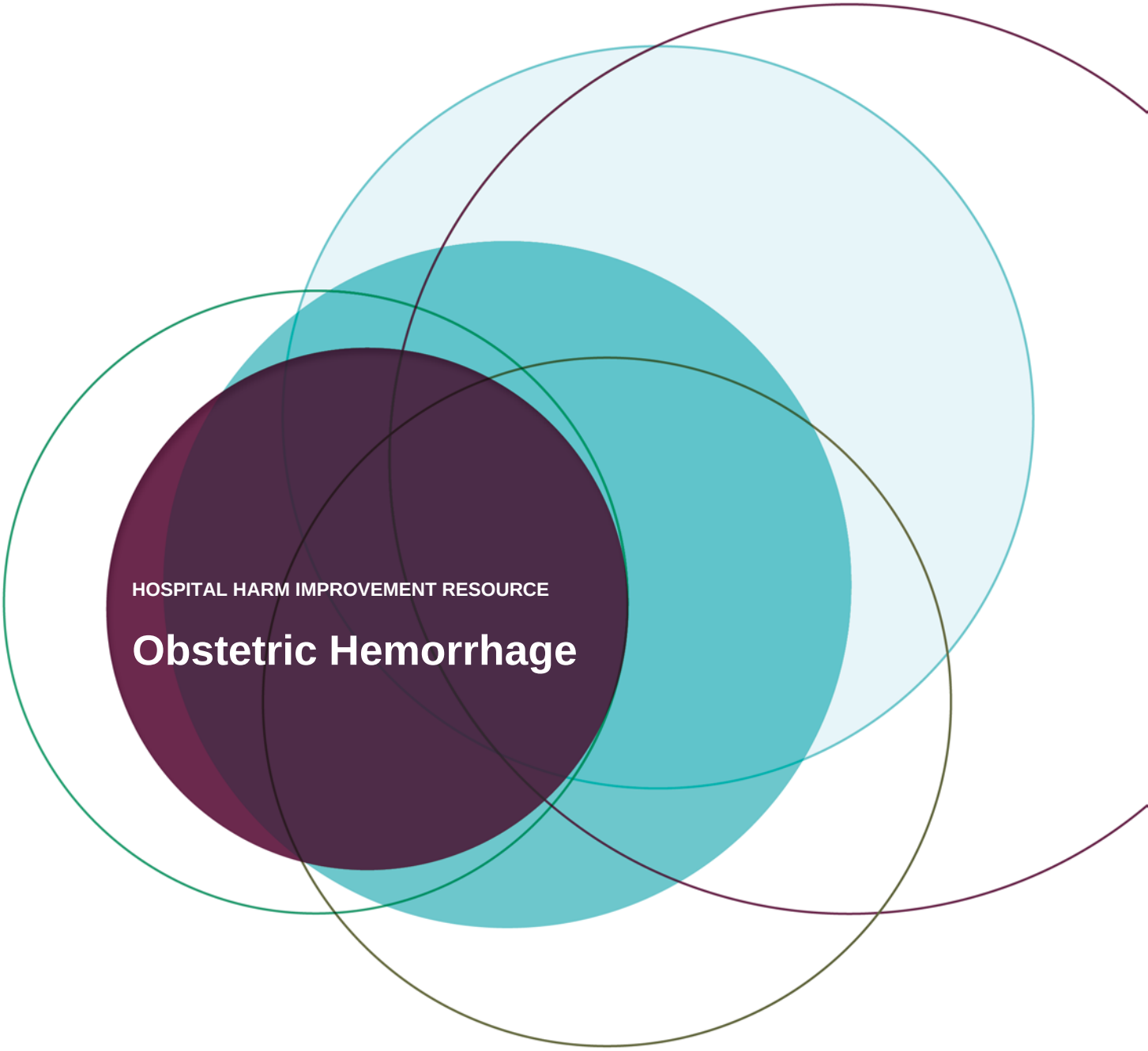

HOSPITAL HARM IMPROVEMENT RESOURCE

Obstetric Hemorrhage

cpsi icsp
Canadian Patient Safety Institute
Institut canadien pour la sécurité des patients

ACKNOWLEDGEMENTS

The Canadian Institute for Health Information and the Canadian Patient Safety Institute have collaborated on a body of work to address gaps in measuring harm and to support patient safety improvement efforts in Canadian hospitals.

The Hospital Harm Improvement Resource was developed by the Canadian Patient Safety Institute to complement the Hospital Harm measure developed by the Canadian Institute for Health Information. It links measurement and improvement by providing evidence-informed resources that will support patient safety improvement efforts.

The Canadian Patient Safety Institute acknowledges and appreciates the key contributions of Dr. Amy Nakajima MD, FRCSC and Dr. Jon (Yosef) Barrett, MBBch, MD, FRCOG, FRCSC for the review and approval of this Improvement Resource.

DISCHARGE ABSTRACT DATABASE (DAD) CODES INCLUDED IN THIS CLINICAL CATEGORY:

A02: Obstetric Hemorrhage		
Concept	Hemorrhage from the pelvic area, genital tract or perineum following non-instrumented vaginal delivery that requires blood transfusion during the delivery episode of care.	
Notes	1. This clinical group includes hemorrhage due to episiotomy. 2. This clinical group excludes obstetric Hemorrhage for hemorrhage associated with incorrect administration of medications (refer to A10: Medication Incidents) 3. Refer to D02: Obstetric Hemorrhage for hemorrhage after an instrument-assisted delivery or Caesarean section delivery. 4. The blood transfusion indicator is optional to code in British Columbia.	
Selection criteria	O72.002 O72.102 O72.202 O90.202	Identified as diagnosis type (M), (1), (2), (W), (X) or (Y) **AND** documentation of blood transfusion (blood received indicator=1)
Exclusions	1. Abstracts with intervention codes for instrument-assisted or Caesarean section delivery (5.MD.53.^^, 5.MD.54.^^, 5.MD.55.^^, 5.MD.56.NN, 5.MD.56.PC, 5.MD.56.NR, 5.MD.56.PF, 5.MD.56.NW, 5.MD.56.PJ or 5.MD.60.^^) 2. Events selected from a diagnosis cluster that is also selected for A10: Medication Incidents.	
Codes	**Code descriptions**	
O72.002	Postpartum third-stage hemorrhage; delivered with mention of postpartum complication	
O72.102	Other immediate postpartum hemorrhage; delivered with mention of postpartum complication	
O72.202	Delayed and secondary postpartum hemorrhage; delivered with mention of postpartum complication.	
O90.202	Hematoma of obstetric wound, delivered with mention of postpartum complication.	
Additional codes		
Exclusions		
5.MD.53.^^	Forceps traction and rotation delivery	
5.MD.54.^^	Vacuum traction delivery	
5.MD.55.^^	Combination of vacuum and forceps delivery	

5.MD.56.NN	Breech delivery without episiotomy, partial breech extraction (assisted breech delivery) with forceps to aftercoming head
5.MD.56.PC	Breech delivery with episiotomy, partial breech extraction (assisted breech delivery) with forceps to aftercoming head
5.MD.56.NR	Breech delivery without episiotomy, total breech extraction with forceps to aftercoming head
5.MD.56.PF	Breech delivery with episiotomy, total breech extraction with forceps to aftercoming head
5.MD.56.NW	Breech delivery without episiotomy, unspecified breech extraction with forceps to aftercoming head
5.MD.56.PJ	Breech delivery with episiotomy, unspecified breech extraction with forceps to aftercoming head
5.MD.60.^^	Caesarean section delivery

D02: Obstetric Hemorrhage

Concept	Hemorrhage from the pelvic area, genital tract, perineum or surgical incision after an instrument-assisted delivery or Caesarean section delivery that requires blood transfusion.	
Notes	1. This group includes hemorrhage due to episiotomy. 2. Refer to A02: Obstetric Hemorrhage for hemorrhage following vaginal delivery without the assistance of instruments. 3. The blood transfusion indicator is optional to code in British Columbia.	
Selection criteria	O72.002 O72.102 O72.202 O90.202	Identified as diagnosis type (M), (1), (2), (W), (X) or (Y) **AND** intervention codes 5.MD.53.^^, 5.MD.54.^^, 5.MD.55.^^, 5.MD.56.NN, 5.MD.56.PC, 5.MD.56.NR, 5.MD.56.PF, 5.MD.56.NW, 5.MD.56.PJ or 5.MD.60.^^) **AND** documentation of blood transfusion (blood received indicator=1)

Codes	**Code descriptions**
O72.002	Postpartum third-stage hemorrhage; delivered with mention of postpartum complication
O72.102	Other immediate postpartum hemorrhage; delivered with mention of postpartum complication
O72.202	Delayed and secondary postpartum hemorrhage; delivered with mention of postpartum complication.
O90.202	Hematoma of obstetric wound, delivered with mention of postpartum complication.
Additional codes	
Inclusions	
5.MD.53.^^	Forceps traction and rotation delivery

5.MD.54.^^	Vacuum traction delivery
5.MD.55.^^	Combination of vacuum and forceps delivery
5.MD.56.NN	Breech delivery without episiotomy, partial breech extraction (assisted breech delivery) with forceps to aftercoming head
5.MD.56.PC	Breech delivery with episiotomy, partial breech extraction (assisted breech delivery) with forceps to aftercoming head
5.MD.56.NR	Breech delivery without episiotomy, total breech extraction with forceps to aftercoming head
5.MD.56.PF	Breech delivery with episiotomy, total breech extraction with forceps to aftercoming head
5.MD.56.NW	Breech delivery without episiotomy, unspecified breech extraction with forceps to aftercoming head
5.MD.56.PJ	Breech delivery with episiotomy, unspecified breech extraction with forceps to aftercoming head
5.MD.60.^^	Caesarean section delivery

OVERVIEW

Primary Postpartum Hemorrhage (PPH) is defined as excessive bleeding that occurs within the first 24 hours after delivery. Traditionally the definition of PPH has been blood loss in excess of 500 mL after vaginal delivery and in excess of 1000 mL after abdominal delivery. For clinical purposes, any blood loss that has the potential to produce hemodynamic instability should be considered PPH. The amount of blood loss required to cause hemodynamic instability will depend on the pre-existing condition of the woman. Hemodynamic compromise is more likely to occur when conditions such as anemia (e.g., iron deficiency, thalassemia) or volume-contracted states (e.g., dehydration, gestational hypertension with proteinuria) (Leduc et al., 2009) are present. Blood loss is difficult to estimate, and is frequently underestimated (Lyndon et al., 2015). Healthy women can compensate for significant blood loss before exhibiting marked signs and symptoms. This underscores the importance of clinical vigilance to manage patients who experience PPH and to ensure the development and implementation of protocols and practices to actively manage the third stage of labour (the period following the completed delivery of the newborn until the completed delivery of the placenta) to prevent PPH (WHO, 2012; Lyndon et al., 2015). PPH is one of the few obstetric complications with an effective preventive intervention and it is generally assumed that by preventing and treating PPH, most PPH-associated deaths could be avoided (Mathai et al, 2007; WHO, 2012).

There are several possible reasons for severe bleeding during and after the third stage of labour, often referred to as the four **T's**:

- **T**one or uterine atony: abnormalities of uterine contraction;
- **T**issue: retained placenta, products of conception;
- **T**rauma of the genital tract: lacerations of the cervix, vagina or perineum; uterine rupture; uterine inversion; and
- **T**hrombin: abnormalities of coagulation due to pre-existing states such as haemophilia A and von Willebrand's Disease, or acquired in pregnancy such as Immune Thrombocytopenic Purpura (ITP) or Disseminated Intravascular Coagulation (DIC) (Leduc, et al., 2009).

Tone or "uterine atony" is the leading cause of immediate PPH (75 to 90 per cent) (Koh et al., 2009).

Secondary PPH is defined as excessive vaginal bleeding from 24 hours after delivery, to up to six weeks postpartum. Most cases of delayed PPH are due to retained products of conception, choriocarcinoma, infection, and subinvolution of the placental implantation site. Other causes include, lower genital tract lacerations/hematoma, surgical injury, dehiscence of Caesarean section scar, fibroids and arteriovenous malformation and coagulopathies (Alexander, Thoas, Sanghera, 2002; ACOG, 2006; Aiken, Mehasseb, Prentice, 2012).

Instrumentation and C-Section*:* Some obstetrical interventions are found to consistently be associated with higher rates of blood loss at the time of delivery thus predisposing patients to developing PPH. Included interventions are instrumental deliveries, episiotomy and Caesarean sections, with emergency Caesarean sections associated with higher rates of blood loss. It is important to note that more recent studies suggest that some obstetrical interventions increase the likelihood of PPH in a subsequent pregnancy, and that the recent increase in PPH in developed countries, which cannot seem to be wholly explained by factors related to the current pregnancy and delivery, may be due to more distal contributory factors (Roberts et al., 2009; Briley et al., 2014).

Risk Factors for PPH

Table 3 of the SOGC Clinical Practice Guideline "Active Management of the Third Stage of Labour: Prevention and Treatment of Postpartum Hemorrhage" (Leduc et al., 2009) lists multiple risk factors associated postpartum hemorrhage (PPH). The California Maternal Quality Care Collaborative (CMQCC) Obstetric Hemorrhage Toolkit (Lyndon et al., 2015), offers guidance on assessing for risk factors on admission as well as during labour and postpartum (see details of risk factors listed below).

Table 1: Pregnancy/Admission Risk Factors (Lyndon et al., 2015)

Low	Medium	High
No previous uterine incision	Prior Caesarean birth(s) or uterine surgery	Placenta previa, low lying placenta
Singleton pregnancy	Multiple gestation	Suspected placenta accreta, percreta, increta
≤ 4 previous vaginal births	> 4 previous vaginal births	Hematocrit < 30 AND other risk factors
No known bleeding disorder	Chorioamnionitis	Platelets < 100,000
No history of postpartum hemorrhage	History of previous postpartum hemorrhage	Active bleeding
	Large uterine fibroids	Known coagulopathy

Additional **risk factors that may develop in labour** include:

- Prolonged second stage.
- Prolonged oxytocin use.
- Active bleeding.
- Chorioamnionitis.
- Magnesium Sulfate treatment.

Additional **third stage/postpartum risk factors** for hemorrhage stemming from the birth process include:

- Vacuum- or forceps-assisted birth.

- Caesarean birth (especially urgent/emergent Caesarean).
- Retained placenta.

IMPLICATIONS

Postpartum hemorrhage is the leading cause of maternal death worldwide, with an estimated mortality rate of 140 000 per year, or one maternal death every four minutes. PPH occurs in five per cent of all deliveries and is responsible for a major part of maternal mortality. The majority of these deaths occur within four hours of delivery, which indicates that they are a consequence of the third stage of labour. Nonfatal PPH results in further interventions, such as uterine exploration, evacuation or surgical procedures. Other implications include: iron deficiency anemia, exposure to blood products, coagulopathy, and organ damage with associated hypotension and shock which has the potential to jeopardize future fertility (Leduc, et. al, 2009).

Despite the use of uterotonics and active management of third stage of labour to prevent PPH, increases in PPH rates have been reported from high income countries, including Canada, the United States, the United Kingdom and Australia. Rates of severe PPH and of transfusion for treatment also appear to be rising. Rates of postpartum hemorrhage and severe postpartum hemorrhage continued to increase in Canada between 2003 and 2010 [from 3.9 per cent in 2003 to 5.0 per cent in 2010] and occurred in most provinces and territories. The increase could not be explained by maternal, fetal, or obstetric factors. Routine audits of severe postpartum hemorrhage are recommended for ensuring optimal management and patient safety (Mehrabadi et al., 2014).

GOAL

To prevent obstetrical hemorrhage from the pelvic area, genital tract, or perineum following vaginal delivery and from surgical incision after an instrument-assisted delivery or Caesarean section.

IMPORTANCE FOR PATIENTS AND FAMILIES

By following the recommended strategies for active management of the third stage of labour, a hospital team can reduce the chance of harm for both mother and baby.

Patient Story

Melissa Price, the patient representative on the hemorrhage task force, had a late postpartum hemorrhage. Melissa ended up with a hysterectomy and about 12 units of blood transfused. While in the Emergency Department, Melissa recalls asking the nurses how they could tell how much blood she was losing – the nurses never weighed the blood, and dumped it from a bed pan into a portable toilet. After Melissa's obstetrician got the bleeding to stop, she was left alone behind a curtain and checked on infrequently. Melissa recalls the feeling sheer panic when the bleeding started up again with 'enormous clots'… "I screamed and I will never forget the look on the

nurse's face when she lifted up that blanket. After that, ER staff was running around everywhere. Rushing to call my OB, rushing to get an OR suite, rushing to figure out how to get my insulin pump turned off. I just kept thinking, God give them more time. They need more time to save me." (Lyndon et. al, 2015).

EVIDENCE INFORMED PRACTICE

Prevention of Primary Postpartum Hemorrhage

1. System Readiness

1. Construct a sterile tray that provides rapid access to instruments used to surgically treat PPH (Lyndon et al., 2015).
2. Construct a sterile tray that provides rapid access to a hysterectomy tray (Lyndon et al., 2015).
3. Conduct regularly scheduled simulation drills for practicing response to obstetric hemorrhage (Lyndon et al. 2015).
4. Adopt and maintain an obstetrical hemorrhage emergency management plan which includes the activation of maternal hemorrhage response team as clinically needed (Lyndon 2015).

2. Time of Admission

1. Identify and manage patients with special consideration:
    - Placenta previa/accrete.
    - Bleeding disorder.
    - Anemia.
    - Those who decline blood products (ACOG, 2012; Lyndon et al., 2015).
    - Anticoagulant use (Nakajima, 2016).
2. Assess hemorrhage risk on admission, throughout labour, postpartum and at every handoff (ACOG, 2012; Lyndon et al., 2015):
    - If medium risk: Type and Screen and review hemorrhage protocol.
    - If high risk: Type and crossmatch 2 units of PRBCs, review hemorrhage protocol and notify OB provider and/or anesthesia (Lyndon et al., 2015).

3. Third Stage of Labour (Leduc et. al, 2009)

[Note #4 and #7 for specific recommendations related to Caesarean section]

1. Active management of the third stage of labour (AMTSL) reduces the risk of PPH and should be offered and recommended to all women. AMTSL involves interventions to assist in expulsion of the placenta with the intention to prevent or decrease blood loss. Interventions include use of uterotonics, clamping of the umbilical cord, and controlled traction of the cord.

2. Oxytocin (10 IU), administered intramuscularly, is the preferred medication and route for the prevention of PPH in low-risk vaginal deliveries. Care providers should administer this medication after delivery of the anterior shoulder.
3. Intravenous infusion of oxytocin (20 to 40 IU in 1000 mL, 150 mL per hour) is an acceptable alternative for AMTSL.
4. An IV bolus of oxytocin, 5 to 10 IU (given over one to two minutes), may be used for PPH prevention after vaginal birth, but is not recommended at this time with elective Caesarean section.
5. Ergonovine can be used for prevention of PPH, but may be considered second choice to oxytocin due to the greater risk of maternal adverse effects and the need for manual removal of a retained placenta. Ergonovine is contraindicated in patients with hypertension.
6. Ergonovine, 0.2 mg IM, and misoprostol, 600 to 800 g given by the oral, sublingual, or rectal route, may be offered as alternatives in vaginal deliveries when oxytocin is not available.
7. Carbetocin, 100 g given as an IV bolus over one minute, may be used instead of continuous oxytocin infusion in elective Caesarean section for the prevention of PPH and to decrease the need for therapeutic uterotonics.
8. For women delivering vaginally with one risk factor for PPH, carbetocin 100 g IM decreases the need for uterine massage to prevent PPH when compared with continuous infusion of oxytocin.
9. Whenever possible, delaying cord clamping by at least 60 seconds is preferred to clamping earlier in premature newborns (< 37 weeks gestation) since there is less intraventricular hemorrhage and less need for transfusion in those with late clamping.
10. For term newborns, the possible increased risk of neonatal jaundice requiring phototherapy must be weighed against the physiological benefit of greater hemoglobin and iron levels up to six months of age conferred by delayed cord clamping.
11. There is no evidence that in an uncomplicated delivery without bleeding, interventions to accelerate delivery of the placenta before the traditional 30 to 45 minutes will reduce the risk of PPH.
12. Placental cord drainage cannot be recommended as a routine practice since the evidence for a reduction in the duration of the third stage of labour is limited to women who did not receive oxytocin as part of the management of the third stage. There is no evidence that this intervention prevents PPH.

[Note: refer to Leduc et. al, 2009 for additional guidelines related to the treatment of postpartum hemorrhage.]

4. Secondary Postpartum Hemorrhage

1. Prompt and careful examination of the birth canal, including both inspection and palpation, to identify and repair lacerations of the perineum, vagina, or cervix, that result in visible or concealed hemorrhage (Andersen & Hopkins, 2008).
2. Repeat risk factor assessment at time of delivery and at least once per shift in the postpartum period. Treat multiple risk factors as high risk. Modify plan of care based on risk category (Lyndon et al., 2015).
3. Continue to monitor the patient for signs and symptoms of secondary PPH.
4. Development and implementation of protocols for the management of the third stage of labour include the use of uterotonic agents to prevent PPH. Protocols for management of ongoing PPH will also address the other possible etiologies of PPH in addition to uterine atony, including retained placenta, genital tract trauma, and defects in coagulation. Adherence to protocols for third stage management and for PPH will improve patient outcomes.

5. Conduct Clinical and System Reviews (see details below)

Given the broad range of potential causes of hemorrhage, in addition to recommendations listed above, we recommend conducting clinical and system reviews to identify latent causes and determine appropriate recommendations.

Clinical and System Reviews, Incident Analyses

Occurrences of harm are often complex with many contributing factors. Organizations need to:

1. Measure and monitor the types and frequency of these occurrences.
2. Use appropriate analytical methods to understand the contributing factors.
3. Identify and implement solutions or interventions that are designed to prevent recurrence and reduce risk of harm.
4. Have mechanisms in place to mitigate consequences of harm when it occurs.

To develop a more in-depth understanding of the care delivered to patients, chart audits, incident analyses and prospective analyses can be helpful in identifying quality improvement opportunities. Links to key resources for analysis methods are included in Resources for Conducting Incident and/or Prospective Analyses section of the Introduction to the Hospital Harm Improvement Resource.

Chart audits are recommended as a means to develop a more in-depth understanding of the care delivered to patients identified by the Hospital Harm measure. Chart audits help identify quality improvement opportunities.

Useful resources for conducting clinical and system reviews:

- Chart Audit Review Process (see Introduction to the Improvement Resource)
- Canadian Incident Analysis Framework
- CPSI Patient Safety and Incident Management Toolkit
- Institute for the Safe Medication Practices Canadian Failure Mode and Effects Analysis Framework
- Institute for Healthcare Improvement Failure Mode and Effects Analysis Tool

MEASURES

Vital to quality improvement is measurement, and this applies specifically to implementation of interventions. The chosen measures will help to determine whether an impact is being made (primary outcome), whether the intervention is actually being carried out (process measures), and whether any unintended consequences ensue (balancing measures).

Below are some recommended measures to use, as appropriate, to track your progress. In selecting your measures, consider the following:

- Whenever possible, use measures you are already collecting for other programs.
- Evaluate your choice of measures in terms of the usefulness of the final results and the resources required to obtain them; try to maximize the former while minimizing the latter.
- Try to include both process and outcome measures in your measurement scheme.
- You may use different measures or modify the measures described below to make them more appropriate and/or useful to your particular setting. However, be aware that modifying measures may limit the comparability of your results to others.
- Posting your measure results within your hospital is a great way to keep your teams motivated and aware of progress. Try to include measures that your team will find meaningful and exciting (IHI, 2012).

For more information on measuring for improvement contact the Canadian Patient Safety Institute Central Measurement Team at measurement@cpsi-icsp.ca

Outcome Measures

1. Per cent of patients with vaginal delivery (with and/or without instrumentation) who had postpartum hemorrhage within 24 hours of delivery.
2. Per cent of patients with vaginal delivery (with and/or without instrumentation) who had postpartum hemorrhage within 24 hours to six weeks of delivery or discharge, whichever occurs first.
3. Percentage of patients with a C-section delivery who had a postpartum hemorrhage.

4. Percentage of patients with vaginal delivery (with and/or without instrumentation) who required any of the following interventions:
    a. Manual removal of placenta.
    b. Uterine balloon tamponade (i.e. commonly known as a Bakri balloon) or uterine packing, embolization.
    c. Blood or blood product.
    d. Use of Activated Factor VII.
    e. Initiation of massive transfusion protocol.
    f. Going to the operating room AFTER the delivery (e.g. D&C, exploration, repair).
    g. Postpartum hysterectomy.
5. Rate of maternal death due to postpartum hemorrhage.

Process Improvement Measures

1. Per cent of obstetrical patients assessed for special considerations and risk of hemorrhage at the time of admission.
2. Per cent of patients assessed for risk of hemorrhage throughout labour.
3. Per cent of patients with vaginal delivery (with and/or without instrumentation) who had active management of the third stage of labour (AMTSL).
4. Per cent of eligible patients undergoing vaginal delivery (with and/or without instrumentation) who received a uterotonic agent.
5. Per cent of patients with vaginal delivery (with and/or without instrumentation) who delivered their placenta(e) within 30 minutes (or 60 minutes if no active bleeding).
6. Per cent of patients with vaginal delivery (with and/or without instrumentation) delivering a premature newborn (<37 weeks) for whom cord clamping was performed up to 60 seconds after delivery.
7. Percentage of patients with vaginal delivery (with and/or without instrumentation) who had prompt and careful examination of the birth canal and repair of lacerations.
8. Percentage of patients assessed at least once per shift for risk of hemorrhage during the postpartum period.
9. Percentage of patients who had ongoing monitoring for signs and symptoms of secondary PPH.

Standards and Required Organizational Practices

Accreditation Canada does not have any Standards or Required Organizational Practices that are directly related to obstetric hemorrhage.

GLOBAL PATIENT SAFETY ALERTS

Global Patient Safety Alerts (GPSA) provides access and the opportunity to learn from other organizations about specific patient safety incidents including alerts, advisories, recommendations and solutions for improving care and preventing incidents.

Recommended search terms:

- Postpartum Hemorrhage
- Obstetric Hemorrhage
- Oxytocin
- Maternal Death

SUCCESS STORY

Grand Rounds: Ob Team Stat: Developing a better L&D rapid response team

The recommended 30 minute “decision to incision” response time to obstetric emergency is not adequate to prevent adverse outcomes in certain scenarios. Improving on the current sequential team activation response to emergency, Allan Bombard, M.D., along with Karyn Almyrde, BSN and Val Catanzarite, MD Phd, developed the “Ob Team Stat” rapid response team. They utilized the Lockheed Martin “Skunk Works” approach to team project development, often employed in the business world. “Ob Team Stat” employs a simultaneous team activation approach to obstetric emergency. The system is activated by any team member, who simultaneously overhead pages and beeps the L&D charge nurse, in-house obstetrician, anesthesiologist, OR surgical team, neonatalogist, and NICU team.

After approval for a new hospital procedure, the team concept was discussed and refined through the Hospital Committees of all the team members and those they would interact with, and then put into operation within a week. Review of six months of data after “Ob Stat Team” introduction revealed the time from team activation to delivery had a mean of 10.9+/- 4.0 minutes, with a range of four to 19 minutes. In a team activation for uterine rupture during a VBAC, delivery was within six minutes and 30 seconds from onset of bradycardia. A different approach to problem solving by a small team, followed by continual monitoring and adaptation of the “Ob Stat Team” dramatically improved response times to obstetric emergencies compared with other institutions (Catanzarite, Almryde, Bombard, 2007).

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OBSTETRICAL HEMORRHAGE RESOURCES

Professional Associations and Helpful Websites

- American Congress of Obstetricians and Gynecologists
- Royal College of Obstetricians and Gynaecologists
- The California Maternal Quality Care Collaborative (CMQCC)
- The Society of Obstetricians and Gynaecologists of Canada (SOGC)
- The WHO Reproductive Health Library

Clinical Practice Guidelines

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Additional Obstetric Hemorrhage Literature Resources

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