Guideline
Report

Safe Administration of Oxytocin

Standardizing practice to promote safe induction and augmentation of labour

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Contents

Executive Summary

This document outlines and gives evidence for changes in practice as listed in the Best Practice Recommendations for the safe administration of intravenous (IV) oxytocin for the purposes of induction and/or augmentation in labour for low-risk pregnant people. The objective of this guideline is to reduce the risk of misuse and/or mismanagement of oxytocin by addressing common factors that have led to errors in its administration. In order to promote a safety culture for the use of this high-alert medication, the following recommendations were identified.

Best Practice Recommendations in Brief

1. Shared Decision Making	Patients are provided with information to participate in shared decision-making on oxytocin induction, augmentation, and expectant management. Patients must be given an opportunity to be fully engaged in the birth planning process and supported to make informed decisions to improve their birthing experience. The informed consent, as part of the shared decision making, must be documented in the patient's chart.
2. Inter-Professional Team Communication	Members of the inter-professional team will maintain communication that is clear, direct, and respectful. The hospital and clinical leadership must develop an environment where all members can openly discuss the appropriateness of an oxytocin order, how it is being titrated throughout labour, and its effect on the fetal heart rate, without hesitation and/or concern of instigating a conflict between the members of the healthcare team.
3. Indications for Induction or Augmentation	The prescriber will utilize the appropriate indication when ordering oxytocin for induction and/or augmentation. The prescriber must use sound clinical judgement and good clinical justification to determine if the indication for induction/augmentation with IV oxytocin will likely improve maternal or fetal outcome.
4. Professional Skills Training	Oxytocin is prescribed and administered by a healthcare professional that is trained and remains competent and educated on its use, including the effects and risks of drug administration. It is of utmost importance that all healthcare providers ordering, administering and

	monitoring patients undergoing an oxytocin induction and/or augmentation, are trained and remain skilled in fetal health surveillance (FHS), and can appropriately interpret results and intervene in a timely matter within their scope of practice.
5. Hospital Preparedness for Adverse Events	Administration of oxytocin will occur in hospitals where the necessary staff and resources are readily available to manage potential patient harm incidents. Staff should be available 24/7/365 to interpret tracings and act on obstetrical emergencies. Sites should have quick access (e.g. within 30 minutes) to an available operating room (OR) suite for urgent caesarean section procedures, or have formal processes in place for patient care transfer.
6. Medication Handling	Oxytocin is stored safely and labelled appropriately. The Institute for Safe Medication Practices (ISMP) Canada and Health Canada recommend the standardization of drug labels to help reduce chances of missing warning labels, miscommunication or product mix-ups. The drug should also be stored where pharmaceutical staff can check stock and expiration dates in order to maintain the quality of the drug.
7. Standard Use	Each hospital will use a standardized evidence-based oxytocin protocol and order set. Standardized order sets help minimize medication errors and ensure precise and transparent drug administration. As a high alert medication, it would not be appropriate to provide a verbal or remote order for oxytocin**.**
8. Independent Double Check and Smart Pump Use	Independent double check is to be performed in preparing the medication and setting the initial pump infusion rate via an IV Smart Pump. Smart Pump technology can provide added checks and prevent dosage errors. ISMP recommends having independent double checks for preparation of IV bags and for programmed medication pumps.

9. Low Dose Regimen	Oxytocin protocols and order sets for oxytocin for the purpose of augmentation and induction will follow a low dose regimen to support safe administration. In the event that a healthcare practitioner provides care that deviates from the recommended protocol, the indication must be justified and documented in the patient's chart.
10. Stopping and Re-Starting Oxytocin Administration	The oxytocin protocol and order set must provide clear start, stop and restart guidelines: 1) An in-person assessment and written order by the prescriber is required before the nurse or midwife can start or restart the infusion. 2) The need to reduce or stop the infusion when there is: a) Atypical or abnormal fetal heart rate (FHR) findings; or b) Uterine tachysystole with or without FHR changes; or c) In the presence of satisfactory uterine activity.
11. Patient Support in Labour	Pregnant patients receiving oxytocin will receive continuous one to one care by a registered healthcare professional for support, advocacy, comfort measures, and monitoring.

Introduction

The Provincial Council for Maternal and Child Health (PCMCH) is implementing an initiative to support *Better Maternal-Neonatal Birth Outcomes* in the province. A recent report from the Healthcare Insurance Reciprocal of Canada (HIROC) and the Canadian Medical Protective Association (CMPA) identified induction and/or augmentation of labour as a large contributing factor to obstetrical liability claims. Amongst those induction and augmentation of labour cases, the leading cause of claims was the mismanagement of oxytocin administration, followed by delays in alerting the appropriate physician of abnormal findings in fetal surveillance [1].

The purpose of this document is to provide best practice recommendations for the safe management of pregnant patients whose labour is induced or augmented with oxytocin. The recommendations in this practice guideline focus on low-risk patients with a singleton, cephalic, term pregnancy (≥37 weeks gestation); a full definition of a low-risk pregnancy is outlined in Appendix A. These recommendations may also be applicable to patients outside of this definition. While this document provides a standardized approach for oxytocin medication administration, individualized assessment and clinical judgment are required to ensure that care plans are tailored to meet patient requirements.

The scope of this document does not guide the following:

- Use of oxytocin in a contraction stress test (oxytocin challenge test);
- Risks and benefits associated with the use of other methods for induction of labour (e.g., prostaglandin, dinoprostone, or mechanical cervical ripening);
- Administration of oxytocin for postpartum hemorrhage prophylaxis; and
- Oxytocin regimen for management of an intrauterine fetal demise.

In addition, these recommendations do not apply to those with contraindications to oxytocin administration, including contraindications to vaginal birth. Namely, placenta previa or vasa previa, prior classic uterine incision or other uterine surgeries that contra-indicate attempts at vaginal delivery, and/or prolapsed cord. Oxytocin must not be administered for the convenience of the staff or in the presence of concerning fetal health surveillance (FHS) as defined by the Society of Obstetricians and Gynaecologists of Canada (SOGC) in Appendix B.

In this 2022 version of the report, the formatting has been updated, but the content and recommendations have remained the same as the original 2019 version. The In-Use Safety Checklist tool has been updated to align with the 2020 *Fundamentals of Fetal Health Surveillance Online Manual*. An accompanying Implementation Toolkit has been created to support implementation of the 11 best practice recommendations using the tools found in the appendices.

Background

Intravenous (IV) oxytocin is commonly used for induction and augmentation of labour; however, in 2007, ISMP classified it as a high-alert medication [2]. The ISMP defines high-alert medications as drugs that have a heightened risk of causing significant patient harm when they are used inappropriately [3]. A recent report from HIROC and CMPA identified that the potential for mismanagement of IV oxytocin is a major contributing factor to induction or augmentation liability claims. ISMP suggests that medications listed as high-alert could benefit from mitigation strategies, including standardized use (e.g., order, storage, preparation, and overall administration), proper labeling, applying clinical decision supports, and/or applying independent double checks where necessary [3].

ISMP Canada has also published on the risk of administering oxytocin to patients [2]. Key risks for wrong drug selection include inadequate labelling of IV syringes and bags and look-alike packaging; those for incorrect dose errors include lack of standardized dosing protocols, lack of standardization for units of measure and improper connection of lines; and contributing factors for wrong route errors include lack of proper labelling on syringes and interconnectivity of epidural and intravenous systems. Through follow up communication with ISMP Canada, they have confirmed that these risks continue to be documented through incident reports submitted to the Canadian Medication Incident Reporting and Learning System [4]. Taking these findings in consideration, the focus of this practice guideline will be to inform safe administration of oxytocin in induction and augmentation of labour.

What is Oxytocin?

Oxytocin is a peptide that is naturally produced by the posterior hypothalamus. Oxytocin binds to uterine receptors that stimulate the smooth muscles of the uterus to produce contractions [5, 6]. Synthetic oxytocin is routinely used in Canada to induce labour in patients, or to augment spontaneous labour when needed. Oxytocin is used routinely in active management of the third stage of labour to decrease postpartum bleeding and the potential for hemorrhage [2]. Since the 1950s, IV oxytocin has been available for the use of induction in pregnant patients with a viable pregnancy and favorable cervix [6]. Although the breasts, vascular smooth muscles, and kidneys can also respond to this drug, there is no apparent effect on renal function or vascular smooth muscle tone when administered in doses used to induce labour [6, 7]. When used inappropriately or in excess, adverse effects may include impaired blood flow to the uterus, uterine tachysystole, uterine rupture, abruptio placentae, amniotic fluid embolism, postpartum hemorrhage (PPH), and fetal hypoxia and acidosis [8]. The drug profile is available in Table 1 below.

Table 1. Drug Profile [6]

Pharmacokinetics	Side effects / Risks
Plasma Half-Life: 3-6 minutes **Onset of action (initial uterine contractions):** IV administration- Within 1 minute IM administration- 3-5 minutes **Steady state achieved (maximal uterine contractile response):** 40 minutes **Duration of action (uterine response):** IM administration contractions subside within 2-3 hours IV administration: contractions subside within 1 hour	**Maternal:** Cardiac dysrhythmias Water intoxication/hyponatremia Hypotension Nausea and vomiting Headache Subarachnoid hemorrhage Pelvic hematoma Uterine hypertonicity Uterine rupture Pulmonary Edema **Neonatal/newborn:** Hyperbilirubinemia

Medico-Legal Claims

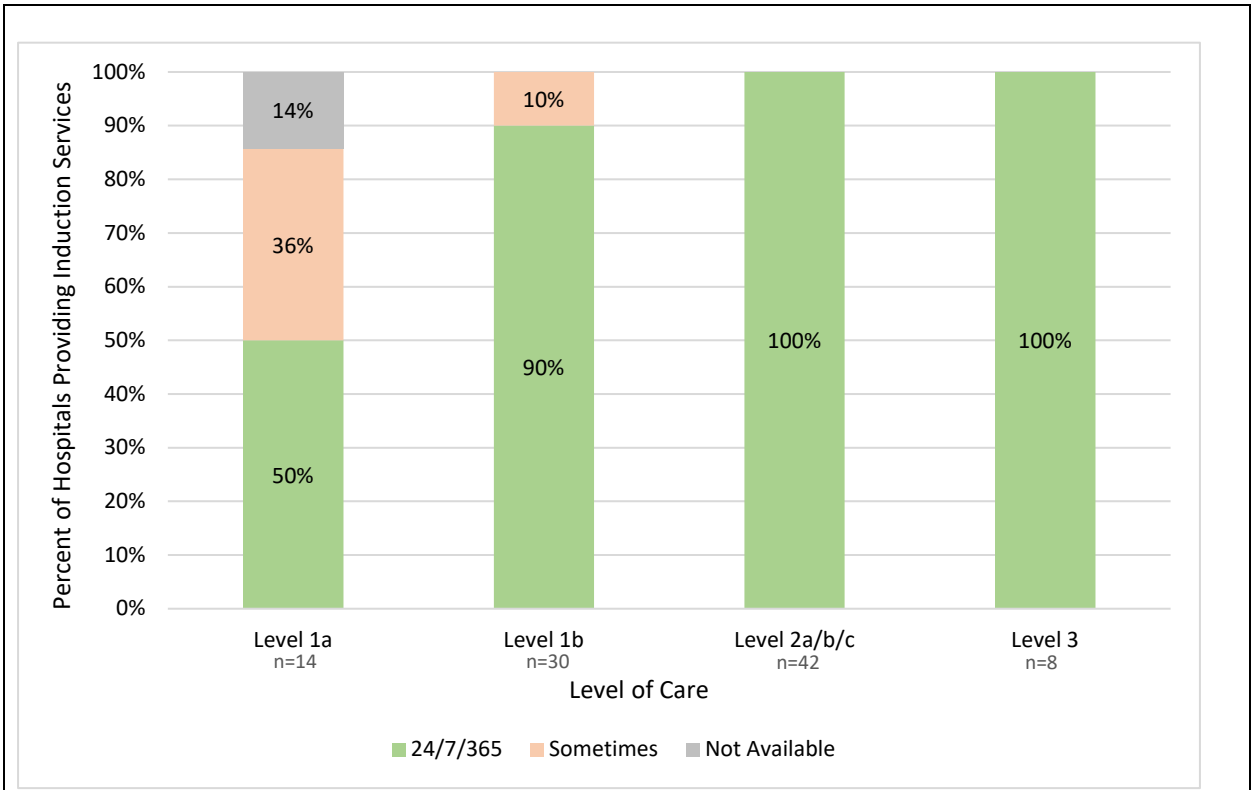
Misuse of oxytocin during labour induction or augmentation remains a common malpractice claim, enough so that there are readily available birth injury lawsuit guides for parents and families [9]. The report by HIROC and the CMPA notes that obstetrics is one of the highest risk clinical areas, accounting for 45% of HIROC and 25% of CMPA liability costs. Obstetrical care is associated with approximately 46% of HIROC and 33% of CMPA compensation payments [1]. Common contributing factors identified by HIROC include: a) a failure to discontinue or reduce the rate of IV oxytocin when clinically indicated; b) a delay in notifying the physician about abnormal uterine activity and/or abnormal fetal health surveillance while oxytocin was being administered; c) failure to challenge questionable induction and augmentation orders; and iv) not escalating care concerns when necessary. Decreased attentiveness while using an oxytocin administration protocol resulted in 33% of HIROC obstetrical cases, and lack of awareness or compliance with hospital oxytocin protocols accounted for 49% of obstetrical cases in 2004-2013 [1]. As such, these cases have informed the recommendations for safe administration of oxytocin and standardization of its use with the aim of reducing adverse obstetrical outcomes at the frontline service delivery level [10].

Current Provincial, National and International Context

While organizations in Canada, such as HIROC, CMPA, and ISMP Canada, have provided background information on misuse cases and tools to support improvements, there are currently no Ontario guidelines on standardized dosage, or oxytocin

administration protocols. In Ontario, the levels of care have been defined by a clinical expert panel led by PCMCH to determine minimum services for maternal and neonatal units (for maternal level of care definitions, see Appendix C). Induction of labour is a service available at all Level 1b hospital or higher. These hospitals, by definition, have the requisite services, personnel and equipment to safely use oxytocin for induction/augmentation. Level 1a hospitals may or may not provide this service and do not have 24/7/365 caesarean section services; however, inductions may be planned in advance or when preparation includes OR availability and/or patient transfer plans in place. In a recent level of care evaluation performed by PCMCH, all hospitals with designated 1b or higher met the listed criteria. While this intervention is not an expected provided service in level 1a hospitals, as per Figure 1, it may still be offered at some capacity in the majority of hospitals with this designation as well. The method in which induction or augmentation is provided is not further defined in the level of care definitions, but likely includes the administration of oxytocin. While level 1a hospitals do not provide 24/7/365 caesarean section services, they may still provide booked induction services or augmentation of labour. These services may be provided as long as interventions are planned beforehand, such as ensuring that an operating room is available, or having patient transfer plans in place in advance [11, 12].

Figure 1. Availability of Induction Services by Ontario Level of Care



Source: PCMCH Level of Care Evaluation Survey, 2018

Other provinces, such as Alberta (Alberta Health Services) and British Columbia (Perinatal Services BC), have created resources to support shared understanding. Both of these provinces have published their own induction of labour protocols, but there are some minor differences between the two. For example, Perinatal Services BC has a slightly lower starting dose than Alberta Health Services, as per Table 2.

Table 2. National Guidelines on Oxytocin Administration Examples

Region	**Organization/ Province**	**High/Low Regimen**	**Initial Dose**	**Increase Interval**	**Dosage Increment**	**Max. Dose Before R/A**
National	SOGC, 2013 [6]	Low	1-2 mU/min	30mins	1-2 mU/min	30 mU/min
	SOGC, 2013 [6]	High	4-6 mU/min	30mins	4-6 mU/min	30 mU/min
Provincial	Perinatal Services British Columbia, 2005 [13]	Low	0.5-1mU/min	30-60mins	1-2 mU/min	20 mU/min
Provincial	Alberta Health Services, 2018 [14]	Low	1-2mU/min	30mins	1-2 mU/min	20 mU/min

Legend: Max. = Maximum; R/A = Reassessment

As per Table 3, there is no uniformly accepted international standard for administering oxytocin [5]. Various international guidelines and publications report low and high dose oxytocin regimens within their protocols. Moreover, within the same maternal units, different regimens are used [15]. This is not without risk and can increase medication errors by prescribers (i.e., obstetricians, family physicians, and midwives with authority to prescribe oxytocin) and administering staff (e.g. nurses and/or midwives).

Table 3. International Guidelines on Oxytocin Administration Examples

Country	Organization/ Province	High/Low Regimen	Initial Dose	Increase Interval	Dosage Increment	Max. Dose Before R/A
United States of America	ACOG, 2009	Low	0.5-2 mU/min	15-40 mins	1-2 mU/min	No maximum dose stated.
	ACOG, 2009	High	6 mU/min	15-40 mins	3-6 mU/min*	
United Kingdom	RCOG, 2001	Low	1-2 mU/min	30mins	2 mU/min	20 mU/min
	RCOG, 2001	High	1-2 mU/min	30mins	4 mU/min**	32 mU/min
Southern Australia	SA HEALTH, 2018	Low	2 mU/min	30mins	2 mU/min	20 mU/min
	SA HEALTH, 2018	High	1-2 mU/min	30mins	2 mU/min	32 mU/min
New South Wales Australia	NSW, 2011	High	2.5 mU/min	30minutes	5 mU/min***	30 mU/min
Ireland	Ireland, 2016 [5]	Low	1-5 mU/min	15-30mins	1-5 mU/min	30 mU/min

Legend: Max. = Maximum; R/A = Reassessment

*Notes: *ACOG incremental increase is reduced to 3mU/min in presence of hyperstimulation and deduced to 1mU/min with recurrent hyperstimulation. **RCOG recommendation for high dose is that low dose is maintained until 20mU/min is reached, then the dosage increment changes from 2mU/min to 4mU/min. ***NSW Australia increases 2.5mU in the first 30minutes, then subsequent increases are 5mU every 30 minutes.*

Similarly, in the United States, misuse of oxytocin was listed as one of the leading allegations in obstetric malpractice cases. In a study of obstetric medication errors, oxytocin joined a list of the top 10 medications associated with high numbers of errors and identified as the most common medication associated with harm [16]. In the U.K., the National Health Service Resolution Authority identified obstetric medicolegal claims as being the largest financial burden on their resources. One of the top contributors was the inappropriate use of oxytocin and its precipitation to fetal hypoxia [17, 18]. In France, it was found that there was a large variety of cervical ripening and labour induction protocols between obstetrical sites, with some being inconsistent with current international guidelines and literature [15, 19]. In contrast, Demark and the UK have national standard clinical guidelines to help minimize variation [20, 21, 22]. In addition to having national clinical guidelines, Denmark also requires mandatory participation in their quality improvement initiatives and clinical data registration for quality management, done either by direct reporting or via an e-health portal [23].

Methods

Literature Review

A literature review was performed to identify relevant evidence to inform the best practice recommendations. Research databases used included PubMed, Cochrane, OVID, and MEDLINE, entering search terms such as oxytocin, Pitocin, augmentation, and induction. A total number of 69 articles were identified related to this topic and its inclusion criteria. Certain articles that referenced oxytocin were excluded, as they did not meet the scope criteria outlined in this document, or represented different population definitions (e.g., reporting on pregnant patients during their third stage of labour, births that included twin or multiple gestations, or use of oxytocin as a preventive measure for postpartum haemorrhage). Clinical practice guidelines and resources were also reviewed. These included guidelines from the Society of Obstetricians and Gynaecologists of Canada (SOGC), the Association of Ontario Midwives (AOM), the American College of Obstetricians and Gynecologists (ACOG), the Royal College of Obstetricians and Gynaecologists of the UK (RCOG), the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG), and the Royal College of Physicians of Ireland (RCPI).

Ontario Practice Review

To understand current practices, all 96 birthing hospitals in Ontario were contacted to provide PCMCH with their order sets or protocols for oxytocin administration. A total of 34 hospitals responded, with 32 hospitals providing protocols, policies, or order sets for their oxytocin administration practice. Two hospitals stated that due to their level of care (level 1a), they precluded oxytocin use. Level 1a hospitals are not defined to have oxytocin augmentation or induction as a minimum criterion to function as a maternity hospital. For this reason, no protocols from level 1a hospitals were found or included. All other levels (1b, 2a, 2b, 2c, and 3) were represented in this sample. Additionally, we received responses from hospitals from across all Local Health Integration Networks (LHINs) with the exceptions of LHINs 1, 5, and 6. Recommendations from obstetrical organizations at national and provincial levels were included to review variations in drug dosage and administration procedure.

Data

Data was requested from BORN Ontario to provide background on the current context and to determine measurement indicators. Using the low-risk birth definition (Appendix A), maternal and neonatal outcome indicators were selected for review. Data from a recent HIROC and CMPA report (2018) were also reviewed [1]. The limitation of the latter report is that not all obstetrical incidents are reported to the CMPA or HIROC. Therefore, this is not a comprehensive representation of all obstetrical care that occurs in hospitals, nor specific to Ontario; however, HIROC provided claims costs for policy

years 2008 – 2017 for Ontario hospitals by level of care for review, with findings described below.

Findings

Oxytocin Protocol Variation

A review of oxytocin protocols demonstrates that there are variations between countries (e.g., Canada, United States of America, and Ireland), and within Canada provincially (Alberta and British Columbia). Ontario currently does not have standardized provincial recommendations for initial starting dose, nor dosing increments with respect either to time or concentration.

The 32 Ontario hospitals that submitted clinical documents on oxytocin use demonstrated significant variation. There was a blend of recommendations that incorporated both the ACOG and SOGC protocols; however, neither of these guidelines describe how the drug should be compounded or stored. In contrast, the RCOG recommended that a standard dilution should always be used to reduce the risk of error and provided two suggestions: 10 IU in 500 ml of normal saline or 30 IU in 500 ml of normal saline [24].

Table 4 demonstrates the variation in oxytocin concentrations prepared in a sample of Ontario hospitals. Very seldom did hospitals include a high dose order set. Those that did include a high dose order set were level 1b or level 3 hospitals. Level 1b hospitals are generally low-risk, and some explicitly include in their policy that a physician needs to be “readily available, within five minutes, for at least 30 minutes after beginning the oxytocin infusion and readily available for the duration of the infusion.” The fact that some hospitals of varying levels of care offer both low and high dose oxytocin further confirms the variation that exists.

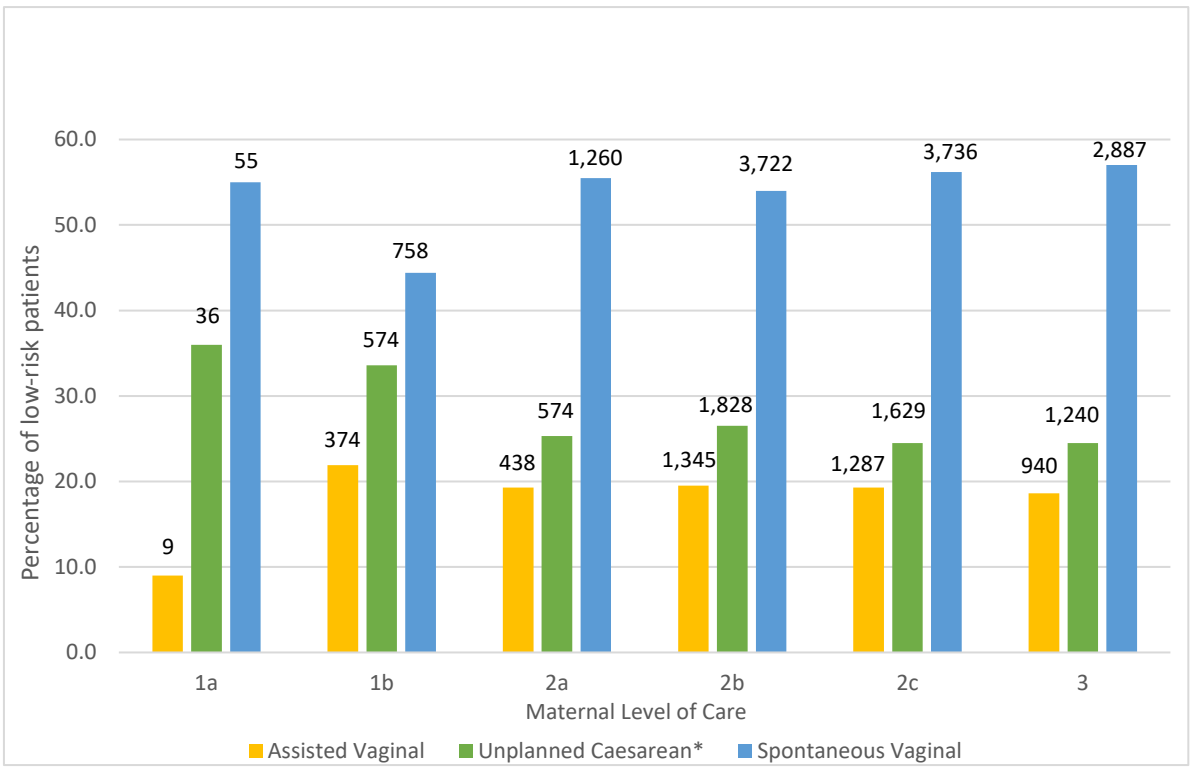
Table 4. Variation in Concentration of Prepared Oxytocin Infusions in Ontario Birthing units

Compounding of Oxytocin Oxytocin units in mL of Isotonic IV Solution	**Infusion Rate** mU/min = mL/hr
10 IU/1000mL	1 mU/min = 6 mL/hr
20 IU/1000mL	1 mU/min=3 mL/hr
6 IU/500mL	1 mU/min=5 mL/hr
10 IU/500mL	1 mU/min=3 mL/hr
20 IU/500mL	1 mU/min=1.5 mL/hr
30 IU/500mL	1 mU/min=1 mL/hr
15 IU/250mL	1 mU/min=1 mL/hr
12 IU/100mL	1 mU/min=0.5 mL/hr
Source: Documents collected by PCMCH from 32 Ontario hospitals, 2018	

Data

In Ontario, approximately 54% of all low-risk patients received oxytocin before or during labour in the 2017-2018 fiscal year (FY). The graph in Figure 2 represents the total number of low-risk patients (definition in Appendix A) receiving oxytocin as a method of induction and/or augmentation, and their mode of birth during the 2017-2018 FY in Ontario by level of care. Over 50% of all low-risk pregnant patients had an unassisted, spontaneous vaginal delivery when given oxytocin, and 19.4% of patients required assisted vaginal birth (forceps and/or vacuum extractor). Noticeably, 25.9% of all patients who received oxytocin consequently had an unplanned caesarean birth. Therefore, in Ontario during the 2017-2018 FY, 5,881 patients who received oxytocin during their labour required an unplanned/emergency caesarean birth.

Figure 2. Percentage of low-risk patients who received oxytocin by type of birth and maternal level of care in Ontario (FY 2017/18)

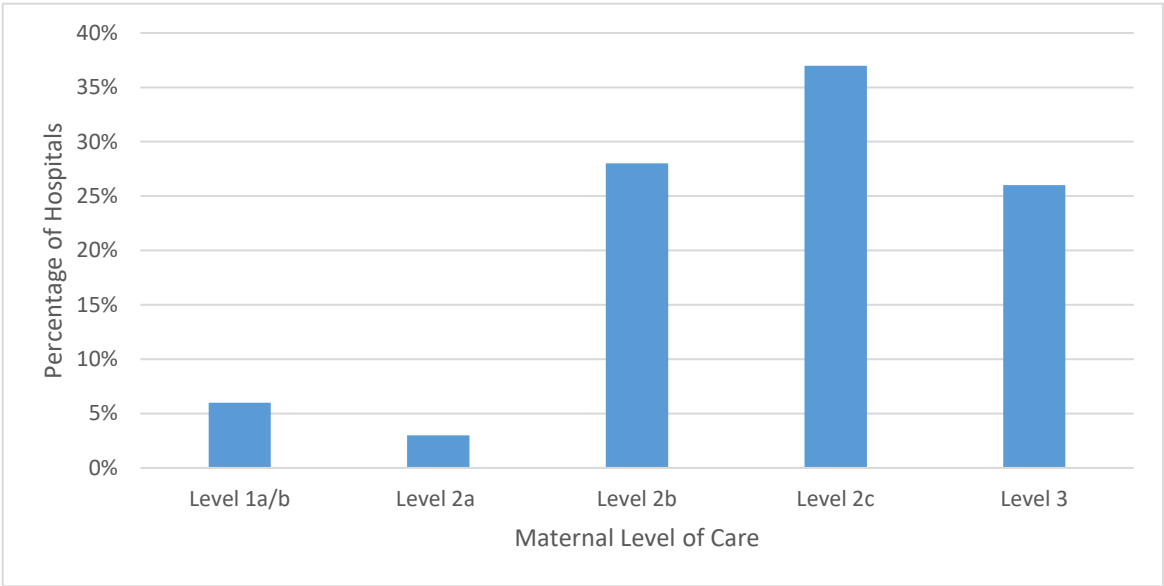


Source: PCMCH analysis and interpretation using data provided by Better Outcomes & Registry Network (BORN) Ontario. BORN Data Source: Years Provided: 2017 to 2018. Resource Type: Tabulated Data. Data Provided in 2019.
*Patients who received oxytocin for an induction or augmentation of labour, which resulted in a caesarean delivery.

As per BORN Ontario data in 2016-2017 and 2017-2018, nearly 50% of patients who undergo a caesarean section had one due to atypical or abnormal fetal surveillance, either as an isolated indication or with other indications for caesarean (such as failed induction or other maternal or fetal indication). For neonatal outcomes, a composite indicator of arterial cord pH less than 7.0 or Apgar at five minutes less than 5 for live and still births whose mothers were low-risk and received oxytocin for induction or augmentation was reviewed. This totaled 1.1% of all births (BORN Ontario, years 2016-2017, tabulated data, provided in 2019).

Figure 3 illustrates the percentage of hospitals that reported a potential (suspected legal action) or an actual (receipt of a Statement of Claims) induction/augmentation claim to HIROC as per HIROC policy years 2008-2017. As expected, level 1 hospitals represent the lowest number of hospitals since they may not offer oxytocin or other induction services at this level of care. Whereas level 2b and 2c indicated a higher percentage of claim costs than level 2a. According to HIROC, team and practitioner loss of situational awareness and the misinterpretation of the fetal status are common contributing factors in oxytocin-related cases. Oxytocin-related cases make up the third most frequent 'risk' category for HIROC claims over $5 million (As per HIROC, November 2017).

Figure 3. Ontario HIROC Induction/Augmentation Claims by LOC (Policy Years 2008-2017)



Source: Healthcare Insurance Reciprocal of Canada (HIROC)
Notes: Induction/augmentation claims in Ontario hospitals only, including precautionary and actual claims. This data excludes midwifery reported claims. This analysis is not an all-inclusive representation of all maternal/newborn incident or harm-related costs as not all incidents are reported to HIROC by subscribers. Most obstetrical matters have multiple contributing factors – for example, misinterpretation of the tracing and failure to turn off the oxytocin in the presence of abnormal tracing. HIROC assigns one risk / exposure code per claim. This analysis only includes cases where the primary risk/exposure related to management of induction/augmentation medications.

Best Practice Recommendations

Recommendation #1: Shared Decision Making

Patients are provided with information to participate in shared decision-making on oxytocin induction, augmentation and expectant management.

Rationale

When being considered for induction or augmentation of labour, patients must be given an opportunity to be fully engaged with their primary healthcare provider in order to make an informed decision and consent to the birthing plan to include oxytocin as an intervention in care [10].

The MRP must undertake an informed consent discussion surrounding oxytocin, including but not limited to: the maternal and fetal indication, benefits and risks of oxytocin administration as well as the benefits and risks of alternatives. This discussion must be held upon admission between the MRP and the patient and again prior to medication set-up. However, if the patient is booked for induction in advance, the MRP should have this discussion in the antenatal period and can provide supplemental materials that may help patients make an informed choice, such as fact sheets or pamphlets. **This discussion must be documented by the ordering practitioner** [6]. Documentation of the informed consent discussions must be in the patient chart, including clinical reasons for induction or augmentation, method of induction or augmentation, and confirmation that patient understands plan of care and has provided verbal consent [14, 13, 6, 25, 10].To support and guide the patient's birthing plan, the healthcare team must consider the patient's preferences and wishes, general condition, and give respect to the individual's dignity and autonomy [26, 10, 27]. With respect to Ontario's breadth of diversity, special considerations should also be given to recognize unique cultural and religious views.

There are some considerations to be kept in mind while discussing options with the patient. The Public Health Agency of Canada identifies that some patients (particularly those younger of age, of lower education and those with income levels) are more likely to report less favourable maternity experiences, which may be attributed to poor communication from the healthcare staff [28]. Poor communication was also noted as a factor in 4% of CMPA obstetrical cases and 8% of HIROC obstetrical cases from 2004-2013 [1]. A patient who has a negative experience during childbirth is more likely to experience other chronic maternal morbidities. Supporting pregnant patients with their birth preparedness and managing their expectations with regard to potential complications is a major consideration for strategies to improve the birthing experience [29]. For these reasons, it is important for healthcare providers to discuss the use of

oxytocin in the plan of care with patients thoroughly and answer questions clearly to ensure their understanding.

Implementation Tools

- **Oxytocin: To Help Start or Speed up Your Labour Patient Education Pamphlet** - A pamphlet (see Appendix D) has been created in collaboration with Health Nexus to help provide families with information on benefits and risks of oxytocin and to help guide informed decision-making discussions between the patient and care provider.
- **Oxytocin to Start or Advance Labour: 5 Questions to Ask Patient Handout** – Created by the Institute for Safe Medication Practices, the handout (see Appendix Q) provides information about the benefits and risks of intravenous oxytocin to supplement the conversation between healthcare providers and patients/care partners about oxytocin.

Recommendation #2: Inter-Professional Team Communication

Members of the health care team must maintain communication that is clear, direct and respectful.

Rationale

Poor inter-professional communication results in patient care delays, obstructed timeliness of interventions and preventable harm incidents [1]. Teams must develop an environment where all members can openly discuss the appropriateness of an oxytocin order, how it is being titrated throughout labour, and its effect on the fetal heart rate without hesitation and/or concern of instigating a conflict between the prescriber and administering healthcare provider [30]. Regardless of their role, each clinician is accountable for the care that they provide [27].

HIROC and the CMPA identified poor communication as a leading cause of oxytocin mismanagement [1]. Their review indicated that delays in alerting the physician about uterine contractions and fetal well-being, along with failure to challenge questionable orders and/or failure to escalate concerns resulted in adverse outcomes [1]. Examples of poor communications are provided by HIROC's risk reference sheet on failure to communicate are referenced in Appendix E and Appendix F. Delayed alerts of concerns of abnormal fetal status and uterine activity resulted in 54% of HIROC obstetrical cases in 2004-2013 [1].

The prescriber must fully document the need and rationale for oxytocin administration, and the acceptance of that order as it relates to the patient's condition (e.g., fetal health surveillance) [31]. Documenting "as per protocol" or "as per orders" is not sufficient and requires more clarification in the written notes [31]. When medically appropriate, and

within the context of a well-integrated system, midwives should maintain primary care of their clients when oxytocin is in use. In most settings, midwives will consult with a physician to obtain an order for oxytocin. In these cases, minimizing transfers and ensuring continuity of care can improve safety and patient satisfaction.

Care providers at the bedside must collectively agree with decisions to use oxytocin to ensure that the patient is a safe candidate for oxytocin administration. Where there is disagreement, there must be a discussion between members of the healthcare team, including the prescribing practitioner/MRP. A formal unit specific escalation process, or *chain of command*, must be in place so that the issue can be raised and addressed promptly [1, 32]. By fostering an environment where open and respectful communication is encouraged, team members are more likely to promote and reinforce their teammates to advocate for the best interests of the mother and baby, and reduce feelings of intimidation and fear of retaliation when voicing clinical disagreement [32]. Likewise, using tools such as SBAR (Situation, Background, Assessment, and Recommendation) and techniques found in Appendix G, as well as having a plan of action, can help frame communication between team members. They will help to inform team members of urgent results and to provide situational awareness so that concerns are escalated appropriately and swiftly, thus preventing further health deterioration [31, 30, 33]. If there is disagreement with the plan of care, the team can refer to the decision tree tool in Appendix H.

These considerations must also be included during the hand-off process, to prevent knowledge gaps and to ensure the new team member is fully aware of the plan of action. Hand-off transition can even offer an opportunity to discover an error that was made before the hand-off. By utilizing regular team training, reviewing case studies together, and skills drills, a team can be trained to recognize and communicate status changes quickly, trust that their communication is taken seriously, and will reflect on their practice, whether their practice outcome is good or poor. [33, 30, 1].

Implementation Tools

- **Communication Technique Examples** - see Appendix G.
- **Algorithm: Disagreeing with the Plan of Care** – The algorithm (see Appendix H) was created to guide the conversation when a member of the care team disagrees with the plan of care when oxytocin use is involved and provides steps that the healthcare team can take to resolve the issue.
- **Pre-Use Oxytocin Safety Checklist** - This checklist (see Appendix N) was adapted from a validated tool by the HCA Perinatal Safety Initiative to serve the Ontario system and complement the recommendations in PCMCH's *Safe Administration of Oxytocin* report.
- **In-Use Oxytocin Safety Checklist** - This checklist (see Appendix O) was adapted from a validated tool by the HCA Perinatal Safety Initiative and aligns with Fetal Health Surveillance to serve the Ontario system and compliment the recommendations in the report.

Recommendation #3: Indications for Induction or Augmentation

The prescriber will order oxytocin for induction and/or augmentation for the appropriate indication(s).

Rationale

Oxytocin must be administered to pregnant patients with indications for oxytocin administration where the expected benefits outweigh the potential harms [34, 26]. The prescriber must use sound clinical judgement to determine if the indication for induction/augmentation with IV oxytocin will likely improve maternal or fetal outcome [34]. Induction of labour should not be routinely offered based on maternal request, although there may be special circumstances where clinical judgement should be used in which the benefits may outweigh the potential harm [20, 6, 12].

Thorough assessments, including a bedside assessment of the pregnant patient and fetus, will help determine if induction or augmentation is indicated and the likelihood of success. This can be done by following the guideline of indications for induction or augmentation, as referenced in Appendix I and Appendix J [35, 6]. There are methods to help determine the appropriateness of induction or augmentation which include (but are not limited to):

- Dating the pregnancy with an ultrasound in the first trimester, as it is the most accurate method to confirm gestational age for those indicated as post-dates inductions [6];
- Checking the list of indications (Appendix I and Appendix J);
- The ability and training to detect and monitoring the fetal wellbeing (e.g., good signal quality of the tracing)
- Assessing the maternal and fetal wellbeing, including maternal uterine contractions and fetal heart rate patterns; and
- Assessing the cervix using the Bishop score in Appendix K.

The Bishop score indicates the favourability of the cervix, such that an unfavourable cervix (Bishop score less than or equal to six) will guide the team in the decision to proceed with cervical ripening first. SOGC, and other clinical practice guidelines, indicate that induction with IV oxytocin is **not an appropriate ripening agent** as the patient should present with a favourable cervix (Bishop score greater than six) [6, 14, 36]. Once the patient's cervix is favourable and further assessments indicate the patient as the right candidate for oxytocin, administration can commence [6, 36]. This must all be documented within the patient chart and may be noted on a safety checklist.

The prescriber must also be aware that oxytocin should not be administered with the following drugs or during the following buffer times [6]:

- Prostaglandin gels (i.e. Prostin, Prepidil) – 6 hours after the last dose;
- Misoprostol – 4 hours after the last dose;

- Dinoprostone insert (Cervidil) – 30 minutes after the last dose.

Caution must be used in the administration of oxytocin as the procedure carries the risk of uterine tachysystole with the potential consequences of atypical or abnormal fetal heart rate changes and uterine rupture as a consequence of sustained hyperstimulation with oxytocin. [26].

Once the prescriber determines the patient's eligibility for oxytocin and has undertaken the informed consent discussion with the patient, the nurse or midwife must be in agreement with the rationale. The College of Nurses of Ontario (CNO) states that nurses should think critically when determining if a drug administration is safe and appropriate, which is also consistent with midwifery practice. Part of the decision-making process for the safe administration of a drug is to assess the benefits and risks of administration given the pregnant patient and the fetal health status.

The nurse or midwife administering the drug is expected to challenge or question orders when there is concern about its appropriateness, and this is an integral part of the nurse's or midwife's role as a registered healthcare professional and patient advocate. As medico-legal claims have demonstrated, it is not sufficient to defer to the prescriber, based on their position and/or experience; all providers (as members of the healthcare team) initiating and monitoring induced or augmented patients are accountable for their practice [2, 1]. Some clinical decision-making tools about disagreeing with plan of care and about medication administration are outlined in algorithms in Appendix H and Appendix L [37].

Implementation Tools

- **Algorithm: Disagreeing with the Plan of Care** – The algorithm (see Appendix H) was created to guide the conversation when a member of the care team disagrees with the plan of care when oxytocin use is involved and provides steps that the healthcare team can take to resolve the issue.
- **Algorithm: Deciding about Medication Administration** – This algorithm (see Appendix L) was developed to guide team decision-making amongst healthcare providers about medication, specifically with respect to IV oxytocin.

Recommendation #4: Professional Skills Training

Oxytocin is prescribed and administered by a trained health care professional educated on its use, including the effects and risks of drug administration.

Rationale

IV oxytocin is considered a high-alert medication by ISMP [2]. There is significant risk of harm if a medication is given by those who do not have the knowledge, skills, and/or

judgement to use it appropriately and safely [37]. Hospitals must ensure all professionals prescribing, administering and monitoring the oxytocin infusion have demonstrated knowledge, experience and training to ensure it is done safely [26, 37]. This includes, but not limited to, knowledge and experience in the following areas [33, 6, 36, 24]:

- Evidence based practices (e.g. dosing and half-life, indications, interactions, adverse events, administration, contraindications and precautions);
- Strategies to enhance team and practitioner situational awareness and "big picture" thinking (e.g. the appropriateness of the medication given the evolving maternal and fetal status and the environment);
- FHS interpretation and can respond in a timely matter;
- Intrauterine resuscitation measures;
- Subtle and overt signs of uterine rupture;
- Atypical/abnormal fetal health status;
- Local induction and augmentation protocols and order sets;
- Local communication practice (e.g. SBAR) and escalation/chain of command protocols; and
- Hand off process/protocol.

In order to prevent adding burden onto clinicians, hospitals must provide accessible drug information which lists onset, duration of action, administration guardrails, and possible adverse effects of oxytocin administration. This will help reduce the need to rely on clinician's recalling the information by memory and would also provide support for medication administering decisions.

Fetal Health Surveillance

Hospitals must implement formal strategies to ensure all intrapartum caregivers (physicians, nurses, and midwives) are appropriately trained in, and have regular ongoing education (every two years) in FHS and in-situ simulation training, as oxytocin administration requires close and regular monitoring of fetal heart rate and uterine contraction patterns [26, 38]. Continuous Electronic Fetal Monitoring is recommended during oxytocin administration to allow for close monitoring of uterine activity and the FHR by the healthcare team [24, 39, 6]. The team must be experienced in understanding nuances in uterine activity in labour to prevent tachysystole. These nuances can be taught to the team through routine training, but also by reviewing cases of induction or augmentation with oxytocin that were outside of defined protocols [33]. Important considerations should not only include frequency of uterine activity, but other characteristics such as duration, intensity, and resting tone of the uterus, as well as how the physiology of these characteristics affect fetal oxygenation [40]. When abnormal uterine contractions and/or atypical or abnormal fetal health surveillance features are identified, interventions for intrauterine resuscitation must be performed, and the findings must be **communicated to the MRP and/or team** so that additional interventions can be completed in a timely manner to support maternal-fetal condition [39].

Intrauterine resuscitation interventions may include (see Appendix M):

- Stopping or reducing the oxytocin infusion rate;
- Repositioning the patient (to left or right lateral position);
- Administering a fluid bolus (only when indicated with maternal dehydration or maternal hypotension);
- Performing a vaginal exam to rule out umbilical cord prolapse if appropriately trained.

For a full list of intrauterine resuscitation interventions, refer to the sample order set in Appendix L.

It would be inappropriate for the physician to countermand the advice or intervention of the bedside nurse regarding oxytocin infusion without the physician performing an in-person examination of the patient and review of the FHS tracing [34, 41]. When differences of opinions exist, a team conversation should take place and include a review of the pros and cons of continuing oxytocin, any questions that the team may have with regard to the medication order, and the reasons why the prescriber holds a different opinion.

Training must also be included for the correct use of the Smart Pumps, as they are useful mechanisms to safely control the administration of a drug. Smart Pumps are infusion devices that have safety measures built in such as dosage control software. This device and its safety features are discussed further in Recommendation #8: Independent Double-Check & Smart Pump Use.

Implementation Tools

- **Communication Technique Examples** - see Appendix G.
- **Algorithm: Disagreeing with the Plan of Care** – The algorithm (see Appendix H) was created to guide the conversation when a member of the care team disagrees with the plan of care when oxytocin use is involved and provides steps that the healthcare team can take to resolve the issue
- **Algorithm: Deciding about Medication Administration** – This algorithm (see Appendix L) was developed to guide team decision-making amongst healthcare providers about medication, specifically with respect to IV oxytocin.
- **Pre-Use Oxytocin Safety Checklist** - This checklist (see Appendix N) was adapted from a validated tool by the HCA Perinatal Safety Initiative to serve the Ontario system and complement the recommendations in PCMCH's *Safe Administration of Oxytocin* report.
- **In-Use Oxytocin Safety Checklist** - This checklist (see Appendix O) was adapted from a validated tool by the HCA Perinatal Safety Initiative and aligns with Fetal Health Surveillance to serve the Ontario system and compliment the recommendations in the report.

Recommendation #5: Hospital Preparedness for Adverse Events

Administration of oxytocin will occur in hospitals where interventions are readily available to manage potential adverse effects.

Rationale

Sites that offer and administer oxytocin must have personnel trained in the use and risk of oxytocin administration, as well as appropriate use of FHS. Staff must be available 24/7/365 to interpret tracings and to act on obstetrical emergencies (i.e., availability of a physician with caesarean section skills and an anesthesiologist, in the event that there is an adverse event). Sites should also have quick access (e.g. within 30 minutes) to an available operating room (OR) suite for obstetrical emergencies, where an immediate caesarean section can occur as part of their escalation process, or have formal processes in place for patient care transfer [1, 10, 42].

British Columbia does allow rural facilities without quick OR accessibilities to participate in inductions and augmentations, provided that they have robust patient transfer systems in place [13]. Similar to British Columbia, Ontario hospitals require that assessments of emergencies and potential caesarean sections should be accessed within 30 minutes for maternal care hospitals and/or a sufficient transfer process in place [11]. Organizations without 24/7/365 staff available (i.e. Level 1a hospitals) or access to OR must have formal processes in place for timely access to resources in order to care for complications and/or identify partner sites that can support prompt transfer and care of patients [11]. In hospitals designated level 1b and above, where caesarean OR is offered 24/7/365, a physician capable of performing caesarean section and other OR support staff (e.g., anesthesiology, nursing) must be available when IV oxytocin is administered [33, 11].

HIROC identified obstetrical incidents that occurred during intrapartum fetal surveillance from 2004-2013. 18% were precipitated by a reduced capacity to respond to obstetrical emergencies, due to lack of staff availability; lack of OR availability represented 11% of these incidents [1].

Recommendation #6: Medication Handling

Oxytocin is stored safely and labelled appropriately.

Rationale

Both the ISMP and Health Canada recommend the standardization of drug labels to help reduce the chances of missing warning labels, miscommunication, or product mix-ups [43, 44]. Oxytocin was added to ISMP's high-alert medication list in 2007 for its significant adverse effects when misused [3]. Due to its high-alert status, oxytocin must be kept in a safe and secure location where only authorized personnel can retrieve it, such as in locked medication carts. The drug must also be stored where pharmaceutical staff can check stock and expiration dates in order to maintain the quality of the drug. The drug shelf-life can become compromised if stored at high temperatures; the ideal storage temperature range should align with drug monographs [45]. Including these checkpoint details may help curtail the normalization of unsafe IV oxytocin use.

There is also a high risk of error if it is labelled incorrectly. Presence of multiple syringes in the delivery setting, difficulties distinguishing prepared bags of IV oxytocin and other solutions, and inadequate labelling or identification have led to ISMP reported incidents of the incorrect drug being administered and patient harm [2]. To prevent this error, it is recommended that standardized medication labels are applied to prepared medication bags [33, 43].

In ideal circumstances, the drug preparation of oxytocin bags should occur in pharmacy. Due to hospital variation in work volume and risk of medication waste, it is recognized this is not always feasible. Regardless if prepared by pharmacy or bedside staff, a **standardized medication label** stating the following information must be applied to the bag immediately when it's prepared: Name of drug, units of oxytocin added to the bag, final concentration of oxytocin in **milliunits per milliliter (mu/mL)**, date of bag preparation, initials of staff member preparing bag, and initials of staff member preparing and performing the independent double check of preparation

The healthcare team should be vigilant of the drug preparation and have situational awareness of drug usage. For this reason, it is recommended that staff should promote and/or implement the secure and appropriate storage, transportation, and disposal of medication [37]. Thus, preventing inappropriate drug handling by individuals not part of the care team (e.g. families, housekeeping).

Implementation Tools

- **Standardized Medication Labels** - These labels (see Appendix P) aim to reduce the chances of missing warning labels, avoid opportunities for miscommunication and/or drug mix-ups.

Recommendation #7: Standard Use of Oxytocin

Each hospital will use a standardized oxytocin protocol and order set.

Rationale

Well-designed order sets contribute to good patient care, and their creation is achievable by considering certain criteria from the best available evidence. For example, when disseminating best practice guidelines: use clear and standardized formatting to reduce variations and unintentional oversight; use alerts and reminders embedded in order sets to decrease medication errors; and consider how the order set reduces unnecessary requests to providers [46]. Hospitals must implement standardized order sets and should not consider IV oxytocin induction/augmentation and its associated practices "standing orders", which is currently not a supported practice by the CNO [47]. The prescriber ordering oxytocin must sign an order set indicating the practice of preparing, monitoring, and intervening during administration. It would be inappropriate for a prescriber to provide a verbal or remote order for oxytocin for a nurse or midwife. Healthcare providers administrating and monitoring the use of oxytocin must always use their knowledge, skill and judgment, despite how routine a practice or procedure may seem [47].

Currently, guidelines and protocols on oxytocin administration during induction/augmentation vary across countries and regions. There has been little evidence to support which oxytocin regimen is best. A recent Public Health Agency of Canada guideline recommends that hospitals have a protocol for oxytocin use in place in each labour and delivery unit that is followed consistently by the healthcare team [48]. It acknowledges that individual provinces may have their own clinical guidelines in place and that each province has incorporated the same recommendations from SOGC and international bodies such as RCOG [48].

ISMP, ISMP Canada and HIROC have continuously advocated for the use of standardized order sets to minimize medication errors [41, 2, 31]. A recent article published by the CMPA campaigns for the standardization of oxytocin protocols and checklists as part of a call-to-action for national quality improvement in obstetrics [49]. Introducing and following these highly specific standardized protocols should help mitigate adverse events from misusing high-alert medications and prevent repeated or common errors [2, 1]. ISMP identified that having a standard method of oxytocin administration helps prevent complicated dosing calculations during urgent circumstances, prevent errors with methods of administration such as failing to use an IV pump or improperly connecting an IV line, and prevent dosage omission [3]. Dosing errors can be prevented with the use of smart pumps with dose-error reduction software, by inputting standard concentrations and dosing limits as outlined in Recommendation #10: Stop & Re-Start Administration. Smart pumps will also provide audit trails of errors and/or overrides of dosage orders [50]. Standardized order sets

must include emergency procedures such as providing intrauterine resuscitation during infusion or using rescue agents during adverse events [46]. An analysis by ISMP did note that wrong rate errors were commonly attributed to misinterpreted orders and incorrect settings being entered in pumps such as being entered as mL/min instead of mU/min or vice versa [50]. As recommended by SOGC and to reduce errors in infusion rate settings, oxytocin infusion rates must be written in mU/min instead of mL/hr [35, 50, 2].

Implementation Tools

- **Pre-Use Oxytocin Safety Checklist** - This checklist (see Appendix N) was adapted from a validated tool by the HCA Perinatal Safety Initiative to serve the Ontario system and complement the recommendations in PCMCH's *Safe Administration of Oxytocin* report.
- **In-Use Oxytocin Safety Checklist** - This checklist (see Appendix O) was adapted from a validated tool by the HCA Perinatal Safety Initiative and aligns with Fetal Health Surveillance to serve the Ontario system and compliment the recommendations in the report.
- **Standardized Order Set** - This order set (see Appendix M) aims to reduce medication errors and ensure accurate and transparent drug administration to avoid dose omission.

Recommendation #8: Independent Double-Check & Smart Pump Use

Independent double check to be obtained in preparing the medication and setting the initial pump infusion rate via a Smart Pump.

Rationale

An "independent double check" requires that two individuals, separately and independently of each other, check a process in the workflow. These are commonly used to verify the correct dosage of a high-alert medication. Independent double check algorithm includes verification of the following:

- Correct patient.
- Correct initial order.
- Correct preparation of infusion.
- Correct labeling of infusion bag.
- Correct initial infusion pump settings, and ensuring it is to the closest port.

Alberta Health Services requires that an independent double check be done when a bag of IV oxytocin is prepared, as well as when setting the initial infusion rate with the infusion pump medication program calculator, as part of their induction of labour guideline [14].

This aligns with ISMP's recognition that there are concerns with dose expression, and their recommendations for having independent double checks for programmed medication pumps [51]. In a retrospective article published by ISMP Canada, it is acknowledged that independent double checks can add to a heavy work burden on a busy clinical team, but when used correctly and consistently, the checks can detect up to 95% of errors, and the perception of the burden of work will decrease [52]. ISMP Canada describes steps involved in implementing a system for independent double checks, including developing policies and tools, training staff, and utilizing human factors principles. This resource is available online here [53]: "Lowering the Risk of Medication Errors: Independent Double Checks" by ISMP Canada & HIROC.

Utilization of smart pump technology can also provide added checks and must be used where oxytocin is administered. Smart pumps can reduce medication errors, improve workflow, and collect data for continuous quality improvement monitoring [50]. With dose-error reduction software, smart pumps can detect dosing and programming errors that can result in the inappropriate dose administration [50]. Hospitals must create a drug library with oxytocin induction/augmentation specifications where soft and hard stops can be applied as additional safeguards to patient care. For instance, considering that an average patient receiving oxytocin for induction will achieve adequate contractions when receiving between 8-12 milliunits per minute, a soft stop should be applied at 12 milliunits per minute to cue a thorough assessment by the administering healthcare provider before proceeding [6]. A hard stop would be at the maximum dose of the medication; which is 20 milliunits per minute. Once this maximum is reached, the administering healthcare provider would need to seek out the MRP for reassessment, and if required, would receive a written order for 30 milliunits per minute, in which the administering healthcare provider would need to select 'override' in the pump for each additional increase. These stops have been added to the order set in Appendix M. The justification for hard and soft stops, along with when to restart the infusion, has been outlined in Recommendation #10: Stop & Re-Start Administration.

Implementation Tools

- **Standardized Order Set** - This order set (see Appendix M) aims to reduce medication errors and ensure accurate and transparent drug administration to avoid dose omission.

Recommendation #9: Low-Dose Regimen

Hospitals administering oxytocin for the purpose of augmentation and induction will follow a low-dose regimen

Rationale

A common safety-oriented practice when starting medications is the “start low, go slow” approach [53]. This should be consistent for the administration of oxytocin for augmentation and induction. While both high-dose and low-dose regimens are cited in national guidelines, a low-dose regimen is preferred in order to support safe administration. For example, a low dose regimen is the recommended standard for Perinatal Services BC, Alberta Health Services, Reproductive Care Program of Nova Scotia, and Southwestern Ontario [14, 13, 54, 55]. Additionally, IV oxytocin is a hormone and does not react with the typical dose-response curve, which adds to the proposition that a low-dose regimen would be preferable [13].

Oxytocin has a slow dilution rate, which means that dosing regimens that are increased too quickly can result in unpredictable and unsafe results, specifically tachysystole with or without fetal heart rate changes [34]. Tachysystole should be defined in the standardized order set. While high doses of oxytocin have the potential to reduce the length of labour, this regimen can increase the risk of uterine tachysystole with associated FHR changes [6, 35, 56]. Once the ideal contraction parameters have been achieved, failure of subsequent labour progression over an appropriate time period (i.e. 4-6 hours) should lead to operative delivery rather than more oxytocin [34].

This best practice statement supports a province-wide low-dose oxytocin protocol to promote the safe administration of oxytocin in Ontario. There are many advantages to a low-dose regimen. These include [53, 57]:

- Improving patient safety by reducing likelihood of adverse effects;
- Reducing drug costs and the need for disposing excess;
- Reducing active pharmaceutical ingredient burdens that may affect the environment, such as reducing drug waste and impact of leaking drug residues; and
- Bolstering patient cooperation with the healthcare team by engaging the patient in determining the best dose for their treatment, which helps to increase trust and feelings of safety.

The regimen recommended in the sample order set (see Appendix M) outlines a concentration of 10 units of oxytocin in 500millilitres of isotonic solution. This requires only one ampule of the drug to be used and minimizes opportunities for error in preparing the medication and wastage. In addition, limiting the concentration and increasing the rate slowly by 1-2 milliunits per minute will reduce chances of adverse events and is most appropriate for a low-risk patient.

Special circumstances in individual patient cases may exist, therefore some protocol variations may be reasonable and require further clinical judgement. In the event that a healthcare practitioner provides care that deviates from the recommended protocol, the indication must be justified and documented in the patient’s chart [24, 58, 6, 14]. For example, patients with a high BMI may benefit from high-dose oxytocin protocol [59].

Using an intrauterine pressure catheter (IUPC) to ensure accurate contraction monitoring for additional safety may be considered.

Implementation Tools

- **Standardized Order Set** - This order set (see Appendix M) aims to reduce medication errors and ensure accurate and transparent drug administration to avoid dose omission.
- **Pre-Use Oxytocin Safety Checklist** - This checklist (see Appendix N) was adapted from a validated tool by the HCA Perinatal Safety Initiative to serve the Ontario system and complement the recommendations in PCMCH's *Safe Administration of Oxytocin* report.
- **In-Use Oxytocin Safety Checklist** - This checklist (see Appendix O) was adapted from a validated tool by the HCA Perinatal Safety Initiative and aligns with Fetal Health Surveillance to serve the Ontario system and compliment the recommendations in the report.

Recommendation #10: Stopping & Re-Starting Oxytocin Administration

Healthcare providers are to be aware of when to stop, reduce and safely restart oxytocin administration.

Rationale

One of the common claims when discussing the mismanagement of IV oxytocin, as reported in the joint HIROC and CMPA report, was failing to reduce or discontinue the infusion rate in the presence of maternal or fetal complications. This included improperly resuming infusion following discontinuation [31]. It is recommended that the patient's infusion of oxytocin should be reduced or discontinued altogether once the active stage of labour is established and there is satisfactory uterine activity. In randomized controlled trials, it was shown that discontinuation of oxytocin reduced the risk of uterine tachysystole, and of patients needing a caesarean delivery [60]. It is important that when the medication is reduced or discontinued, there is a need to ensure that the team is highly functioning within its communication teamwork skills, as aligned with Recommendation 2: Inter-Professional Team Communication.

Nurses and midwives administering and monitoring patients undergoing IV oxytocin induction and augmentation, should be supported and expected to stop or reduce the oxytocin infusion in the presence of complications and notify the MRP as per the order set. A midwife may act as MRP during the monitoring and management of oxytocin administration. It will be the midwife's responsibility to decide when and with whom to

consult, and to initiate consultations, when clinical situations arise that require other healthcare providers in the care of their client [61].

The infusion should be *reduced or stopped* in the presence of satisfactory uterine activity, in the event of an *atypical* FHR, and/or in the event of tachysystole without FHR changes. The infusion must be *stopped* in the event of an *abnormal* FHR or in the presence of tachysystole with atypical/abnormal fetal heart rate changes. When oxytocin is stopped, the provider administrating should apply other interventions to support fetal oxygenation (intrauterine resuscitation). Where it is a nurse, they should notify the physician immediately of the patient status and document communicating their actions. These actions must be listed in the standardized order set, as per the example in Appendix M. The prescriber must complete an in-person assessment prior to restarting the infusion and document; in such an instance, a pre-use oxytocin checklist would need to be performed again [2, 10, 31]. The differences between an atypical and an abnormal FHS can be found in Appendix B.

Once oxytocin induction or augmentation have been initiated and an ideal contraction pattern has been achieved, failure of subsequent labour progression over an appropriate time period should lead to operative delivery, rather than more oxytocin [34]. Rather than prolonging the use of oxytocin or increasing its dosage in the setting of adequate contractions without cervical dilation, administration of oxytocin should be stopped.

Implementation Tools

- **Standardized Order Set** - This order set (see Appendix M) aims to reduce medication errors and ensure accurate and transparent drug administration to avoid dose omission.

Recommendation #11: Patient Support in Labour

Pregnant patients in labour receiving an oxytocin infusion will receive continuous one-to-one care by a registered health care professional for support, advocacy, comfort measures and monitoring.

Rationale

Patients receiving oxytocin must have one-to-one (1:1) midwife or nurse-to-patient ratio for continuous support in labour [62, 13, 25, 10]. While there is limited evidence to show that the suggested ratio improves perinatal outcomes [62], other benefits have been reported, such as the decreased need for oxytocin, an elevated appreciation of patient safety, shorter labours, and the family's increased satisfaction with the birthing experience [63, 29, 64]. The World Health Organization reports that infants whose

mothers had been supported during labour augmentation were less likely to have an Apgar score < 7 at five minutes [26].

From a practical standpoint, sites should be cognizant of their allocation of resources and staffing availability when determining patient acuity for oxytocin administration. For instance, a preterm patient with an underlying cardiovascular diagnosis and preeclampsia receiving oxytocin for induction would require a different degree of nursing attention in comparison to a patient with no risk factors during term labour requiring augmentation [39]. Considering the risks associated with oxytocin administration and its high alert status, these patients must receive 1:1 care in the appropriate hospital setting in order to receive continuous support, advocacy, comfort measures, and monitoring.

Measurement

To measure success in standard implementation and demonstrate improvements, there are recommended indictors for the procedure, organization, and outcomes related to oxytocin administration. The table below lists common indicators that hospitals can monitor.

Indicator Type	Indicator	Suggested Data Source	Directionality
Process Indicator	Rate of staff compliance with the safety checklists (Pre-Use and In-Use)	Local data collection.	Higher rate is better.
Process Indicator	Rate of staff compliance with standardized order set.	Local data collection.	Higher rate is better.
Organizational Indicator	Number of hospitals that have applied the standardized oxytocin administration order set sample (Appendix O).	Provincial data collection.	Higher rate is better.
Maternal Outcome Indicator	Rate of vaginal births among pregnancies induced or augmented with oxytocin.	BORN Ontario	Higher rate is better.
Maternal Outcome Indicator	Rate of caesarean births among pregnancies induced or augmented with oxytocin due to atypical or abnormal fetal surveillance.	BORN Ontario	Lower rate is better.
Maternal Outcome Indicator	Rate of postpartum hemorrhage among pregnancies induced or augmented with oxytocin.	BORN Ontario	Lower rate is better.
Maternal Outcome Indicator	Rate of maternal fever among pregnancies induced or augmented with oxytocin.	BORN Ontario	Lower rate is better.
Neonatal Outcome Indicator	Rate of neonates with an APGAR <5 at 5 minutes of life and arterial cord gas pH <7 at birth.	BORN Ontario	Lower rate is better.
Neonatal Outcome Indicator	Rate of neonates weighing ≥2500 grams born to pregnancies induced or augmented with oxytocin that were admitted to the NICU.	BORN Ontario	Lower rate is better.

Conclusion

With the release of the report on obstetrical safety from HIROC and CMPA, it was highlighted that the inappropriate use of oxytocin and its association with poor FHS interpretation needed to be addressed in a standardized way in order to reduce poor birth outcomes. In spite of its high alert status, oxytocin is dispensed and used frequently, and there continues to be a lack of awareness of its potentially dangerous effects. After reviewing a number of protocols, both abroad and within Ontario, there is consensus that the differences between the protocols, small or large, opens the door for high variations of what is considered a safe interval of practice.

Recognizing the need to promote a safety culture for the use of IV oxytocin for induction and augmentation of labour, PCMCH aims to lead practice change at the frontline level by developing this set of best practice recommendations and driving their implementation across the province to ensure a standardized approach. These recommendations strive to prevent and mitigate the potential of adverse events, as it was identified that there were risks and occurrences of misuse and mismanagement of oxytocin in labour and delivery units, with variations in practice from one centre to another. By publishing a standardized practice for the province, campaigning for a low-dose administration, and improving inter-professional communication, PCMCH foresees that this endeavor will support *Better Maternal-Neonatal Birth Outcomes* in the province. While these proposed practice changes are expected to be employed and built into hospital protocols to improve quality and safety, it is also expected that sound clinical judgment be applied for patients that may fall outside the scope of this work.

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Appendices

Appendix A: Low-Risk Pregnancy Definition

Low-risk Pregnancy Definition	
Parity	Include: Nulliparous pregnant patients
Number of fetuses	Include: Singleton only
Presentation	Include: Cephalic
Gestational age	Include: greater than or equal to 37 weeks
Diabetes	Exclude: Any diabetes
Hypertensive disorders in pregnancy	Exclude: Gestational Hypertension; Eclampsia; HELLP; Preeclampsia; Preeclampsia Requiring Magnesium Sulfate; Pre-existing Hypertension with Superimposed Preeclampsia
IUGR	Exclude: IUGR
Cardiovascular	Exclude: Pre-existing hypertension
Placental	Exclude: placenta previa
Fetal anomalies	Exclude: fetal anomalies
Source: https://www.obgyn.utoronto.ca/sites/default/files/SOON_Newsletter_Spring%202019_Apr%2012%202019.pdf	

Appendix B: Classification of Intrapartum EFM Tracings

	Normal	Atypical	Abnormal
Uterine activity	• Normal contraction pattern	• Tachysystole may be present with normal, atypical, or abnormal tracings; monitor closely for concerning FHR characteristics	
Baseline	• 110–160 bpm	• 100–110 bpm • >160 bpm for 30–80 minutes • Rising baseline • Arrhythmia (Irregular rhythm)	• <100 bpm • >160 bpm for >80 minutes • Erratic baseline
Variability	• 6–25 bpm • ≤5 bpm for <40 minutes	• ≤5 bpm for 40–80 minutes	• ≤5 bpm for >80 minutes • ≥25 bpm for >10 minutes • Sinusoidal
Acceleration	• Spontaneous accelerations but not required • Acceleration with scalp stimulation	• Absence of acceleration with scalp stimulation	• Usually absent (accelerations, if present, do not change classification of tracing)
Deceleration	• None • Non-repetitive uncomplicated variable decelerations • Early decelerations	• Repetitive uncomplicated variables • Non-repetitive complicated variables • Intermittent late decelerations • Single prolonged deceleration ≥2 minutes but <3 minutes	• Repetitive complicated variables • Recurrent late decelerations • Single prolonged deceleration ≥3 minutes but <10 minutes
Interpret clinically (in light of total situation)	• No evidence of fetal compromise	• Physiologic response	• Possible fetal compromise
Terminology	**Recurrent**: Decelerations occur with ≥50% of uterine contractions in any 20-minute window. **Intermittent**: Decelerations occur with <50% of uterine contractions in any 20-minute segment. **Repetitive**: ≥3 in a row **Non-repetitive**: 1 or maximally 2 in a row		

EFM: electronic fetal monitoring; FHR: fetal heart rate.

Source: SOGC Clinical Practice Guideline, Fetal Health Surveillance: Intrapartum Consensus Guideline (No. 396 March 2020)

Appendix C: PCMCH Maternal Hospital Levels of Care Criteria (2013 Update Version)

Diagnostic Tests/Treatments for Maternal Care						
Type of Diagnostic Test/Treatment	**MATERNAL LEVEL**					
Minimum Standard for Level	**Level 1a**	**Level 1b**	**Level 2a**	**Level 2b**	**Level 2c**	**Level 3**
PRENATAL						
Electronic fetal monitoring (i.e., non-stress testing)	YES	YES	YES	YES	YES	YES
IN LABOUR						
Continuous electronic fetal monitoring (external)	NO	YES	YES	YES	YES	YES
OBSTETRICAL INTERVENTIONS						
Induction of labour	NO	YES	YES	YES	YES	YES
Operative vaginal delivery (forceps and/or vacuum)	YES*	YES*	YES	YES	YES	YES
Epidural and/or regional analgesia**	NO**	NO**	YES	YES	YES	YES
Surgery, Caesarean Section	NO	YES	YES	YES	YES	YES
Access to adult Intensive Care Unit (ICU) care on-site	NO	NO	NO	NO	NO	YES
Administration of blood products	YES	YES	YES	YES	YES	YES
POST DELIVERY						
Notes: * Excludes mid-cavity rotation ** Where available for Levels 1a and 1b						

Human Resources for Maternal Care						
Type of Personnel	**MATERNAL LEVEL**					
Minimum Standard for Level	**Level 1a**	**Level 1b**	**Level 2a**	**Level 2b**	**Level 2c**	**Level 3**
MEDICAL – MOST RESPONSIBLE PROVIDER						
Family Physician/ Midwife	YES	YES	YES	YES	YES	YES
General Surgeon/ General Practitioner (GP) Surgeon/ GP Obstetrical Surgeon	NO	YES	NO	NO	NO	NO
Obstetrician	NO	NO	YES	YES	YES	YES
GP Anaesthetist	NO	YES	YES	NO	NO	NO
Anaesthesiologist	NO	NO	NO	YES	YES	YES
Maternal-Fetal Medicine Specialist	NO	NO	NO	NO	NO	YES
NURSING						
Registered Nurse (with maternal-newborn care expertise)	YES	YES	YES	YES	YES	YES
Registered Practical Nurse	Optional	Optional	Optional	Optional	Optional	Optional
OTHER STAFFING SUPPORT						
Pharmacist	NO	NO	YES	YES	YES	YES
Note: Availability of personnel should be consistent with the model of care within the organization and the normal work schedule for the particular professional group.						

For full level of care definitions, including neonatal level of care, click here.

Appendix D: Oxytocin: To Help Start or Speed up Your Labour Patient Education Pamphlet

www.pcmch.on.ca

What happens when I am given oxytocin?

- You will be attached to a continuous **electronic fetal monitor** (EFM) which constantly checks your contractions and your baby's heart rate. The monitor may be removed for a few minutes if you and your baby are okay and the oxytocin rate is not going up or down.
- You will receive oxytocin through an intravenous (IV). It will begin with a low dose and will gradually be increased until your contractions are strong and close together.
- Your HCP may also break your water to help speed up your labour.
- You will receive close care by a nurse or midwife.
- You will have regular vaginal exams to check if your cervix is opening well.
- Some women experience more pain when given oxytocin. If this happens, your HCP will support you and help you decide on a pain relief method that is best for you and your baby, based on your preferences.

Some questions I have for my HCP:

1. _____

_____

2. _____

_____

3. _____

_____

Due date: _____

Date of possible induction:

_____

Who to call to confirm:

_____

Phone #: _____

Where to go: _____

_____

Provincial Council for Maternal and Child Health
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Oxytocin: To Help Start or Speed Up Your Labour

Provincial Council for Maternal and Child Health
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meilleur départ
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Helping you make the right decision with your HCP

For most women, labour begins on its own; but for some, it may be (medically) necessary to have an **induction** (to help start labour) or **augmentation** (to speed up labour). Your health care provider (HCP) may recommend different options for this. One of the ways this can be done is with a medication called oxytocin. It is important to have all the information you need to make the best decision for you and your baby.

Oxytocin: What you need to know

Oxytocin is a hormone that is produced naturally. It helps your uterus to contract enough for labour. Contractions are needed to open the lower part of your uterus (called the "cervix"). Your cervix has to open fully for you to give birth vaginally.

If stronger contractions are needed to make your birth come more quickly, your HCP may recommend a medication which is similar to the natural hormone you would produce. It is given by intravenous (IV), which is a small tube placed into your arm to give you fluid. The tube will be attached to a pump and it will measure the fluid and medication you will receive.

How would I benefit from an induction with oxytocin?

An induction is recommended when a health problem makes continuing pregnancy more risky. Giving oxytocin is one of several ways that your HCP may offer you to make your labour come quicker.

Reasons related to your pregnancy:

- You have gone more than a week or two past your due date.
- Your baby is not growing well or baby movements have slowed down.
- Your water has broken before labour has started.
- You have an infection.
- You have a medical illness like high blood pressure, diabetes, kidney disease or heart problems.
- You have a problem with your placenta.

Labour is usually induced for valid medical reasons. There may be other reasons why you are offered an induction with oxytocin.

Please speak with your HCP to understand your specific needs and discuss your treatment plan.

How would I benefit from an augmentation with oxytocin?

If your labour slows down, oxytocin is sometimes used to help increase your contractions so they are stronger and closer together, resulting in your cervix opening.

What are the risks of IV oxytocin?

For safety, an induction or augmentation with oxytocin needs to happen in a hospital setting. Your HCP will begin with a low dose of oxytocin and will monitor you and your baby closely. Some women need more time with oxytocin than others. Decisions about your care will be based on how your body reacts to the oxytocin.

Some of the risks include:

- Your uterus contracts too frequently or there may be unexpected changes in the baby's heart rate. If this happens, the oxytocin may be reduced or stopped to ensure that you and your baby are safe. If you and your baby are okay, the oxytocin could be restarted at a later time.
- If your body doesn't respond to oxytocin as expected, or if you or your baby show concerning signs, your HCP might recommend a caesarean birth.

NOTE: To download the handout, please click here.

Appendix E: HIROC Case Example – Failure to Communicate Fetal Status

RISK REFERENCE SHEET

HIROC

Failure to Communicate Fetal Status

Sector: Acute Care (Maternal/Newborn)

Failure to communicate (or effectively communicate) fetal status and/or obtain a consult regarding abnormal fetal status or concerns arising during labour is a frequent occurrence in HIROC obstetrical claims. While practitioners are accountable for their decisions to hold-off on notifying or escalating medical management concerns/disagreements with the most responsible practitioner (MRP), long standing negative interdisciplinary and/or leadership dynamics and instability can present barriers to effective team communication during clinical situations. In cases where communication or consultation did take place, lack of documentation makes the case particularly challenging to defend.

COMMON CLAIM THEMES

- Significant delays notifying/requesting MRP attendance following patient arrival at obstetrical triage and/or admission to the labour/delivery unit.
- Different definitions/terms to describe fetal status resulting in treatment and communication delays.
- Delay in communicating abnormal fetal heart rate (FHR) patterns identified in obstetrical triage to the labour floor nurse and MRP.
- Delay in communicating (including calling for assistance) due to:
  - Perceived/actual power and control imbalances, hostility, conflicts and trust issues within the interdisciplinary team including long standing negative leadership dynamics and instability;
  - Cumbersome, impractical and non-specific chain of command/escalation protocols;
  - On-call practitioners participation in elective procedures and/or clinic;
  - Misinterpretation of fetal heart rate patterns and/or decreased vigilance over time to atypical and abnormal patterns (e.g. clinically significant changes to baseline and variability, prolonged second stage of labour, oxytocin-inducted fetal tachycardia or uterine tachysystole and FHR abnormalities);
  - 'Wait and see' approach (i.e. wait until the situation is emergent);
  - Poor patient handover practices (e.g. staff breaks and shift changes).
- Informal communications/consultations later disputed by the consultant/MRP (e.g. nurse to nurse, midwife to physician, nurse to physician).
- Lack of documentation of paging efforts to on-call physician and level of urgency communicated.
- Lack of clarity as to who can call the second on-call physician and/or activate the obstetrical emergency contingency plan when the on-call obstetrician, anaesthesiologist or paediatrician is unavailable or does not attend in a timely manner.

CASE STUDY 1

A maternal patient presented to the obstetrical triage unit for monitoring. An abnormal FHR pattern was identified by the triage nurse just before the patient was transferred to the labour floor. Late decelerations and minimal variability were identified by the labour floor nurse shortly after admission to the floor and were communicated to the MRP. An emergency C-section was performed. Long-term neurological sequelae were not ruled out. Expert review was not supportive of the nurses' management or communication practices, in particular the 90 minute delay notifying the MRP from the onset of loss of variability in the triage unit. The triage nurse recalled advising the labour floor nurse of the abnormal tracing and need to notify the MRP prior to the transfer, a recollection which was disputed by the labour floor nurse.

CASE STUDY 2

Nurses encountered periodic atypical and abnormal FHR patterns throughout the patient's second stage of labour. The FHR findings were constantly communicated; however, the obstetrician dismissed the nurses' concerns and believed the FHR patterns to be 'normal'. Worried about the obstetrician's lack of concern, the charge nurse was notified. The nurses elected not to escalate the matter further (e.g. to the Department lead/chief) despite their reservations about the patient's medical management. Following a prolonged and abnormal active labour, the infant was diagnosed with moderate brain damage. Review of the case indicated the labour floor lacked a chain of command policy, and nursing leadership for the unit was reluctant to go over and above the attending obstetrician with regard to care.

Canadian Case Examples

RISK REFERENCE SHEET

HIROC

Failure to Communicate Fetal Status: Maternal/Newborn

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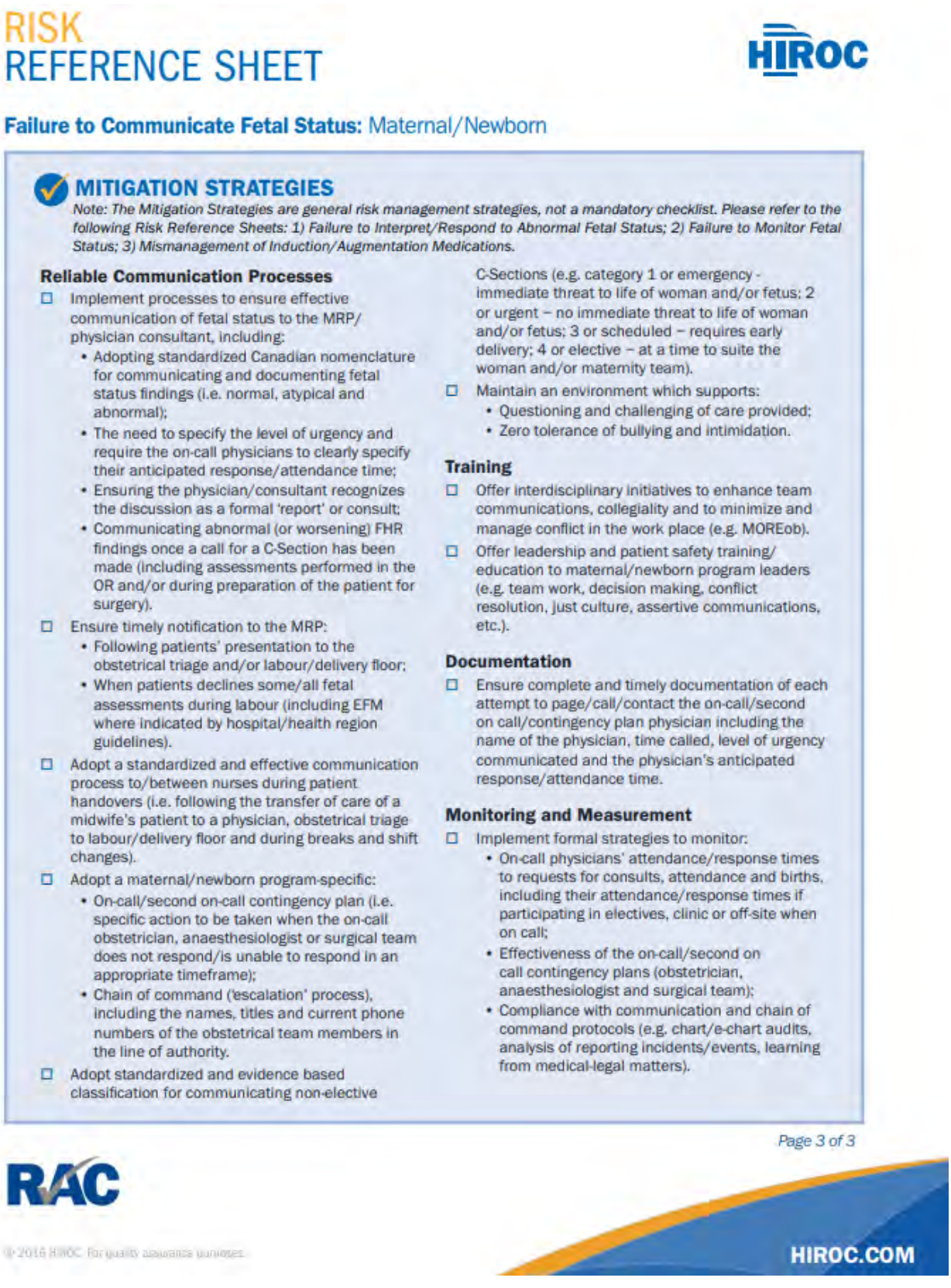
Date last reviewed: March 2016



RISK
REFERENCE SHEET

HIROC

Failure to Communicate Fetal Status: Maternal/Newborn

MITIGATION STRATEGIES

Note: The Mitigation Strategies are general risk management strategies, not a mandatory checklist. Please refer to the following Risk Reference Sheets: 1) Failure to Interpret/Respond to Abnormal Fetal Status; 2) Failure to Monitor Fetal Status; 3) Mismanagement of Induction/Augmentation Medications.

Reliable Communication Processes

- ☐ Implement processes to ensure effective communication of fetal status to the MRP/ physician consultant, including:
  - Adopting standardized Canadian nomenclature for communicating and documenting fetal status findings (i.e. normal, atypical and abnormal);
  - The need to specify the level of urgency and require the on-call physicians to clearly specify their anticipated response/attendance time;
  - Ensuring the physician/consultant recognizes the discussion as a formal 'report' or consult;
  - Communicating abnormal (or worsening) FHR findings once a call for a C-Section has been made (including assessments performed in the OR and/or during preparation of the patient for surgery).
- ☐ Ensure timely notification to the MRP:
  - Following patients' presentation to the obstetrical triage and/or labour/delivery floor;
  - When patients declines some/all fetal assessments during labour (including EFM where indicated by hospital/health region guidelines).
- ☐ Adopt a standardized and effective communication process to/between nurses during patient handovers (i.e. following the transfer of care of a midwife's patient to a physician, obstetrical triage to labour/delivery floor and during breaks and shift changes).
- ☐ Adopt a maternal/newborn program-specific:
  - On-call/second on-call contingency plan (i.e. specific action to be taken when the on-call obstetrician, anaesthesiologist or surgical team does not respond/is unable to respond in an appropriate timeframe);
  - Chain of command ('escalation' process), including the names, titles and current phone numbers of the obstetrical team members in the line of authority.
- ☐ Adopt standardized and evidence based classification for communicating non-elective C-Sections (e.g. category 1 or emergency - immediate threat to life of woman and/or fetus; 2 or urgent – no immediate threat to life of woman and/or fetus; 3 or scheduled – requires early delivery; 4 or elective – at a time to suite the woman and/or maternity team).
- ☐ Maintain an environment which supports:
  - Questioning and challenging of care provided;
  - Zero tolerance of bullying and intimidation.

Training

- ☐ Offer interdisciplinary initiatives to enhance team communications, collegiality and to minimize and manage conflict in the work place (e.g. MOREob).
- ☐ Offer leadership and patient safety training/ education to maternal/newborn program leaders (e.g. team work, decision making, conflict resolution, just culture, assertive communications, etc.).

Documentation

- ☐ Ensure complete and timely documentation of each attempt to page/call/contact the on-call/second on call/contingency plan physician including the name of the physician, time called, level of urgency communicated and the physician's anticipated response/attendance time.

Monitoring and Measurement

- ☐ Implement formal strategies to monitor:
  - On-call physicians' attendance/response times to requests for consults, attendance and births, including their attendance/response times if participating in electives, clinic or off-site when on call;
  - Effectiveness of the on-call/second on call contingency plans (obstetrician, anaesthesiologist and surgical team);
  - Compliance with communication and chain of command protocols (e.g. chart/e-chart audits, analysis of reporting incidents/events, learning from medical-legal matters).

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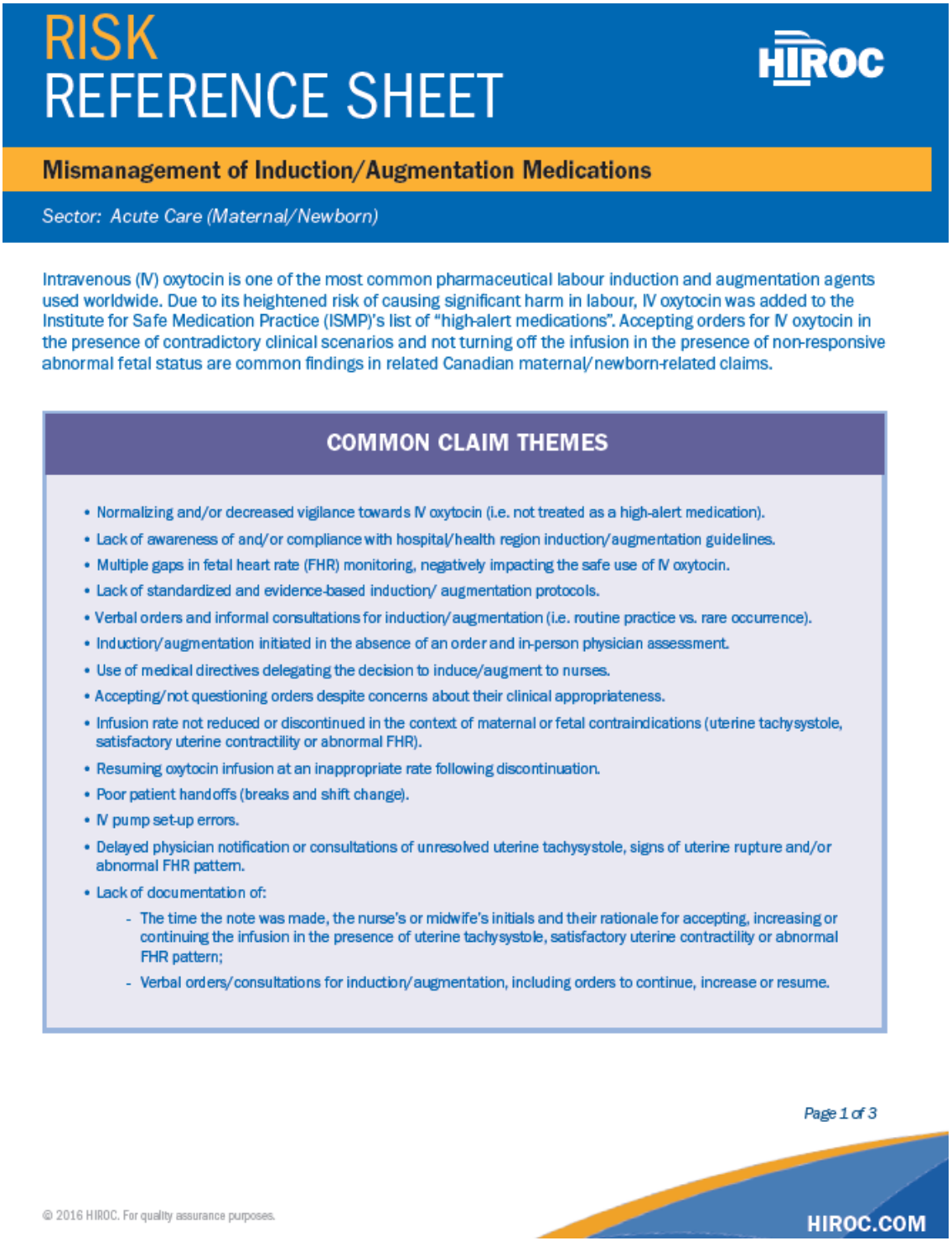
NOTE: For full size reference sheet, click here.

Appendix F: HIROC Case Examples – Mismanagement of Induction/Augmentation Medications



RISK
REFERENCE SHEET

HIROC

Mismanagement of Induction/Augmentation Medications

Sector: Acute Care (Maternal/Newborn)

Intravenous (IV) oxytocin is one of the most common pharmaceutical labour induction and augmentation agents used worldwide. Due to its heightened risk of causing significant harm in labour, IV oxytocin was added to the Institute for Safe Medication Practice (ISMP)'s list of "high-alert medications". Accepting orders for IV oxytocin in the presence of contradictory clinical scenarios and not turning off the infusion in the presence of non-responsive abnormal fetal status are common findings in related Canadian maternal/newborn-related claims.

COMMON CLAIM THEMES

- Normalizing and/or decreased vigilance towards IV oxytocin (i.e. not treated as a high-alert medication).
- Lack of awareness of and/or compliance with hospital/health region induction/augmentation guidelines.
- Multiple gaps in fetal heart rate (FHR) monitoring, negatively impacting the safe use of IV oxytocin.
- Lack of standardized and evidence-based induction/ augmentation protocols.
- Verbal orders and informal consultations for induction/augmentation (i.e. routine practice vs. rare occurrence).
- Induction/augmentation initiated in the absence of an order and in-person physician assessment.
- Use of medical directives delegating the decision to induce/augment to nurses.
- Accepting/not questioning orders despite concerns about their clinical appropriateness.
- Infusion rate not reduced or discontinued in the context of maternal or fetal contraindications (uterine tachysystole, satisfactory uterine contractility or abnormal FHR).
- Resuming oxytocin infusion at an inappropriate rate following discontinuation.
- Poor patient handoffs (breaks and shift change).
- IV pump set-up errors.
- Delayed physician notification or consultations of unresolved uterine tachysystole, signs of uterine rupture and/or abnormal FHR pattern.
- Lack of documentation of:
  - The time the note was made, the nurse's or midwife's initials and their rationale for accepting, increasing or continuing the infusion in the presence of uterine tachysystole, satisfactory uterine contractility or abnormal FHR pattern;
  - Verbal orders/consultations for induction/augmentation, including orders to continue, increase or resume.

Page 1 of 3

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RISK REFERENCE SHEET

HIROC

Mismanagement of Induction/Augmentation Medications: Maternal/Newborn

CASE STUDY 1

A G3P2 patient's labour was augmented by IV oxytocin. The rate of infusion was increased three times over a 60 minute period before the FHR became difficult to detect. While an emergency C-Section was performed the infant sustained long-term brain damage. Experts were not supportive of the physician's decision to order augmentation as well as the nurse's decision to accept the order and increase the rate of infusion as the patient's uterine contractions were recorded prior to and throughout the augmentation as being strong and frequently occurring. The experts were also critical of the nurse's decision to increase the rate of infusion to a higher rate than prescribed by hospital protocol, delays in turning off infusion and notifying the most responsible practitioner (MRP) in the presence of a tachysystole of the uterus and loss of the fetal heart rate. It was also suggested that a communication breakdown between the primary and relief nurse during the augmentation contributed to a delay notifying the MRP.

CASE STUDY 2

A G1P0 maternal patient underwent IV augmentation due to slow progress of labour. Oxytocin was ordered and implemented 'as per protocol'. Within a couple of hours, minimal FHR variability and decelerations were encountered however the infusion continued. Ultimately a STAT C-Section was performed and the infant sustained permanent neurological sequelae. Experts were not supportive of the nurse's decision to not turn off the oxytocin, hesitancy to challenge or escalate concerns surrounding the physician's order to continue with augmentation in the presence of ongoing abnormal FHR patterns and questioned whether the nurse 'blindly followed' orders. The nurse's concerns were not recorded in the health record or brought to the attention of the physician or team lead. Review of the case indicated the nurse hesitated to voice concerns as the physician was constantly in the room, and felt the call for the C-Section was imminent.

Canadian Case Examples

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RISK REFERENCE SHEET

HIROC

Mismanagement of Induction/Augmentation Medications: Maternal/Newborn

MITIGATION STRATEGIES

Note: The mitigation strategies are general risk management strategies, not a mandatory checklist. Please also refer to the following Risk Reference Sheets: 1) Failure to Monitor Fetal Status; 2) Failure to Interpret/Respond to Abnormal Fetal Status; 3) Failure to Communication Fetal Status.

Reliable Care Processes

- ☐ Adopt standardized induction/augmentation dosing protocols or order sets, including starting dose and incremental increases, and the defined rate (or range) of infusion at which to resume oxytocin after discontinuation.
- ☐ Adopt standardized algorithms/clinical pathways to guide clinical decision making when ordering, initiating and monitoring during induction/augmentation including:
  - Indications for the immediate reduction or discontinuation of the infusion without notifying/consulting the ordering/on call physician;
  - Use of standardized 'pre-oxytocin' and 'oxytocin in-use' checklists.
- ☐ Require an in-person physician assessment of the patient and a written order before an order for induction/augmentation is implemented and before restarting or increasing the rate of infusion in the presence of maternal or fetal contraindications (e.g. uterine tachysystole and abnormal FHR patterns); prohibit the use of induction/augmentation 'standing orders' and medical directives.
- ☐ Maintain an environment which supports the questioning and challenging of induction/augmentation orders.

Documentation

- ☐ Ensure complete and timely nursing and midwifery documentation of physician consultations and orders for induction/augmentation (e.g. name of the ordering/consulting physician; date/time the order/consult took place; the fetal status and risk factors relayed at the time of discussion/consultation; the findings and recommendations; changes to the birth plan/management plan).
- ☐ Ensure complete and timely nursing and midwifery documentation of the rationale for accepting an order, continuing or increasing the rate of infusion in the presence of maternal or fetal contraindications ('as per protocol' or 'as per orders' is not sufficient).

Training

- ☐ Offer interdisciplinary/team based educational sessions on induction/augmentation medications (e.g. dosing regimens, intervals between rate increases and impact on fetal reserves).

Monitoring and Measurement

- ☐ Implement formal strategies to monitor:
  - Frequency and impact of oxytocin-induced uterine tachysystole;
  - Non-compliance with in-person assessment and written order requirements for pharmaceutical induction/augmentation;
  - Perinatal harm incidents involving induction/augmentation medications (e.g. chart audits/trigger tools, incident reports, team debriefs, quality reviews);
  - Compliance with 'pre' and 'in-use' oxytocin checklists and induction/augmentation 'bundles' (where bundles are used).

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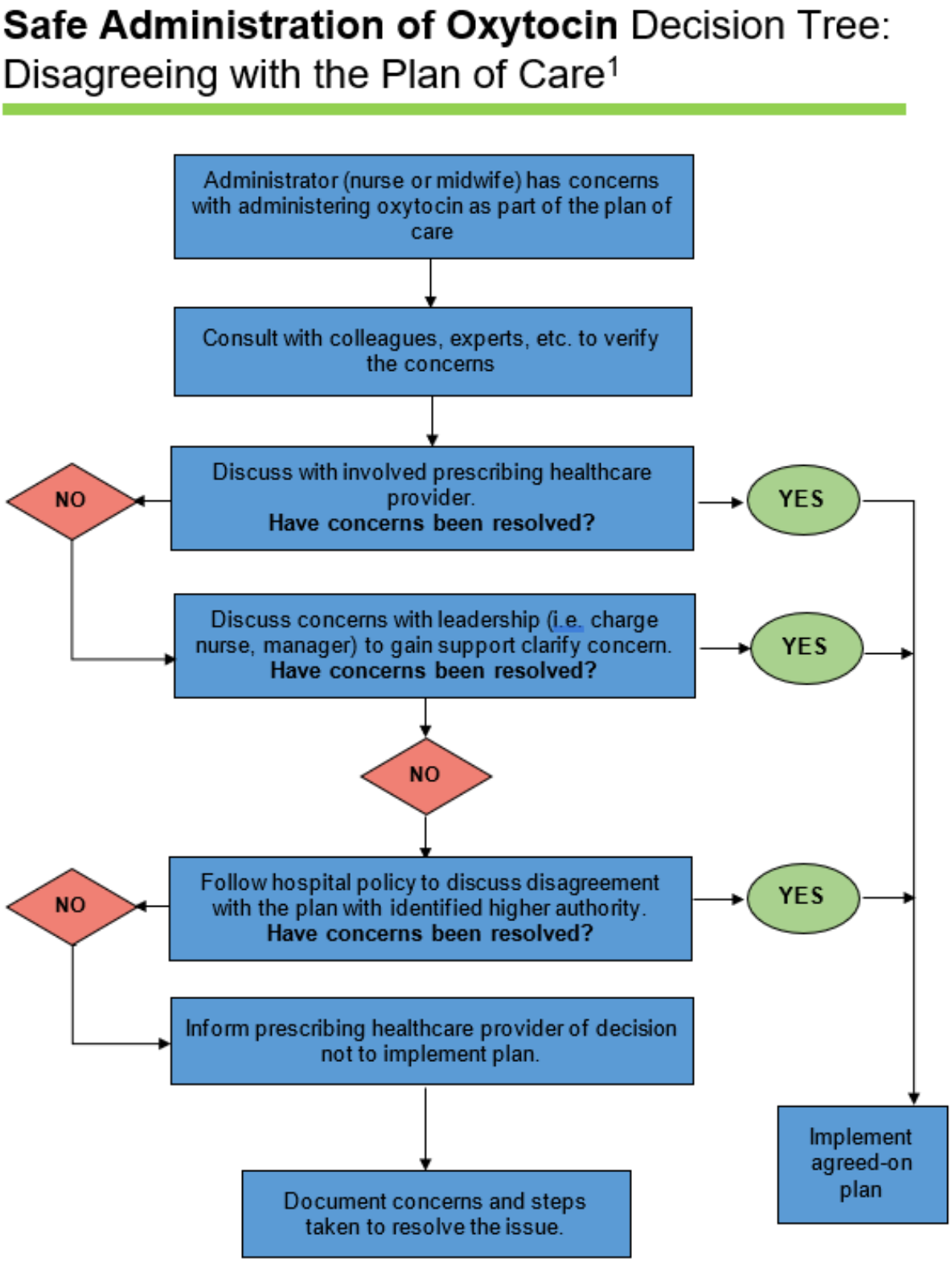
Appendix G: Communication Technique Examples

Name of Tool	Purpose
SBAR	This tool supports concise and urgent communications. **Situation** - problem, patient, project **Background** - important information **Assessment** - your evaluation **Recommendations** - actions required For more information, please visit: IHI – SBAR Toolkit: https://bit.ly/2iZNwMg
I Pass The Baton	This tool guides communications around proper handoffs and health care transitions. The phrase is an acronym that denotes: **I**ntroduction, **P**atient, **A**ssessment, **S**ituation, **S**afety The **B**ackground, **A**ctions, **T**iming, **O**wnership, **N**ext For more information, please visit: • ACOG – Communication Strategies for Patient Handoffs: https://bit.ly/2C9YgOs • AHRQ – Team STEPPS system: https://bit.ly/2nAx32X
Team STEPPS system	This communication system is a compendium of evidence-based tools and techniques that help manage crucial conversations or "just in time" conversations. Examples of these are: a. Morning briefings b. Team Check-ups and Call-out strategies c. Debriefs on Accountability d. Using CUS language for patient advocacy, "**C**oncerned, **U**ncomfortable, this is a **S**afety issue". It supports better management of conflicts by using a constructive positive approach to emphasize "**what** is right, not **who** is right" with DESC method: **D:** Describe the specific behavior or situation. **E:** Express how the situation makes you feel or concerns you. **S:** Suggest other alternatives. **C:** Consequences stated in terms of team goals, not punishment. For a complete list of tools and strategies, please visit: AHRQ – Team STEPPS Guide: https://bit.ly/2v2A66o

Appendix H: Decision Tree: Disagreeing with Plan of Care



1. Source: Adapted from CNO, "CNO Practice Guidelines: Disagree With the Plan of Care", June 2009

NOTE: To download the tool individually in PDF format, please click here.

Appendix I: Indications of Induction of Labour with Oxytocin

<table>
<tr><th colspan="2">Criteria for Induction</th></tr>
<tr><td>High Priority [6]
Preeclampsia ≥ 37 weeks
Significant maternal disease not responding to treatment
Significant but stable antepartum hemorrhage
Chorioamnionitis
Suspected fetal compromise
Term pre-labour rupture of membranes with maternal GBS colonization</td><td>Other Indications [6]
Postdates (> 41+0 weeks) or post-term (> 42+0 weeks) pregnancy
Uncomplicated twin pregnancy ≥ 38 weeks
Diabetes mellitus (glucose control may dictate urgency)
Alloimmune disease at or near term
Intrauterine growth restriction
Oligohydramnios
Gestational hypertension ≥ 38 weeks
Intrauterine fetal death
PROM at or near term, GBS negative
Logistical problems (history of rapid labour, distance to hospital)
Intrauterine death in a prior pregnancy (Induction may be performed to alleviate parental anxiety, but there is no known medical or outcome advantage for mother or baby.)</td></tr>
<tr><td colspan="2">Contraindications [6]
Placenta or vasa previa or cord presentation
Abnormal fetal lie or presentation (e.g., transverse lie or footling breech)
Prior classical or inverted T uterine incision
Significant prior uterine surgery (e.g., full thickness myomectomy)
Active genital herpes
Pelvic structural deformities
Invasive cervical carcinoma
Previous uterine rupture
Unacceptable Indications [6]
Care provider or patient convenience
Suspected fetal macrosomia (estimated fetal weight > 4000 g) in a non-diabetic woman is an unacceptable indication because there is no reduction in the incidence of shoulder dystocia but twice the risk of CS.</td></tr>
<tr><td colspan="2">Source: SOGC, “SOGC Clinical Practice Guideline: Induction of Labour”, September 2013</td></tr>
</table>

Appendix J: Indications for Augmentation of Labour with Oxytocin

Criteria for Oxytocin Augmentation

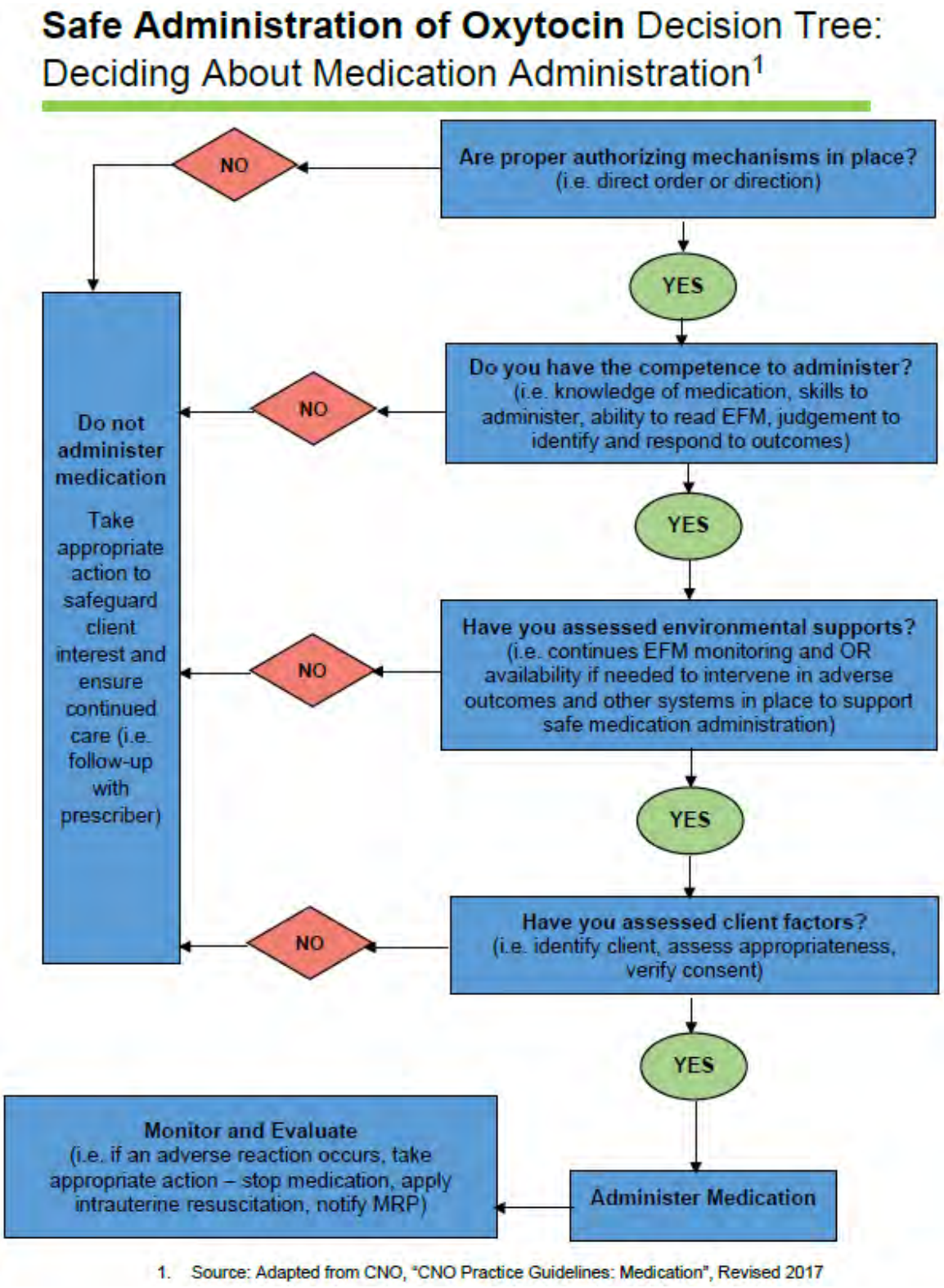
• Latent phase labour exceeding 20 hours in a primiparous patient or exceeding 14 hours in a parous patient. [34]
• Slow progress of labour, which is defined as a cervical dilatation rate of less than 0.5 cm to 1 cm per hour during the active phase. [26]
• Active phase labour with arrest of dilatation exceeding 2 hours with inadequate uterine activity. [34]
• Second-stage arrest of descent with inadequate uterine activity, defined as [34]:
  o A contraction pattern demonstrating less than 220 MVU in the presence of inadequate labour progress, as defined in above.
  o A contraction pattern with less than a contraction every 2-3 minutes, lasting less than 80-90 seconds, and not palpating strong to an experienced labour nurse

Appendix K: Modified Bishop Score System

Factor	Score		
	0	**1**	**2**
Cervical dilation, cm	0	1–2 cm	3–4 cm
Cervical effacement, %	0-30%	40-50%	60-70%
Length, cm	>3	1-3	<1
Cervical consistency	Firm	Medium	Soft
Cervical position	Posterior	Middle	Anterior
Fetal station	Sp −3 or above	Sp −2	Sp −1 or 0
Source: SOGC, "SOGC Clinical Practice Guideline: Induction of Labour", September 2013			

Method for Use:
The Bishop score allows the clinician to score 5 factors to assess whether a patient's cervix is in good condition for an induction of labour. Depending on the assessed state of a factor (such as the patient's cervix length), it would be given a score of 0, 1, or 2. The sum of these scores for all of the factors will determine if the cervix is ripe enough to proceed with an induction. A Bishop score less than or equal to 6 indicates that the cervix is unripe and will require a ripening agent before being induced with IV oxytocin.

Appendix L: Decision Tree: Deciding About Medication Administration



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Appendix M: PCMCH Sample Oxytocin Order Set

Provincial Council for Maternal and Child Health	*Hospital Name/Logo*	*Patient Identification*

Labor and Delivery Order Set
Oxytocin Induction and Augmentation

Allergies ☐ No Known Allergies ☐ _____

Date prescribed	**Time:**

Admission

☐ Admit to Labour and Delivery Unit under attending MRP. Refer to hospital Admission Order set

Prior to Commencing Oxytocin:

☐ Patient consent for the administration of oxytocin for the induction or augmentation of labour is documented.
☐ Patient is examined vaginally and has a Bishop score documented.
☐ Patient has no contraindications to vaginal birth, such as placenta previa or vasa previa, prior classic uterine incision or other uterine surgeries that contraindicate attempts at vaginal delivery, and/or prolapsed cord.
☐ Continuous electronic fetal monitoring (EFM) for at least 20 minutes (to confirm a normal fetal heart rate (FHR) pattern and uterine activity (UA)). If EFM tracing is atypical or abnormal, notify the MRP immediately (SOGC, 2007).
☐ 6 hours has passed since the last dose of prostaglandins gel (Prostin, Prepidil) (SOGC, 2013).
☐ 4 hours has passed since the last dose of misoprostol (SOGC, 2013).
☐ 30mins has passed since the removal of a dinpoprostone insert (Cervidil) (SOGC, 2013).

Monitoring During Oxytocin Infusion:

☐ Continuous electronic fetal monitoring (CPPC, 2018; RCOG, 2001).
☐ Electronic fetal monitoring may be interrupted for periods of up to 30 minutes in the first stage of labour (if tracing is normal, maternal-fetal condition is stable, and the infusion rate of oxytocin has not been increased in the last 30 minutes) to allow for ambulation, personal care, and hydrotherapy (SOGC, 2020; CPPC, 2020).
☐ Assess and document the FHR and UA assessment findings:
  - q15 minutes during first stage of labour and before the onset of pushing in the second stage (CPPC, 2018; SOGC, 2007).
  - q15 minutes during active second stage, once the woman has begun pushing (CPPC, 2020; SOGC, 2020).
  - Maternal heart rate, respirations, and blood pressure q30min and prn. **Notify MRP if vitals outside normal limits.**
  - Maternal temperature q4h if membranes intact, q2h once membranes have ruptured and prn. (Perry et al., 2017). **Notify MRP if temperature is greater than 38°C.**
  - Monitor intake and output and observe for signs of water intoxication/hyponatremia (e.g., lethargy, ataxia, confusion, seizures).
  - Vaginal examination q2-4h or PRN for labour progress in the first stage (Perinatal Services BC, 2011)
  - Vaginal examination q1h in the active second stage (Perinatal Services BC, 2011)
☐ Notify MRP immediately when any signs of the following occur:
  - Atypical or abnormal FHR
  - Tachysystole (defined over 30 minutes)
  - Excessive vaginal bleeding

Medication

- ☐ Primary IV initiated with maintenance infusion of ☐ 0.9% Sodium Chloride OR ☐ Ringers Lactate at ☐ _____ mL/hr on IV smart pump
- ☐ Oxytocin infusion 10 units in 500 mL of ☐ 0.9% Sodium Chloride **OR** ☐ Ringers Lactate on IV smart pump
  - Note: Final concentration of solution is **Oxytocin 20 milliunits/mL.**
- ☐ Piggyback oxytocin infusion onto primary IV line connected at port closest to the patient.
- ☐ Independent double check performed for initial pump set up as per table 2.
- ☐ Low Dose Protocol
  - Start oxytocin infusion at ☐ **1 milliunits/minute (3 mL/hour) OR** ☐ **2 milliunits/minute (6 mL/hour).**
  - Increase the rate by ☐ **1 milliunits/minute (3 mL/hour) OR** ☐ **2 milliunits/minute (6 mL/hour) q 30 minutes**, as needed, until a normal uterine contraction pattern is achieved. Refer to table 1 for dosage chart and table 3 for definition of normal uterine contraction pattern.
  - Do not exceed a rate of **12 milliunits/minute** without reassessment and/or verbal order from MRP.
  - Do not exceed a rate of **20 milliunits/minute** without a **written order from the MRP**. MRP reassessment required at 20 milliunits/minute, and if required a maximum infusion rate of 30 milliunits/minute may be ordered.

Reduce Oxytocin

- ☐ In the event of atypical FHS (as defined in table 5), reduce the oxytocin infusion rate by half or stop oxytocin infusion.
- ☐ In the event of tachystole (as defined in table 3) **with a normal or atypical FHS, decrease oxytocin to half the rate or stop oxytocin infusion.**
- ☐ Apply intrauterine resuscitation interventions as defined in *Intrauterine Resuscitation* table 4 below.
- ☐ Document clinical actions and notify MRP when oxytocin decreased.

Stop Oxytocin

- ☐ In the event of an abnormal FHS (as defined in table 5), **stop oxytocin immediately.**
- ☐ In the event of tachystole (as defined in table 3) **with an** abnormal FHS, **stop oxytocin immediately.**
- ☐ Apply intrauterine resuscitation interventions as defined in *Intrauterine Resuscitation* (table 4).
- ☐ Document clinical actions and notify MRP when oxytocin discontinued.

Restart Orders

- ☐ Restart oxytocin at half the rate IF: it has been discontinued for less than 30mins, and the FHR tracing and contraction pattern are normal.
- ☐ Restart oxytocin at initial starting dose IF: it has been discontinued for 30mins or longer, the FHR tracing and contraction pattern are normal, and a complete fetal and maternal assessment has been discussed with the MRP prior to restarting.

Additional Order

_____
_____
_____
_____
_____
_____
_____
_____

Ordering MRP

Print Name: _____ Signature: _____

NOTE: To download this tool in PDF format, please click here.

Information Tables

Table 1: Oxytocin Dosage Rate

Oxytocin 10 International Units (IU) in 500 mL of IV fluid (20 milliunits/mL)			
Dose	**Rate / Hour**	**Dose**	**Rate / Hour**
1 milliunits/minute	3 mL/h	11 milliunits/minute	33 mL/h
2 milliunits/minute	6 mL/h	12 milliunits/minute	36 mL/h
3 milliunits/minute	9 mL/h	13 milliunits/minute	39 mL/h
4 milliunits/minute	12 mL/h	14 milliunits/minute	42 mL/h
5 milliunits/minute	15 mL/h	15 milliunits/minute	45 mL/h
6 milliunits/minute	18 mL/h	16 milliunits/minute	48 mL/h
7 milliunits/minute	21 mL/h	17 milliunits/minute	51 mL/h
8 milliunits/minute	24 mL/h	18 milliunits/minute	54 mL/h
9 milliunits/minute	27 mL/h	19 milliunits/minute	57 mL/h
10 milliunits/minute	30 mL/h	20 milliunits/minute	60 mL/h

Table 2: Independent Double Check for Initial Pump Set Up

Independent Double Check for Initial Pump Set Up

To be performed and signed by two regulated health care professionals (e.g. RN, MW, MD).

CHECK 1		CHECK 2
	Correct Patient	
	Correct Drug	
	Correct Drug Concentration (on bag)	
	Correct Programmed Concentration on Smart Pump	
	Correct rate (in milliunits/minute)	
	Correct IV Line and Port Connection	

Check 1: _____ _____

Printed Name Signature

Check 2: _____ _____

Printed Name Signature

Tables 3, 4, and 5 are sourced from the Society of Obstetrics and Gynaecologists of Canada (SOGC) No. 396 Fetal Health Surveillance: Intrapartum Consensus Guideline (Dore et al., 2020) and the content is intended to support one's understanding and utilization of the above Order Set.

Table 3: Classification of Normal Uterine Activity and Tachysystole
SOGC Clinical Practice Guideline, Fetal Health Surveillance: Intrapartum Consensus Guideline (No. 396 March 2020)
Normal • **Frequency**: 5 or less contractions in a 10-minute window, averaged over 30 minutes • **Duration:** Less than 90 seconds • **Intensity:** Mild, moderate or strong by fundal palpation, **OR** IUPC >25 mm Hg and <75 mm Hg above the baseline except in second stage • **Resting tone:** Uterus soft on palpation for a minimum of 30 seconds between contractions, **OR** IUPC <25 mm Hg
Tachysystole Includes any of the following criteria: • **Frequency:** 6 or more contractions in a 10-minute window, averaged over 30 minutes • **Duration**: More than 90 seconds • **Resting tone:** Resting period between contractions of <30 seconds **OR** the uterus remains firm or >25 mm Hg between contractions

Table 4: Intrauterine resuscitation
SOGC Clinical Practice Guideline, Fetal Health Surveillance: Intrapartum Consensus Guideline (No. 396 March 2020)
The goal of intrauterine resuscitation is to improve uterine blood flow, umbilical circulation, and maternal–fetal oxygenation. Actions may include the following: • Remove vaginal PGE_2/ **Stop or decrease oxytocin** • Change maternal position to left or right lateral • Check maternal vital signs, including differentiation of maternal heart rate from fetal heart rate • Ask woman to modify or pause pushing efforts in the active second stage of labour • Improve maternal hydration, with an intravenous fluid bolus, only if indicated (i.e., maternal hypovolemia and/or hypotension); be aware of maternal fluid balance • Perform vaginal examination to rule out cord prolapse and assess progress • Consider tocolysis in the presence of tachysystole with atypical or abnormal tracing (e.g., with intravenous nitroglycerine). Although sublingual is frequently used, it is not effective. • Consider amnioinfusion in the presence of complicated variable decelerations • Provide supportive care to reduce maternal anxiety (to lessen catecholamine impact) • Consider oxygen by mask only when maternal hypoxia and/or hypovolemia is suspected/confirmed. Oxygen is reserved for maternal resuscitation in the presence of maternal hypoxia or hypovolemia, NOT for fetal resuscitation.

Table 5: Classification of Intrapartum EFM Tracings

SOGC Clinical Practice Guideline, Fetal Health Surveillance: Intrapartum Consensus Guideline (No. 396 March 2020)

	Normal	Atypical	Abnormal
Uterine activity	• Normal contraction pattern	• Tachysystole may be present with normal, atypical, or abnormal tracings; monitor closely for concerning FHR characteristics	
Baseline	• 110–160 bpm	• 100–110 bpm • >160 bpm for 30–80 minutes • Rising baseline • Arrhythmia (Irregular rhythm)	• <100 bpm • >160 bpm for >80 minutes • Erratic baseline
Variability	• 6–25 bpm • ≤5 bpm for <40 minutes	• ≤5 bpm for 40–80 minutes	• ≤5 bpm for >80 minutes • ≥25 bpm for >10 minutes • Sinusoidal
Acceleration	• Spontaneous accelerations but not required • Acceleration with scalp stimulation	• Absence of acceleration with scalp stimulation	• Usually absent (accelerations, if present, do not change classification of tracing)
Deceleration	• None • Non-repetitive uncomplicated variable decelerations • Early decelerations	• Repetitive uncomplicated variables • Non-repetitive complicated variables • Intermittent late decelerations • Single prolonged deceleration ≥2 minutes but <3 minutes	• Repetitive complicated variables • Recurrent late decelerations • Single prolonged deceleration ≥3 minutes but <10 minutes
Interpret clinically (in light of total situation)	• No evidence of fetal compromise	• Physiologic response	• Possible fetal compromise
Terminology	**Recurrent**: Decelerations occur with ≥50% of uterine contractions in any 20-minute window. **Intermittent**: Decelerations occur with <50% of uterine contractions in any 20-minute segment. **Repetitive**: ≥3 in a row **Non-repetitive**: 1 or maximally 2 in a row		

EFM: electronic fetal monitoring; FHR: fetal heart rate.

Appendix N: Pre-Use Oxytocin Safety Checklist

Pre-Use Oxytocin Safety Checklist[1]

If the following checklist cannot be completed, oxytocin should not be initiated.

- ☐ Current history, physical, and perinatal record in the chart.[2]
- ☐ Indication for induction or augmentation with oxytocin is documented in the patient's health record.
- ☐ Patient demonstrates understanding of benefits and risks associated with oxytocin administration and verbal consent is received and documented by MRP in patient's chart.
- ☐ Patient has no contraindication for vaginal delivery.
- ☐ Unit acuity has been assessed and physician, and/or other health care team members are aware of the induction/augmentation and are readily available in the event of an emergency.
- ☐ Cervical status is assessed and documented.
- ☐ Fetal presentation is assessed and documented.
- ☐ Appropriate fetal health surveillance (FHS) assessment has been performed. The fetal heart rate (FHR) pattern is normal, and has been documented (prior to induction, a normal 20-minute Non-Stress Test (NST); or prior to augmentation, a normal FHR has been observed on electronic fetal monitoring (EFM)).
- ☐ Order signed and in chart.

Notes:

1. Low-Risk Pregnant Patients: This checklist was developed to support the safe management of pregnant patients whose labour is induced or augmented with oxytocin and focuses on low-risk patients with a singleton, cephalic, term pregnancy. It may also be applicable to patients outside of this definition.
2. This may be delayed for non-elective admissions. Hospitals should obtain the patient's Ontario Perinatal Record 1 and 2; however, in the event it is not available, the physician/midwife should perform a thorough assessment of the patient (including collecting past clinical history and Bishop score) to determine eligibility for oxytocin.

This checklist represents a guideline for care: however, individualized medical care is directed by the primary care provider.

Source: Adapted from the HCA Healthcare Perinatal Safety Initiative, Pre-Oxytocin Checklist, 2009.

NOTE: To download this tool in PDF format, please click here.

Appendix O: In-Use Oxytocin Safety Checklist

In-Use Oxytocin Safety Checklist[1]

This checklist should be successfully completed every 30 minutes (+/- 5min) while oxytocin is in use.

If this checklist cannot be completed, oxytocin must be decreased or stopped[2].

☐ **Continuous Electronic Fetal Monitoring (EFM) Assessment shows:**

- Normal EFM tracing for each of the 2, 15-minute (+/- 5 minutes) segments of FHS in the last 30 minutes (i.e. baseline within normal range, moderate variability. No or non-repetitive uncomplicated decelerations).
- No more than 1, 15-minute segment where the EFM is Atypical.
- No more than 1 late deceleration occurred within the previous 30 minutes.
- No more than 2 complicated variable decelerations within the previous 30 minutes.

☐ **Uterine Contractions**

- No more than 5 contractions in a 10-minute window, averaged over 30 minutes.
- No contraction with a duration greater than 90 seconds.
- Uterus palpates soft between contractions for a minimum of 30 seconds.
- If an intrauterine pressure catheter (IUPC) is in place, measured uterine resting tone is less than 25 mm Hg for at least 30 seconds between each contraction.

Notes:

1. This checklist was developed to support the safe management of pregnant patients whose labour is induced or augmented with oxytocin and focuses on low-risk patients with a singleton, cephalic, term pregnancy. It may also be applicable to patients outside of this definition.
2. This checklist represents a guideline for care: however, individualized medical care is directed by the primary care provider. If oxytocin is stopped, the pre-oxytocin checklist should be reviewed before oxytocin is restarted.

Source: Adapted from the HCA Healthcare Perinatal Safety Initiative, Oxytocin "In Use" Checklist, 2009

NOTE: To download this tool in PDF format, please click here.

Appendix P: Sample of Standardized Oxytocin Label

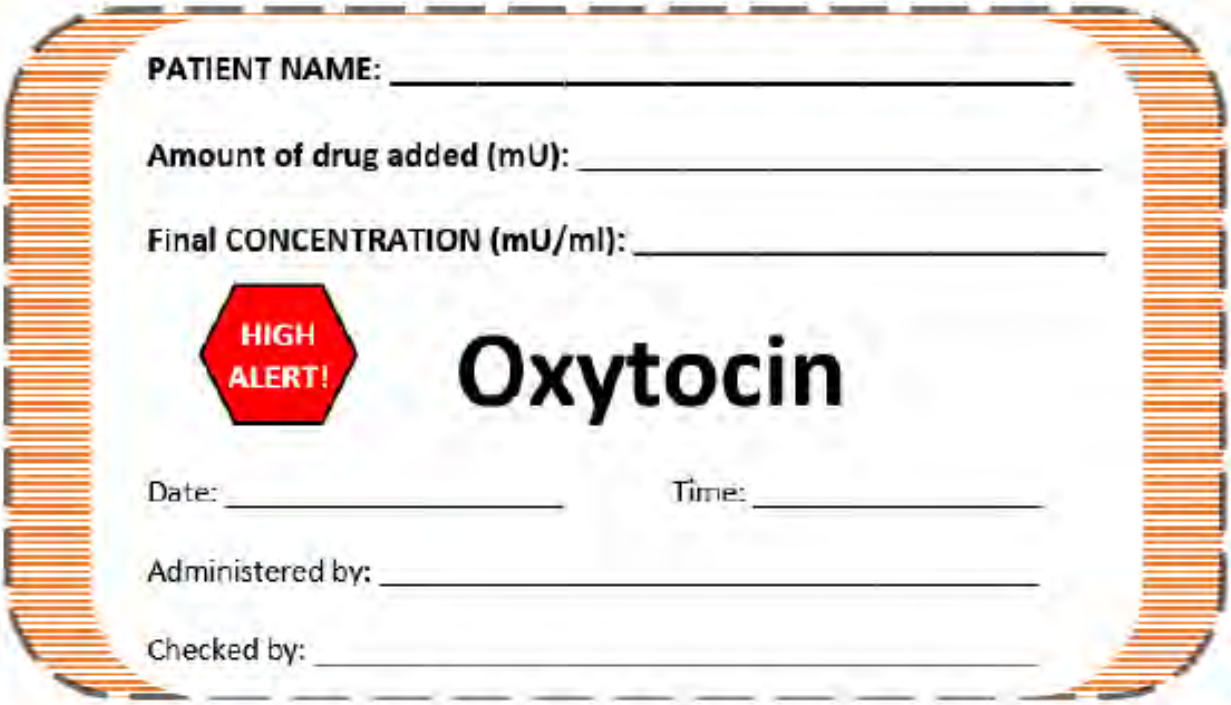

Figure 1: Label for reconstituted oxytocin IV bag

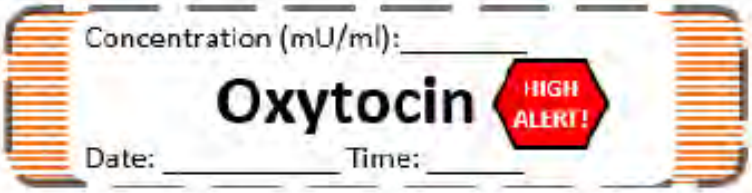

Figure 2: Adult syringe label for oxytocin

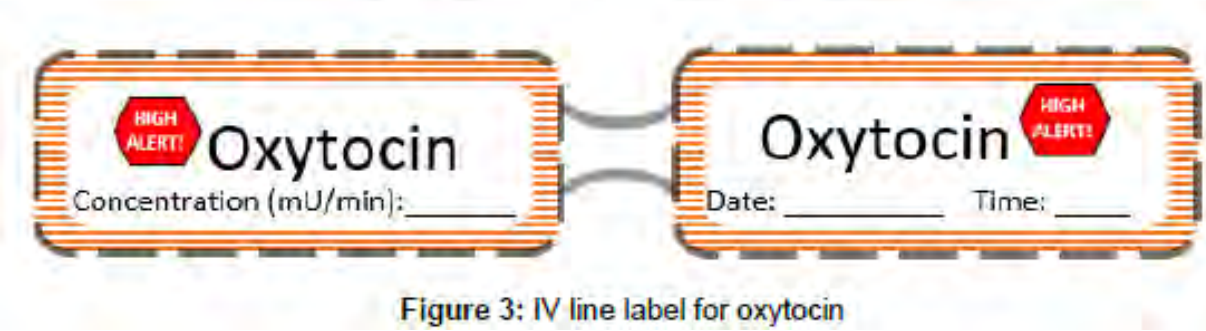

Figure 3: IV line label for oxytocin

NOTE: To download this tool in PDF format, please click here.

Appendix Q: Oxytocin to Start or Advance Labour: 5 Questions to Ask Patient Handout (Institute for Safe Medication Practices ((ISMP) Canada)

Oxytocin to Start or Advance Labour:
5 Questions to Ask

1. What is oxytocin?

- Oxytocin is a hormone that is produced naturally in pregnancy to make the uterus contract. When the uterus contracts, it is called labour.
- Oxytocin is also a medicine that is given during labour if the natural supply is not enough.

2. Why is it used and what are the benefits?

- To help start labour (induction), or
- To help advance labour (augmentation) when the time between contractions is too long, the length of contractions is too short, or contractions are too weak.
- Oxytocin helps the uterus contract. The contractions open the cervix and help your baby move down into the birth canal.
- Oxytocin should only be used when the benefits of delivery outweigh the risks of continuing the pregnancy.
- Benefits may include being able to have a vaginal birth and not requiring a Caesarean delivery (C-section).
- In Canada, 8 out of 10 patients who received oxytocin to start or advance labour gave birth vaginally.[1]

3. Proper Use: How is it given?

- Oxytocin to start or advance labour is given intravenously using a pump to control the amount of medicine you receive.
- The medicine will start at a low dose and then will be increased gradually to get the right contraction pattern for you.
- In some cases, if the contractions are affecting the baby's heart rate or if the contractions are too close together, your health care provider may reduce or stop the oxytocin.

4. What are the risks?

- Risks to you and your baby can vary depending on your past or current health factors (e.g., heart condition, blood pressure).

Risks to the baby may include:	Risks to you may include:
• heart rate changes (e.g., slow heartbeat) due to overly strong or frequent contractions • shortage of oxygen due to overly strong or frequent contractions	• increased labour pain • fast/irregular heart rate or changes in blood pressure • heavy bleeding or post-partum bleeding • strong contractions that are too long or too frequent • headache, nausea, vomiting • tear in the uterus requiring an emergency C-section (rare)

Rarely oxytocin may cause serious or life-threatening harm to you or your baby, so it is important to have already discussed the risks and benefits of oxytocin use with your doctor or midwife before treatment is started.

- Other options may include waiting for labour to start, having a C-section, or using other medicines, each of which has its own benefits and risks—discuss with your doctor or midwife to determine what is best for you and your baby.

5. Monitor: What do I watch for?

- Your baby's heart rate and your contractions will be closely monitored using a fetal monitor.
- Your health care team will check on you often and watch over your labour closely.
- Your contractions, blood pressure, and heart rate will be checked regularly.
- You may need to have pain medicine to help you with the pain of labour. You will be provided with choices to manage your pain.
- Let your health care team know right away if you have:
  - sudden onset of severe abdominal pain
  - heavy bleeding from your vagina

For more information about induction of labour visit:
www.pregnancyinfo.ca/birth/labour/induction/

Questions and Notes

[1] Source: Discharge Abstract Database/Hospital Morbidity Database, 2019–2020, Canadian Institute for Health Information (CIHI).

Development of this resource was funded through the Canadian Medication Safety Coalition.

NOTE: To download the handout from ISMP Canada, please click here.