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Counting Every Drop: Preventing Maternal Mortality with Quantifying Blood Loss through Triton Scale

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Nursing 653: Internship

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Abstract

Postpartum (PP) hemorrhage is one of the leading causes of maternal mortality (AWHONN, 2021). In each of the past three years, the percentage of PP hemorrhage has increased at Hospital X. The PP unit at Hospital X performs around 4,500 total deliveries each year. While the standard of care for PP blood loss is to specifically measure blood in milliliters as Quantifying Blood Loss (QBL) for Labor and Delivery (L&D), it is not yet the standard of care in the 24 hours postpartum after delivery (ACOG, 2019). This quality improvement project involved educating nurses about measuring blood loss – specifically past the initial measuring in L&D – using the Triton Scale and proper documentation of QBL onto EPIC, the hospital's electronic patient record system (EPIC). This included creating an instructional video for the Triton Scale, flyers on how to document QBL, emails of changes and implementation, and surveys on nurses' feedback for QBL implementation. Data collection focused on daily auditing of the nurses' QBL documentation for the first two voids of a vaginal delivery, QBL for the first four hours of enhanced recovery after surgery (ERAS), and the first eight hours ERAS with ambulation. If a patient hemorrhages, the focus shifts to determine when the nurse notified the Medical Doctor (MD) or Obstetric (OB) rapid response. QBL compliance increased by 96% among all nurses in the PP unit. While QBL compliance increased, it was not statistically significant; however, important steps towards attaining this goal were found. Nurses have demonstrated significant improvements in the ability to use the Triton scale and the ability to properly document their findings if PP hemorrhage is suspected. Therefore, it is recommended to continue QBL measurements for another two months before re-evaluating the effectiveness of this Quality Improvement (QI) project in early recognition of PP hemorrhage.

Keywords: Quantifying blood loss, postpartum, c/section delivery, vaginal delivery, compliance

Section II: Introduction

The postpartum unit is a place where mothers recover from their recent vaginal or cesarean section (C-section) deliveries. The main purpose of PP care is to ensure safety, stabilize vital signs, control bleeding, and meet the needs of the mother and child. Even though a lot of excitement occurs in PP units, healthcare staff must stay vigilant and observe whether PP complications occur. One of the most common complications to be aware of is PP hemorrhage, which is one of the leading causes of morbidity and mortality in childbirth (National Library of Medicine, 2022).

Maternal hemorrhage is defined as "a cumulative blood loss of greater than or equal to 1,000 mL or blood loss accompanied by signs or symptoms of hypovolemia within 24 hours after the birth process, remains the leading cause of maternal mortality worldwide" (ACOG, 2022). Vital signs and laboratory values that indicate postpartum hemorrhage are decreased blood pressure, increased heart rate, and a decrease in red blood cell count (Cleveland Clinic, 2022). Common causes of PP hemorrhage include uterine atony and coagulation disorders. To reduce the rate of PP hemorrhage, preventative measures, such as uterine massages, are performed to help the muscles of the uterus contract. Medications such as oxytocin, methylergonovine, or misoprostol are also used to stimulate contractions (Cleveland Clinic, 2022). While postpartum hemorrhage remains a leading cause of maternal mortality, it is also a preventable cause of severe maternal morbidity (CMQCC, 2022). PP hemorrhage can be prevented, and identifying symptoms quickly is crucial because this serious condition, if undetected and untreated, can lead to death (Cleveland Clinic, 2022). One of the methods used to quickly determine PP hemorrhage is utilizing QBL. Quantifying blood loss uses methods such as collection bags or containers, weighed blood loss, or a combination of the two, to determine the amount of blood loss in

patients (WHO, 2022). Estimated blood loss (EBL) is using human judgment and 'estimation' to determine the amount of blood lost. This typically refers to a healthcare worker who looks at and estimates the amount of blood lost, then determines whether that amount warrants intervention. The World Health Organization (WHO) has recommended that visual estimations be utilized when determining blood loss. They did not find sufficient evidence to recommend the quantitative measurement of blood loss over clinical estimation.

The Quality Improvement (QI) team focuses on quantifying blood loss in the early diagnosis of postpartum hemorrhage (PPH). The overall problem is that most hospitals are now using QBL on labor and delivery units but not on postpartum units. The aim of this project is to initiate QBL specifically in the postpartum units for the first two voids to identify PPHs that occur after delivery versus during the immediate recovery period of labor and delivery. The main goal of this quality improvement project is to measure quantifying blood loss using the Triton scale for the early diagnosis of postpartum hemorrhage and for early intervention and treatment by notifying and calling physicians to the bedside or calling OB Rapid Response on the postpartum unit at Hospital X.

Problem Description

Past research has focused on quantifying blood loss in labor and delivery. There is little research and few case studies on the application of QBL in the postpartum unit; however, lack of research does not warrant disregard. The World Health Organization has only recommended estimated blood loss over quantifying blood loss because postpartum hemorrhage is mainly a larger issue in low-income countries (WHO, 2022).

Prior to the quality improvement project, the PP unit at Hospital X had not been recording QBL during the PP period. Estimated blood loss was utilized instead of QBL, but there was no numerical documentation of EBL; rather, the typical charting was light, moderate, or heavy. This made it difficult to identify PP hemorrhage and the amount of blood loss leading up to it, especially in the early stages of postpartum hemorrhage. When the Quality Improvement team of CNL students looked at the data for Hospital X, postpartum hemorrhage occurred in 6% of deliveries during 2020; this percentage doubled in 2021, with 12% of deliveries experiencing postpartum hemorrhage. This may be attributed to the implementation of the Triton scale for QBL measurement in February 2021 in L&D only. Using the Triton scale allows for an accurate objective measurement of blood loss because 1ml of blood is equal to 1 mg on the scale; in comparison, the current use of EBL is a visual, subjective estimation – without numerical measurement – of blood loss, which varies from person to person. Upon investigation of the PPH data for PP documentation after L&D, no documentation was found regarding the time of the hemorrhage or the amount of blood loss. The lack of accurate data entry by the nursing staff created a barrier for data collection and the exact determination of time when a postpartum hemorrhage had occurred. The QI team decided this will be the focus of the project with the approval of coordinators and supervisors.

The QI team originally reviewed the literature to determine the best time frame to monitor for PP hemorrhage, but the literature lacked a clear consensus on a recommended time frame for PP measurement. Thus, the team decided to use this opportunity to implement QBL measuring and documenting charting during a 3-month trial. Nurses were to collect QBL at the first two voids after a vaginal delivery. Daily audits were performed to measure compliance.

Review of Literature

The World Health Organization states that “postpartum hemorrhage is the leading cause of maternal mortality and the primary cause of one quarter of maternal deaths globally” (WHO, 2012). The United States mortality rate for maternal care is highest among industrialized nations at 25% (National Library of Medicine, 1997). The U.S. healthcare system should be quantifying blood loss in primary postpartum because research has shown this method is more accurate when performed correctly and leads to better health outcomes such as reduced length of hospitalization (The American College of Obstetrics & Gynecology, 2018).

A review of the literature was performed from various sources, primarily scholarly articles. The main areas of focus were primary postpartum hemorrhage and quantitative versus estimated blood loss. The aim of the literature review is to determine whether QBL is more accurate than EBL for the earlier diagnosis of postpartum hemorrhage in the postpartum unit. The PICO question that guided this research was: In postpartum patients, how does cumulative 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 PP hemorrhage during hospital stay? Since there was not enough relevant evidence-based practice or literature research to support quantifying blood loss for 24 hours, the PICO question had to be changed to: 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 time in notifying the provider? Notifying medical doctors includes calling medical doctors to the bedside or calling OB rapid response. Databases used to search for literature are sources from PubMed, AWHONN, ACOG, and CINAHL. An advantage for choosing 1st and 2nd void versus a number of time frames is that nurses will cover at least eight hours of QBL. Patients who were freshly admitted to the PP unit and were bleeding more heavily will have increased monitoring during

the 1st and 2nd void time frames. A disadvantage of choosing 1st and 2nd void versus an exact time frame is that nurses might be careless, or less attentive, in treating patients who are not bleeding as heavily upon admission but bleeding heavily before the 1st or 2nd void. This could cause a delay in notification to MD or OB rapid response.

Keywords: Quantifying blood loss, postpartum, c/section delivery, vaginal delivery, compliance

Primary postpartum hemorrhage is bleeding that occurs in the first 24 hours after delivery (WHO, 2018). Traditionally, the term was defined as an estimated blood loss greater than 500 mL during delivery or greater than 1000 mL during cesarean delivery. In 2017, the American College of Obstetrics and Gynecology (ACOG) redefined the term as estimated blood loss greater than 1000 mL. However, blood loss greater than 500 mL is still considered abnormal and may need intervention. The current research shows that the visual estimation method for blood loss has been largely inaccurate. Underestimation or overestimation leads to delayed interventions for treatment (Toledo, 2007).

One example of underestimation of blood loss was shown in a study completed in 2007 called *The Accuracy of Blood Loss Estimation After Simulated Vaginal Delivery*. The authors used calibrated drape markings for blood loss estimation. Patients were randomized with simulated blood loss amounts. The study reported a 15% error for estimation of all volumes, concluding that using a quantified method of measuring blood loss was more accurate than a visual estimation. Another study from Florida showed underestimation was up to 50% inaccurate when using visual methods over quantitative methods (Florida Perinatal Quality Collaborative, 2015). They found that training can increase the accuracy of visual estimation, but those skills deteriorate after only nine months. Another study in 2011 was conducted at the Charite

University Hospital. They concluded that QBL is more effective than visual estimation of blood loss because it can detect early postpartum hemorrhage (National Library of Medicine, 2016). A pelvic drape was used to measure blood after vaginal delivery. Mothers were observed for two hours, and the providers recorded the level of blood loss from the drape showing that QBL is better than estimating blood loss for PP hemorrhage.

Nurses have a duty to prevent PP hemorrhage through preventative measures. Under the American Nursing Association (ANA), this includes "implementation, development, and sustainment of quantifying blood loss protocols" (ANA, 2022). If a nurse or healthcare team is aware that a method implemented will improve patient healthcare outcomes, then they are required to look into potentially incorporating that method into the healthcare system (ANA, 2022). However, there are other considerations such as cost, training, feasibility, and success.

Rationale (Theoretical Framework)

The theoretical framework for this project is Kotter's change theory. This is an eight-step process for leading change: *create a sense of urgency, build a guiding coalition, form a strategic vision and initiatives, enlist a volunteer army, enable action by removing barriers, generate short-term wins, sustain acceleration, and institute change* (Kotter, 1996).

At Hospital X, the rates of postpartum hemorrhage have been rising since 2020, *creating a sense of urgency*. This was utilized in conjunction with a literature review to support the need for a change. USF nursing students worked with the co-lead coordinator for this Quality Improvement project to form a *guiding coalition*. The QI team *formed a strategic vision and initiatives* by clarifying that proper documentation of QBL should be performed to improve patient outcomes. Nurses in the PP unit *enlist as a volunteer* to carry out QBL documentation on

EPIC. *Enlisting as a volunteer* means nurses are willing to comply with carrying out QBL using the Triton Scale. For nurses who were not trained on the Triton Scale, they were able to learn through in-person education as well as an instructional video concerning use of the Triton Scale. This *enables action by removing barriers* such as understanding how to use the Triton Scale with proper documentation on EPIC. Progress was tracked and collected by measuring compliance; updates on compliance rates at staff meetings were used to *generate short-term wins* to increase staff compliance and adherence. Once nurse compliance increased, QBL documentation with MD notification for PPH was encouraged to continue doing their job to sustain efficiency. *Institutional change* meant changing from QBL to EBL with proper documentation. Nurses were able to easily access QBL and determine when PPH had occurred.

Specific Project Aim

This project aims to promote quantifying blood loss versus estimating blood loss with a compliance goal of 90%. The desired outcome of this project is to track blood loss more accurately to notify medical doctors at bedside or call OB Rapid Response within 30 minutes in the earlier diagnosis of postpartum hemorrhage for better patient health promotion.

Section III: Methods

Context (Microsystem Assessment)

The postpartum unit at Hospital X has three floors where healthcare workers help mothers recover from delivery and care for newborns. There is one nursing station on each floor, and the noise level on each unit is minimal to provide mothers and babies an environment conducive to rest and recovery. Nurses are easily contacted and accessed with call buttons, and

nurse managers are also available on the unit as a resource. Shifts start at 7:00 am or 7:00 pm with a thirty-minute window for a face-to-face report handoff. Each nurse is assigned to three couplets (mother and baby) for a total of six patients, unless the acuity of a patient increases due to medical complications. In this case, the nurse is assigned less patients so the proper attention and care can be provided to the patients with high acuity. The first and third floor have postpartum nurses (high acuity maternal conditions), while the second floor has both antepartum and postpartum nurses (high acuity maternal conditions). In the postpartum units, there are a total of 175 nurses.

Nurses on the unit communicate well and work together to give the best care to their patients, ensuring excellent care is being provided; however, when asked about improving the work environment, many reported feeling burnt out and not having mental health support from the hospital.

A SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis was used for this quality improvement project (Appendix D). The purpose of the SWOT analysis is to help identify the organization's position before deciding on a new strategy (National Library of Medicine, 2020). The SWOT analysis discusses quantifying blood loss in postpartum. Strengths include improvements in patient health outcomes and accurate documentation of the amount of blood loss, which are evidence-based practices. A weakness is the increased workload for nurses. A PP nurse typically has three patients and needs to perform QBL upon admission, 1st void, and 2nd void. It takes an additional five minutes to do QBL using the Triton Scale versus EBL. This comes out to a total of 45 minutes more each shift using the Triton Scale. There is also an ongoing debate if obtaining quantifying blood loss using the Triton scale is within the scope of practice for a certified nursing assistant (CNA); placing this task within their scope of practice

allows for delegation and can relieve the workload on the nurse. Some opportunities for quantifying blood loss include timely postpartum hemorrhage treatment and earlier notification to provider or OB rapid response. These opportunities not only help patients get the help they need, but also reduce the length of stay in the hospital. With such opportunities, there are also threats to quantifying blood loss.

A Gantt chart (an illustration of a project schedule) was utilized for this project to help determine the timeline and implementation of quantifying blood loss in the postpartum unit at Hospital X (Appendix G). This project started on February 1, 2022, and the planning stage occurred in the first week. Research occurred from February 8, 2022, to March 15, 2022. The reason for the extended planning phase was due to ongoing modification to the PICO question. The original PICO question was: In postpartum patients, how does cumulative Quantifying Blood Loss 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? The issue with this PICO question was that there was not enough relevant evidence-based practice or literature research to support quantifying blood loss for 24 hours. Upon performing additional research, a consensus was made to move forward with the new 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 time in notifying the provider? Notifying medical doctors includes calling medical doctors to the bedside or calling OB rapid response.

From February 22, 2022, to March 29, 2022, a pre-survey was used to gauge nurses' reactions and attitudes to the new implementation and their ability to use the Triton Scale. The finding was that 56.6% of nurses agreed that after receiving Triton training, they felt comfortable

using Triton for QBL. Additionally, 57.9% of nurses agreed that it is necessary to implement QBL using Triton to identify postpartum hemorrhage at an earlier stage. In addition to the pre-survey, nurses were presented an opportunity to be educated on how to use the Triton scale during their shifts. An instructional video demonstrating the Triton scale could also be accessed on the floor with a QR code. Implementation of QBL using the Triton scale for all patients began on March 29, 2022 and is being maintained to date. Post-surveys started from April 11, 2022 and continued until April 25, 2022. This quality improvement project will continue for future cohort nursing students working with Hospital X clinical nurses.

A PDSA (Plan, Do, Study, Act) cycle was also used to plan for this quality improvement project (Appendix F). In the planning stage, it was predicted that QBL leads to earlier diagnosis of PPH than EBL, based on the literature search. The team planned for QBL data collection on EPIC to evaluate this prediction. During the 'Do' stage, QBL documentation for the first two voids of vaginal and c-section delivery was implemented. There were also observations and auditing of staff compliance to record data. In the 'Study' stage, data was analyzed to compare results to predicted outcomes. Results were evaluated by noting the amount of QBL in PP If the patient hemorrhaged, the Quality Improvement team looked at when the MD or OB rapid response was notified in the 'Notes' section. Finally, in the 'Act' stage, the postpartum nurses began QBL measurement as planned; patient data was monitored daily to determine how many patients hemorrhaged in postpartum.

A fishbone diagram - diagrams used to show the potential causes of a specific event - was employed (Appendix E) to demonstrate the various aspects causing delayed postpartum notification responses to MD or OB rapid responses due to using EBL instead of QBL. Prior to the QI implementation, on postpartum, the use of QBL and Triton was not enforced, and the

nurses did not have the specific training skills for QBL. Additionally, there were inadequate numbers of scales and no weighted measurements in EPIC. Lastly, in management, there is a need to follow up with nurses who do not believe in the need for QBL so the Quality Improvement team can educate the nurses with evidence-based reasoning for implementation of QBL. There should be follow up with nurses who do not comply with hospital policies and procedures to enforce the implementation, and showcase the improved patient outcomes as a result of QBL to increase buy-in. These are the main factors contributing to late postpartum notification to MD or OB rapid response.

Cost-Benefit Analysis

The main cost of this implementation is the cost of the Triton Scale (Appendix J). There is a one-time implementation fee of $27,500 for 11 scales, with a 6-month pilot subscription of $48,701.25 every six months for the Triton Scale. With the pilot discount for implementation and subscription of $27,500.00 and $48,701.25 the total payment is $0. The software license has a cost of $22.50 per delivery and $8,116.88 per month. According to the Agency for Healthcare Research and Quality (2011), the mean cost per stay of all types of delivery is $3,800 per day. With the earlier diagnosis of postpartum hemorrhage through the Triton Scale, the hospital could save $3,800 for each additional day in the postpartum unit. This will lead to mothers having a more positive birthing experience, preventing serious complications related to excessive blood loss, and allowing for more bonding time with their newborn.

Intervention

The intervention was to educate postpartum nurses about the proper use of the Triton scale to quantify blood loss at Hospital X. Prior to implementation of the Triton Scale, the QI

team gathered nurses' knowledge about the Triton Scale and QBL through pre-implementation surveys in the postpartum units. The Triton Scale is an application on a tablet used to collect QBL in mL with pre-weighted items such as perineal pads, ice packs, and chuxs within the system. The system then calculates the amount of blood loss by subtracting pre-weighted items for total blood loss. After collecting survey responses, the QI team began educating nurses on how to use the Triton Scale with proper documentation on EPIC.

The QI team also utilized flyers and posted them near nursing stations and bathrooms around the postpartum unit. A QR code was created and placed on the flyers linking to the instructional video on the Triton Scale. The flyer also included information regarding when QBL would be implemented, the length of time for the Triton Scale implementation (3-month trial), and instructions on when to quantify blood loss upon patient admission to the postpartum unit (Appendix K). Along with posting flyers and creating a Triton scale instructional video, nurses were also trained in person. Using the Triton Scale, the Quality Improvement team demonstrated to the nurses how to use the Triton Scale for QBL. In a day, the Quality Improvement team would go to all three PP floors to work with each nurse one-on-one for education. Teaching was provided for two weeks; about 10 nurses per day. During the training, nurses learned how to use the scale and were also asked to demonstrate the process to evaluate the effectiveness of the teaching, utilizing the teach-back method. Once complete, nurses could ask questions such as where to record the amount onto EPIC. Staff were asked to fill out a pre-implementation survey and mid-implementation survey (Appendix H & I) to determine their understanding of when to quantify blood loss for vaginal or c-section. The survey was also meant to gain an understanding of how accepting the nurses were to the changes and if they had any questions regarding quantifying blood loss using the Triton scale.

Study of the Intervention

Daily audits were recorded at the same time every day to determine the compliance rates of documenting quantified blood loss. Nurses who did not quantify blood loss for the first two voids received re-education from the Clinical Nurse Leader at Hospital X. This was determined by the students going through each patient record and checking if QBL had been measured and the milliliters of blood loss. If there was a postpartum hemorrhage, time of notification to MD to bedside or OB rapid response was reviewed. Compliance rates were also evaluated to determine the effectiveness of the intervention.

Section IV: Results

Data was also collected regarding postpartum hemorrhage. The QI team found records of PPH for the year of 2020, 2021, and 2022. Results showed that 19 PPH occurred in April 2020, 51 PPH occurred in April 2021, and 35 PPH occurred in April 2022. It is also worth noting that the increase from 2020 to 2021 may be due to the Triton scale being introduced in February 2021 in the labor and delivery department. When investigating the data for 2020 and 2021, there was no record to find when the patient hemorrhaged either in labor and delivery or in postpartum. Daily audits ensured that nurses recorded the amount of QBL, whether the patient hemorrhaged in labor and delivery or in postpartum and the notification time of MD or OB rapid response.

For the month of April 2022, there was a total of 35 total PPH out of 272 total deliveries at Hospital X for a rate of 12.9%. There were 167 vaginal deliveries and 105 C/Section deliveries. 29 PPH occurred in Labor and delivery, and 6 PPH occurred in Postpartum. With the earlier diagnosis of PPH through QBL, this can help to improve patient outcomes.

The post mid-implementation results indicated that 77.8% of nurses agree that after Triton Training, they feel comfortable using the Triton Scale to measure QBL after Triton training. After implementation, there was a total of 90.3% of nurses who strongly agreed on being comfortable with using Triton, demonstrating a 12.5% increase.

In the pre-implementation survey, the QI team also asked nurses their top indicators of initiating QBL collection, with the most common indicators being large clots and greater than one pad saturation in an hour; QBL collection was then followed by calling OB rapid response. Documentation on EPIC was improved by providing QBL for each patient upon admission, 1st void, and 2nd void. Documentation compliance improved by 98%. Nurses were also expected to provide when a MD or OB rapid response was notified timely, if a patient was determined a PPH. Time of notification for PPH to MD or OB rapid response was within 30 minutes of hemorrhage.

Section V: Discussion

Summary

Nurses in the postpartum unit have demonstrated the ability to use the Triton Scale comfortably in the case of a suspected postpartum hemorrhage. Before the implementation of QBL using the Triton Scale, a nurse at the hospital X in the postpartum unit was not able to quantify blood loss for a patient who was hemorrhaging and had to ask a labor and delivery nurse to come to the floor. Now, the nurse can say she is comfortable using the Triton Scale after implementation of the Triton Scale. There are also other nurses who reported similar stories.

The main barrier with implementing this project was pushback from nurses. Even though nurses received training on the Triton Scale and there was an increased compliance rate of 98% QBL for the 1st and 2nd void, most nurses did not find QBL to be useful in the PP unit. A suggestion to move forward is that new nurses should be oriented upon hire. This way nurses do not have to do individual training and less push back is expected.

Another barrier with implementing this project was the limited time frame of this project. This meant time researching further evidence in literature for a time frame to quantify blood loss. With no real available research literature to support the number of hours for QBL measurement frames, the PICO question was modified. Additionally, there is an ongoing effort to have Certified Nursing Assistants use the Triton Scale to quantify blood loss for the 2nd void. There has been backlash from Certified Nursing Assistants believing this is out of their scope of practice causing Registered nurses to have an increased workload. Furthermore, there was no data for Triton use from previous years to utilize as a baseline.

Within the 3-month time frame for the project, the QI team could only perform daily audits for one month to compare data due to the time restraint. With the limited time frame of the project, there has been a discussion about who will continue to collect data after USF nursing students are no longer with Hospital X.

CONCLUSION

It has been well established in the medical field that postpartum hemorrhage is one of the leading causes of maternal mortality. Therefore, it is crucial to implement new strategies to prevent these deaths. The Quality Improvement team found that although there was not enough evidence to show that QBL is better than EBL in PP, nurses are now able to use the Triton Scale

comfortably when a PPH does occur. Due to time restraint, QBL using the Triton Scale with proper documentation was only analyzed for one month. QBL using the Triton Scale should be implemented for several months to accurately determine if QBL helps in the earlier diagnosis of PPH in PP. By continuing to use QBL using the Triton Scale, there will be more data to collect monthly to compare the impact of QBL and the Triton Scale. Suggestions for future studies based on what the Quality Improvement team has found is more time to conduct QBL data through EPIC and in the Fall at Hospital X where PPH occurs more frequently than in the Spring.

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Section VII: Appendices

Appendix A: Statement of Determination

Title of Project: Counting Every Drop

The postpartum unit at Hospital X has seen an increase in postpartum hemorrhage among patients who underwent vaginal or c/section deliveries. Postpartum hemorrhage within the postpartum unit has increased over the years and has not reached Hospital X target goals based on Hospital X hospital's data. The goal of this project is to notify providers or OB rapid response in the earlier diagnosis of PPH. By doing so, this will help with patient well-being as well as cost for longer hospital length of stay. The process begins with auditing nurse EPIC charts to ensure that QBL are measured and documented using the Triton Scale. For patients that do show post-partum hemorrhage, time of notification to MD or OB rapid response is noted. There has been a 98% nurse compliance to use Triton scale and record findings on EPIC. This project is important because this will help nurses identify when patients are hemorrhaging to notify and respond appropriately. This will ensure patient safety and satisfaction with reduced hospital length of stay.

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.

Appendix B: Non-Research Determination Form

EVIDENCE-BASED CHANGE OF PRACTICE PROJECT CHECKLIST *

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

Project Title:	**YES**	**NO**
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.		
The specific aim is to improve performance on a specific service or program and **is a part of usual care**. ALL participants will receive standard of care.		
The project is **NOT** 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 **NOT** follow a protocol that overrides clinical decision-making.		
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 **NOT** develop paradigms or untested methods or new untested standards.		
The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does **NOT** seek to test an intervention that is beyond current science and experience.		
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.		
The project has **NO** funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.		
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., **not** a personal research project that is dependent upon the voluntary participation of colleagues, students and/ or patients.		
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: *"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."		

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):

Summer Le

Signature of Student:

DATE 5/14/2022

SUPERVISING FACULTY MEMBER NAME (Please print):

Lisa Brozda RN, MSN, CNS

Signature of Supervising Faculty Member

RN, MSN, CNS DATE 5/14/2022

Appendix C: 5 P's:

Purpose:
In our postpartum unit at Lucile Packard Children's Hospital Stanford, we aim to provide safety care for new mothers and their babies who require hospitalization after pregnancy. We aim to prevent postpartum hemorrhage and work closely with providers to provide mothers and babies with postpartum services needed.

- Care that meets individual needs
- Answer any concerns to help mothers and babies
- Support mothers and babies at bedside to promote bonding
- Prevent and look out for postpartum hemorrhage

Patients: postpartum, new mothers, newborns

Professionals: Nurses experienced in caring for new mothers and babies. They are also specially trained to be on the lookout for postpartum hemorrhage.

- **OB rapid response**
- **MD; Provider**
  - Social workers
  - Spiritual care
  - Interpreter services
  - **Obstetricians**
  - **Lab techs**
  - **Unit Secretary**
  - **Nursing Team Leader**
  - **Nursing Educators**

Processes:

- **Assessments (QBL, VS etc.) of New mothers upon arrival to the floor within 30 minutes, after first void, and after second void for both vaginal and c-section.**

Patterns:

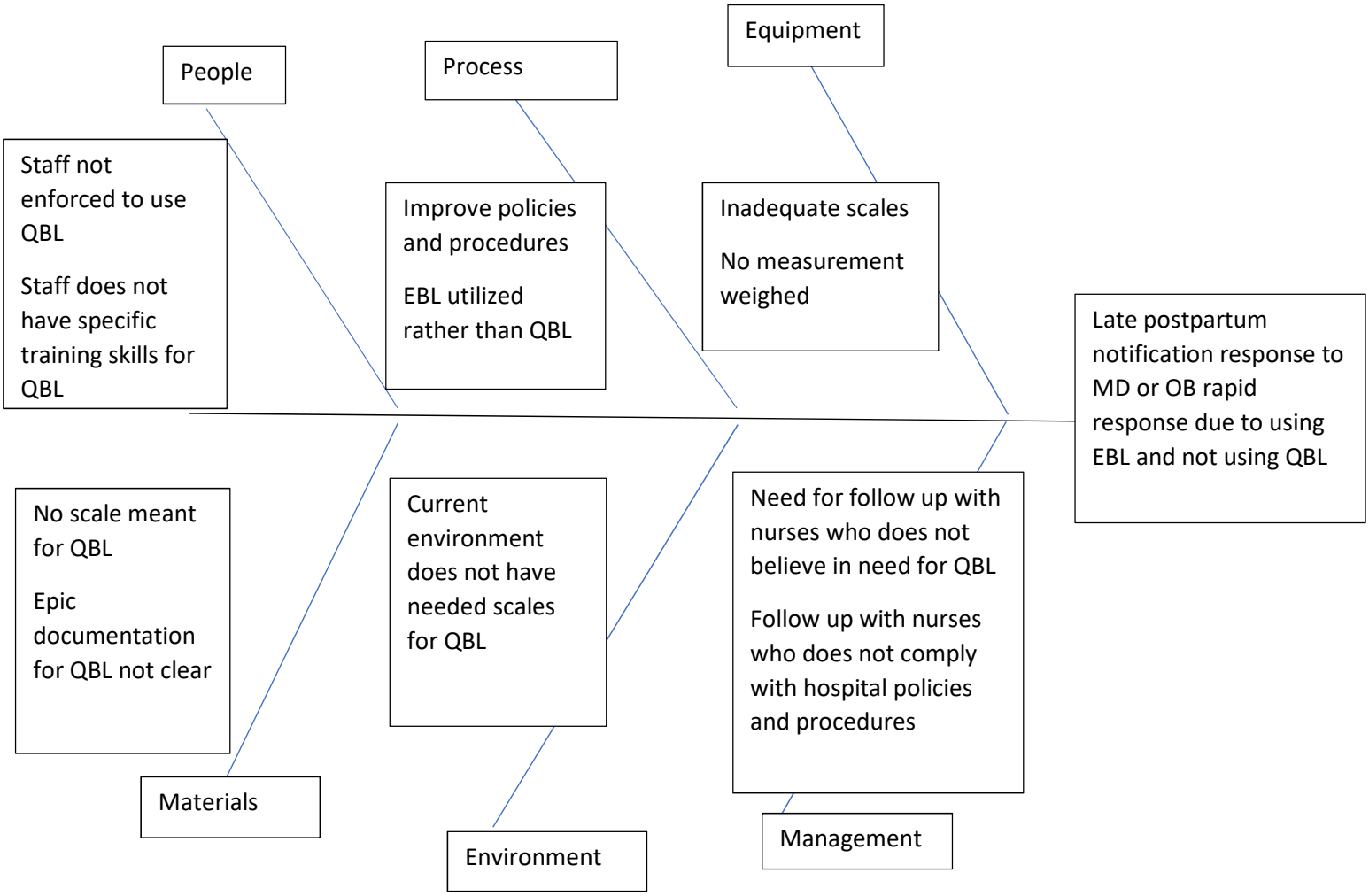
- Huddles at 7:00 am and 7:00 pm
- Patient Hand Off Report: 7:00 am- 7:30 am and 7:00 pm- 7:30 pm
- Admissions Day of the week:
  - Monday
  - Tuesday
  - Wednesday
  - Thursday
  - Friday
  - Saturday
  - Sunday
- Patient education: blood clots, perineal pads

Appendix D: SWOT Analysis

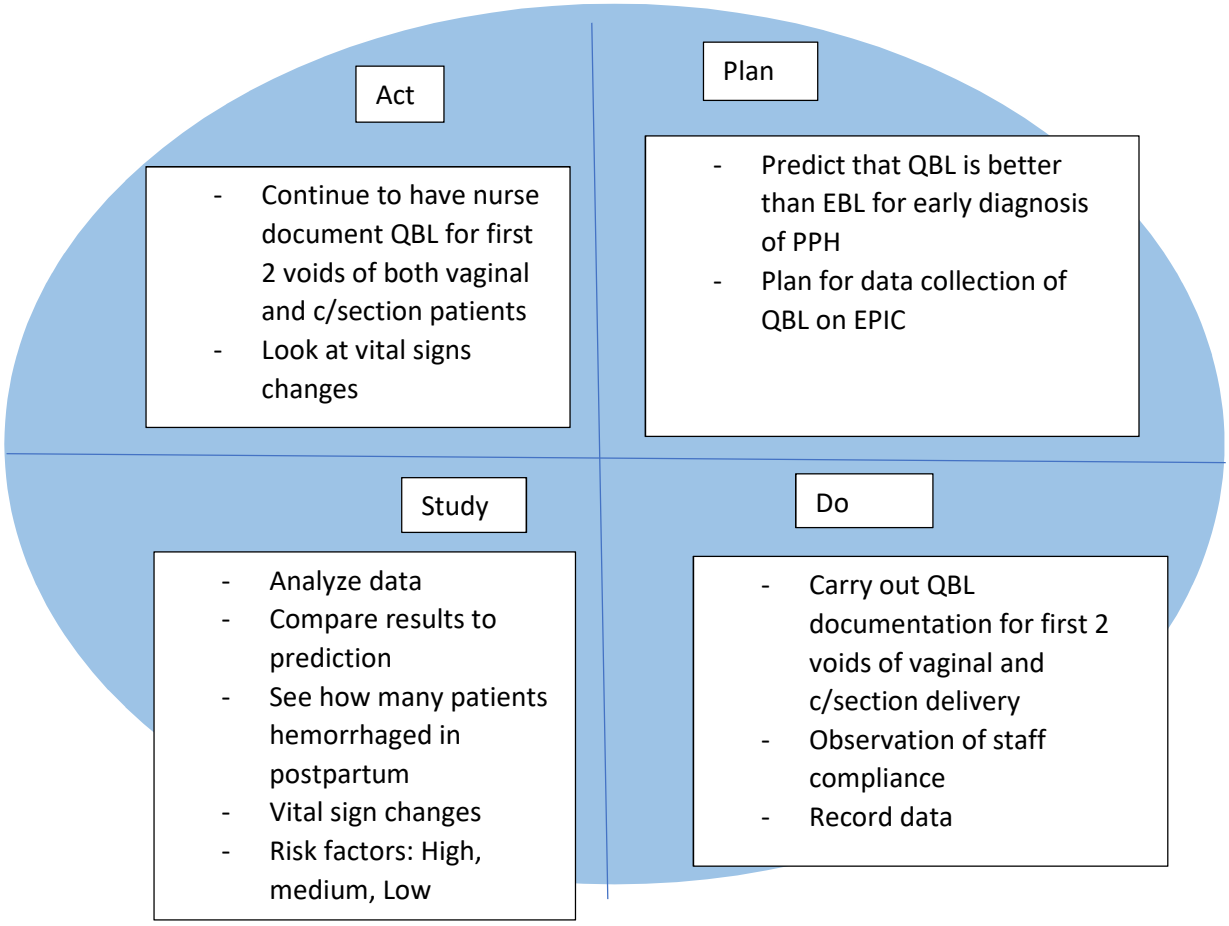
QBL PP

Strength	Weaknesses
Increase patient health outcomes Accurate amount of blood loss Evidenced based practice	More workload for nurses Nurse resistance
Opportunities	**Threats**
Reduced delayed PPH treatment Earlier notification to provider or OB Rapid Response	Time consuming for low risk PPH patient AI disconnection Staff engagement Staff attitude to change

Appendix E: Fishbone Diagram

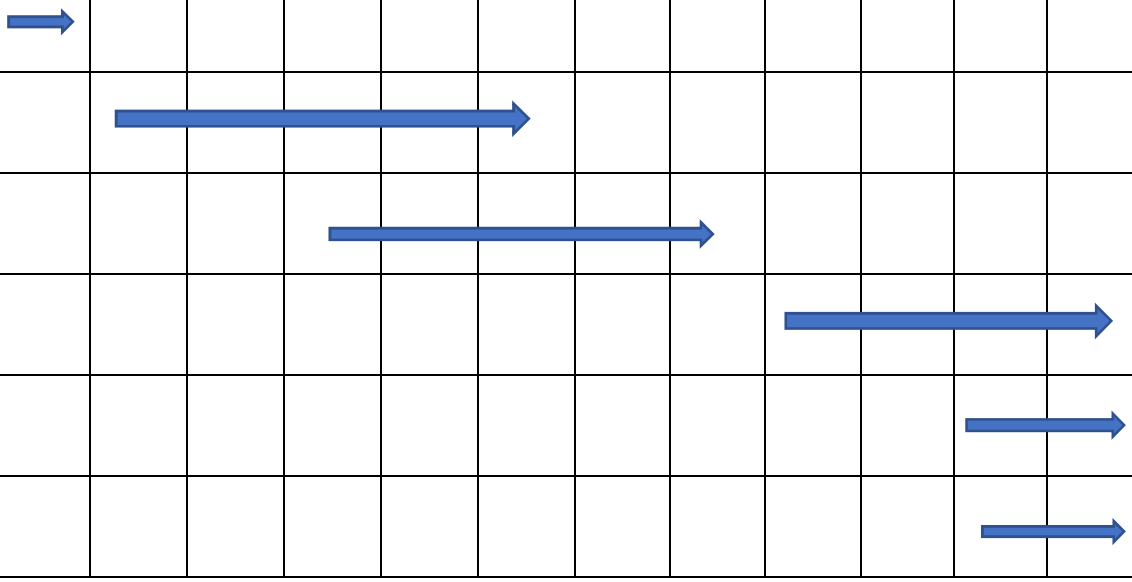


Appendix F: PDSA CYCLE



Appendix G: Gantt Chart

PPH using Triton Scale QBL	Feb 1-8	Feb 8-15	Feb 15-22	Feb 22-Mar 1	Mar 1-8	Mar 8-15	Mar 15-22	Mar 22-29	Mar 29-Apr 4	Apr 4-11	Apr 11-18	Apr 18-25
Planning												
Research												
Pre-survey												
Implementation												
Post-Survey												
Follow Up												



Appendix H: QBL 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!

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?

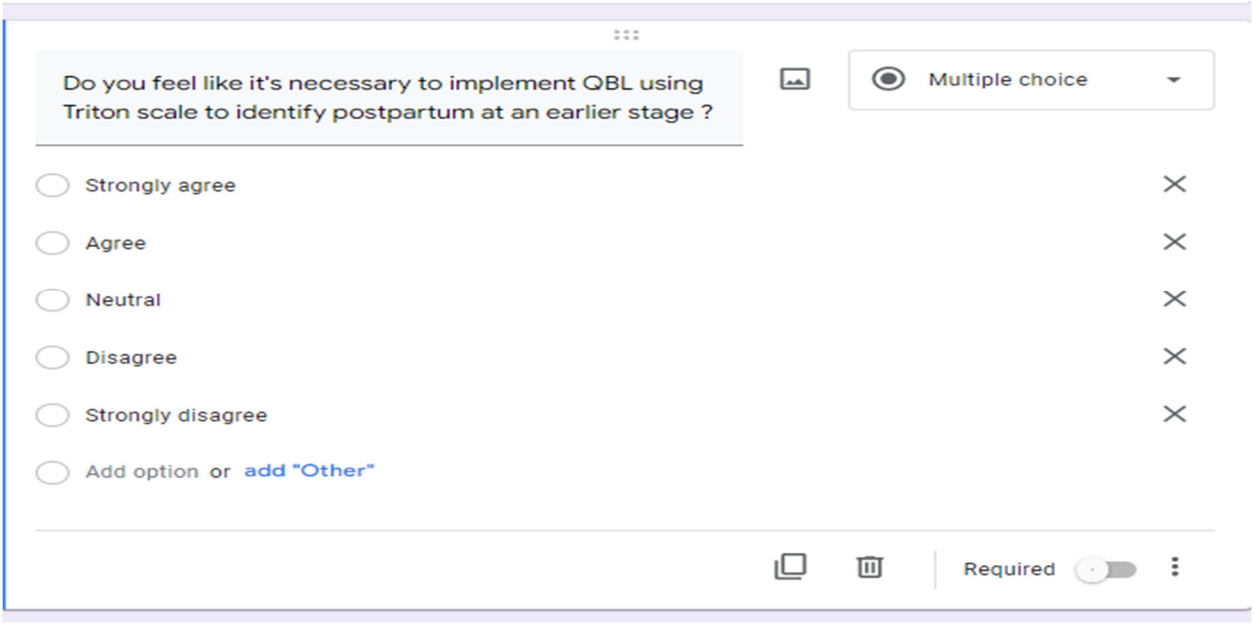
- ○ Strongly Agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

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



Appendix I: QBL Mid-Point Survey

This survey will serve as a midpoint 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?

Appendix J: Triton Scale Cost

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

One-Time Implementation Fee	**$27,500.00**
PILOT DISCOUNT (Implementation)	**($27,500.00)**
6-Month Pilot Subscription Total	**$48,701.25**
PILOT DISCOUNT (Subscription)	**($48,701.25)**
TOTAL	**$0.00**

Appendix K: Flyers

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


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
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
Why QBL needs to be done now
Timely escaltion to provider
Accuracy
Patient Outcomes

Appendix L: Emails for staff

Hello Staff,

Your hard work with the implementation of Triton in postpartum has not gone unnoticed!

Last week, we had full nurse participation with QBL documentation. Amazing job!

Once again, please use Triton QBL with documentation on Epic for newly delivered patients for the next 3 months:

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)

For those who have already filled out the midpoint survey, thank you for your timely responses. If you have not done so already, please fill out the post-survey from CNL students attached below.

To address some of the feedback we have received:

- 91.9% of nurses feel comfortable using Triton after receiving training. If you still have not received training on Triton or need a refresher, please visit the link to the YouTube Video the CNL students created.
- 73.7% of nurses agreed or strongly agreed that QBL is more accurate than EBL.
  - Evidence shows that Visual estimation of blood loss (EBL) can result in underestimation of blood loss, causing delay and failure of early interventions for PPH, thus adversely affecting maternal morbidity and mortality. The California Maternal Quality Care Collaborative (CMQCC) hemorrhage toolkit suggests Quantitative Blood Loss (QBL) is a more accurate measure (American College of Obstetricians and Gynecologists, 2018)
- There has also been a lot of feedback regarding how it seems unnecessary to continue weighing blood soaked items when there is only a scant amount of blood yielding a small QBL amount.
  - Evidence shows:
    - Studies that have compared visual estimation to quantitative measurement have found that visual estimation is more likely to underestimate the actual blood loss when volumes are high and overestimate when volumes are low (ACOG, 2019).

As always feel free to reach out with any questions or concerns you may have.

Best,

Karen Poon, Rachel Bautista-Dhesi, and USF CNL students: Amy, Iana, and Summer.

Survey Link:

https://docs.google.com/forms/d/e/1FAIpQLSdDlBwGdrhKwSiHNLulLUuc6fuKhvBVQGngkfKt7PLPNWuKcA/viewform