close in proximity to the os.
<b>pH</b>	The potential of hydrogen. A measure of the hydrogen ion concentration of a solution. The degrees of acidity and alkalinity of a substance are expressed in pH values. A solution that is neither acid or alkaline is assigned a pH of 7. Increasing acidity is expressed as a number <7, increasing alkalinity a number >7.
<b>pO<sub>2</sub></b>	Partial pressure of oxygen. Adult normal range in arterial blood is 85-95 mm Hg.
<b>Placenta Accreta</b>	Partial or complete absence of the decidua basalis and abnormal adherence of the placenta to the uterine wall.
<b>Preeclampsia</b>	Toxemia of pregnancy, characterized by hypertension, albuminuria and edema.
<b>Thromboembolism</b>	The blocking of a blood vessel by a clot or part of a clot that has broken off from the place where it formed and traveled to another organ.
<b>Uterine Hyperstimulation</b>	A series of single contractions lasting two minutes or more with a contraction frequency of five or more in ten minutes
<b>Vagal Response</b>	Decrease in heart rate secondary to stimulation of the vagus nerve.
<b>Variability</b>	Changes in the fetal heart rate that result from the interplay between sympathetic and parasympathetic nervous system.
<b>Variable Deceleration</b>	Periodic change in fetal heart rate caused by umbilical cord compression; decelerations vary in onset, occurrence and waveform.

**Glossary References:**

Ladewig PW, London ML, Moberly SM and Olds SB.

Contemporary Maternal-Newborn Care, 5<sup>th</sup> edition, Prentice Hall, 2002,

Glossary pp 847-861.

Cloherty JP, Eichwald EC and Stark AR. Manual of Neonatal Care, 6<sup>th</sup> edition,  
Lippincott, Williams and Wilkins, 2008.

Creasy R, Resnick R, and Bralow L and WB Saunders. Maternal–Fetal Medicine,  
4<sup>th</sup> edition, 1999.

Taber’s Cyclopedic Medical Dictionary, 21<sup>st</sup> edition, On-Line Unbound Medicine, 2009.

### Appendix III Electronic Fetal Monitoring

**Table 1: Sample of Educational Resources in Electronic Fetal Monitoring Terminology, Interpretation and Evaluation**

Intrapartum fetal heart rate monitoring: nomenclature, interpretation and general management principles. ACOG Practice Bulletin 106. American College of Obstetricians and Gynecologists. Obstet Gynecol. 2009. 114:192-202.
Macones GA, Hankins GD, Spong CY, Hauth J, Moore T. The 2008 National Institute of Child Health and Human Development workshop report on electronic fetal monitoring: update on definitions, interpretation, and research guidelines. Obstet Gynecol 2008;112:661–6.
Association of Women’s Health, Obstetric and Neonatal Nurses’ Education and Resources Fetal Heart Rate Monitoring Program: Introductory, intermediate and advanced coursework and certification in EFM. Available at <a href="http://www.awhonn.org">http://www.awhonn.org</a> .
Professional Education Center course offerings for EFM and EFM certification. Available at <a href="http://www.proedcenter.com/cart/course.php">http://www.proedcenter.com/cart/course.php</a> .
K2 Medical Systems computer-based training and certification in EFM. Available at <a href="http://www.k2ms-america.com">http://www.k2ms-america.com</a> .
Advanced Practice Strategies computer-based course offerings for EFM. Available at <a href="http://www.aps-web.com/elearning">http://www.aps-web.com/elearning</a> .

**Table 2: Sample of Strategies for Sustaining Uniformity in EFM Evaluation and Interpretation Skills**

Rounding with “just in time” education and reinforcing use of standardized EFM terminology.
Standardize sign-out, change of shift handoffs, incorporating standardized EFM terminology.
Incorporate standardized EFM terminology in “board rounds” when updating patient’s status with other members of the L&D team.
Conduct direct observations of labor and delivery clinicians during rounds or other EFM-related discussions to assess use of standardized EFM terminology in real time.
Incorporate standard EFM terminology refreshers in staff competency educational sessions.
Provide educational posters and other reminders strategically positioned in the labor and delivery unit and change rooms, reinforcing terminology, categorization and management.
<p>Periodic grand rounds or staff meeting discussions of EFM tracing evaluation and interpretation</p> <ul style="list-style-type: none"> <li>○ EFM pattern and case of the month</li> <li>○ EFM pattern of the week</li> <li>○</li> </ul>
Periodically survey patients about knowledge and satisfaction with the maternity hospital’s patient-oriented EFM-related educational activities.

## Appendix IV

### Induction

#### Normal Deliveries: Leapfrog Specifications

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#### GENERAL INSTRUCTIONS

You should use these specifications to calculate and report the Normal Delivery outcome and process

measures in the Leapfrog Hospital Survey.

Survey scoring is described in more detail at a link on the home page of the online survey.

**Reporting Time Period:** Answer all questions for the 12 months ending:

- December 31, 2008, for surveys submitted prior to November 1, 2009;
- June 30, 2009 for surveys (re)submitted after October 31, 2009.

#### *Normal Deliveries – Volume*

##### **Total Live Births (Q1)**

Definition of **live birth**:

A **live birth** refers to the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life - e.g. beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles - whether or not the umbilical cord has been cut or the placenta is attached.

Source: World Health Organization (WHO)

#### *Measurement Guidelines for Normal Deliveries*

#### **Normal Deliveries-1: Elective Delivery Prior to 39 Completed Weeks Gestation**

**Source: National Quality Forum (PN-007-07)**

**Denominator:** Eligible cases include all mothers that delivered singletons at or after 37 completed weeks gestation during the reporting period with **Excluded Populations** removed. Plurality=1

Gestational Age at delivery = at or after 37 completed weeks gestation (ICD-9 code 765.29)

Report this value in Q3.

*If fewer than 10 cases during the reporting period, skip the next question.*

#### **Excluded Populations:**

Exclude any cases with one or more of the following ICD-9 codes:

- 645 (post-dates)
- 656.5 (IUGR)
- 658.0 (oligohydramnios)
- 642 (hypertension)
- 648.0 (diabetes)
- 648.8 (abnormal glucose tolerance)
- 648.5 (congenital cardiovascular disorders complicating pregnancy)

- 648.6 (other cardiovascular diseases complicating pregnancy)

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### **Normal Deliveries: Leapfrog Specifications**

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- 641 (unspecified antenatal hemorrhage)
- 646.2 (maternal renal disease)
- 646.7 (acute fatty liver of pregnancy)
- 651 (multiple gestation)
- 652 (malpresentation)
- 656.1 (Rhesus isoimmunization affecting management of mother)
- 656.2 (isoimmunization from other and unspecified blood-group incompatibility affecting management of mother)
- 656.4 (fetal demise)
- 657 (hydramnios)
- 658.1 (ruptured membranes)
- 649.3 (maternal coagulopathy)
- V27.1(mother with single stillborn)

**Numerator:** Number of eligible cases included in the denominator that were electively delivered prior to 39 completed weeks gestation.

Elective delivery, for purposes of this measure, include the following::

- medical induction of labor (ICD-9 code; 73.4); or
- previous cesarean delivery complicating pregnancy childbirth or the puerperium (ICD-9 code: 654.2)

Report this value in Q4.

### **Normal Deliveries-2: Cesarean Rate for Low-Risk First Birth Women (a.k.a. NTSV CS Rate)**

**Source: National Quality Forum (PN-010-07)**

**NOTE: Numerators and denominators for this measure will be reported individually for each specified maternal age category**

**Denominator:** Eligible cases include all mothers who delivered singletons at or beyond 37 completed weeks gestation during the reporting period, where the birth is the mothers first delivery and vertex presentation (no breech or transverse positions), with **Excluded Populations** removed.

*Note: Eligible cases include those mothers where the birth is their first delivery (parity=0). This does not necessarily mean the birth is the mother's first pregnancy (gravida=0).*

Identify cases with the following ICD-9-CM codes (MS-DRG):

- 765 (formerly 370): Cesarean section w CC
- 766 (formerly 371): Cesarean section w/o CC
- 767 (formerly 374): Vaginal delivery w sterilization &/or D&C
- 768 (formerly 375): Vaginal delivery w/o sterilization &/or D&C.
- 774 (formerly 372): Vaginal delivery w complicating diagnoses
- 775 (formerly 373): Vaginal delivery w/o complicating diagnoses

Keep those cases that have all of the following (either in the birth record or maternal record):

- Parity = 0
- Presentation = Vertex or cephalic
- Gestational age at delivery = at or after 37 completed weeks gestation (ICD-9 code

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**Normal Deliveries: Leapfrog Specifications**

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- Plurality = 1 (i.e. a singleton)

Report these values in column (a) for each of the following maternal age categories:

- Under 15

- 15-19

- 20-24

- 25-29

- 30-34

- 35-39

- 40-44

- 45-49

- 50 and over

**Excluded Populations:**

Eligible cases should exclude any cases with one or more of the following ICD-9-CM codes:

Multiple births

651.00 TWIN PREGNANCY-UNSPEC

651.01 TWIN PREGNANCY-DELIVERED

651.03 TWIN PREGNANCY-ANTEPART

651.10 TRIPLET PREGNANCY-UNSPEC

651.11 TRIPLET PREGNANCY-DELIV

651.13 TRIPLET PREG-ANTEPARTUM

651.20 QUADRUPLET PREG-UNSPEC

651.21 QUADRUPLET PREG-DELIVER

651.23 QUADRUPLET PREG-ANTEPART

651.30 TWINS W FETAL LOSS-UNSP

651.31 TWINS W FETAL LOSS-DEL

651.33 TWINS W FETAL LOSS-ANTE

651.40 TRIPLETS W FET LOSS-UNSP

651.41 TRIPLETS W FET LOSS-DEL

651.43 TRIPLETS W FET LOSS-ANTE

651.50 QUADS W FETAL LOSS-UNSP

651.51 QUADS W FETAL LOSS-DEL

651.53 QUADS W FETAL LOSS-ANTE

651.60 MULT GES W FET LOSS-UNSP

651.61 MULT GES W FET LOSS-DEL

651.63 MULT GES W FET LOSS-ANTE

651.80 MULTI GESTAT NEC-UNSPEC

651.81 MULTI GESTAT NEC-DELIVER  
651.83 MULTI GEST NEC-ANTEPART  
651.90 MULTI GESTAT NOS-UNSPEC  
651.91 MULT GESTATION NOS-DELIV  
651.93 MULTI GEST NOS-ANTEPART  
Early Onset of Delivery  
644.20 EARLY ONSET DELIV-UNSPEC  
644.21 EARLY ONSET DELIVERY-DEL  
Fetus presentation  
652.20 BREECH PRESENTAT-UNSPEC

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652.21 BREECH PRESENTAT-DELIVER  
652.23 BREECH PRESENT-ANTEPART  
652.30 TRANSV/OBLIQ LIE-UNSPEC  
652.31 TRANSVER/OBLIQ LIE-DELIV  
652.33 TRANSV/OBLIQ LIE-ANTEPAR  
652.40 FACE/BROW PRESENT-UNSPEC  
652.41 FACE/BROW PRESENT-DELIV  
652.43 FACE/BROW PRES-ANTEPART  
652.60 MULT GEST MALPRESEN-UNSP  
652.61 MULT GEST MALPRES-DELIV  
652.63 MULT GES MALPRES-ANTEPAR  
Previous cesarean delivery  
654.20 PREV C-SECT NOS-UNSPEC  
654.21 PREV C-SECT NOS-DELIVER  
654.23 PREV C-SECT NOS-ANTEPART  
Intrauterine death  
656.40 INTRAUTERINE DEATH-UNSP  
656.41 INTRAUTER DEATH-DELIVER  
656.43 INTRAUTER DEATH-ANTEPART  
Locked twins  
660.50 LOCKED TWINS-UNSPECIFIED  
660.51 LOCKED TWINS-DELIVERED  
660.53 LOCKED TWINS-ANTEPARTUM  
Delayed delivery of multiple  
662.30 DELAY DEL 2ND TWIN-UNSP  
662.31 DELAY DEL 2ND TWIN-DELIV  
662.33 DELAY DEL 2 TWIN-ANTEPAR  
Maternal Distress  
669.60 BREECH EXTR NOS-UNSPEC  
669.61 BREECH EXTR NOS-DELIVER  
Non-single liveborn birth outcomes

V271 DELIVER-SINGLE STILLBORN  
V272 DELIVER-TWINS, BOTH LIVE  
V273 DEL-TWINS, 1 NB, 1 SB  
V274 DELIVER-TWINS, BOTH SB  
V275 DEL-MULT BIRTH, ALL LIVE  
V276 DEL-MULT BRTH, SOME LIVE  
V277 DEL-MULT BIRTH, ALL SB  
Multiple pregnancy affecting fetus  
76.15 MULT PREGNANCY AFF NB  
Breech extraction  
72.51 PART BRCH EXTRAC W FORCP  
72.52 PART BREECH EXTRACT NEC  
72.53 TOT BRCH EXTRAC W FORCEP  
72.54 TOT BREECH EXTRAC NEC

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**Normal Deliveries: Leapfrog Specifications**

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**Numerator:** Number of eligible cases included in the denominator by respective maternal age range that were delivered by cesarean section.

Births to include:

- Either of the following MS-DRGs:
- 765 (*formerly 370*): Cesarean section w CC
- 766 (*formerly 371*): Cesarean section w/o CC

Report these values in column (b) for each of the following maternal age categories:

- Under 15
- 15-19
- 20-24
- 25-29
- 30-34
- 35-39
- 40-44
- 45-49
- 50 and over

**Normal Deliveries-3: Newborn Bilirubin Screening Prior to Discharge**

**Source: National Quality Forum (PN-014-07)**

**Denominator:** Eligible cases include all normal newborns born at or beyond 35 completed weeks gestation that were delivered in the facility during the reporting period (all inborns) with **Excluded Populations** removed.

*Use ICD-9 codes 765.28 (35-36 completed weeks of gestation ) and 765.29 (37 or more completed weeks of gestation) to capture births at or beyond 35 completed weeks gestation*

**Excluded Populations:**

Exclude any cases:

- admitted to the NICU; or
- with parental refusal to test; or
- newborn died prior to discharge

**Numerator:** Number of eligible cases included in the denominator who have a serum or transcutaneous bilirubin screen prior to discharge to identify risk of hyperbilirubinemia according

to the Bhutani Nomogram

See:

*American Academy of Pediatrics Clinical Practice Guidelines: Management of Hyperbilirubinemia*

*in the Newborn Infant 35 or More Weeks of Gestation.*

<http://aappolicy.aappublications.org/cgi/content/full/pediatrics;114/1/297>

**Tip:** To view any Figure in the reference, click on it to open, then again to enlarge.

### **Normal Deliveries: Leapfrog Specifications**

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### **Normal Deliveries-4: Appropriate DVT Prophylaxis in Women Undergoing Cesarean Delivery**

**Source: National Quality Forum (PN-006-07)**

**Denominator:** Eligible cases include all women undergoing cesarean delivery during the reporting period.

Include cases with one of the following ICD-9-CM codes (MS-DRG):

- 765 (*formerly 370*): Cesarean section w CC
- 766 (*formerly 371*): Cesarean section w/o CC

### **Excluded Populations:**

No exclusions.

**Numerator:** Number of eligible cases included in denominator who received either fractionated or

unfractionated heparin or pneumatic compression devices prior to surgery.

### ***Change Summary***

*since initial 2009 edition dated 4/01/2009*

**From Baystate Medical Center:**

Date & Time: \_\_\_\_\_

Patient Stamp

**INDUCTION CHECKLIST: OFFICE**

**TO BE COMPLETED BY PROVIDER:**

**PRIOR TO SCHEDULING AN INDUCTION PLEASE COMPLETE THE FOLLOWING:**

- Medically Indicated Induction (Check all indications that apply) Yes  No 
  - Preeclampsia/eclampsia and/or hypertensive disorder
  - Maternal medical conditions (e.g., diabetes mellitus, renal disease, chronic pulmonary disease)
  - Premature rupture of membranes
  - Chorioamnionitis
  - IUFD
  - Post-term pregnancy ( $\geq 42$  weeks of gestation)
  - Fetal compromise (e.g., severe fetal growth restriction, isoimmunization)
  - Abruptio
- Elective Induction (all other indications):
  - Is this an elective induction? Yes  No
  - Is EDD  $\geq 39$  weeks gestation at induction date? Yes  No
  - Please document the indication: \_\_\_\_\_

- 
- Examination: Please complete the following:
    - Cephalic presentation Yes  No
    - EFW: \_\_\_\_\_
    - Bishop Score \_\_\_\_\_

*Modified Bishop Score:*

Factor Score	0	1	2	3
Dilation (cm)	Closed	1-2	3-4	5-6
Effacement (%)	0-30	40-50	60-70	$\geq 80$
Station*	-3	-2	-1,0	+1, +2
Cervical Consistency	Firm	Medium	Soft	
Cervical Position	Posterior	Mid-position	Anterior	

\*Station reflects +3 to -3 scale

With a total score  $\geq 8$  the probability of vaginal delivery after labor induction is similar to that after spontaneous labor

OPT OUT: [If the above evaluation is not appropriate for you, please explain.]

LDRP FAX # - 7948538

Completed by \_\_\_\_\_

Clinical criteria that support a term pregnancy:

1. Fetal heart tones documented for 20 weeks by nonelectronic fetoscope or for 30 weeks by Doppler.
2. Thirty six weeks have elapsed since a CRL at 6-12 weeks of gestation or BPD/FL at 13-20 weeks of gestation.

*IHI Induction Form 1*

*Effective Monday, 2/13/2006*

**Inductions may only be scheduled once this form is completed and forwarded to L&D**

**Thank you for your assistance.**

## Appendix V Staffing & Communications

**Table: Summary of Findings Related to Staffing and Communications from the Medical Literature with Rankings**

Physicians-in-training working traditional schedules with recurrent 24-hour shifts:

- Make 36% more serious medical errors than those whose scheduled work is limited to 16 consecutive hours<sup>59</sup> [Level I Evidence]
- Make five times as many serious diagnostic errors<sup>59</sup> [Level I Evidence]
- Have twice as many on-the-job attentional failures at night<sup>61</sup> [Level I Evidence]
- Suffer 61% more percutaneous injuries after their 20<sup>th</sup> consecutive hour of work, exposing them to an increased risk of acquiring hepatitis, HIV, and other blood-borne illnesses<sup>62</sup> [Level II Evidence]
- Have a doubling in their risk of a motor vehicle crash when driving home after 24 hours of work<sup>60,63</sup> [Level II Evidence]
- Experience a 1.5 to 2 standard deviation deterioration in performance relative to baseline rested performance on both clinical and non-clinical tasks<sup>64</sup> [Level II Evidence]
- Suffer decrements in performance commensurate with those induced by a blood alcohol level of 0.05 to 0.10%<sup>65,66</sup> [Level I Evidence]
- Report making four times as many fatigue-related medical errors that lead to a patient's death<sup>60</sup> [Level III Evidence]
- May not be able to adequately judge their level of impairment<sup>66</sup> [Level I Evidence]
- Individuals (not specifically physicians) experience a degradation in decision-making for up to 30 minutes after awakening<sup>71,72</sup> [Level II Evidence]

Hand-offs

- Seventy per cent of sentinel events in hospitals result from communications failures and half occur during handovers<sup>90</sup> [Level III Evidence]
- Approximately 20% of errors that lead to injury of patients and malpractice claims were attributed to poor hand-offs<sup>89</sup> [Level III Evidence]
- Use of a centralized, computerized prenatal record led to reductions of missing prenatal records in L&D from 16% to 2%<sup>94</sup> [Level II Evidence]

Nurses working shifts of greater than 12 consecutive hours:

- Report a 1.9 to 3.3-fold increased odds of making an error in patient care<sup>67,68</sup> [Level III Evidence]
- Have a significantly increased risk of suffering a needle stick injury<sup>69</sup> [Level III Evidence]
- Experience a decrease in vigilance on the job<sup>68</sup> which is critical to their ability to serve as effective "patient safety nets"<sup>70</sup> [Level III Evidence]

**Studies were reviewed and evaluated for quality according to the method outlined by the U.S. Preventive Services Task Force:**

- I.** Evidence obtained from at least one properly designed randomized controlled trial.
- II-1.** Evidence obtained from well-designed controlled trials without randomization.
- II-2.** Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one center or research group.
- II-3.** Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments also could be regarded as this type of evidence.
- III.** Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

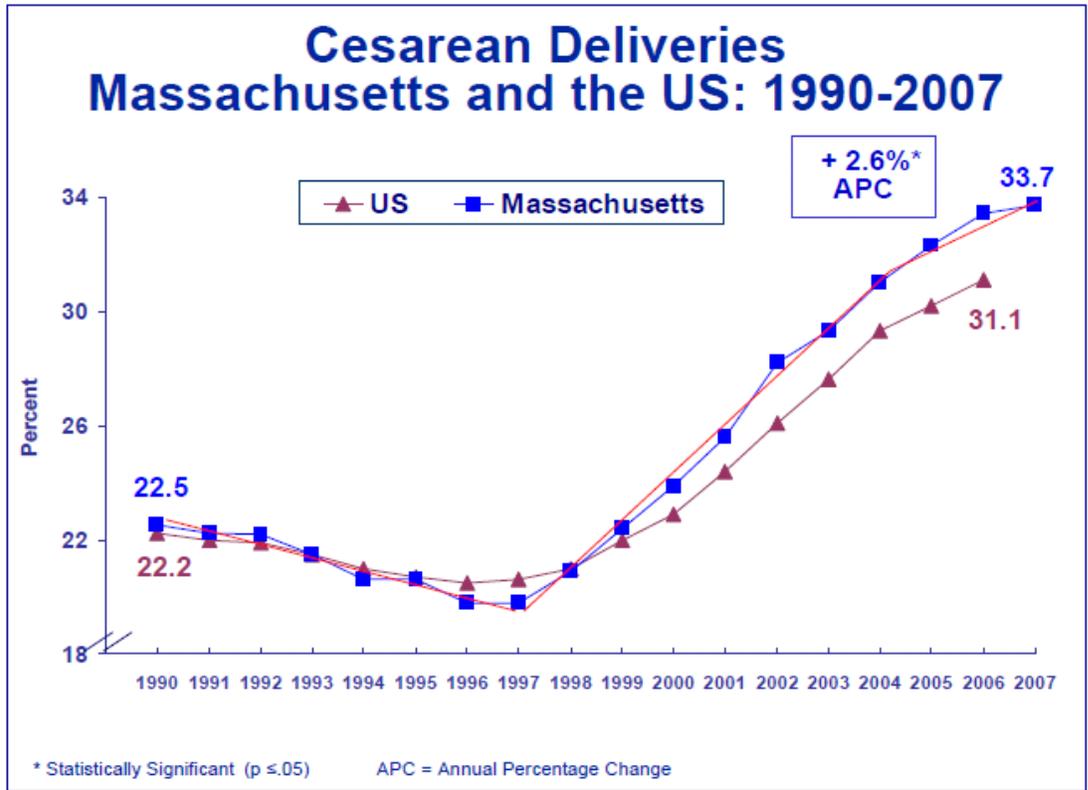
**Based on the highest level of evidence found in the data, recommendations are provided and graded according to the following categories:**

- Level A**—Recommendations are based on good and consistent scientific evidence.
- Level B**—Recommendations are based on limited or inconsistent scientific evidence.
- Level C**—Recommendations are based primarily

## Appendix VI

### Cesarean Section

Figure 1:



Source: Massachusetts Department of Public Health, Bureau of Health Information, Statistics, Research, and Evaluation

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**Table 1: Summary of Selected Recommendations for Performing Safe Cesarean Delivery (Readers should see source documents for complete lists and further rationale)**

Category	Element	Recommendation	Level of Evidence, Reference
Pre operative	Timing	Await 39 weeks for scheduled cesarean delivery	B, 1
		Delivery at emergency CS should be accomplished as quickly as possible. Although a decision to delivery interval of < 30 minutes is an accepted standard, this interval is not in itself critical in influencing baby outcome	C, 1
	Testing	Pregnant women should be offered a hemoglobin assessment before CS	C, 1
		Type and screen/cross is not needed in for CS in healthy women with uncomplicated pregnancies	C, 1
	Location	Those having CS who are at risk for blood loss of > 1000	C, 1

		<p>ml ( antepartum hemorrhage, abruption, uterine rupture, and placenta previa) should have the CS carried out at a maternity unit with on-site blood transfusion services.</p>	
	<p>Time-Out/Safety Checklist</p>	<p>A safety checklist/time-out should be completed before operative procedures (in rare circumstances emergent, clinical circumstances may suggest modification of this recommendation)</p>	<p>WHO Reference</p>
<p>Operative</p>	<p>Anesthesia</p>	<p>Regional anesthesia should be offered with volume preloading and ephedrine or phenylephrine for treatment of hypotension</p>	<p>A, 1</p>
		<p>Units should drill for failed intubation</p>	<p>D, 1</p>
		<p>Antiemetics should be offered</p>	<p>A, 1</p>

	Prophylaxis	Antibiotic prophylaxis should be give and is best administered before skin incision	A, 1+2
		Prophylaxis for thromboembolism should be used	D, 1
	Skin preparation , draping	Adhesive drapes are not recommended	Fair, 2
	Positioning	Operating table should have 15° lateral tilt	A, 1
	Surgical Technique	Transverse skin incision should be used unless there is a specific contraindication	B, 1+2
		Layers below the skin should developed extended bluntly using scissors but not a knife if necessary	B, 1+2
		A bladder flap should not be created	Fair, 2
		Hysterotomy should be extended bluntly	A, 1+2
		Placenta should be delivered using cord traction	A, 1+2
		Intraperitoneal repair of the uterus	A, 1

		should be undertaken	
		The effectiveness and safety of single layer closure of the uterine incision is uncertain. Except within a research context, the uterine incision should be sutured with two layers.	B, 1
		Neither visceral nor parietal peritoneum should be sutured	A, 1+2
		Subcutaneous tissue should be sutured (only) when it measures > 2 cm in depth	A, 1+2
		Superficial wound drains should not be used	A, 1+2
	Medications	Oxytocin should be used after delivery	B, 1
	Newborn Care	A practitioner skilled in resuscitation should be present	C, 1
Postoperative	Monitoring	Women should be observed on a one-to-one basis by a properly trained member of staff	D, 1

		<p>until they have regained airway control and cardiorespiratory stability and are able to communicate.</p> <p>After recovery from anaesthesia, observations (respiratory rate, heart rate, blood pressure, pain, and sedation) should be continued every half hour for 2 hours, and hourly thereafter provided that the observations are stable or satisfactory. If these observations are not stable, more frequent observations and medical review are recommended.</p>	
	Medication	Providing there is no contraindication, nonsteroidal anti-inflammatory drugs should be offered post-CS	A, 1
	Diet	Those recovering well can eat and	A, 1

		drink ad lib	
	Care	Urinary catheter should be removed 12 hours after last dose of regional anesthesia when a woman is mobil	D, 1
		Dressing should be removed at 24 hours and wound monitored for signs of infection	D, 1
	Newborn Care	Additional Breastfeeding Support should be offered	A, 1

Sources: National Institute for Clinical Excellence. Clinical Guideline 13: Caesarean Section. April 2004, London. Berghella V, Baxter JK, Chauhan SP. Evidence-based cesarean delivery. American Journal of Obstetrics & Gynecology 2005; 193: 1607-17.

**Table 2: ACOG Recommendations for Conduct of Trial of Labor After Cesarean By Level of Scientific Evidence**

<p><b>Level A Recommendations: Based on good and consistent scientific evidence.</b></p> <ul style="list-style-type: none"><li>• Most women with one previous cesarean delivery with a low-transverse incision are candidates for VBAC and should be counseled about VBAC and offered a trial of labor.</li><li>• Epidural anesthesia may be used for VBAC.</li></ul>
<p><b>Level B Recommendations: Based on limited or inconsistent scientific evidence.</b></p> <ul style="list-style-type: none"><li>• Women with a vertical incision within the lower uterine segment that does not extend into the fundus are candidates for VBAC.</li><li>• The use of prostaglandins for cervical ripening or induction of labor in most women with a previous cesarean delivery should be discouraged.</li></ul>
<p><b>Level C Recommendations: Based primarily on consensus and expert opinion.</b></p> <ul style="list-style-type: none"><li>• Because uterine rupture may be catastrophic, VBAC should be attempted in institutions equipped to respond to emergencies with physicians immediately available to provide emergency care.</li><li>• After thorough counseling that weighs the individual benefits and risks of VBAC, the ultimate decision to attempt this procedure or undergo a repeat cesarean delivery should be made by the patient and her physician. This discussion should be documented in the medical record.<ul style="list-style-type: none"><li>A. Vaginal birth after a previous cesarean delivery is contraindicated in women with a previous classical uterine incision or extensive transfundal uterine surgery.</li></ul></li></ul>

## Appendix VII

### Maternal Hemorrhage

**Table: Sample of Resources for the Development or Refinement of Maternal Hemorrhage Guidelines and Protocols**

<p>Wisconsin Association for Perinatal Care, Postpartum Hemorrhage Resources. <i>Algorithm for Postpartum Hemorrhage</i>, 2003. Available at: <a href="http://perinatalweb.org/index.php?option=com_content&amp;task=view&amp;id=201&amp;Itemid=398">http://perinatalweb.org/index.php?option=com_content&amp;task=view&amp;id=201&amp;Itemid=398</a>.</p>
<p>California Maternal Quality Care Collaborative: Hemorrhage Task Force. <i>California Obstetrical Guidelines: Overview</i>, 2009. Available at <a href="http://www.CMQCC.org">www.CMQCC.org</a>.</p>
<p>New York State and New York City Departments of Health. <i>Managing Maternal Hemorrhage</i>. 2008. Available at <a href="http://www.acog.org/acog_districts/dist_notice.cfm?recon=1&amp;bulletin=155">http://www.acog.org/acog_districts/dist_notice.cfm?recon=1&amp;bulletin=155</a>.</p>
<p>Dicker R, Garman K, Goodnough L and Spain D, Stanford Hospital and Clinics, Stanford Medical Center, <i>Massive Transfusion Guidelines</i>, 2005.</p>
<p>Departments of Anesthesia, Emergency, Laboratory, Surgery, Trauma, Critical Care and Blood Utilization, South Shore Hospital, South Weymouth, MA . <i>Massive Transfusion Clinical Practice Guideline</i>, 2008.</p>
<p>California Maternal Quality Care Committee Obstetric Hemorrhage Task Force. <i>OB Hemorrhage Toolkit</i>, 2009. Available at <a href="http://cmqcc.org/ob">http://cmqcc.org/ob</a>.</p>
<p>Paul L. Ogburn, MD, Director Maternal Fetal Medicine, Stonybrook University, New York. <i>Obstetric Hemorrhage</i>. <a href="http://www.health.state.ny.us/professionals/protocols">http://www.health.state.ny.us/professionals/protocols</a> and <a href="#">guidelines/maternal hemorrhage</a>, 2005.</p>
<p><i>Planning Reduces the Risk of Maternal Death</i>, Robert L. Barbieri, MD editorial , OBG Management, <a href="file:///C:/Documents">file:///C:/Documents</a> and Settings, 9/11/09.</p>
<p><i>Recognition and Management of Hemorrhage</i>, OB Hemorrhage Algorithm, Illinois Department of Public Health, <a href="http://www.idph.stat.il.us">www.idph.stat.il.us</a>, 2008.</p>

**Appendix VIII**

**Disparities Surveys**

**Telephone Survey of Labor & Delivery Units  
Version 1: Clinical Directors and Nurse Managers**

**Date of Interview** \_\_\_\_\_

**Interviewer** \_\_\_\_\_

**I. Introduction**

As part of a project on patient safety in Obstetrics lead by the Betsy Lehman Center at the Department of Public Health, we are conducting preliminary interviews with practitioners and managers in several of the Labor and Delivery (L&D) units across the state. We are interested in gaining insight into the provision of obstetrical care for diverse populations, and in learning about how to improve the care of patients of different racial/ethnic/cultural/religious/linguistic groups. We also would like to identify resources currently being used to care for these populations in L&D.

All of your responses will be confidential, and will not be tied back to you or your hospital.

Do you have any questions before we begin?

**II. Background of L&D Patients and Staff**

1. Of the patients seen in your L&D over the past year, can you give an estimate of the % of patients from the following racial and ethnic populations?

<b>Race/Ethnicity</b>	<b>% Distribution</b>				
	<b>0-5 %</b>	<b>6-15 %</b>	<b>16 -25 %</b>	<b>26 - 50%</b>	<b>&gt;50 %</b>
Asian					
American Indian/Alaskan Native					
Black/African American					
Hispanic/Latino					
Middle Eastern/North African					

Native Hawaiian/Other Pacific Islander					
White					
Other					

2. Over the past 5 years, have the numbers and % of patients from the different racial and ethnic groups seen in your L&D changed? \_\_\_ Yes \_\_\_ No

If yes, please explain.

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3. Of the staff in your L&D -- including senior/attending OB's, residents, fellows, nurse managers and staff nurses, can you give an estimate of the % from the following racial and ethnic populations?

Race/Ethnicity	% Distribution				
	0-5 %	6 -15 %	16 25 %	26 50 %	>50 %
American Indian/Alaskan Native					
Black/African American					
Hispanic/Latino					
Middle Eastern/North African					
Native Hawaiian/Other Pacific Islander					
White					
Other					

4. Of the patients seen in your L&D over the past year, can given give an estimate of the percentage that spoke a primary language other than English? \_\_\_\_\_ %

5. For patients, what non-English primary languages were seen most often?

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6. Of the staff in your L&D -- including OB's, residents, nurse managers and staff nurses can given give an estimate of percentage that fluently speak a language other than English?  
\_\_\_\_\_ %

7. What non-English languages do the staff speak?

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### III. L& D Experience

8. How often do the staff in your L&D identify patients who cannot read English – both because of literacy level and a different language spoken?  
\_\_\_ Often \_\_\_ Sometimes \_\_\_ Rarely \_\_\_ Never

9. How often do cultural and/or religious issues related to delivery, including emergency situations, conflict with general practice in your L&D?  
\_\_\_ Often \_\_\_ Sometimes \_\_\_ Rarely \_\_\_ Never

Please explain (PROMPTS, if needed: examples: administration of blood products; conduct of procedures, such as cesarean sections; gender of providers; were particular populations involved?)

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10. What do you think are the most significant issues in caring for patients of different cultures, religious and languages in L&D?

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11. Does your L&D unit conduct an assessment to evaluate the needs of diverse populations in the provision of their care? \_\_\_ Yes \_\_\_ No

If yes:

Who does the assessment? \_\_\_\_\_

How is the assessment done? (PROMPT: Is there an assessment tool?)

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Please describe the content of the assessment (cultural, religious, linguistic aspects).

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12. Do you have any written protocols that address the linguistic, cultural and religious needs in the provision of care to diverse populations in L&D?

\_\_\_ Yes \_\_\_ No

If yes, please describe:

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13. Given the patients seen in L&D at your hospital, how well do you feel that the L&D staff are prepared to care for diverse patients?

\_\_\_ very well prepared \_\_\_ well-prepared \_\_\_ somewhat prepared

\_\_\_ somewhat unprepared \_\_\_ very unprepared

14. Are there specific cultural/religious/linguistic populations that you see in L&D that the staff are most prepared to care for? Least prepared? Please describe each, giving specific examples when possible.

**Most Prepared**

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**Least Prepared**

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**IV. Resources and Staff Training**

15. In situations where patients speak a primary language other than English, how often do the L&D staff use the following:

a. Professional medical interpreter in-person:

\_\_\_ never \_\_\_ rarely \_\_\_ sometimes \_\_\_ often

b. Professional interpreter by phone:

\_\_\_ never \_\_\_ rarely \_\_\_ sometimes \_\_\_ often

c. Other hospital employees and medical staff, including physicians:

\_\_\_ never \_\_\_ rarely \_\_\_ sometimes \_\_\_ often

d. Adult family members or friends of patient

\_\_\_ never \_\_\_ rarely \_\_\_ sometimes \_\_\_ often

e. Family members who are children

\_\_\_ never \_\_\_ rarely \_\_\_ sometimes \_\_\_ often

f. Other: Please describe \_\_\_\_\_

\_\_\_ never \_\_\_ rarely \_\_\_ sometimes \_\_\_ often

16. Are there particular languages that are more difficult to access interpreter services for than others? \_\_\_ Yes \_\_\_ No

What languages are the most difficult to find services for?

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17. Are there particular problems in accessing different types of interpreter services on certain days (weekdays/weekends) or times of the day (day/evening/night)? \_\_\_ Yes \_\_\_ No

Please indicate the types of services (for example, in-person interpreters) that are the most difficult to access by day of week and time of day.

Day of Week	Type of Service by Time of Day		
	8AM - 5PM	5PM – 12AM	12AM – 8AM
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			
Sunday			

18. How often do you think language barriers in L&D’s generally result in:

- a. delays in obtaining informed consent      \_\_\_ never \_\_\_ rarely \_\_\_ sometimes \_\_\_ often
- b. Prescription or treatment error            \_\_\_ never \_\_\_ rarely \_\_\_ sometimes \_\_\_ often
- c. Lower quality of care                            \_\_\_ never \_\_\_ rarely \_\_\_ sometimes \_\_\_ often

19. Have L&D staff received training in caring for diverse populations? \_\_\_ Yes \_\_\_ No.

If yes:

a. Was the training mandatory? YES/NO	
b. What L&D staff participated (OB's – attendings, fellows and residents; midwives; nurse managers; staff nurses; anesthesiologists; neonatologists; other)?	
c. How many training sessions have you had? Was it a one-time, or on-going?	
d. What was the format of the training (for example, on-line, in-person)?	
e. What was the content of the training (topics covered)? Did the training include cultural competence and cross-cultural skills training?	

20. Do you think staff in your L&D need additional training in caring for diverse populations?  
\_\_\_ Yes \_\_\_ No

If yes, please explain (different populations, content, types of training)

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21. Do you have any suggestions about how maternity hospitals might improve the care for diverse populations in L&D, but also in prenatal and post-partum care?

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22. Do you have any other comments to help us understand the challenges in caring diverse populations in your L&D service?

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Thank you so much for your time.

The information you provided will be de-identified and included in a report of the Expert Panel in Obstetrics to be issued by the Lehman Center this summer. The Lehman Center will be notifying your hospital when the report is available.

**Telephone Survey of Labor & Delivery Units  
Version 2: Staff Nurses**

**Date of Interview** \_\_\_\_\_

**Interviewer** \_\_\_\_\_

**I. Introduction**

As part of a project on patient safety in Obstetrics lead by the Betsy Lehman Center at the Department of Public Health, we are conducting preliminary interviews with practitioners and managers in several of the Labor and Delivery (L&D) units across the state. We are interested in gaining insight into the provision of obstetrical care for diverse populations, and in learning about how to improve the care of patients of different racial/ethnic/cultural/religious/linguistic groups. We also would like to identify resources currently being used to care for these populations in L&D.

All of your responses will be confidential, and will not be tied back to you or your hospital.

Do you have any questions before we begin?

**II. Background of L&D Patients and Staff**

19. Of the patients seen in your L&D over the past year, can you give an estimate of the % of patients from the following racial and ethnic populations?

Race/Ethnicity	% Distribution				
	0-5 %	6-15 %	16 -25 %	26 - 50%	>50 %
American Indian/Alaskan Native					
Asian					
Black/African American					
Hispanic/Latino					
Middle Eastern/North African					
Native Hawaiian/Other Pacific Islander					

White					
Other					

20. Over the past 5 years, have the numbers and % of patients from the different racial and ethnic groups seen in your L&D changed? \_\_\_ Yes \_\_\_ No

If yes, please explain.

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21. Of the staff in your L&D -- including senior/attending OB's, residents, fellows, nurse managers and staff nurses, can you give an estimate of the % from the following racial and ethnic populations?

Race/Ethnicity	% Distribution				
	0-5 %	6 -15 %	16 25 %	26 50 %	>50 %
American Indian/Alaskan Native					
Black/African American					
Hispanic/Latino					
Middle Eastern/North African					
Native Hawaiian/Other Pacific Islander					
White					
Other					

22. Of the patients seen in your L&D over the past year, can given give an estimate of the percentage that spoke a primary language other than English? \_\_\_\_\_ %

23. For patients, what non-English primary languages were seen most often?

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24. Of the staff in your L&D -- including OB's, residents, nurse managers and staff nurses can given give an estimate of percentage that fluently speak a language other than English?  
\_\_\_\_\_ %

25. What non-English languages do the staff speak?

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**III. L& D Experience**

26. How often do you identify patients who cannot read English – both because of literacy level and a different language spoken?  
\_\_\_ Often \_\_\_ Sometimes \_\_\_ Rarely \_\_\_ Never

27. How often do cultural and/or religious issues related to delivery, including emergency situations, conflict with general practice in your L&D?  
\_\_\_ Often \_\_\_ Sometimes \_\_\_ Rarely \_\_\_ Never

Please explain (PROMPTS, if needed: examples: administration of blood products; conduct of procedures, such as cesarean sections; gender of providers; were particular populations involved?)

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28. What do you think are the most significant issues in caring for patients of different cultures, religious and languages in L&D?

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29. Does your L&D unit conduct an assessment to evaluate the needs of diverse populations in the provision of their care? \_\_\_ Yes \_\_\_ No

If yes:

Who does the assessment? \_\_\_\_\_

How is the assessment done? (PROMPT: Is there an assessment tool?)

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Please describe the content of the assessment (cultural, religious, linguistic aspects).

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30. Does your L&D have any written protocols that address the linguistic, cultural and religious needs in the provision of care to diverse populations?

Yes  No

If yes, please describe:

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31. Given the patients seen in L&D at your hospital, how well do you feel that you are prepared to care for diverse patients?

very well prepared  well-prepared  somewhat prepared

somewhat unprepared  very unprepared

32. Are there specific cultural/religious/linguistic populations that you see in L&D that you think you are most prepared to care for? Least prepared? Please describe each, giving specific examples when possible.

**Most Prepared**

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**Least Prepared**

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**IV. Resources and Staff Training**

33. In situations where patients speak a primary language other than English, how often do you use the following:

- g. Professional medical interpreter in-person:  
\_\_\_ never \_\_\_ rarely \_\_\_ sometimes \_\_\_ often
- h. Professional interpreter by phone:  
\_\_\_ never \_\_\_ rarely \_\_\_ sometimes \_\_\_ often
- i. Other hospital employees and medical staff, including physicians:  
\_\_\_ never \_\_\_ rarely \_\_\_ sometimes \_\_\_ often
- j. Adult family members or friends of patient  
\_\_\_ never \_\_\_ rarely \_\_\_ sometimes \_\_\_ often
- k. Family members who are children  
\_\_\_ never \_\_\_ rarely \_\_\_ sometimes \_\_\_ often
- l. Other: Please describe \_\_\_\_\_  
\_\_\_ never \_\_\_ rarely \_\_\_ sometimes \_\_\_ often

34. Are there particular languages that are more difficult to access interpreter services for than others? \_\_\_ Yes \_\_\_ No

What languages are the most difficult to find services for?

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35. Are there particular problems in accessing different types of interpreter services on certain days (weekdays/weekends) or times of the day (day/evening/night)? \_\_\_ Yes \_\_\_ No

Please indicate the types of services (for example, in-person interpreters) that are the most difficult to access by day of week and time of day.

Day of Week	Type of Service by Time of Day		
	8AM - 5PM	5PM – 12AM	12AM – 8AM
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			
Sunday			

36. How often do you think language barriers in L&D’s generally result in:

- a. delays in obtaining informed consent     \_\_\_ never \_\_\_ rarely \_\_\_ sometimes \_\_\_ often
- b. Prescription or treatment error            \_\_\_ never \_\_\_ rarely \_\_\_ sometimes \_\_\_ often
- c. Lower quality of care                            \_\_\_ never \_\_\_ rarely \_\_\_ sometimes \_\_\_ often

19. Have you received training in caring for diverse populations? \_\_\_ Yes \_\_\_ No.

If yes:

a. Was the training mandatory? YES/NO	
b. What L&D staff participated (OB's – attendings, fellows and residents; midwives; nurse managers; staff nurses; anesthesiologists; neonatologists; other)?	
c. How many training sessions have you had? Was it a one-time, or on-going?	
d. What was the format of the training (for example, on-line, in-person)?	
e. What was the content of the training (topics covered)? Did the training include cultural competence and cross-cultural skills training?	

21. Would you like additional training in caring for diverse populations? \_\_\_ Yes \_\_\_ No

If yes, please explain (different populations, content, types of training)

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22. Do you have any suggestions about how maternity hospitals might improve the care for diverse populations in L&D, but also in prenatal and post-partum care?

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22. Do you have any other comments to help us understand the challenges in caring diverse populations in your L&D service?

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Thank you so much for your time.

The information you provided will be de-identified and included in a report of the Expert Panel in Obstetrics to be issued by the Lehman Center this summer. The Lehman Center will be notifying your hospital when the report is available.