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### Every Milliliter Matters: A Quality Improvement Initiative for Postpartum Quantified Blood Loss

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**Every Milliliter Matters: A Quality Improvement Initiative for Postpartum Quantified  
Blood Loss**

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### Abstract

**Problem:** The microsystem for maternal-child healthcare in 2020 had 5.9% of deliveries progress to a postpartum hemorrhage. In 2021, the percentage of deliveries that progressed to a postpartum hemorrhage increased to 12.3%. The nearly two-fold increase in postpartum hemorrhage occurrence led to the creation of the Quality Improvement (QI) initiative to identify postpartum hemorrhage at an earlier stage. The QI initiative aims to extend the quantitative blood loss (QBL) measurement beyond labor and delivery, and support identification of postpartum hemorrhage in the postpartum period.

**Context:** The microsystem that this quality improvement project occurred on were three postpartum units in a Bay Area Hospital. The microsystem was made up of postpartum nurses, antepartum nurses, nurse team leaders, nurse managers, nurse educators, obstetricians, anesthesiologists, nursing assistants, and unit clerks. The Bay Area Hospital averages approximately 4,500 births per year. QBL was initiated in the Bay Area Hospital's labor and delivery unit in February 2021.

**Interventions:** The quality improvement team implemented quantified blood loss (QBL) collection with a gravimetric scale (Triton scale) in the postpartum units to identify postpartum hemorrhage and improve notification time to the provider. The postpartum nurses collected QBL at the first two voids for vaginal deliveries and at four and eight hours for cesarean section deliveries. Daily EPIC electronic health records (EHRs) were audited to reinforce education.

**Measures:** Staff surveying was conducted before implementation of the quality improvement project and after implementation with a mid-point survey. Education on Triton use was delivered to postpartum nurses in-person and through virtual modalities.

**Results:** After the implementation of QBL in the postpartum units, 90% of postpartum nurses felt comfortable using the Triton scale to collect QBL. During the month of April 2022 in which chart audits were conducted, there was a significant decrease in the number of postpartum hemorrhages compared to April 2021. In addition, chart auditing revealed that 82.9% of the postpartum hemorrhages occurred in labor and delivery, while 17.1% of postpartum hemorrhages occur in postpartum.

**Conclusion:** The quantification of blood loss is an evidence-based method to accurately collect cumulative postpartum blood loss and should be used for all postpartum patients and extend beyond the labor and delivery measurement of QBL to determine accurate information related to primary postpartum hemorrhage. In a Bay Area Hospital, the implementation of QBL was introduced in three postpartum units. Through and through education efforts allowed postpartum nurses to gain the confidence to properly collect QBL for all postpartum patients and identify the occurrence of postpartum hemorrhages that occur in the postpartum units.

*Keywords:* postpartum, hemorrhage, quantified blood loss, blood loss, estimated blood loss, maternal morbidity, obstetric hemorrhage, cumulative blood loss

## **Every Milliliter Matters: A Quality Improvement Initiative for Postpartum Quantified Blood Loss**

During the postpartum period, it is essential to accurately record the amount of blood loss a mother has due to concerns for postpartum hemorrhage. Current standards require labor and delivery nurses to collect QBL, but there is no current standard to suggest the practice during postpartum. Two methods are commonly used for blood loss measurement. Estimated blood loss (EBL) is done by visually estimating blood loss based on subjective determination that varies between providers. The evidenced-based and California Maternal Quality Care Collaborative (CMQCC) and Association of Women’s Health, Obstetric and Neonatal Nurses (AWHONN) guideline is QBL. QBL is done by using a gravimetric approach in which a scale is used to weigh the amount of blood loss. According to the American College of Obstetrics and Gynecology (ACOG) (2019), “54- 93% of maternal deaths due to obstetric hemorrhage may be preventable. QBL is an objective measurement that is recommended for the early identification of hemorrhage for all births.” Postpartum hemorrhage (PPH) is defined as postpartum blood loss greater than 1,000 mL (ACOG, 2017). Although QBL isn’t the only means to prevent the acceleration of PPH to a later stage, quantifying blood loss is best practice compared to estimated blood loss (EBL).

According to AWHONN (2021), 10.7% of maternal deaths in the United States due to hemorrhage occurred from 2014 to 2017. The early identification of postpartum hemorrhage is integral to halting the progression of postpartum hemorrhage to a later stage. Stages of postpartum hemorrhage are broken down into four stages. Stage 0 is the stage where every birthing mother begins and where an assessment for postpartum hemorrhage risk should be completed for all women in active management of 3rd stage of labor (CMQCC, 2022). Stage 1 is



defined as cumulative blood loss amounts greater than or equal to 500mL for vaginal deliveries and greater than or equal to 1000 mL for cesarean deliveries with continued bleeding or signs of concealed hemorrhage (CMQCC, 2022). Stage 2 is seen as continued bleeding with cumulative blood loss of less than 1500 mL or abnormal vital signs that have not stabilized (CMQCC, 2022). Stage 3 is identified by continued bleeding with cumulative blood loss greater than 1500 mL or 2 units of packed red blood cells given or abnormal vital signs or suspicion of disseminated intravascular coagulation (DIC) (CMQCC, 2022). To identify what stage of hemorrhage patients are in, QBL provides the highest reliability to count total blood loss. By having an accurate cumulative blood loss measurement, patient outcomes can be improved by delivering appropriate treatment based on the amount of blood loss. Appropriate treatment and notification to the provider can prevent the need for blood transfusions and possibly death.

While labor and delivery guidelines include identifying the level of risk for PPH prior to delivery, postpartum hemorrhage occurs in 40% of low-risk women (ACOG, 2019). Therefore, QBL should be measured for all postpartum women regardless of the lack of risk factors for postpartum hemorrhage. When utilizing visual estimation, 50% is known to be imprecise in cases of high blood loss (ACOG, 2021). When visual estimation is utilized in cases of high blood loss, amounts are underestimated. Inversely, in cases of low blood loss, amounts are overestimated. When healthcare providers use EBL to measure blood loss, there is a large margin for error as the amount estimated can vary from provider to provider.

In this QI project, postpartum nurses at the Bay Area Hospital will be adopting a change to their current practice of EBL by implementing QBL in postpartum. In turn, the postpartum nurses will be receiving practice, training, and support to confidently collect QBL to identify postpartum hemorrhage at an earlier stage. By mastering this skill of using the Triton scale to

quantify blood loss, postpartum nurses will be able to properly respond to active hemorrhages in rapid response situations and perform QBL. Organizational values and priorities focus on extraordinary care, continual learning, and breakthrough discoveries. In alignment with continual learning, this project allows postpartum nurses to seek continuous improvement with technology as well as to adapt evidence-based practice into care for their patients.

### **Problem Description**

The microsystem that the quality improvement initiative took place on were three postpartum units at a Bay Area Hospital. A retrospective chart audit was done to examine data specific to total deliveries with PPH. In 2020, the hospital had 5.9% of total deliveries progress to postpartum hemorrhages. In 2021, the postpartum hemorrhages increased to 12.3% of deliveries. Therefore, there was an increase of nearly double postpartum hemorrhages from 2020 to 2021. The potential theory for the sharp increase in hemorrhages may be in part due to the implementation of the Triton scale in the labor and delivery unit within the hospital. The initial date of labor and delivery unit Triton implementation was February of 2021. Average blood loss with PPH in 2020 equaled 1,471 mL of blood loss and in 2021 equaled 1,359 mL. Cesarean section (C-section) deliveries with PPH in 2020 included an average of 16 per month (13.7% yearly) and in 2021 an average of 35 per month (28.3% yearly). Overall, there was an increase in 19 C-sections with PPH from 2020 to 2021. Vaginal deliveries with PPH in 2020 averaged 6 per month (2.2% yearly) and in 2021 averaged 13 per month (4.7% yearly). Therefore, there was an average increase in 7 deliveries with PPH per month from 2020 to 2021.

When the quality improvement team conducted initial retrospective chart audits to determine the occurrence of postpartum hemorrhages that occurred in the postpartum unit, there was inconclusive data to determine the occurrence because no QBLs were being charted in the

postpartum period. Nurses in postpartum were still using estimated blood loss (EBL) or using descriptive words such as scant, to describe little to no bleeding. The only time QBL was being done in the postpartum unit was when there was a significant “trigger” for the nurse to conduct a QBL. In our pre-implementation survey, the main “triggers” that were identified were blood clots, greater than 1 pad saturation per hour, or an OB rapid response call (see Appendix K).

### **Available Knowledge**

A PICO question was developed by the quality improvement team to guide research regarding how the implementation of QBL could improve notification time to the provider. The metric of notification time to the provider was used due to the inability to measure a specific time frame for QBL since it had not been done in the postpartum units. By utilizing notification time to the provider, the quality improvement team theorized QBL would allow for earlier detection of postpartum hemorrhage, therefore, decreasing the length of time to notify the provider. Decreased notification time would therefore lead to more timely response and treatment of PPH, and decreasing the number of overall unidentified hemorrhages.

### **PICO Question**

In postpartum patients, how does measuring QBL using Triton for the first 8 hours after delivery compared to not measuring QBL for the first 8 hours after delivery affect the time in notifying the provider? Notifying a provider includes calling the provider to the bedside or calling an OB rapid response.

### **Keywords**

Quantitative blood loss, postpartum hemorrhage, blood loss, estimated blood loss, 24hours, Triton scale, vaginal delivery, cesarean section, and provider notification.

## Literature Review

The review of the literature was conducted through nursing research databases such as CINAHL, PubMed, and Google Scholar. Research suggests the implementation of the evidence-based practice of QBL identifies postpartum hemorrhage at earlier stages and can prevent maternal mortality. Postpartum hemorrhage (PPH) is a leading cause of maternal morbidity and mortality throughout the world (John, 2016). According to Marshall et al. (2017), “women with PPH experienced significantly longer length of stay (3.67 days) and higher inpatient mortality rates (104 per 100,000) than women without PPH (3 per 100,000).”

Research by Ladouceur & Goldbort (2019) described a quality improvement project that was conducted over 3 months in a U.S. urban community hospital. The community hospital was measuring postpartum blood loss using visual estimation leading to the practice change of quantified blood loss. According to authors, Ladouceur & Goldbort (2019), implementing QBL increased provider and nurse awareness of the importance of this evidence-based practice change in preventing maternal morbidity and mortality.

According to Hire et al. (2020), during an observational trial in a tertiary medical center in the midwestern United States, quantification of blood was being tested to determine if fewer activations of postpartum hemorrhage protocols would occur compared to EBL use. Over half of the activations of postpartum hemorrhage protocols would not have been classified as PPH based on QBL amounts. QBL use during cesarean births reduced the number of PPHs that were identified. In addition, some research did suggest that quantified blood loss measurement was associated with higher rates of postpartum hemorrhage (Bell et al., 2020). This is due to the previously missed postpartum hemorrhages that were going undetected with the use of EBL. Bell

et al. (2020) explained that identification of PPH through QBL allowed for earlier interventions in the treatment of postpartum hemorrhage.

Regarding blood transfusions, Blosser et al. (2021) suggested there was no significant difference in the rate of blood transfusions with the use of QBL (2.0%) compared to EBL (2.0%). However, QBL was more sensitive in predicting significant blood loss (6.5%) compared to EBL (2.1%) which could lead to earlier identification of PPH and lead to faster treatment for patients (Blosser et al., 2021).

For the quality improvement team to carry out a successful quality improvement project, identifying potential barriers through research was conducted in order combat similar issues. According to Seacrist et al. (2018), a qualitative descriptive study with a grounded theory approach was conducted to gather experiences from hospital leaders, champions, and staff from hospitals in New Jersey and Georgia. Experiences were drawn from the implementation of AWHONN's PPH project. Positive outcomes with the implementation of the PPH project were led by support from administrators and active nurse and physician champions (Seacrist et al., 2018). Barriers to implementation included poor staff buy-in and lack of resources (Seacrist et al., 2018).

### **Change Theory**

The change theory that was used to guide the project was John Kotter's Eight Step Process for Leading Change. Kotter's steps for leading change have been developed "from over 40 years of his observations of leaders working toward transforming organizations" (Butts & Rich, 2022). This process involves creating a sense of urgency, building a guiding coalition, forming a strategic vision and initiatives, enlisting a volunteer army, enabling action by removing barriers, generating short-term wins, sustaining acceleration, and instituting change

(Butts & Rich, 2022). An initial sense of urgency was created by the quality improvement team going to the three different postpartum units and having conversations with nurses about postpartum hemorrhage and conducting microsystem assessments. This was the first introduction of the project theme for the staff on the units. Additionally, the pre-implementation survey was created for staff to complete. This was a step in gathering current viewpoints on postpartum hemorrhage in the units. In the second step of Kotter's process, the quality improvement team built a guiding coalition by presenting the project plans at Local Improvement Team (LIT) meetings where interdisciplinary staff meet to discuss change and projects happening in the units. Charge nurses were involved in acting as "super users" in the Triton training process as well as the quality improvement team. A strategic vision was designed by the QI team after adjusting project aims. After adhering to new project initiatives, clear visions were set out not only for the team but the staff. Educational flyers and informational posters were created to outline the change in QBL staff would begin performing based on the type of delivery. The volunteer army that Kotter's process suggests consisted of members from the quality improvement team. The quality improvement team created a video to assist with Triton training as well as conducted in-person training for both day and night shifts for a whole week leading up to the project start date (see Appendix G). Once the project went live on the units, the concern of gray basin waste was brought to the attention of the QI team. To enable action, we implemented utilizing a plastic liner in the gray basin in order to not have to throw away basins for each patient. This allowed the nurses to complete the change with adequate resources. Short-term wins were displayed through the weekly updates sent out to staff. Updates would include the percentage of compliance in the project discovered through daily chart audits and adequate provider notification times that occurred when postpartum hemorrhage was identified. Sustaining

acceleration was implemented by conducting a mid-point survey for the RNs. The survey focused on feedback from the project and nurses' attitudes towards QBL. The sustained acceleration will continue upon the end of CNL student involvement in the change project. Upon the end of the project's 3-month trial, instituted change will need to be determined.

### **Project Aim**

This quality improvement project aimed to improve the notification time to providers by quantifying blood loss in postpartum patients with a vaginal delivery at the first two voids and for cesarean delivery at four hours and eight hours.

## **Methods**

### **Microsystem Assessment**

The microsystem on the first floor is quiet, minimal noise, and has three nursing stations. The charge nurse is visible upon entering the unit as she is at the front desk. Nurses are visible easily while walking through the unit. Resource nurses are utilized before getting in contact with managers. Hand-off is conducted face-to-face from 7 am to 7:30 am. Due to the COVID-19 pandemic, nurse-patient communication has been difficult due to attempting to limit the amount of time spent in patient rooms. Nurse-nurse communication has also displayed difficulties resulting in some gossip on the unit based off of nurses reports in small group interviews. Nurses are overworked and burnt out, with multiple areas of stress in their lives. Unfortunately, no mental health services are available to nurses on the unit. Conflict resolution is taken place by charge nurses who usually "put out fires" and escalate situations to managers if needed. Steps done after a conflict include debriefing, ICares, and setting boundaries with families.

Interdisciplinary communication between physicians and nurses is effective with Local Improvement Team (LIT) meetings that facilitate clear communication.

The microsystem in this quality improvement project included three postpartum units. Floor one consisting solely of postpartum has a ratio of eight RNs and one manager. Floor two which is mixed with antepartum and postpartum has a ratio of ten RNs and one manager. Floor three additionally only consists of postpartum patients and possesses five RNs and one manager. There are approximately eighteen rooms on each floor. Patient ratios normally include three patients to one RN. However, ranges from one to three couplets are prevalent on the unit. For example, a couplet includes the mother and the newborn. Therefore, it is often that nurses have six patients, and possibly up to eight. If patient assignments include an active COVID-19 patient or the patient is on Magnesium Sulfate ratios switch to one nurse to two patients. If patients are displaying hypertensive crises, there is a one-to-one ratio for the nurse to patient.

### **SWOT Analysis**

A SWOT analysis was conducted to determine the strengths, weaknesses, opportunities, and threats of the quality improvement initiative (see Appendix C). Strengths that were identified included adopting evidence-based practice into the microsystems, obtaining accurate blood loss in the postpartum period, increasing nurse readiness during an active hemorrhage situation, reducing error with Triton use, the culture of change adapted, and availability of resources in microsystems. Weaknesses included staff push back to change, interruption of previous nurse workflow, added nurse workload, inability to have QBL added to the nursing assistant scope of practice, increase of waste of plastic liners, and staff ability to receive training. Opportunities include increased communication between the interdisciplinary team, improved notification time to the provider, and reduction in delay of identification and treatment of postpartum hemorrhage.



Threats to the success of the project include time to complete QBL, staff resistance to change, and sustainability of the practice.

### **Return on Investment**

Triton costs include the number of systems, one-time implementation fees, and the cost of software licenses (see Appendix F). The Bay Area Hospital purchased eleven systems during the implementation of Triton on labor and delivery with the Triton implementation fee equaling \$27,500.00. The one-time purchase of Triton implementation fee for the postpartum units would be approximately \$2,500 per system. Since there are five Triton systems in the postpartum units, the total for all units is approximately \$12,500.00. The Triton implementation fee includes training and case support, professional services, hardware (Apple device(s), Bluetooth scale), and consumables (scanning label, inserts, calibration placard, and materials shipping). The cost of the software license includes Triton AI, Triton canister, and Triton QBL. The cost of a software license per delivery is \$22.50 and per month \$8,116.88.

In utilizing QBL, identifying postpartum hemorrhage at an earlier stage is increased and treatment options are provided sooner. “Obstetric hemorrhage, particularly with transfusion, during the birth hospitalization is also associated with increased likelihood of readmission” (CMQCC, 2015). Preventing unidentified hemorrhages through QBL will in turn limit transfusion rates and readmission rates. Therefore, readmission costs could be reduced in the allowance of identification and treatment of postpartum hemorrhage. In addition, “Increased hemorrhage and transfusion rates correlate with the rise in cesareans. The increase in cesareans has also been associated with hospital readmission in the first 30 days postpartum” (CMQCC, 2015).

According to Marshall et al. (2017), the average LOS for a delivery not complicated by PPH is 2.63 days. When a non-atomic PPH occurs, patient LOS increases to 3.67 days and in atonic PPH deliveries (2.98 days) (Marshall et al., 2017). PPH increased LOS by 1.04 days. Therefore, length of stay is another costly expense PPH can have on a hospital. By identifying postpartum hemorrhage at an earlier stage with Triton QBL the increased length of stay (LOS) could be prevented by treating the patient to prevent the worsening to late-stage hemorrhage. According to Marshall et al. (2017), an increased cost of approximately \$106.7 million annually is attributable to an increased length of stay in the setting of postpartum hemorrhage. The hospital can save hundreds of millions of dollars by identifying postpartum hemorrhage at an earlier stage and providing proper treatment to patients to prevent worsening of hemorrhage.

### **Gantt Chart**

The quality improvement team created a Gantt chart to display the project timeline (see Appendix B). The tasks that were needed to complete the project were outlined in the chart and had corresponding dates to be completed. Some tasks carried over for multiple weeks which were indicated by the amount of colored red boxes. Each colored red box indicates one week on the Gantt chart. The project began the week of January 24, 2022 and concluded the week of May 2, 2022. The end date was the conclusion of the quality improvement team's contribution to the project, but the microsystems will continue to implement the initiative for a total of three months. Nurse training with Triton scale occurred for three weeks from the week of March 21, 2022 to the week of April 4, 2022. Chart audits were conducted for a total of five weeks from the week of April 4, 2022 to the week of May 2, 2022.

## **Interventions**

The postpartum nurses were surveyed before the start of QBL in the postpartum units on their attitudes and beliefs about postpartum hemorrhage and QBL versus EBL (see Appendix J). The method of QBL that RNs used was gravimetrically utilizing the Triton QBL scale. The scale is Bluetooth operated and connected to the iPad screen used to display steps of weighing and the total amount weighed. According to (Saoud et al., 2019), “The Triton system is approved by the Food and Drug Administration, and its accuracy is supported by several studies.” In addition, “the Triton system will ultimately lead to proper and timely implementation of obstetric hemorrhage protocols and hopefully better maternal outcomes” (Saoud et al., 2019). Triton scales were placed on each microsystem. The first-floor postpartum unit received two Triton systems. The second-floor mixed postpartum unit and the antepartum unit received two Triton systems. The third-floor postpartum unit received one Triton system. It was essential to the project that RNs used a quantitative method to calculate blood loss. Doctorvaladan et al. (2017), stated, “Accurate blood loss estimation is clinically valuable and may substantially alter the timing of interventions to control hemorrhage.” Conversely, underestimation may lead to a delay in evaluation and treatment, particularly if further blood loss occurs postpartum. This risk may be exacerbated by the fact that patients with presumed low blood loss may be placed in care environments with a lower nurse-to-patient ratio and less intensive monitoring (Doctorvaladan et al., 2017).

The postpartum nurses were initially given training on how to use the Triton scale from the Triton representative. However, the postpartum nurses were not given mandated times to receive the training and therefore were reliant upon personal decision-making to receive the training. An educational video was sent to staff and flyers were posted around all three units (see

Appendix G, H, & I). A QR code was created for easy scan access on the postpartum nurse's phones (see Appendix G). Additional education was provided during two staff meetings through PowerPoint presentations and Local Improvement Team (LIT) meetings (see Appendix N & O). The quality improvement team provided in-person education to staff on 3-day shifts and 3-night shifts leading up to the implementation of QBL postpartum. After 2 weeks of implementation, staff was given midpoint surveys to gain feedback on recent practice changes (see Appendix L). The survey included attitudes and perceptions on current practices of QBL in postpartum and allowed nurses to give feedback regarding areas of improvement. Although this survey was labeled midpoint survey, for this project it will serve as the post-implementation survey. The survey was labeled as a midpoint because it will be the midpoint for all of the staff in the microsystems who will continue to carry out the project for three months.

“User Guide: Triton QBL” educational video was created by the QI team which demonstrated the steps of using the Triton Scale for weighing products (see Appendix G). The educational video was 1 minute and 59 seconds in length and was posted on YouTube for nurses to visit when needing assistance with steps on using the Triton scale. Important reminders were also included in the video such as plugging in the Triton to charge after use and cleaning the Triton after each use with purple capped disinfecting wipes even with patients who are on isolation precautions. The video accrued 60 views since its posting date of March 11, 2022. For staff to access the video, QR codes were generated for staff to scan for quick access through their phones which were included on educational flyers and staff meeting PowerPoint presentations. Additionally, video links were sent out to staff via e-mail and Voalte.

The project “Go Live” date began the week of 3/28/2022. At the start of this date, daily chart audits were conducted by the QI team to ensure postpartum nurses were recording and

charting QBL for vaginal deliveries at the first two voids, and C-section within the first 4 hours during Dangle Enhanced Recovery After Surgery (ERAS) and within the first 8 hours during Ambulation (ERAS). Postpartum nurses also received training from the QI team wherein the EPIC electronic charting system weighed blood loss would be charted. The blood loss was recorded in the Intake and Output (I/O) flowsheet under the Triton QBL row. To encourage staff and keep staff updated, weekly emailed updates were sent to the postpartum nurses regarding compliance, the occurrence of PPH in postpartum, and notification of provider times.

### **Study of the Intervention**

The intervention was studied through the use of pre-implementation surveys, mid-point surveys, and chart audits. The two surveys conducted included seven questions each and used Likert scales for responses. The mid-point survey included a question where nurses could provide feedback on the intervention as it was occurring. Daily chart audits were conducted during the duration of April 2022. The quality improvement team utilized EPIC electronic charting records for each postpartum unit and identified postpartum patients who were still within the 24-hour timeframe post-delivery. Postpartum patients who met the inclusion criteria were recorded on a secure Excel spreadsheet.

### **Measures**

Before implementation of QBL in PP, a pre-implementation survey was conducted to assess all 3 postpartum floors (see Appendix J). Postpartum nurses from all three floors were initially surveyed to determine viewpoints on quantitative blood loss (QBL) and postpartum hemorrhage (PPH). During the “Go-Live” period, daily chart audits were conducted by the QI team to check for compliance with the recording and charting of QBL by the postpartum nurses. Other metrics that were observed during the chart audits were the number of postpartum patients,

postpartum hemorrhages, postpartum hemorrhages that occurred during postpartum, total blood loss, type of delivery, patient's MRN number, provider notification, and nurses who provided care for patients. Charts were flagged on the Excel chart audit sheet by indication of a red highlight. Nurses' names were noted if QBL was not conducted for their patients. The CNS on the team was then notified of the staff member and provided additional education on the project goals. No disciplinary action was taken against staff members who were identified as non-compliant with the implementation of QBL postpartum.

This project was undertaken as an Evidence-based change of practice project at the Bay Area hospital and as such was not formally supervised by the Institutional Review Board.

## **Results**

### **Pre-Implementation Survey Results**

Pre-implementation survey results collected were not representative of the whole postpartum nursing staff as the response total yielded twenty responses out of 175 nurses (see Appendix K). The pre-implementation survey results assessing if postpartum nurses currently implement QBL for postpartum patients yielded 85% of respondents saying yes, and 15% of respondents reporting no. Top triggers for collecting QBL before implementation included 95% due to blood clots, 80% due to greater than one pad/ hour saturation, and 75% due to an OB rapid response. Question three from the pre-implementation survey resulted in 52.6% of respondents disagreeing that implementing QBL with the Triton scale for patients would disrupt the current workflow. Only 5.3% of respondents strongly agreed that implementing QBL with the Triton scale for patients would disrupt the current workflow. Question four on the pre-implementation survey yielded 55% of respondents disagreeing that they would encounter

barriers if they implemented QBL for postpartum patients. No respondents strongly agreed there would be barriers, but 10% agreed they would encounter barriers if they implemented QBL for postpartum patients. Key points from the survey included, that 77.8% of nurses either strongly agreed or agreed that after receiving Triton training, they felt comfortable using Triton to measure QBL. Only 5% of postpartum nurses disagreed with the statement. Question six resulted in 84.2% of nurses strongly agreeing or agreeing that they believe that they have adequate resources to implement QBL for patients using the Triton scale. There were no postpartum nurses who disagreed with the statement, but 10.5% felt neutral about having adequate resources. Lastly, 66.7% of nurses agreed it was necessary to implement QBL using Triton to identify PPH at an earlier stage.

### **Mid-point Survey Results**

The mid-point survey results were more comprehensive for the postpartum nurses as forty-two responses were collected in total (see Appendix M). Nearly double the responses were gathered compared to the initial pre-implementation survey that was conducted. When examining the results from the first mid-point survey question, 35.7% of respondents strongly disagreed or disagreed that collecting QBL changed their perception of hemorrhage occurrence. In addition, 30.9% of respondents strongly agreed or agreed that collecting QBL changed their perception of hemorrhage occurrence.

Question two revealed that 54.7% of respondents felt as though Triton QBL severely impacted or impacted significant time to their patient care. On the contrary, 26.2% of respondents to the survey revealed that Triton QBL added no impact or very little impact of time to their patient care. In reference to question three of the survey regarding QBL improving notification time to the provider, 33.3% of postpartum nurses strongly agreed or agreed. While

on the other hand, almost half of the respondents (45.2.%) felt neutral about QBL improving notification time to the provider.

Question four which was measuring how comfortable postpartum nurses felt using Triton to measure QBL yielded 90.3% strongly agreeing or agreeing. There was a 12.5% increase from the pre-implementation survey to the mid-point survey. There were 9.8% of postpartum nurses that either felt neutral or disagreed with feeling comfortable using Triton to measure QBL after receiving Triton training. Question five regarding if the quantified number of blood loss in postpartum patients has surprised the postpartum nurse concluded that over half (54.8%) strongly disagreed or disagreed. Only 14.3% of postpartum nurses reported strongly agreeing or agreeing that the quantified number of blood loss in their postpartum patients surprised them.

The last question ranked on a Likert scale was question six gathering postpartum nurses' opinions if they believed QBL was more accurate than EBL. Results displayed that 73.8% of postpartum nurses strongly agreed or agreed that QBL is more accurate than EBL. Inversely, there were still 26.2% of postpartum nurses who felt neutral or strongly disagreed that QBL was more accurate than EBL. Question seven on the mid-point survey allowed postpartum nurses to share their feedback in a short answer format. The question pertained to any changes the postpartum nurses would make to the current collection process of QBL. Responses from the postpartum nurses included, "Patients with scant bleeding on postpartum do not need pads weighed. Unless there is a clot or significant bleeding, measuring pads does not contribute much" and "Finding a more sustainable option. The hospital contributes greatly to waste already. Using multiple bins or even plastic garbage bags that cannot be recycled or otherwise reused is a huge problem."



The mid-point survey results served as final survey results due to the time constraints of involvement of members from the quality improvement team. After the three-month implementation, a final post-survey will be conducted by the CNS on the quality improvement team.

### **Post-Implementation Chart Audit Results**

Post-implementation chart audits were conducted for the month of April 2022 daily at 5 pm by the QI team. Categories that were audited included postpartum patient medical record numbers, date delivered, time delivered, QBL charted, notification of provider, the reason for notifying the provider, type of delivery, total blood loss recorded, and nurses caring for the patients. During week one of implementation, there were 60 postpartum patients, 88% compliance with QBL documentation from nurses, and 2 postpartum hemorrhages that occurred postpartum with adequate provider notification time. During week two, there were 68 postpartum patients, an increase to 98% nurse compliance with QBL documentation, and 2 postpartum hemorrhages that occurred postpartum with adequate provider notification time. By week three of implementation, there was 100% nurse compliance with Triton QBL documentation. For the month of April 2022, the Bay Area Hospital had a total of 274 deliveries. The total vaginal deliveries resulted in 167 and total cesarean section deliveries resulted in 107. Chart audit results yielded a total of 35 deliveries (12.7%) that progressed to postpartum hemorrhages for the month of April 2022. Of the 35 postpartum hemorrhages, 29 of them (82.9%) occurred in the labor and delivery unit and 6 of them (17.1%) occurred while in the postpartum unit. Overall, out of the total deliveries 2.2% of deliveries progressed to postpartum hemorrhages in the postpartum unit. When comparing retrograde chart audits for April 2021, there was a decrease of 16 deliveries that progressed to postpartum hemorrhages in April 2022.

For the month of April 2022, there was a total of 150,668 mL of blood lost during the 274 total deliveries. Average blood loss per delivery resulted in 558 mL of blood loss. The maximum amount of blood loss was 4,140 mL of blood loss and the minimum amount of blood loss was 8 mL of blood loss based on reported QBL by postpartum nurses.

### **Effects of Improvement on Staff**

Although the conduction of QBL on all postpartum patients did not decrease notification time to the provider, there were unintended benefits of increased postpartum nurse comfortability in collecting QBL using the Triton scale. The training the staff received and the implementation of QBL on every patient yielded a 90% comfortability in using Triton for QBL by the postpartum nurses. Therefore, postpartum nurses were able to incorporate evidence-based practices into their care for postpartum mothers on the units.

## **Discussion**

### **Key Findings**

After the implementation of Triton QBL in the postpartum units, there was a decrease in postpartum hemorrhages from April 2021 (51 postpartum hemorrhages) in comparison to April 2022 (35 postpartum hemorrhages). Continued QBL in the postpartum units would need to be collected for the remainder of the year to determine if there is a statistical significance in the implementation of the quality improvement initiative. In addition, when retrospective chart audits were conducted rates of postpartum hemorrhage were higher in the Fall while this quality improvement initiative took place during the Spring.

The microsystem was able to accurately record the number of postpartum hemorrhages that occurred in the postpartum unit using the Triton scale. During the month of April 2022, 35

deliveries (12.7%) progressed to postpartum hemorrhages. Of the 35 deliveries, 6 (17.1%) occurred in the postpartum units. Out of the total deliveries (274) for the month of April 2022, 6 (2.2%) of postpartum hemorrhages occurred in the postpartum units. Notably, postpartum nurse comfortability with collecting QBL using the Triton scale was 90.3% at the midpoint survey.

### **Lessons Learned**

#### ***Gap in Research***

During the conduction of current literature, a gap in research was discovered for the recommended time frame for collection of QBL during the first 24 hours postpartum. The suggested 24-hour collection time was based on hemorrhage toolkits from Texas, Florida, and Illinois. Therefore, after a gap in research was discovered and pushback from guiding coalitions occurred, the reconfiguration of the project aims occurred. Therefore, the initial PICO question was not used and was changed to incorporate provider notification time.

**Initial PICO Question.** In postpartum patients, how does cumulative Quantitative Blood Loss (QBL) collection for 90 minutes postpartum compared to 24 hours cumulative QBL collection postpartum for non-moderate to high-risk patients affect early detection of postpartum hemorrhage during hospital stay?

#### ***Supplies/ Plastic Liner/Gray Basin***

After implementing the Triton scale QBL in the three postpartum units, it was brought to the attention of CNS on the project that there was a backorder on gray basins on the unit and that the QI team should find another alternative to reduce gray basin waste. A solution of applying a plastic liner waste bag around the gray basin was implemented immediately. Staff was notified of the changes via e-mail from the CNS on the team. Additional education was provided that nurses should make sure to add the plastic liner before zeroing the scale and that plastic liners

should be disposed into the biohazard bin on the units. Staff was additionally reminded of these updates through weekly updates provided by the QI team via e-mail as well as through PowerPoint presentations given to staff during two staff meetings. After the conduction of midpoint staff surveying, waste was still a concern for staff. Alternative solutions should be implemented to reassure staff that concerns are being heard and that the quality improvement team is being environmentally conscious.

### ***Triton Operation***

**User Error.** During the implementation of Triton QBL on the postpartum units, there was one occurrence of a user error. The nurse had weighed her patient's blood-soaked item using Triton and received her accurate weight. When charting her amount in EPIC Hyperspace, the nurse imputed the data into the column previously used when calculating dry weights and actual weights which in turn calculated an additional blood loss amount. The EPIC charting system recognized the total mL of blood loss as several items that were blood-soaked leading to an excessive amount of blood loss. This nurse made sure to report this user error to the CNS on staff to consider these user errors and supply additional education on where proper documentation of QBL taken with Triton should be charted.

**Automatic Update to EPIC.** The Triton scale was designed to make weighing blood-soaked items easier for healthcare providers, by simplifying steps to receive accurate blood loss amounts. However, a feature that may have not been purchased, activated, or simply not applicable to the Triton scale is the ability for recorded blood loss to not be automatically added to the patient's EPIC EHR. Therefore, this requires nurses to record the blood loss on a piece of paper or directly into the chart if it is open in order to not lose the mL of blood loss. Once the nurse weighs the blood-soaked item, they were trained to record the output and then close the

case before returning the Triton to its original location. This was a pattern that the postpartum nurses were not used to, due to other forms of equipment such as the vital signs machines that automatically send data to the patient's EHR.

**Triton Not Configured to Patient's Room Number.** Another barrier that the postpartum nurses encountered was that the Triton scale did not configure itself to the patient's room number. Although each Triton was configured to the specific floor and unit it was assigned to, blood loss would not save under a patient's room number. Nurses ultimately felt as though "it was pointless" to have the patient's room number configured to the Triton if there is not a cumulative total that will be saved for that day.

#### ***Few Postpartum Patients with Hemorrhage in Postpartum***

An additional lesson learned was that there was a very small percentage of patients who hemorrhaged in the postpartum unit setting. According to chart audit data, 2.2% of the patient's hemorrhaged in the postpartum unit. After the three-month trial period of QBL in the postpartum units, the microsystems may feel it is unnecessary to continue with QBL for every patient in postpartum due to the low percentage of hemorrhages that occur in postpartum. The quality improvement team suggests the continued implementation of Triton QBL for all postpartum patients to limit undiagnosed hemorrhages that progress to late-stage hemorrhage.

#### ***Provider Notification Time***

Although the PICO question was concerning provider notification times, there was no change in provider notification time. For hemorrhages that occurred during the postpartum period in the postpartum unit, there was adequate notification time to the provider within 30 minutes. The project aim was not fulfilled, but the quality improvement initiative discovered

important gaps in postpartum nurse education with Triton and implemented the evidence-based practice of QBL.

### **Contributions to Successful Change**

Persistent communication by the quality improvement team with postpartum staff contributed to successful change. Due to some of the members of the quality improvement team not being familiar with the staff from the microsystems, the initial pushback was received from the staff. However, in response the QI team initiated constant engagement with the postpartum staff and maintaining open communication, and the postpartum staff began to buy into the quality improvement initiative. Members of the postpartum staff started to assist the quality improvement team by gathering all postpartum nurses for training during in-person education. Additionally, when delivering in-person education, the quality improvement team utilized incentives of candy for nurses who were able to complete successful teach back to the quality improvement team member. Incentivizing the education gave postpartum nurses motivation to receive the training and allow for hands-on learning.

### **Conclusions**

The implementation of QBL in the postpartum units will continue for an additional two months to complete the three-month trial period. After looking at survey results, it is unlikely for staff to continue the implementation of QBL postpartum after the designated time frames given in the QI project. However, there was usefulness of the work for implementing this project due to the mastery of using the Triton scale for QBL. Before this project, only 77.8% of nurses felt comfortable using the Triton scale after education. After implementing the project, 90.3% of nurses felt comfortable using the Triton scale for QBL. Another success in the project was that postpartum nurses learned how and where to properly chart Triton QBL amounts in the I/O

flowsheet in EPIC. After the implementation of this quality improvement project, there will be accurate data on the number of postpartum hemorrhages that occur in the labor and delivery unit and the postpartum unit. Before the implementation of this project, this data was not available.

In addition, nurses were able to receive proper training for Triton use and implementation. Due to the routine nature of the project, nurses were able to practice Triton QBL numerous times to allow them to feel comfortable accurately recording QBL. This is advantageous because collecting blood loss in a quantitative method is best practice to identify postpartum hemorrhage. Recommendations for QBL in the postpartum units are to continue QBL for all postpartum patients to continue standards of care for postpartum patients and allow for detection of postpartum hemorrhage at an earlier stage.

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## Appendix A

## Statement of Determination and Non-Research Determination Form

**Project: Statement of Determination and Non-Research Determination Form****Student Name: Amy Quinones****Title of Project: Every Milliliter Matters: Postpartum Quantified Blood Loss****Brief Description of Project: Implementation of QBL in the postpartum units at a Bay Area Hospital with the Triton Scale.****Data that Shows the Need for the Project:** In 2020 had 5.9% of deliveries progress to a postpartum hemorrhage. In 2021, the percentage of deliveries that progressed to a postpartum hemorrhage increased to 12.3%.**Aim Statement:** This quality improvement project aimed to improve the notification time to providers by quantifying blood loss in postpartum patients with a vaginal delivery at the first two voids and for cesarean delivery at four hours and eight hours.**Description of Intervention(s):** Pre-implementation survey of postpartum staff, educational video for instructions of Triton use, in-person Triton education, educational flyers, mid-point survey for feedback, and instruction of project at staff meetings/LIT meetings. Staff implemented Triton QBL for all postpartum vaginal and cesarean deliveries.**Desired Change in Practice:** Implement evidence-based practice of quantified blood loss (QBL) assessment for every postpartum patient.**Outcome measurement(s):** 90% comfortability in using Triton for QBL by the postpartum nurses. 2.2% of postpartum hemorrhages occurred in the postpartum units

To qualify as an Evidence-based Change in Practice Project, rather than a Research Project, the criteria outlined in federal guidelines will be used:

(<http://answers.hhs.gov/ohrp/categories/1569>)

This project meets the guidelines for an Evidence-based Change in Practice Project as outlined in the Project Checklist (attached). Student may proceed with implementation.

This project involves research with human subjects and must be submitted for IRB approval before project activity can commence.

Comments:



**EVIDENCE-BASED CHANGE OF PRACTICE PROJECT CHECKLIST \***

**Instructions: Answer YES or NO to each of the following statements:**

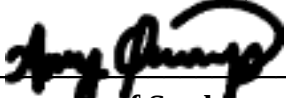
<b>Project Title: Quantitative Blood Loss in Postpartum</b>	<b>YES</b>	<b>NO</b>
The aim of the project is to improve the process or delivery of care with established/ accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes.	x	
The specific aim is to improve performance on a specific service or program and <b>is a part of usual care</b> . ALL participants will receive standard of care.	x	
The project is <b>NOT</b> designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does <b>NOT</b> follow a protocol that overrides clinical decision-making.	x	
The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does <b>NOT</b> develop paradigms or untested methods or new untested standards.	x	
The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does <b>NOT</b> seek to test an intervention that is beyond current science and experience.	x	
The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP.	x	

The project has <b>NO</b> funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.	x	
The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., <b>not</b> a personal research project that is dependent upon the voluntary participation of colleagues, students and/ or patients.	x	
If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: <i>“This project was undertaken as an Evidence-based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board.”</i>	x	

**ANSWER KEY:** If the answer to **ALL** of these items is yes, the project can be considered an Evidence-based activity that does NOT meet the definition of research. **IRB review is not required. Keep a copy of this checklist in your files.** If the answer to ANY of these questions is **NO**, you must submit for IRB approval.

\*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.


**STUDENT NAME (Please print):**

  
 \_\_\_\_\_  
 Signature of Student:

    Amy Quinones         DATE 3/31/2022    

**SUPERVISING FACULTY MEMBER NAME (Please print):**

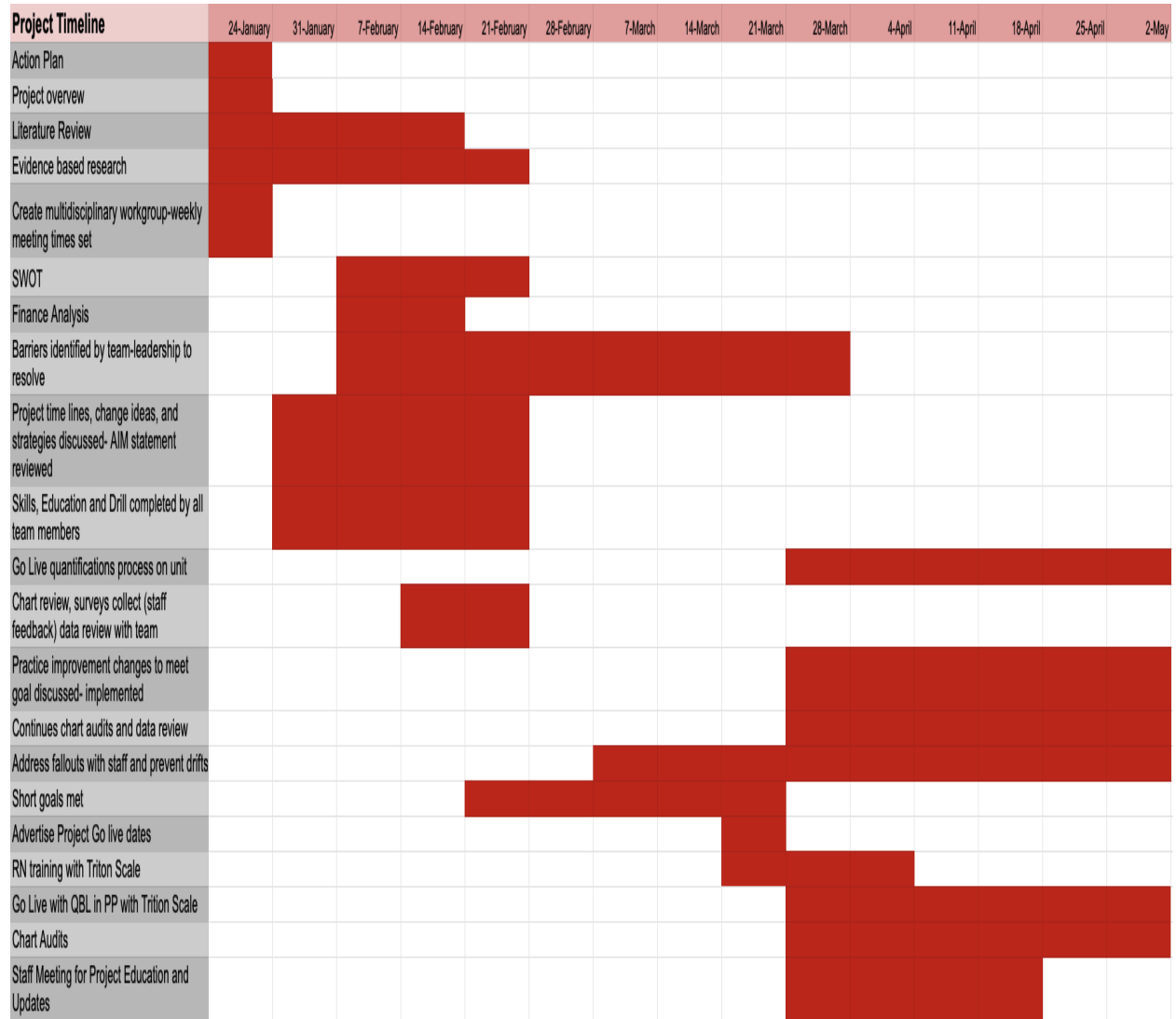
    Lisa Brozda, RN, MSN, CNS  
 \_\_\_\_\_  
 Signature of Supervising Faculty Member

 RN, MSN, CNS     DATE 3/31/2022

## Appendix B

### Gantt Chart

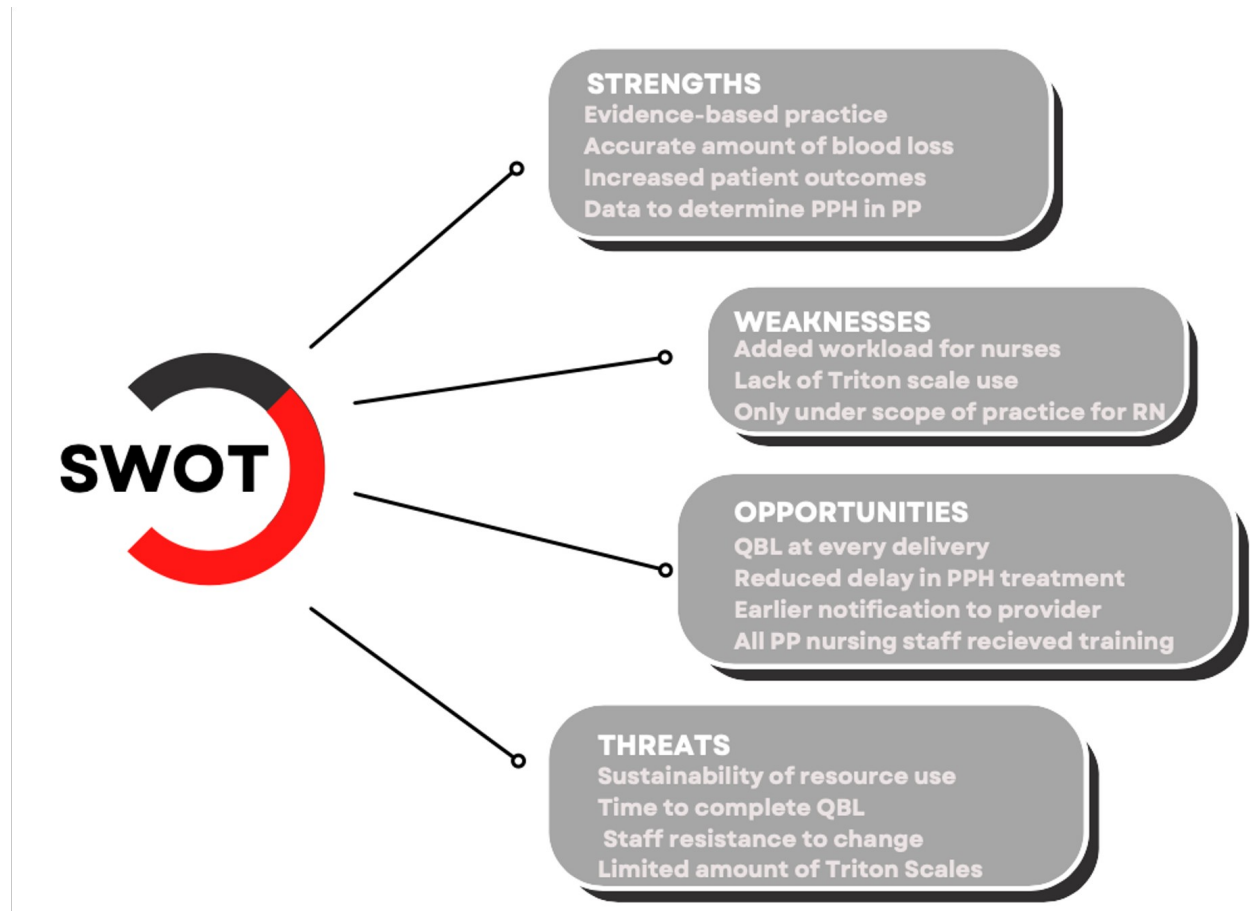
Quality Improvement project timeline with outline of specific tasks and dates by week that each task needs to be completed.



**Appendix C**

**SWOT Analysis**

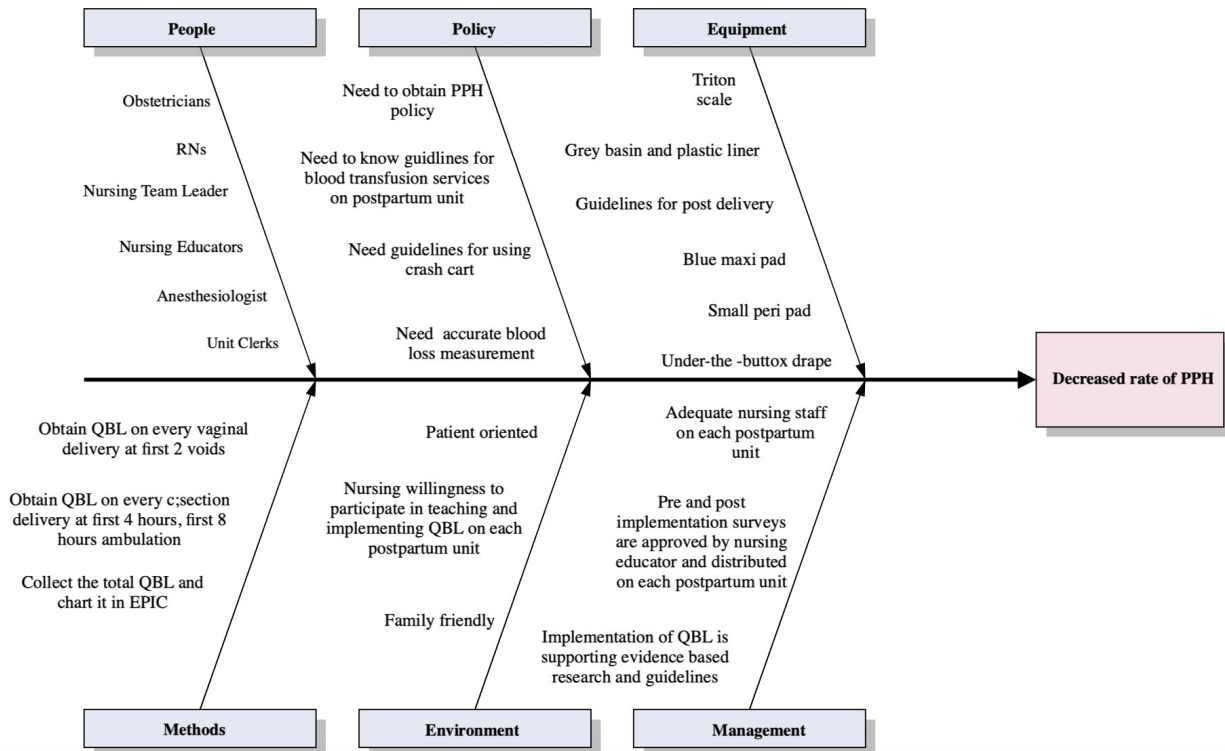
Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis of implementation of QBL using the Triton scale in the postpartum units.



**Appendix D**

**Fishbone Diagram**

Causes analysis tool to identify causes such as: people, policy, equipment, methods, environment, and management for an effect of decreased rate of PPH.

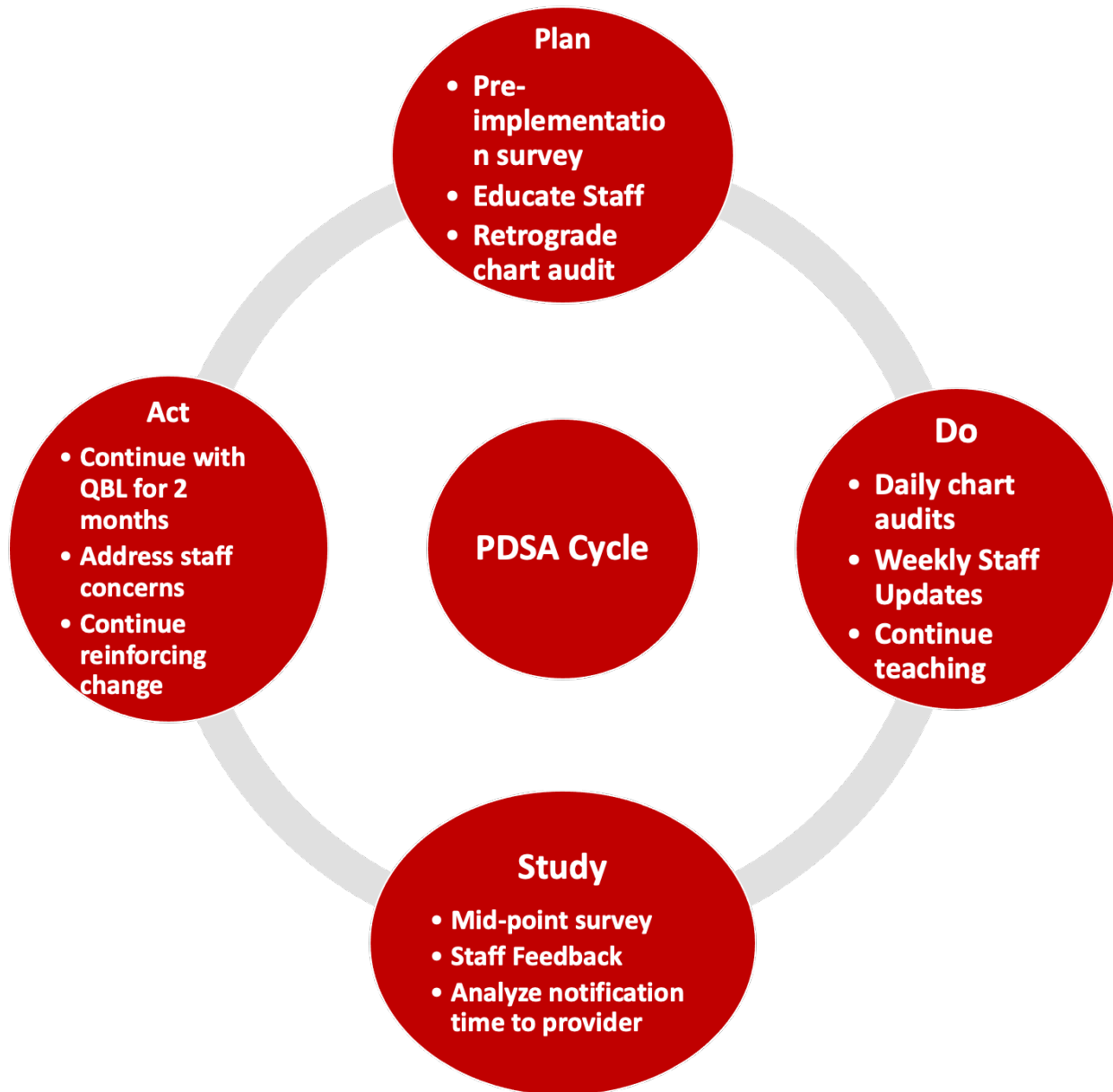




**Appendix E**

**PDSA Cycle**

Plan, Do, Study, Act (PDSA) cycle involves four steps for problem identification when implementing change.



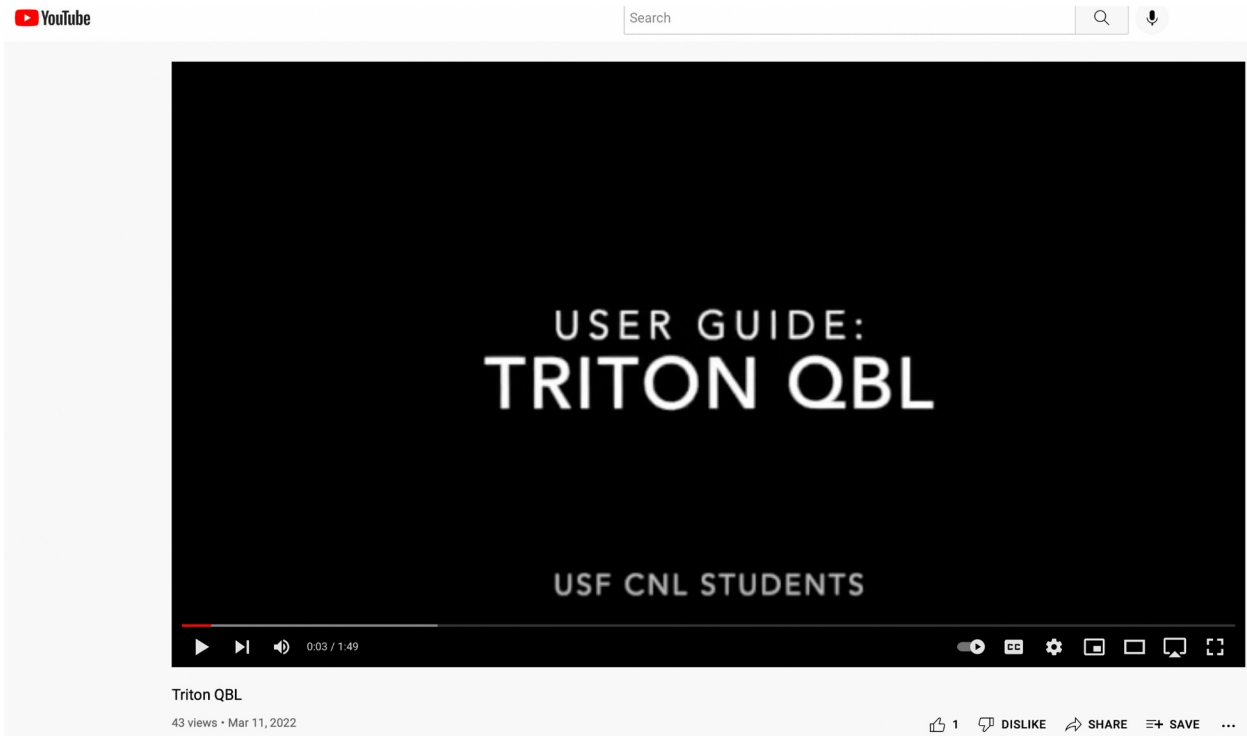
**Appendix F**

**Triton Cost Table**

<b>Software License</b>			
Yearly Delivery Volume	Description	UOM	Price per Case
4329	<b>Triton - Blood Loss (Obstetrics)</b> Includes licenses for Triton AI, Triton Canister and Triton QBL	Per Delivery	\$22.50
		Per Month	\$8,116.88
<b>One-Time Implementation Fee</b>			
Number of Systems	Description	One-Time Cost	
11	<b>Triton Implementation Fee</b> Includes: - Training and case support - Professional services - Hardware (Apple device(s), Bluetooth scale) - Consumables (scanning label, inserts, calibration placard) - Materials shipping	\$27,500.00	

## Appendix G

### Triton QBL Education Video, Link, and QR Code



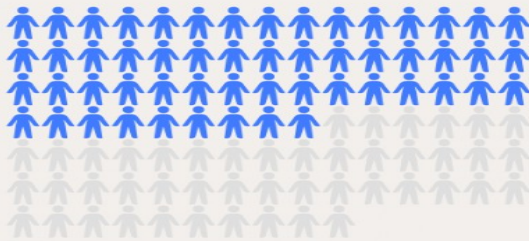
Triton QBL Education Link: <https://youtu.be/Auza6qw5OPc>

Appendix H

QBL Educational Flyer

# QBL in PP:

Everything You Need to Know



## 54-93%

Of maternal deaths due to obstetric hemorrhage may be preventable. QBL is an objective measurement that is recommended for the early identification of hemorrhage for all births.

### Go Live



March 28, 2022 RN's in PP will collect QBL using Triton for all PP patients.

- Vaginal - QBL at first 2 voids
  - C-section - QBL first 4 hours
- Dangle ERAS & first 8 hours Ambulation ERAS.

3 month trial period

#### Postpartum Hemorrhage



Occur in low risk women

#### Visual estimation



is known to be imprecise, in cases of high blood loss

#### Maternal Deaths



Due to hemorrhage from 2014- 2017

### Why QBL needs to be done now



Timely escalation to provider

Accuracy

Patient Outcomes



References: Maternal Safety, Council on Patient Safety in Women's Health Care [published erratum appears in Obstet Gynecol 2018;126:1111]. Obstet Gynecol 2018;126:15. Main EK, Goffman D, Scovone BM, Low LK, Bingham D, Fontaine PL, et al. National Partnership for Maternal Safety, consensus bundle on obstetric hemorrhage. National Partnership for Maternal Safety. [https://www.nmwhjournal.org/action/showPdf?pii=51751-4851%2E2821%2E200085-4&utm\\_source=AWHONN&utm\\_medium=page-embed&utm\\_campaign=practice-brief-click&utm\\_id=https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pregnancy-complications-data.htm](https://www.nmwhjournal.org/action/showPdf?pii=51751-4851%2E2821%2E200085-4&utm_source=AWHONN&utm_medium=page-embed&utm_campaign=practice-brief-click&utm_id=https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pregnancy-complications-data.htm), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7920212/>, [https://www.jognn.org/article/S0884-2175\(21\)00062-9/fulltext](https://www.jognn.org/article/S0884-2175(21)00062-9/fulltext), [https://www.jognn.org/action/showPdf?pii=S0884-2175\(21\)00062-9](https://www.jognn.org/action/showPdf?pii=S0884-2175(21)00062-9)

Appendix I

Quality Improvement Initiative Information Flyer

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2022 LPCH Postpartum Units

# Quantitative Blood Loss in All Postpartum Patients



Vaginal Births: QBL at  
first 2 Voids

C-section: QBL first 4  
hours Dangle ERAS &  
first 8 hours Ambulation  
ERAS

Begins  
March 28, 2022  
Trial 3 months

---

Use of Triton scale for QBL is  
necessary

---

## Appendix J

## Pre-implementation Survey

## QBL Survey PP

The following survey is to assess the current workflow when implementing QBL in the Postpartum unit at Lucile Packard Children's Hospital. We appreciate your time and value your feedback!

 aoquinones@dons.usfca.edu (not shared) [Switch account](#)



Do you currently implement QBL for Postpartum patients?

- Yes
- No

What is a "trigger" that makes you implement QBL for a patient?

- Large clots
- Greater than 1 pad/ hr saturation
- Change in Vital signs
- Trickling of Blood
- Boggy uterus
- OB Rapid
- Gush of blood
- Other: \_\_\_\_\_

Do you think implementing QBL with Triton scale for patients will disrupt current workflow?

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Do you believe you will encounter barriers if you implement QBL for Postpartum patients?

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly disagree

After receiving Triton training, I feel comfortable using Triton to measure QBL

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

Do you believe you have adequate resources to implement QBL for patients using the Triton scale?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

Do you feel like it's necessary to implement QBL using Triton scale to identify postpartum at an earlier stage ?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

Submit

Clear form

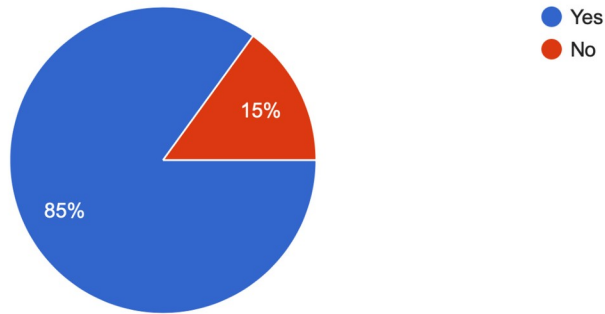


### Appendix K

#### Pre-implementation Survey Results

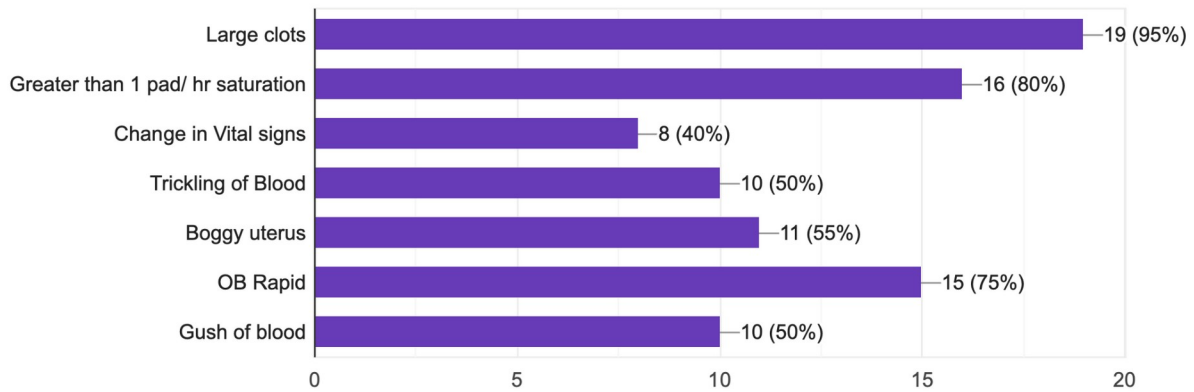
Do you currently implement QBL for Postpartum patients?

20 responses

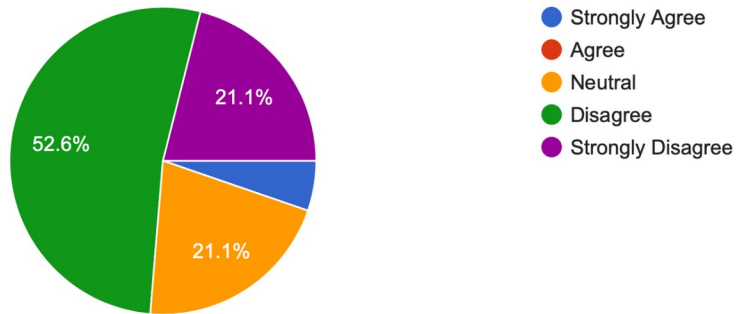


What is a "trigger" that makes you implement QBL for a patient?

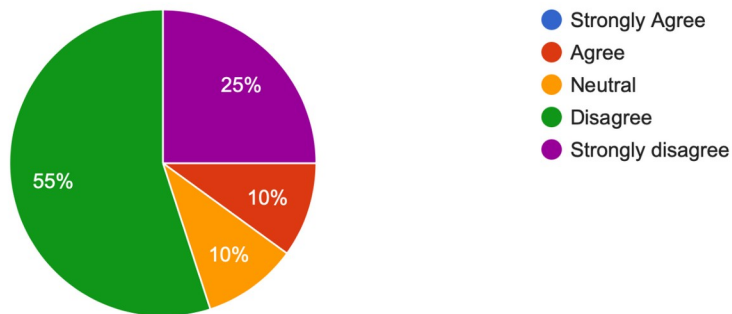
20 responses



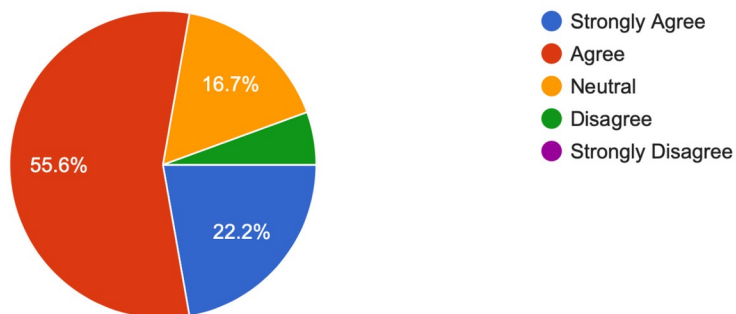
Do you think implementing QBL with Triton scale for patients will disrupt current workflow?  
19 responses



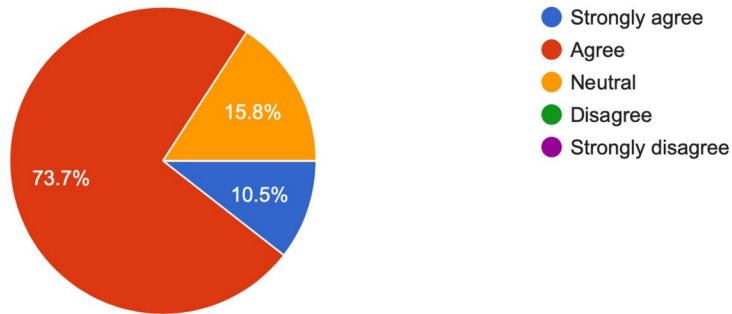
Do you believe you will encounter barriers if you implement QBL for Postpartum patients?  
20 responses



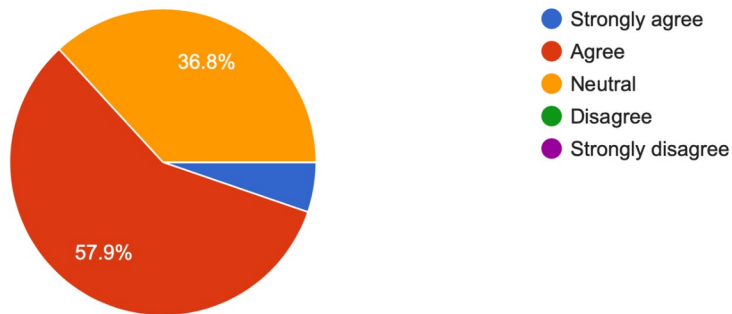
After receiving Triton training, I feel comfortable using Triton to measure QBL  
18 responses



Do you believe you have adequate resources to implement QBL for patients using the Triton scale?  
19 responses



Do you feel like it's necessary to implement QBL using Triton scale to identify postpartum at an earlier stage ?  
19 responses



## Appendix L

### Mid-point Survey

#### QBL Mid Point Survey

This survey will serve as a mid point survey to assess the implementation of QBL with use of Triton in postpartum at Lucile Packard Children's Hospital. We appreciate your time and feedback!

Did collecting QBL change your perception of hemorrhage occurrence?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

Has Triton QBL added significant time to your patient care

- Severely Impacted
- Impacted
- Neutral
- Very little impact
- No impact

...

QBL improved notification time to the provider

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

After receiving Triton training, I feel comfortable using Triton to measure QBL

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

Has the quantified number of blood loss in your postpartum patient's surprised you?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

Do you believe QBL is more accurate than EBL? ...

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

What changes, if any, would you make to the process?

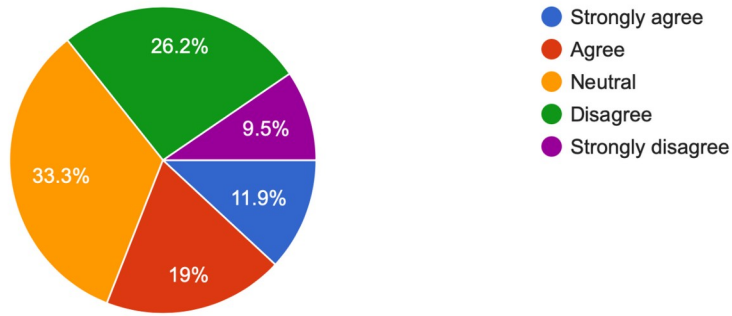
Long answer text

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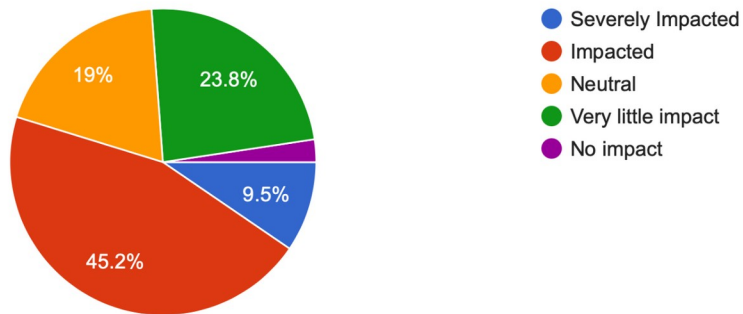
### Appendix M

#### Mid-point Survey Results

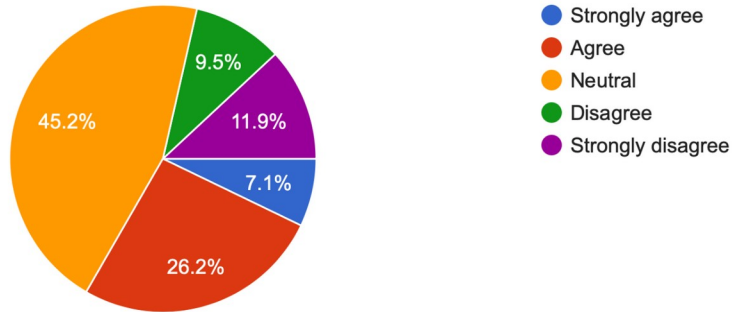
Did collecting QBL change your perception of hemorrhage occurrence?  
42 responses



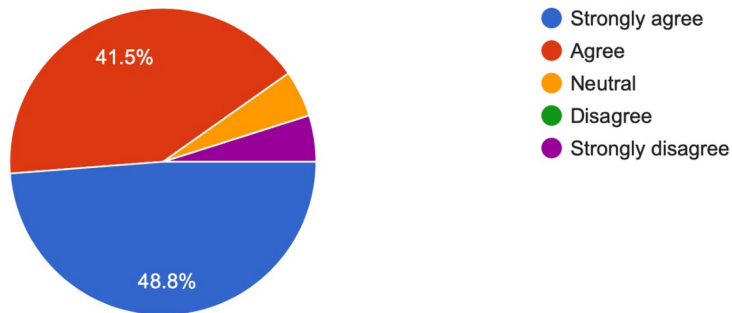
Has Triton QBL added significant time to your patient care  
42 responses



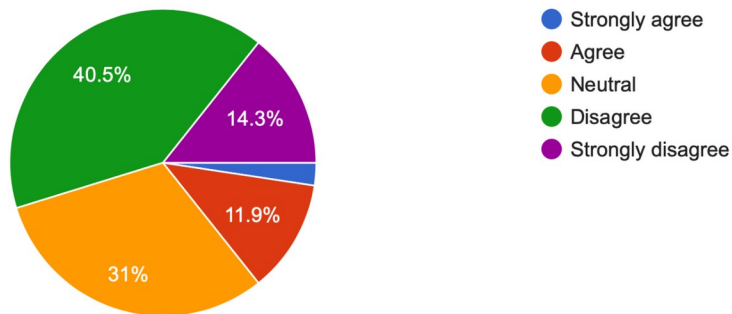
QBL improved notification time to the provider  
42 responses



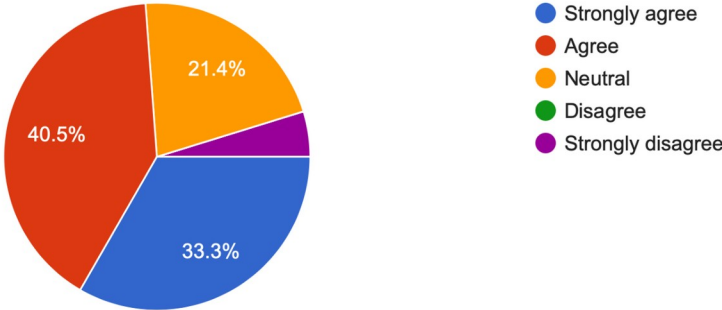
After receiving Triton training, I feel comfortable using Triton to measure QBL  
41 responses



Has the quantified number of blood loss in your postpartum patient's surprised you?  
42 responses



Do you believe QBL is more accurate than EBL?  
42 responses





Appendix N

Staff Meeting PowerPoint Presentation

# QBL in Postpartum

Iana Vatsenko, Summer Le, Amy Quinones

Background and Our Why

**54-93%**

Of maternal deaths due to obstetric hemorrhage may be preventable. QBL is an objective measurement that is recommended for the early identification of hemorrhage for all births.

Background and Our Why Cont.

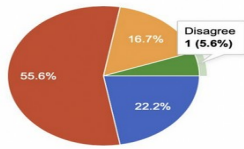
Category	Percentage	Notes
Postpartum Hemorrhage	40%	Occur in low risk women
Visual estimation	50%	is known to be imprecise, in cases of high blood loss
Maternal Deaths	10.7%	Due to hemorrhage from 2014- 2017

PICO Question

In Postpartum patients how does measuring QBL using Triton for the first 8 hours after delivery compare to not measuring QBL for the first 8 hours after delivery affect time in notifying provider?

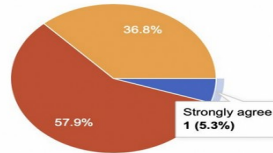
- Notifying MD includes calling MD to beside or calling OB Rapid Response

### Pre-implementation Survey Results



55.6% of nurses agreed after receiving Triton training they felt comfortable using Triton for QBL

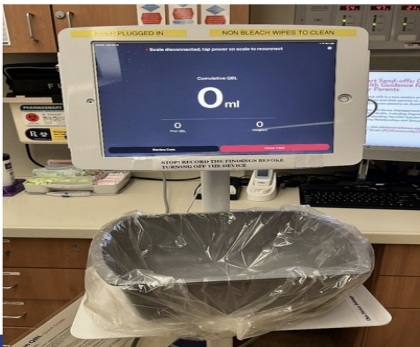
- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree



57.9% Nurses agreed it was necessary to implement QBL using Triton to Identify PPH at an earlier stage.

### Go Live: Week of 3/28- Daily Audits

- Ensure nurses are recording and charting QBL
  - Vaginal- QBL at the first 2 voids
  - C-Section- QBL within the first 4 hours during Dangle (ERAS) and within the first 8 hours during Ambulation (ERAS)



- Add plastic liner in order to reduce grey basin waste.
- Make sure to add liner before zeroing the scale
- Plastic liner disposed into Biohazard

### Quick Reminders

- Always clean Tritons after each use with purple wipes to disinfect (even with Isolation pts)
- Always remember to plug in Triton to charge

### Upcoming goals

- Daily audits
- Weekly Updates for nurses
- Post-Survey: Week of April 11th, 2022.



## Appendix O

## Staff Local Improvement Team (LIT) Meeting Presentation

**PPH QBL**

Iana V, Amy Q, Summer L

**Background**

Primary PPH occurs in 1-5% of women within the first 24 hours

**Project Aim:**

**Quantify blood loss in PP for the first 24 hours**

**Pico question**

**In postpartum patients, how does cumulative Quantitative Blood Loss (QBL) collection for 90 minutes postpartum compared to 24 hrs cumulative QBL collection postpartum for non moderate to high risk patients affect early detection of postpartum hemorrhage during hospital stay?**

## Pre-Implementation Survey Questions

### QBL Survey PP

The following survey is to assess the current workflow when implementing QBL in the Postpartum unit at Lucile Packard Children's Hospital. We appreciate your time and value your feedback!

Do you currently implement QBL for Postpartum patients?

Yes

No

Do you think implementing QBL with Triton scale for patients will disrupt current workflow?

Strongly Agree

Agree

Neutral

Disagree

Strongly Disagree

What is a "trigger" that makes you implement QBL for a patient?

Large clots

Greater than 1 pad/ hr saturation

Change in Vital signs

Trickling of Blood

Boggy uterus

QBL scale

Do you believe you will encounter barriers if you implement QBL for Postpartum patients?

Strongly Agree

Agree

Neutral

Disagree

Strongly disagree

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### Pre Implementation Survey

- 91.7 % implement QBL for Postpartum patients
- Top triggers/concerns:
  - 100% blood clots
  - 41.7 change in vital signs
- Staff barriers:
  - 50% disrupt current workflow.
- Staff support:
  - 66.7% comfortable using Triton to measure QBL
  - 83.3% adequate resources available
- 66.7% feels like it is necessary to implement QBL using Triton scale to identify postpartum at an earlier stage.

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### PPH Data 2020-2021

- Total Deliveries with PPH
  - 2020: Average of 21/ month
  - 2021: Average of 48/ month
  - **Increase in 27 deliveries/ month with PPH from 2020 to 2021**
- Average Blood loss with PPH
  - 2020: 1471 mL
  - 2021: 1359 mL
- C-section deliveries with PPH
  - 2020: Average of 16/ month
  - 2021: Average of 35/ month
  - **Increase in 19 c/s with PPH from 2020 to 2021**
- Vaginal deliveries with PPH
  - 2020: Average of 6/ month
  - 2021: Average of 13/ month
  - **Increase in 7/ vaginal deliveries/ month**

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### Upcoming goals:

- More nurse participation in survey
- Audits
- Determine financial impact
- Prepare for staff presentation