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Implementation and Organization of a Perioperative Lactation Program: A Descriptive Study

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Abstract

Introduction: As breastfeeding rates rise, perioperative care of lactating women is an increasingly important issue. There is a lack of reports describing the implementation of perioperative lactation programs. Beginning in 2014, Memorial Sloan Kettering Cancer Center developed a perioperative lactation program to address the comprehensive care of lactating patients. The aim of this study was to determine the incidence of lactation in our perioperative population, as well as to describe preliminary data and experiences during the implementation of our program.
Materials and Methods: This retrospective descriptive study included lactating patients who underwent procedures requiring anesthesia care at our institution from August 2014 to February 2017. This period coincided with implementation of the lactation program, which focused on patient identification, education, and support, as well as staff education and collaboration. Patient volume and characteristics, procedure types, and intraoperative non-narcotic analgesic use were analyzed.
Results: Over the 30-month study period, we identified 80 lactating perioperative patients, with ~2–3 patients presenting monthly. The median (range) age of the child was 5 (0.6–24) months. Most of our lactating patients were American Society of Anesthesiologists class I–II patients (81%), who underwent general anesthesia (89%), and received at least one non-narcotic analgesic intraoperatively (89%).
Conclusion: Our study showed that we cared for lactating patients undergoing a wide range of procedures on a regular basis. The results from this study are intended to inform the next phase of our research, which will focus on determining how this work impacts outcomes such as postoperative lactation complications, breastfeeding resumption, and overall patient satisfaction.

Keywords: perioperative lactation program, lactation pharmacology, anesthesia in lactation, breastfeeding resumption after anesthesia, analgesic use in lactation, cancer

Introduction

As breastfeeding rates rise in countries such as the United States and Canada,[1,2] the appropriate care of lactating women in the perioperative setting is an increasingly important issue. These women require specific care, especially during a stressful perioperative period in which mother and infant are separated. Without a plan for managing lactation during the perioperative period, these patients are at risk for lactation complications, such as breast engorgement, mastitis, decreasing milk supply, and undesired weaning. Mastitis occurs in the majority of cases in the first 6 weeks postpartum, but may occur at any time during lactation.[3] Known factors which may predispose a lactating woman to developing mastitis and which may be present in the perioperative period include missed feedings, a change in the usual breastfeeding schedule, a decrease in the number of feedings, as well as maternal stress, fatigue, and illness.[3,4] Avoiding mastitis is particularly important in the perioperative setting, as its symptoms (including fever, rigors, myalgia, and lethargy) may closely resemble those of a postoperative surgical infection.[3,5] Maternal level of milk production is critical to the risk of engorgement and resulting negative outcomes, including decreased milk production. Also, postoperative pain can suppress lactation.[6] In addition, maternal contact with the healthcare system is a known factor for premature weaning and supplementation with formula.[4]

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Most of the literature regarding perioperative lactation consists of reviews regarding the safety of anesthetic and analgesic medications. Chu et al., Cobb et al., and Dalal et al. found that current evidence suggests that once a mother is awake and alert postoperatively, breastfeeding generally can be resumed.[7–9]

Few case reports or case series exist regarding perioperative lactation management. One study of the role of oxytocin in anesthetic consumption found that breastfeeding before induction of anesthesia attenuates the stress response to surgery.[10] Stuttmann et al. detailed four case reports of xenon anesthesia for lactating patients, concluding that xenon anesthesia, combined with short-acting opioids, may be a technique that enables immediate resumption of breastfeeding after surgery.[11]

There is a lack of reports describing the practical implementation of programs providing comprehensive perioperative care for lactating women. The only such work we found was written in 2013 by Watson et al. The authors described the development of a policy to support breastfeeding in an unquantified sample of women who were acutely ill in the intensive care unit. They included one descriptive surgical obstetric case study of lactation management for a mother who was critically ill after undergoing cesarean section. They concluded that care of breastfeeding women with acute illness requires specific strategies for early patient identification and lactation support.[12]

Beginning in August 2014, Memorial Sloan Kettering Cancer Center (MSKCC) developed and implemented a comprehensive program to support lactating women in the perioperative setting. The aim of this study was to determine the incidence of lactation in our perioperative population, as well as to describe preliminary data and experiences during the implementation of our program. The results from this study are intended to inform the next phase of our research, which will focus on determining how this work impacts outcomes such as postoperative lactation complications, breastfeeding resumption, and overall patient satisfaction.

Materials and Methods

Study design and population

The MSKCC Institutional Review Board provided ethics approval (October, 2014, #WA0491-14; renewal, March, 2016, #16-173) and waived the need for informed consent. This retrospective descriptive study included lactating patients who underwent procedures requiring anesthesia care at MSKCC (New York, NY) from August 26, 2014 to February 28, 2017. The start date was chosen to coincide with the initial development and implementation of the program, and the end date coincided with the latest time at which all data were complete when we conducted the study.

The lactation program at MSKCC was founded by a postanesthesia care unit nurse at our institution who practices in the community as an International Board-Certified Lactation Consultant® (IBCLC). Although her official professional role at the institution is within the realm of nursing rather than lactation consultancy, her expertise and experience outside of the hospital as an IBCLC was an invaluable resource for the program. Other lactation program members included two anesthesiologists, a gynecologic cancer surgeon, presurgical testing clinic advanced practice providers, presurgical nurses, postanesthesia care unit nurses, informatics and technology staff, and pharmacists. An initial goal of the program was to develop a proposed workflow to guide the care and support of lactating patients throughout the perioperative period (Fig. 1). The workflow included elements such as a proposed order set (Appendix A1).

To develop guidelines for perioperative lactation management, the lactation program examined the literature and evidence around lactation guidelines. PubMed was searched using the subjects: ''Perioperative Lactation,'' ''Postoperative Lactation,'' ''Anesthesiology and Lactation,'' ''Case Series and Lactation,'' with the word ''breastfeeding'' also substituted for ''lactation.'' Further search for appropriate material was performed after additional review of the reference lists in the searched articles.

In addition, well-known references within the lactation field were examined to develop guidelines with respect to commonly used anesthetics, analgesics, and perioperative medications (Table 1). These references included *Medications and Mothers' Milk*, a comprehensive source for professionals seeking pharmacological advice on breastfeeding.[14] In addition, we consulted the ''InfantRisk Center,'' which provides education pertaining to medication safety for breastfeeding mothers and operates a hotline for questions regarding medication use in lactating women.[20] We also referred to the ''Drugs and Lactation Database,'' also known as ''LactMed,'' which is maintained by the U.S. National Library of Medicine.[15]

Several steps were taken to consistently identify lactating patients before the date of the procedure. Patients are typically seen at our presurgical testing clinic, where a history and physical is performed by advanced practice providers. By modifying the history form to include a checkbox for ''breastfeeding'' under the ''review of systems,'' we ensured that most women were screened for lactation and identified at a centralized location. In addition, staff in surgeons' office practices, the presurgical testing clinic, and the gastrointestinal endoscopy clinic were asked to alert the program when lactating patients were identified before their procedures. An email distribution list was created to facilitate communication with all lactation program members.

Patient education began when lactating patients were identified in our presurgical testing clinic. Advanced practice providers provided education, including a pamphlet designed by the lactation program, entitled ''Preparing for your surgery or procedure while you are breastfeeding or lactating'' (Appendix A2). Patients were asked to bring their personal breast pumps and all supplies needed for expression of milk on the day of their procedures. To decrease the risk of perioperative engorgement, patients were instructed to breastfeed or express milk until the breasts were empty in the presurgical holding area, immediately before undergoing anesthesia. Additionally, they were instructed to resume breast milk expression immediately in the postoperative period on achieving an awake state, as well as to pump every 3–4 hours, or at least as often as the baby typically fed. Patients were instructed to breastfeed or express milk for their children's consumption only once they were alert in the postoperative period, and to postpone breastfeeding if medication administration led to maternal sedation.

Selection criteria were lactating patients identified preoperatively who wished to maintain lactation in the perioperative period. Some patients who were lactating at the time of the presurgical testing clinic visit decided definitively to

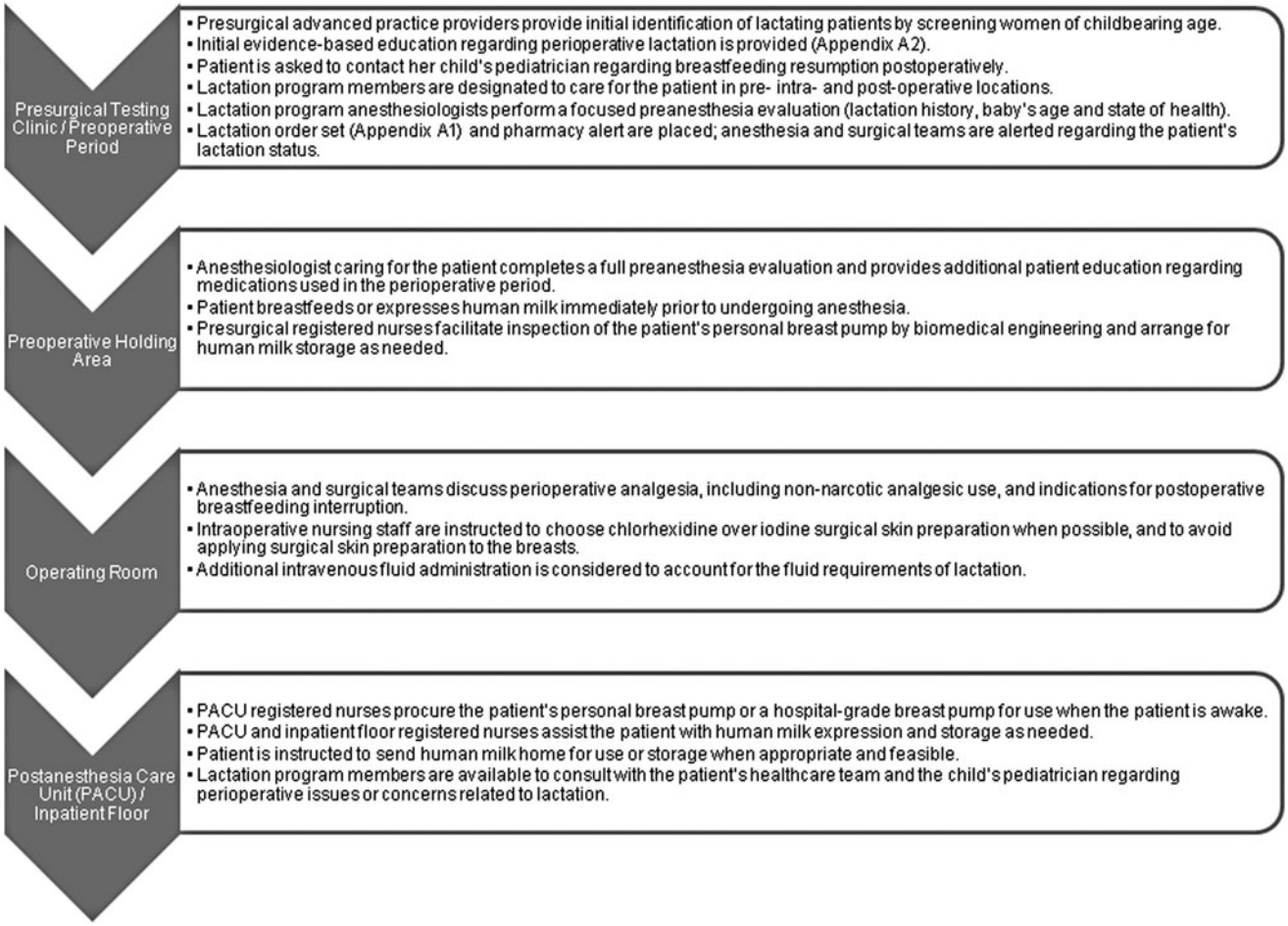

FIG. 1. Workflow for care of the lactating patient in the perioperative period.

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wean their children before the procedure despite patient education. These patients typically stated that they were ready to wean their children without regard to undergoing a procedure, and that the separation provided an opportunity for weaning.

Patients were asked to notify their children's pediatricians of their upcoming procedures to develop a plan for resumption of breastfeeding and administration of expressed breast milk postoperatively. Because the lactation program had two dedicated anesthesiologist members, they were available to consult and collaborate with patients, their children's pediatricians, and their surgeons regarding the perioperative course, including medications prescribed and administered. This typically occurred through preoperative phone calls with patients and/or their pediatricians, and email or in-person conversations with the surgical team. Community pediatricians were viewed in this role as any other perioperative consultants with whom anesthesiologists may communicate perioperatively. Lactation program anesthesiologists were available to provide education to community pediatricians as needed, for example, regarding the compatibility of anesthetics with lactation (Table 1).

This team approach regarding medications used in the perioperative period was designed to support patients in making informed decisions regarding resumption of breastfeeding in conjunction with their healthcare providers and children's pediatricians. In developing the lactation program, involvement of community pediatricians was considered particularly important for instances in which babies may be preterm, newborn, or have medical issues, such as apnea, bradycardia, or hypotonia, or when high doses, frequent doses, or prolonged use of maternal perioperative narcotics may be required. Involvement of pediatricians allowed a clear designation of their role in determining a plan for observation or monitoring of children when breastfeeding was resumed.

Anesthesiologist lactation program members provided education to anesthesia staff, including fellow anesthesiologists and certified registered nurse anesthetists. This began with one-on-one education regarding care of individual lactating patients who presented perioperatively, starting in August 2014. Formal in-service education regarding care of the lactating patient was provided for the entire MSKCC anesthesia department through lectures in July 2015 and August 2016. Education emphasized the use of intraoperative non-narcotic analgesics and avoidance of medications requiring breastfeeding interruption when possible (Table 1). The intraoperative anesthesia team was notified on or before the day of the procedure regarding the patient's lactation status. Anesthetic management was determined by the anesthesia team members, who were responsible for communicating with the

Table 1. Commonly Used Anesthetics, Analgesics, and Perioperative Medications

Agent	*Breastfeeding interruption recommended?*[a]	*Additional information*
Sedative–hypnotics		
Propofol[13,14,15]	No	Low milk levels
Dexmedetomidine[14,16,17]	Yes-10 hours	Terminal elimination half-life 2 hours
Etomidate[15]	No	Low milk levels
Ketamine[14]	No	Short serum half-life
Benzodiazepines		
Midazolam[13,14,15]	No	Short half-life
Narcotic analgesics (intravenous)		Consult pediatrician if high doses, frequent dosing, or prolonged maternal use are required
Fentanyl[13,14,15]	No	Low oral bioavailability, short half-life
Hydromorphone[14,15]	No	Potent narcotic; compatible with breastfeeding, but may consider alternative such as morphine or fentanyl
Morphine[14,15]	No	Low oral bioavailability
Remifentanil[14,15]	No	Low oral bioavailability, short half-life
Narcotic analgesics (oral)		
Codeine[14,15]	Yes; consult pediatrician; child may require monitoring when breastfeeding is resumed	Active metabolite; avoid maternal use, choose alternative agent
Hydrocodone[14,18]	No	Limit dose to 30 mg/day
Oxycodone[14]	No	Limit dose to 30 mg/day
Non-narcotic analgesics		
Acetaminophen[14,15]	No	
Ketorolac[14,15,19]	No	Consult pediatrician if infant has a ductal-dependent cardiac lesion
Inhalational agents		Short serum half-lives
Desflurane[15]	No	
Isoflurane[15]	No	
Nitrous oxide[14,15]	No	
Sevoflurane[14,15]	No	
Local anesthetics (all routes)[14,15]		Low oral bioavailability
Bupivacaine	No	
Lidocaine	No	
Mepivacaine	No	
Ropivacaine	No	
Muscle relaxants		
Cisatracurium[15]	No	Low oral bioavailability
Rocuronium[15]	No	Low oral bioavailability
Succinylcholine[15]	No	Low oral bioavailability, short half-life
Vecuronium	No	
Reversal agents		
Glycopyrrolate[14,15]	No	Low oral bioavailability, short half-life
Neostigmine[15]	No	Short half-life
Sugammadex[20]	Yes-4 hours	New medication
Antiemetics		
Aprepitant[14]	No	Transfer into milk likely minimal
Dexamethasone[14]	No	
Ondansetron[14]	No	
Scopolamine (transdermal)[14]	No	Low oral bioavailability
Cardiovascular agents		
Ephedrine[14]	No	
Esmolol[14,15]	No	Short half-life
Labetalol[14,15]	No	Low milk levels
Metoprolol[14,15]	No	Low milk levels
Phenylephrine[14,15]	No	Low oral bioavailability
Antibiotics		
Cefazolin[14,15]	No	Low oral bioavailability
Cefotetan[14,15]	No	Low oral bioavailability
Clindamycin[14,15]	No	Consult pediatrician if infant develops effects on gastrointestinal flora
Piperacillin and tazobactam[14,15]	No	Low milk levels
Vancomycin[14,15]	No	Low oral bioavailability

[a]Time after administration of agent; recommendations apply to acute, short-term maternal use of standard doses in the perioperative period; for agents that do not require breastfeeding interruption, breastfeeding may be resumed once the mother has achieved an awake, stable, alert state for a healthy, full-term non-neonate; consult pediatrician if baby is preterm, a neonate, or has medical conditions.

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surgical team any requirements for postoperative breastfeeding interruption, such as use of dexmedetomidine or sugammadex (Table 1).

Perioperative analgesia guidance for surgeons emphasized the postoperative use of non-narcotic analgesics when feasible, as well as the avoidance of codeine.[21,22] Hydrocodone and oxycodone are oral narcotics that are prescribed frequently by surgeons at our institution for postoperative analgesia. Because some studies have reported adverse infant effects, such as sedation and respiratory depression, at higher doses of hydrocodone and oxycodone, we requested that surgeons limit prescriptions of hydrocodone and oxycodone to 30 mg a day.[14,18]

Nursing staff were instructed to facilitate breastfeeding or expression of milk in the presurgical holding area, immediately before transfer of lactating patients to the operating room. This occurred either by ensuring that patients were comfortable expressing milk (for example, with access to an electrical outlet and privacy) or by allowing breastfeeding children as visitors in the presurgical holding area. Intraoperative nursing staff were instructed to choose chlorhexidine over iodine surgical skin preparation when possible, as ingestion of iodine by a breastfeeding child may interfere with thyroid function.[14] Nursing staff in postoperative areas assisted patients with milk expression once awake, for example by assisting patients in achieving a comfortable sitting position.

Because we practice at a cancer center that lacks in-house obstetric and lactation consultant services, it was necessary to institute new measures for material support of our lactating patient population. Our institution acquired hospital-grade breast pumps and supply kits for use if personal breast pumps and supplies were forgotten, malfunctioning, or did not pass inspection with biomedical engineering. A human milk storage policy was developed, and designated human milk storage refrigerators with central temperature monitoring were placed in perioperative sites, with nursing staff coordinating milk storage. Patients with extended stays were encouraged to send milk home for use or storage when appropriate and feasible.

Data collection and analysis

Patient age, American Society of Anesthesiologists (ASA) physical status, anesthesia type, hospital length of stay, intraoperative non-narcotic analgesic use, and procedure type were collected from the medical records. The child's age was provided by the patient. Patient characteristics are presented as number (percentage) or median (range). Descriptive statistics were calculated using Microsoft Excel 2007 (Microsoft Corporation, Redmond, WA).

Results

Over the 30-month study period, we identified 80 lactating perioperative patients, with ~2–3 patients presenting monthly. This represented 0.07% of the ~109,000 total anesthetics performed at MSKCC during this period, including those performed at our main surgical, gastrointestinal endoscopy, and multiple ambulatory locations. The majority of these cases was performed on our main surgical operating room platform, where 52 (65%) of the lactating patients represented 0.15% of the ~34,000 cases performed on the main platform during this period.

The characteristics of our lactating patient population are shown in Table 2. The youngest child was 2.5 weeks old and was the only neonate in the study. The median (range) age of the child was 5 (0.6–24) months.

Several patients had multiday postoperative hospitalizations, including two (0.03%) patients, each of whom stayed for 9 days. Twenty-nine (36%) patients were discharged on the day of the procedure and did not require overnight hospitalization.

Most of our lactating patients were ASA class I–II patients (81%), who underwent general anesthesia (89%), and received at least one non-narcotic analgesic intraoperatively (89%).

The procedures performed in our lactating patient population are listed in Table 3. The most commonly performed procedures were thyroidectomy and/or neck dissection (40%), followed by ambulatory gynecologic surgery (12%), and minor soft tissue tumor resection (9%).

Discussion

Our results showed that, although our lactating patient population was a small percentage of our total perioperative population, we regularly cared for lactating patients during the study period.

The only published article we found regarding the practical implementation of a lactation program described a policy that supported lactating critically ill women, including those in the perioperative period. The policy was implemented in the setting of a tertiary hospital's perinatal program and was supported by a lactation consultant service, in contrast to our program, which had no such support. The authors contacted

Table 2. Lactating Patient Characteristics, August 2014 to February 2017 ($N=80$)

Characteristic	n *(%) or median (range)*
Maternal age at surgery, years	35 (21, 46)
ASA	
I	6 (7)
II	59 (74)
IIII	15 (19)
IV	0 (0)
Child age at surgery, months	5 (0.6, 24)
Anesthesia type	
General	71 (89)
MAC	8 (10)
Regional	1 (1)
Hospital length of stay, days	
0	29 (36)
1	27 (33)
2–4	19 (24)
5–7	3 (4)
>7	2 (3)
Intraoperative non-narcotic analgesic use	
Acetaminophen only	47 (59)
Ketorolac only	2 (2)
Both acetaminophen and ketorolac	22 (28)
Neither acetaminophen nor ketorolac	9 (11)

ASA, American Society of Anesthesiologists physical status; MAC, monitored anesthesia care.

Table 3. Procedure Types for Lactating Patients, August 2014 to February 2017 ($N=80$)

Procedure type	n *(%)*
Thyroidectomy and/or neck dissection	32 (40)
Ambulatory gynecological surgery	10 (12)
Various procedures requiring ≥3 day postoperative hospitalization (colorectal, gynecological, neurosurgical, ophthalmic, orthopedic, vascular)	10 (12)
Minor soft tissue tumor resection	7 (9)
Gastrointestinal endoscopy	4 (5)
Melanoma resection	4 (5)
Various procedures requiring ≤1 day postoperative hospitalization (genitourinary, gynecological, ophthalmic, otolaryngologic)	4 (5)
Ambulatory plastic surgery	3 (4)
Cystoscopy	3 (4)
Sarcoma resection	3 (4)

women after their discharge and asked questions regarding their breastfeeding experience at the hospital. They reported outcomes that were limited to subjective patient responses, such as ''Breastfeeding was important to me; I wanted to keep my options open because I didn't know what the outcome would be.''[12]

Our work uniquely details the practical implementation of a perioperative lactation program at an institution that lacks the support of in-house lactation consultant and obstetric services, which is often the case at specialty institutions that provide anesthesia care, such as ambulatory surgery centers. In addition, our work may be generalizable to a large subset of lactating patients undergoing a variety of procedures and anesthetics. Despite our cancer focus, our study population included patients undergoing general and regional anesthesia, as well as monitored anesthesia care. These patients underwent many types of minor to major procedures, including colorectal, gynecological, gastrointestinal endoscopy, genitourinary, head and neck, neurosurgical, ophthalmic, orthopedic, otolaryngologic, plastic surgery, soft tissue, and vascular procedures.

The major limitation of our work is a lack of data regarding outcomes in our lactating patient population, as the implementation phase of our lactation program yielded only demographic data. We anticipate that data from this study, as well as our experience with this phase of the program, will inform the next stage of our research. Specific areas for future research may include evaluating lactation complications, such as perioperative breast pain, engorgement, mastitis, decreased milk supply, and undesired formula supplementation or weaning. Lactation program members caring for patients in the postoperative period observed postoperative sedation and pain to be possible factors that may interfere with postoperative milk expression and breastfeeding. Time to resumption of milk expression or breastfeeding postoperatively, postoperative milk expression and breastfeeding intervals and limitations, and rates of lactation complications are areas for further exploration.

Overall patient satisfaction is another area for future study. Lactation program members who interacted with patients preoperatively noted that patients often had the highest level of preoperative anxiety regarding management of perioperative lactation. This included concerns regarding the logistics of breast milk expression and resumption of breastfeeding perioperatively, as well as the compatibility of medications, particularly anesthetics and analgesics, with lactation. Patients often expressed relief in having a plan for lactation management that involved their entire healthcare teams, including children's pediatricians. Future work may involve surveying patients to evaluate the extent to which lactation program interventions decrease perioperative stress and anxiety, and allow patients to resume breastfeeding and meet overall breastfeeding goals. Given that a study found that breastfeeding before anesthesia induction attenuates the stress of surgery,[10] further research might explore methods that support breastfeeding throughout a patient's hospital stay.

Dalal et al. suggested consultation with a lactation specialist and pediatrician for patients undergoing major surgery. They also suggested monitoring for breastfed infants of mothers who require medications that may be respiratory depressants.[9] Our lactation program sought to explore the practical implementation of such suggestions. It also attempted to address several challenges in our patient population in balancing the perioperative use of medications, particularly opioids, with resumption of breastfeeding postoperatively. These challenges include the varied perioperative narcotic requirements of our lactating patient population, with some patients requiring multiple days of postoperative narcotics through patient-controlled analgesia, and other patients not requiring any perioperative narcotics. In addition, we practice at a specialty hospital that is not affiliated with a community or in-house general pediatric practice. Also, collaboration with children's pediatricians may be challenging due to their varied levels of knowledge regarding perioperative lactation management.

One review for anesthesia providers regarding postoperative breastfeeding recommends that mothers should closely monitor their infants for signs and symptoms of behavioral changes while consuming medications.[8] The responsibility to minimize medication effects must also be borne by healthcare providers. To address the aforementioned challenges, our program emphasized patient education and collaboration among the patient's entire healthcare team, incorporating the combined knowledge and expertise of anesthesiologists, pediatricians, and surgeons. Additional areas for future research include maternal narcotic requirements and their impact on breastfeeding children.

Conclusion

Our study showed that we cared for lactating patients undergoing a wide range of procedures on a regular basis during the implementation of our comprehensive perioperative lactation program. The results from this study are intended to inform the next phase of our research, which will focus on determining how this work impacts outcomes such as postoperative lactation complications, breastfeeding resumption, and overall patient satisfaction.

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Disclosure Statement

No competing financial interests exist.

References

1. Centers for Disease Control and Prevention. Breastfeeding report card. 2016. Available at www.cdc.gov/breastfeeding/data/reportcard.htm (accessed October 27, 2017).
2. Statistics Canada. Breastfeeding Trends in Canada. 2015. Available at www.statcan.gc.ca/pub/82-624-x/2013001/article/11879-eng.htm (accessed October 27, 2017).
3. Amir LH. ABM clinical protocol #4: Mastitis, revised March 2014. *Breastfeed Med* 2014;9:239–243.
4. Wenner L. Care of the breastfeeding mother in medical-surgical areas. *Medsurg Nurs* 2007;16:101–104.
5. Amir LH, Lumley J. Women's experience of lactational mastitis—I have never felt worse. *Aust Fam Physician* 2006;35:745–747.
6. Dumphy D. The breastfeeding surgical patient. *AORN J* 2008;87:759–766.
7. Chu TC, McCallum J, Yii MF. Breastfeeding after anaesthesia: A review of the pharmacological impact on children. *Anaesth Intensive Care* 2013;41:35–40.
8. Cobb B, Liu R, Valentine E, et al. Breastfeeding after anesthesia: A review for anesthesia providers regarding the transfer of medications into breast milk. *Transl Perioper Pain Med* 2015;1:1–7.
9. Dalal PG, Bosak J, Berlin C. Safety of the breast-feeding infant after maternal anesthesia. *Paediatr Anaesth* 2014;24:359–371.
10. Bhaskara B, Dayananda VP, Kannan S, et al. Effect of breastfeeding on haemodynamics and consumption of propofol and sevoflurane: A state entropy guided comparative study. *Indian J Anaesth* 2016;60:180–186.
11. Stuttmann R, Schafer C, Hilbert P, et al. The breast feeding mother and xenon anaesthesia: Four case reports. Breast feeding and xenon anaesthesia. *BMC Anesthesiol* 2010;10:1.
12. Watson J, Hermann S, Johnson B. Developing a policy to support breastfeeding in women who are hospitalized and acutely ill. *Nurs Womens Health* 2013;17:188–196.
13. Nitsun M, Szokol JW, Saleh HJ, et al. Pharmacokinetics of midazolam, propofol, and fentanyl transfer to human breast milk. *Clin Pharmacol Ther* 2006;79:549–557.
14. Hale TW, Rowe HE. Medications and Mothers' Milk 2017. New York: Springer Publishing Company, 2017.
15. U.S. National Library of Medicine, Drugs and lactation database (LactMed). Available at https://toxnet.nlm.nih.gov/newtoxnet/lactmed.htm (accessed October 27, 2017).
16. Hospira, Inc. Dexmedetomidine prescribing information. Available at http://labeling.pfizer.com/ShowLabeling.aspx?id=4404 (accessed October 27, 2017).
17. Nakanishi R, Yoshimura M, Suno M, et al. Detection of dexmedetomidine in human breast milk using liquid chromatography-tandem mass spectrometry: Application to a study of drug safety in breastfeeding after cesarean section. *J Chromatogr B Analyt Technol Biomed Life Sci* 2017;1040:208–213.
18. Sauberan JB, Anderson PO, Lane JR, et al. Breast milk hydrocodone and hydromorphone levels in mothers using hydrocodone for postpartum pain. *Obstet Gynecol* 2011;117:611–617.
19. Sachs HC. The transfer of drugs and therapeutics into human breast milk: An update on selected topics. *Pediatrics* 2013;132:e796–e809.
20. Texas Tech University Health Sciences Center. InfantRisk center. Available at www.infantrisk.com (accessed October 27, 2017).
21. European Medicines Agency. Restrictions on use of codeine for pain relief in children–CMDh endorses PRAC recommendation [Internet]. Available at www.ema.europa.eu/ema/index.jsp?curl=pages/medicines/human/referrals/Codeine-containing_medicines/human_referral_prac_000008.jsp&mid=WC0b01ac05805c516f (accessed October 27, 2017).
22. Tobias JD, Green TP, Cote CJ, et al. Codeine: Time to say ''no''. Available at http://pediatrics.aappublications.org/content/138/4/e20162396.long (accessed October 27, 2017).

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(Appendix follows →)

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Appendix

Appendix A1

Lactation Program
Lactation Order Set

Memorial Sloan Kettering Cancer Center

Placed by: Presurgical testing clinic advanced practice provider
Lactation status: ☐ Lactating ☐ Not lactating
Date of surgery:
Does the patient have own equipment? ☐ Yes ☐ No ☐ Unknown

Comments:

Automatic actions triggered by order:

☐ Email notification automatically sent to lactation program members, surgeon, and pharmacy
☐ Pharmacy alert placed

Instructions:

Presurgical testing clinic staff:

☐ Provide perioperative lactation patient educational pamphlet

Biomedical engineering staff:

☐ Check breast pump

Nursing staff:

☐ Assist patient with pumping as needed
  ☐ Patient should express milk or breastfeed immediately before procedure in holding area
  ☐ Patient should express milk as soon as awake in postanesthesia care unit and every 3-4 hours, or as often as the baby feeds
☐ Choose chlorhexidine over iodine surgical skin preparation and avoid applying to the breasts if possible; wash surgical skin preparation from the breast area if necessary at the conclusion of surgery
☐ Follow breast milk storage policy and arrange refrigeration of human milk as needed
☐ Order breast pump and supplies from central supply for patient use as needed

Surgery & pharmacy staff:

☐ Favor non-steroidal anti-inflammatory drugs and acetaminophen when possible
☐ Limit oxycodone or hydrocodone to 30 mg/day; avoid codeine
☐ Consult Lactation Program by email for assistance as needed

Appendix A2

Memorial Sloan Kettering Cancer Center

PATIENT and CAREGIVER EDUCATION

Preparing for your surgery or procedure while you are breastfeeding or lactating

This information will help you prepare for your surgery or procedure at Memorial Sloan Kettering Cancer Center (MSKCC) while you are breastfeeding or lactating.

Before Your Surgery or Procedure

Talk with your surgeon and anesthesiologist about the type of medication that you will receive before, during, and after your surgery or procedure. By talking with your healthcare team ahead of time, they can support you throughout your care.

If you have questions about any of the medications you will receive, there are resources that can help:

○ Infant Risk Center
www.infantrisk.com
806-352-2519
You can find information on the use of medications during pregnancy and breastfeeding.

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○ TOXNET Drugs and Lactation Database (LactMed)
www.toxnet.nlm.nih.gov/newtoxnet/lactmed.htm
You can find information about medication and other chemicals that can be passed on to your infant from breast milk.

○ International Lactation Consultant Association
www.ilca.org
888-452-2478
You can find a lactation consultant near you by searching under the ''Directories'' section.

If possible, pump and store a supply of breast milk before your surgery or procedure. Storing your breast milk ahead of time will allow your baby to continue to be fed your breast milk while you are separated. You can find information about how to safely store your breast milk by visiting the Centers for Disease Control and Prevention website listed under ''Additional Resources'' below.

The Day of Your Surgery or Procedure

Plan to breastfeed or pump right before your surgery or procedure. This will help maintain your milk supply and prevent pain and engorgement.

What to bring to the hospital

☐ Your own breast pump with power source
☐ All the supplies you need for milk expression
☐ Milk storage containers
☐ A cooler bag with ice packs (to store pumped breast milk)

Talk with your healthcare team

On the day of your surgery or procedure, tell your healthcare team that you are breastfeeding or lactating and wish to continue.

After Your Surgery or Procedure

Anesthesia (medication to make you sleep) does not stay in your body for very long. If you have questions about the anesthesia you received, talk with your anesthesiologist. You should plan to start pumping again as soon as you are awake and able. If you need help, ask a member of your healthcare team. You may also need help from your family or friends while you recover from your surgery or procedure.

While you are separated from your baby, plan to pump every 3–4 hours, or at least as often as your baby feeds. Pumping frequently will help maintain your supply of breast milk until you are able to breastfeed again.

If you have questions about any of the medications you will receive after your surgery or procedure, talk with your healthcare provider about finding a different medication. You can also check the websites or call the number listed under the ''Before Your Surgery or Procedure'' section.

If you expect to stay in the hospital for more than 24 hours, make arrangements with a family member or friend to bring your pumped breast milk home each day.

Your breast milk can be stored in an insulated cooler bag with ice packs for 24 hours. Keep the ice packs in contact with the milk containers at all times, and open the cooler bag as little as possible.

Additional Resources

Additional websites you may find helpful

Centers for Disease Control and Prevention
Proper Handling and Storage of Human Milk
www.cdc.gov/breastfeeding/recommendations/handling_breast milk.htm
Provides information about how to safely prepare and store breast milk.

Breastfeeding USA
www.breastfeedingusa.org
Provides information and support for breastfeeding.

Resources for pumping supplies near MSKCC

Falk Medical Supplies
1167 First Avenue between East 63rd and East 64th Streets
New York, NY 10065
212-744-8080

Yummy Mummy
1201 Lexington Avenue between East 81st
and East 82nd Streets
New York, NY 10028
212-879-8669

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