

Technology Enables New and Improved Best Practices to Mitigate Preventable Complications in Obstetric Care Delivery

VIRTUA OUR LADY OF LOURDES HOSPITAL*, CAMDEN, NEW JERSEY

Annual Births.....800

Online Users.....341

LDRS (Labor+ Delivery+ Recovery) beds.....6

Annual inpatient discharge.....14,304

Recognized as one of the Top U.S. hospitals in Newsweek's 2020 list that demonstrated excellence in maternal care

Customer since May 2007
*2020 estimates



Labor and delivery (L&D) costs are rising in the U.S. due in part to preventable complications and manageable chronic conditions.¹ The maternal population today has more comorbidities that are pregnancy related, for example, preeclampsia and pre-existing conditions such as diabetes and obesity.

Moreover, the increase of women delaying having children until after age 35 coupled with the presence of chronic conditions plays a greater role in safer deliveries and the outcomes of moms and babies impacting the cost of care. Complications, on average, add 20 percent to the cost of a vaginal delivery and 25 percent to the cost of a cesarean delivery.²

In this context, evidenced-based perinatal research is affecting new care practices to address pregnancy-related complications, indicating which actions should be taken for clinical decision making and early interventions.

Hospitals, for their part, must ensure the perinatal technology in use is highly optimized for ideal performance. The pursuit of higher quality care and safer childbirth during delivery can prevent and mitigate a multitude of risk factors, ensuring the survival and best outcomes of the mother and baby.

Case Study: Virtua Our Lady of Lourdes Hospital

Our Lady of Lourdes Hospital, part of the Virtua Health nonprofit health system in southern New Jersey, is a long-standing provider of high-quality perinatal care. Designated as a Community Perinatal Centers Intermediate by the

CLINICOMP'S PERINATAL SYSTEM:

- QBL Electronic Calculator
- Perinatal Charting
- Electronic Documentation
- Postpartum Hemorrhage Risk Assessment Table
- Fetal Monitor Remote Display with Smart Alerts (FMRDSA)
- Improves quality of care, safety and workflow by offering real-time access to data spanning the entire perinatal range, from antepartum through postpartum
- Integrates with a wide range of devices and systems to serve as the core clinician documentation and EMR system
- Offers a flexible and configurable platform enabling hospitals to quickly address needs as they emerge
- Performs clinical calculations automatically, imports maternal data to the newborn's record, provides decision support, and manages monitoring and clinical alerts
- Simplifies data capture with a variety of flowsheet templates
- Facilitates adherence to standards of care from the American College of Obstetricians and Gynecologists; American Academy of Pediatrics; Association of Women's Health, Obstetric and Neonatal Nurses; and Joint Commission

New Jersey Department of Health and Senior Services, the Camden, New Jersey-based hospital provides a full range of maternity services and testing for low-and high-risk pregnant women and advanced care for high-risk newborns.

To improve perinatal care management and delivery in 2007, Our Lady of Lourdes implemented CliniComp's Perinatal System providing electronic documentation, clinical decision support, fetal surveillance, fetal strip charting, and real-time fetal surveillance alerts.

This case study explores how over the subsequent years the hospital leveraged CliniComp's advanced perinatal solutions to develop innovative capabilities to support new best practice protocols to address four defining perinatal initiatives.

1. Post-partum hemorrhage and blood loss
2. Prolonged second stage labor
3. Maternal and fetal monitoring and surveillance
4. Baby-Friendly infant feeding note

I. Measuring Accuracy of Quantitative Blood Loss to Manage Postpartum Hemorrhage

Obstetric hemorrhage is extensive bleeding that may occur before or after delivery, but more than 80 percent of cases occur post-partum.³ Postpartum hemorrhage causes approximately 11 percent of maternal deaths in the U.S. and is the leading cause of maternal death worldwide.⁴ Importantly, 54 to 93 percent of maternal deaths due to obstetric hemorrhage may be preventable.⁵ In addition, the cost of a delivery with hemorrhage is about 45 percent more.⁶

Quantitative blood loss (QBL) is a significant health factor in the management of postpartum hemorrhage. QBL methods are shown to be an exact assessment of determining actual blood loss rather than a visual estimate. Visual estimation of blood loss is likely to underestimate blood loss, causing delay and failure of early interventions for postpartum hemorrhage, thus adversely affecting maternal morbidity and mortality.⁷

Based on work by California's Hospital Quality Institute and the AWHONN Postpartum Hemorrhage Project, Our Lady of Lourdes OB clinicians learned that the more accurate documentation of and the more quickly a hemorrhage is identified, the more errors are reduced associated with manual measuring of blood fluid.⁸ Numerous medical studies found manual estimation of blood loss results in inaccurate calculations and can lead to complications with the mother. QBL is considered an evidenced-based perinatal best practice that leads to early symptom identification and intervention.

Quantitative Blood Loss (QBL) Electronic Calculator

In February 2018, Our Lady of Lourdes instituted new best practices prompted by medical research to manage post-partum hemorrhage. Hospital IT leaders worked with OB clinicians to define and embed two tools within the **CliniComp Perinatal System** to assess the risk of hemorrhage and measure blood loss.

The **CliniComp QBL Electronic Calculator** in conjunction with the Postpartum Hemorrhage Risk Assessment Table assists nurses to monitor, screen and

measure the patient's volume of blood loss. The QBL e-calculator quantifies and then documents the fluid exactly within CliniComp's Perinatal System.

The newly automated tool replaced the hospital's "pen and paper" arduous manual calculation estimation technique, a practice that is performed historically by L&D departments nationwide. The QBL calculator has an item selection dry weight field and a wet weight field automatically calculating the difference for estimated blood loss. The documented e-calculation data accessible in CliniComp streamlines communication among perinatal team members alerting to blood loss and potential hemorrhage complications.

QBL e-calculator's accurate measurement activates early symptom identification and intervention

Our Lady of Lourdes perinatal team reports the QBL e-calculator's accurate data description of blood loss fueled dramatic improvements to its care practices treating patients earlier as opposed to waiting for the complications to surface hours later, when potential risks to the mother could be life-threatening.

"Medical research study after study reveals that especially during a C-section, blood loss tended to be underestimated and at times the patient's condition was significant," said Patricia Cerveny, BSN, RN, CBC, C-EFM, Nursing Director—Women's and Children's Services at Virtua Our Lady of Lourdes Hospital.

"As a result, we're almost waiting for symptoms to develop and suddenly the situation is close to emergent. Where as the CliniComp QBL Electronic Calculator's accurate measurement enables our OB team to better predict the possibilities and begin intervention early, if necessary, at the appropriate time."

"A clinician knows that a patient seen visually losing half their blood volume during labor and delivery will most certainly suffer severe postpartum hemorrhage," she continued. "But all around, it's better medically and a best practice to have an accurate measurement of the mother's blood loss to watch for early identification of symptoms to catch and treat early. Thanks to the CliniComp QBL Electronic Calculator, we can administer a blood transfusion and lab work and identify changes in vital signs like tachycardia, for example."

Our Lady of Lourdes nurses have positively embraced adopting the QBL e-calculator. "With any change you need to have your OB team's support and today using the e-calculator is second nature to us," noted Cerveny.

The QBL e-calculator populates the mother's delivery summary with the QBL value. The consistent accuracy of the e-calculations alleviates the risk of perinatal nurses inputting transcription errors. The e-note also reduces the harmful impact to patients caused by administration errors. The QBL calculations then populate the attending provider's notes. The OB physician is verbally made aware of a potential risk, also reinforced in the Notes documentation.

The **CliniComp QBL Electronic Calculator** helps to support and improve the quality of maternal care practices. The enhanced protocols augmented by the tool are credited for contributing to decreasing Our Lady of Lourdes' length of stay by managing blood loss and potential hemorrhage proactively through the protocol practices.

"[T]he CliniComp QBL Electronic Calculator's accurate measurement enables our OB team to better predict the possibilities [of blood loss] and **begin intervention early** if necessary, at the appropriate time."

PATRICIA CERVENY | BSN, RN, CBC, C-EFM |
NURSING DIRECTOR | WOMEN'S AND
CHILDREN'S SERVICES

Postpartum hemorrhage risk assessment table

Our Lady of Lourdes Hospital uses a **postpartum hemorrhage risk assessment table** embedded within **CliniComp's Perinatal System**. The standardized tool is adapted from guidance provided by the Alliance for Innovation in Maternal Health (AIM) Patient Safety Bundle: Obstetric Hemorrhage⁹ and The AWHONN Postpartum Hemorrhage Project.¹⁰

The tool alerts hospital multidisciplinary teams of high-risk status and potential emergent needs in case the mother, for example, has a severe hemorrhage requiring a hysterectomy. In this situation, the OB nurse, upon performing the assessment, sees the alert flagging the patient is at high risk and notifies the anesthesiologist and blood bank personnel who can respond in a more expedient manner.

II. Allowing Mothers to Labor Down and Feel the Urge to Push Naturally Versus Forced

The second of three stages of birth is known to be associated with vaginal tears, abnormal heart rate of the baby, hemorrhage, infection, blood clots, strokes and other adverse maternal complications that, in some cases, lead to the need to have a C-section.

Virtua Our Lady of Lourdes Hospital implemented several evidence-based, second-stage labor practices in **CliniComp's Perinatal Charting** to better manage the mother's second stage of labor. The practices were drawn from AWHONN and the American College of Nurse-Midwives' clinical guidelines calling for improved management of second-stage labor.¹¹

The guidelines help the hospital achieve its goals of perinatal safety reducing cesarean births and optimizing maternal and fetal outcomes associated with labor and birth, hence improving women's birth experience satisfaction.

Traditionally, second stage labor starts after the mother's cervix has dilated to 10 centimeters (about 4 inches), and it continues until the baby finishes moving through the vaginal canal and is born.

"If inducing labor the traditional way, when pushing starts the baby may not be in the right position or not down far enough and into the vaginal canal, which has risk for injury to both mom and baby," said Cerveny. "Our ultimate goal for second stage-labor is to allow for a vaginal birth."

The hospital now encourages expectant mothers to "labor down" instead of the hospital perinatal team directing the mother to force push. Laboring down allows the woman's body to naturally bring the baby further down and rotate while following only natural, gentle urges to push or not push at all. Laboring down is also an effective way for the woman to conserve energy and rest.

Another new perinatal measure that the OB team has instituted to improve second-stage labor safety and management is the banning of routine indwelling urinary catheters. Previously, mothers receiving epidural anesthesia also had a Foley catheter inserted. That practice is no longer followed unless there is a medical necessity incidence such as urinary retention.

The various intervention measures and new practices were added to Our Lady of Lourdes's **flowsheet documentation** within the CliniComp system for a vaginal birth. **CliniComp's Perinatal System** documents and reports the second-stage labor's fetal and mother data intensive process for compliance and legal requirements.

The **CliniComp electronic documentation** has enabled the perinatal team to measure and report its perinatal quality improvement and outcomes progress. Data findings demonstrate that Our Lady of Lourdes:

- Lowered the hospital's C-section rate from 23 percent in 2017 to 20 percent in 2018.
- Reduced third-and fourth-degree lacerations

According to Cerveny, the OB nursing staff enthusiastically embraced the "labor down" initiative.

"CliniComp's Perinatal System helped us take a look at what all happened during any delivery....And it's so easy to find them [documented changes] when I do chart reviews....

The flowsheet documentation streamlines the entire continuum of the labor and delivery process, which is a really great build."

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NURSING DIRECTOR | WOMEN'S AND
CHILDREN'S SERVICES

"This was a very comprehensive initiative and we offered a lot of education supporting it," she recalled. "The CliniComp documentation helped support the L&D practice change and getting the staff including the physicians on board with permitting the mother to labor longer in second stage."

"**CliniComp's Perinatal System** helped us take a look at what all happened during any delivery," Cerveny added. "Our team documents, for example, physical changes every 30 minutes. This along with new intervention and practice changes have a place to be documented in the application. And it's so easy to find them when I do chart reviews. Before, I had to look elsewhere and at clinical notes. The flowsheet documentation streamlines the entire continuum of the labor and delivery process, which is a really great build."

Also essential to maternal and fetal well-being is the management of second-stage labor. **CliniComp's fetal surveillance software**, integrated with clinical documentation, enables OB clinicians to observe in real time the electronic fetal strip—located within the documentation screen—through the length and duration of the second stage of labor. The electronic fetal monitoring (EFM) tracing visible on the labor flowsheet can be referenced by the clinician to document the baby's response to maternal position and pushing efforts to show trends of patterns over time and potential complications to guide clinical decision-making.

Other OB processes such as pushing techniques, assessing mom and baby's response, monitoring heart rates, evaluating mom's exhaustion and whether she is pushing effectively, estimating the potential for mom to rupture membranes or develop a fever and more are tracked and documented on flowcharts within **CliniComp's Perinatal System**.

FETAL MONITORING REMOTE DISPLAY

- Displays multiple patient fetal information simultaneously in real time from a central station
- Stores and archives fetal and maternal traces, and generates visual and audible alarms when fetal heart rates are too fast or too slow
- Alerts nurses when patients are disconnected from fetal monitors
- Enables users to visualize all monitored patients in one central location

“You have to synchronize all of that data and look at the big picture when reviewing second stage labor to make informed clinical decisions whether to intervene. This includes making the right decision call for a C-section,” said Cerveny.

III. Surveillance and Monitoring of Mom and Baby for Optimal Delivery and Health

In the course of managing labor and delivery, the OB team is attuned to the monitoring and surveillance of mom physiologic status, fetal distress, maternal pain control and monitoring for hemorrhage.



Figure 1: CliniComp's Fetal Monitor Remote Display with Smart Alerts (FMRDSA)

In 2018, Virtua Our Lady of the Lourdes Hospital upgraded **CliniComp's Fetal Monitor Remote Display with Smart Alerts (FMRDSA)** (see Figure 1) to its central nursing station.

Obstetricians and OB nurses contributed improvement suggestions. A training video was produced describing updates to the FMRDSA along with a quick tip sheet to support the implementation. The FMRDSA is a major component of **CliniComp's Perinatal System** that integrates the electronic documentation.

The **CliniComp FMRDSA** displays multiple patients' fetal information simultaneously and in real time on one screen. The system captures and archives fetal and maternal traces. Visual and audible alarms for tachycardia, bradycardia, and "Fetal Heart Rate Not Detected" are available for immediate notification.

"Having the bigger screen visible in the nursing station is wonderful and is certainly a better option for us," said Cerveny. "Any OB team member walking by in the hallway can see a strip and identify if it belongs to their assigned patient and if there is a need to intervene and that is reassuring. The full monitoring and surveillance capabilities available within the patient's electronic medical record and the conversion of the paper-to-electronic strips also now visible and part of the same record are all very beneficial."

"The [CliniComp] fetal remote display is a great tool that the nurses love to use and even when we perform chart audits. The ability to see the team's annotations makes the task of monitoring a patient easier for our nurses at the bedside who can add a quick note."

ELIZABETH BALDWIN | MSN, RNC-EFM, MNN |
ADVANCED CLINICAL EDUCATOR

Elizabeth Baldwin, MSN, RNC-EFM, MNN, Advanced Clinical Educator at Virtua Our Lady of Lourdes Hospital, agreed. "The [CliniComp] fetal remote display is a great tool that the nurses love to use and even when we perform chart audits. The ability to see the team's annotations makes the task of monitoring a patient easier for our nurses at the bedside who can add a quick note."

"As we capture the fetal strip, we're able to display it on the central monitor," Baldwin continued. "If the nurses are responding to a change in the fetal heart rate that they've noticed from viewing the monitor, they are able to make that annotation describing their interventions directly in the patient record."

IV. Baby Friendly Infant Feeding Note Documents Requisite Breastfeeding

To support Our Lady of Lourdes Hospital's designation as a Baby Friendly Facility¹², the perinatal team created a multidisciplinary note aka **Infant Feeding Note** to address and capture all required electronic documentation for breast milk feeding. The information is displayed in one screen view in the **CliniComp's Perinatal System** for easy access.

Baby Friendly practices are designed to optimize mother-baby bonding and to protect, promote and support breastfeeding in the first few days of a new baby's life.¹³ Baby-Friendly designation means that a maternity facility has successfully implemented the Ten Steps to Successful Breastfeeding.

According to Djuana Rivers, MSN, RN-BC, Clinical Informaticist at Virtua Our Lady of Lourdes Hospital, the new Infant Feeding Note allows nurses to document multiple breastfeeding entries. The consistency of the completed documentation assures obstetricians and perinatal nurses that all key Baby Friendly infant feeding practices are addressed with the mother.

Previously, many Baby Friendly educational elements were discovered missing from the OB flowsheet. "Scarce details were scattered and documented in the form of comments or free-text narratives," said Rivers. "The information was not tagged or called out specific to Baby Friendly documentation requirements."

Furthermore, OB nurses did not have a reliable way to capture and maintain the requisite documentation also required for charting. Nor did they have a guaranteed way to uphold and promote as the norm that breastfeeding is recognized by scientific authorities as the optimal method of infant feeding.

Today, with the use of **CliniComp's Perinatal System**, Our Lady of Lourdes Hospital's L&D department can maintain clinical documentation integrity in accordance with Baby Friendly Guideline Tenets.

Perinatal System | Customer Success

¹ Maternal & Infant Health Trends Series Report 2: The Added Cost of Complications During and After Delivery. Premier Inc. Accessed July 2020. <https://explore.premier-inc.com/MaternalHealthTrendsCost>

² Maternal & Infant Health Trends Series Report 2: The Added Cost of Complications During and After Delivery. Premier Inc. <https://explore.premierinc.com/Maternal-HealthTrendsCost>. Accessed July 2020.

³ McLintock C, James AH. Obstetric hemorrhage. J Thromb Haemost. 2011;9(8):1441-1451. doi:10.1111/j.1538-7836.2011.04398.x

⁴ Quantitative Blood Loss in Obstetric Hemorrhage. The American College of Obstetricians and Gynaecologists. <https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2019/12/quantitative-blood-loss-in-obstetric-hemorrhage#>. Published 2019. Accessed July 2020.

⁵ Quantitative Blood Loss in Obstetric Hemorrhage. The American College of Obstetricians and Gynaecologists. <https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2019/12/quantitative-blood-loss-in-obstetric-hemorrhage>. Published 2019. Accessed July 2020.

⁶ Maternal & Infant Health Trends Series Report 2: The Added Cost of Complications During and After Delivery. Premier Inc. <https://explore.premierinc.com/Maternal-HealthTrendsCost>. Accessed July 2020.

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⁸ Mulford K. Virtua is working to combat state's maternal death rate, first by lowering C-sections. The Courier-Post. February 04, 2019. <https://www.courierpostonline.com/story/news/local/south-jersey/2019/02/04/virtua-tackles-njs-high-maternal-death-rate/2701683002/>. Updated December 11, 2019. Accessed July 2020.

⁹ Patient Safety Bundle: Obstetric Hemorrhage. Council on Patient Safety in Women's Health Care. <https://safehealthcareforeverywoman.org/wp-content/uploads/2017/11/Obstetric-Hemorrhage-Bundle.pdf>. Published 2015. Accessed July 2020.

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¹¹ Garpiel SJ. AWHONN's Second-Stage Labor Practices Reduce Cesarean Births and Newborn Harm. J Obstet Gynecol Neonatal Nurs.2019;48(3): S95. doi: [https://www.jognn.org/article/S0884-2175\(19\)30205-9/fulltext](https://www.jognn.org/article/S0884-2175(19)30205-9/fulltext)

¹² Baby-Friendly Facilities A-Z and by State. Baby Friendly USA. <https://www.babyfriendlyusa.org/for-parents/baby-friendly-facilities-by-state/>. Accessed July 2020.

¹³ Celebrating 500 Baby-Friendly Designated Facilities in the United States. Baby Friendly USA. <https://www.babyfriendlyusa.org/news/baby-friendly-usa-celebrates-major-milestone-of-500-baby-friendly-designated-facilities-in-the-united-states/>. Published 2018. Accessed July 2020.

For more information on CliniComp | EHR Perinatal and the [CliniComp | EHR](#) suite of solutions to simplify clinical workflow, alleviate IT complexities, and promote fiscal vitality, please contact us at:

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