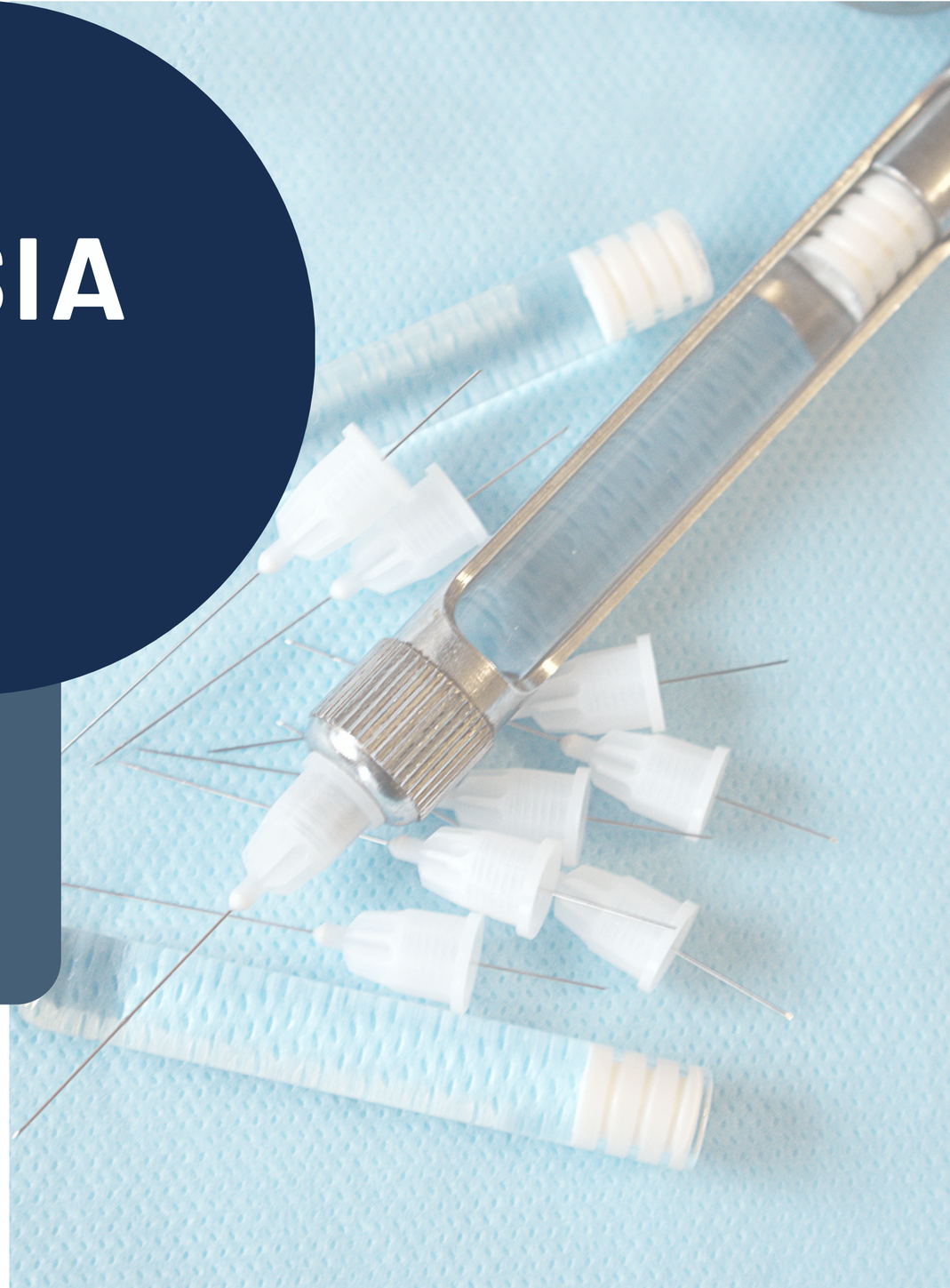
REGIONAL ANESTHESIA IN BREAST SURGERY

Why • The Case for Change
What • The Tools for Change
How • Four Phases of Program Development



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NAVIGATION

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INTRODUCTION

The Playbook provides ideas, examples and resources.

This Playbook was developed as an initiative by leaders in the field working to advance sustainability in regional anesthesia, with support from CASCADES.

These materials are based on expert interviews with anesthetists, surgeons, administration leaders and patient partners from January through June 2022.

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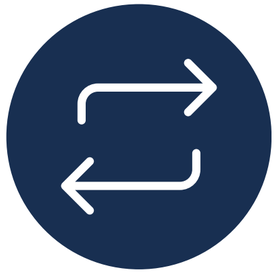

WHY

The Case for Change

WHAT

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Four Phases of Program Development

WHY

The Case for Change

1. Anesthetic Gases
2. Alternative Anesthetic Strategies
3. Breast Surgery Case Study

Anesthetic Gases

ANESTHETIC GASES CONTRIBUTE TO CLIMATE CHANGE

Inhaled anesthetics are the mainstay of general anesthesia. Yet these agents are also potent greenhouse gases (GHGs) and contribute to the climate impact of healthcare. (1) A 2012 report from the English National Health Service found that waste anesthetic gases comprised 5% of the carbon footprint from acute care institutions. (2) At a global scale, it is estimated that anesthetic gas emissions are equivalent to 3.1 million tons of carbon dioxide annually. (3)

Halogenated ethers are liquid agents added to the anesthetic breathing circuit in a carrier gas mixture (which may include nitrous oxide) that the patient inhales. The majority of administered anesthetic gas is ultimately exhaled unmetabolized.(4) Exhaled excess gases are channeled out of the patient breathing circuit and collected by scavenging systems, and then vented as medical waste gas directly into the surrounding area. (5) Waste anesthetic gases remain in the lower atmosphere for years. It is estimated that sevoflurane remains in the atmosphere for 1.4 years, desflurane for 21.4 years and nitrous oxide for up to 150 years.(1,6,7) Once in the atmosphere, these gases contribute to the greenhouse effect and in turn global climate change. (8) The global warming potential (GWP) of these agents over a 100 year time horizon (GWP100) relative to CO_2 has been measured at 130 for sevoflurane, 510 for isoflurane, and 2540 for desflurane.(9) The impact can also be illustrated using driving equivalences at different fresh gas flow (FGF) rates using GWP at one year. For example, at 2 L/min FGF, one day of surgery is equivalent to driving 1,566 km, 1,334 km and 7,849 km for sevoflurane, isoflurane and desflurane, respectively. (10) The release of anesthetic gases represents a major challenge to environmental sustainability in healthcare.

RESOURCES:

- Anesthetic gases primer
- Anesthetic gases infographic
- Case Study: Anesthetic Gas at Raigmore Hospital, within NHS Highland (UK)
- Özelsel TJ, Sondekoppam RV, Buro K. The future is now-it's time to rethink the application of the Global Warming Potential to anesthesia. Can J Anaesth. 2019 Nov;66(11):1291-1295.

Alternative Anesthetic Strategies

REGIONAL ANESTHESIA AS A SOLUTION

Regional anesthesia involves neuraxial or peripheral nerve block, often supplemented with intravenous sedation, and can either replace or complement general anesthesia. This can significantly reduce or eliminate the use of inhaled anesthetic gases (10,11). Life cycle assessments of inhaled anesthetics compared to regional, total intravenous anesthesia (TIVA), and sedation have shown that the climate impacts of regional, TIVA, and sedation are orders of magnitude lower than those of inhaled agents (12,13). With recent advances in technology and techniques, regional anesthesia is well positioned to become the primary “green” mode of anesthesia (10).

Regional anesthesia is the standard of care for some procedures (e.g., hip and knee arthroplasties), and for others (e.g., breast surgery) its application is evolving. While some procedures are not amenable to regional anesthesia, it is nonetheless underutilized on a global scale.

Anesthesiologists and surgeons should consider the use of regional anesthesia in light of its favourable environmental impacts, positive patient outcomes and experience, and potential influence on economic sustainability.(10)

RESOURCE:

- Steven Ethier, DO, and Ban Tsui, MD, MSc, FRCPC. How I Do It: Regional Anesthesia for Breast Surgery. ASRA News. 2020 May

Breast Surgery Case Study

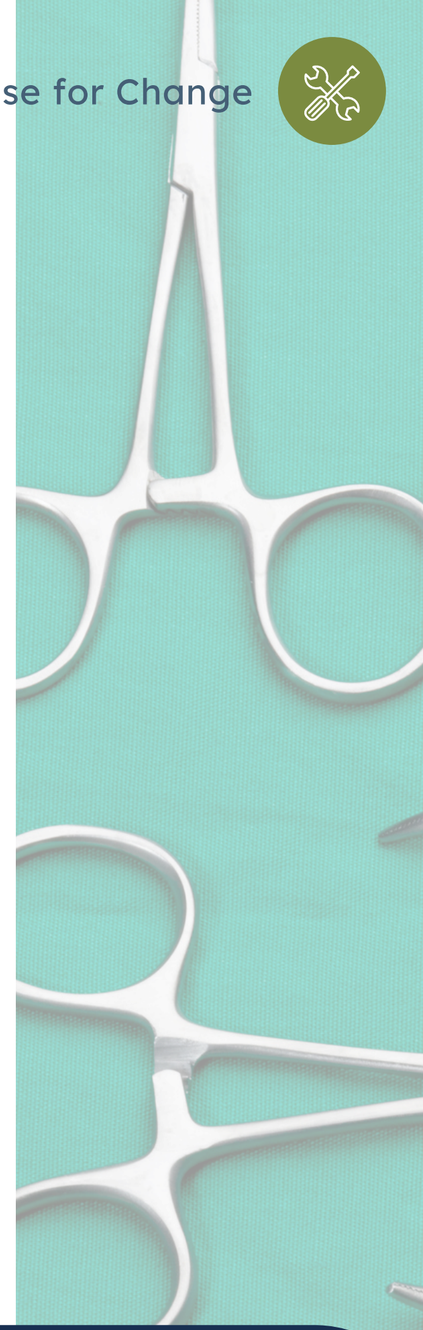
DEVELOP RESILIENCE TO CLIMATE SHOCKS

Regional anesthesia can provide full surgical anesthesia for a range of breast surgeries including lumpectomy, mastectomy (+/- alloplastic reconstruction), sentinel lymph node biopsy, and axillary lymph node dissection. Intravenous sedation is often administered as well but can be omitted for patient preference.

A variety of regional anesthesia techniques may provide effective anesthesia and analgesia for breast surgery. The options highlighted in Figure 2 and Table 2 of Steven Ethier and Ban Tsui's "How I Do It: Regional Anesthesia for Breast Surgery" (ASRA anesthesia News. 2020 May), includes paravertebral blockade (PVB), erector spinae plane block (ESPB), and pectoral nerve block (PECS II). Epidural analgesia and serratus plane blocks are additional techniques for effective breast analgesia.(14) Of these, the most widely used for breast surgery are PECS and PVB.

Existing literature and early data from the CASCADES working group suggest that compared to general anesthesia, regional anesthesia for breast surgery is associated with less post-operative nausea and vomiting, lower pain scores and less analgesic use, and higher patient satisfaction. At a health system level, breast regional anesthesia enables higher surgical case volumes and conversion of historically inpatient procedures to ambulatory ones. It also avoids aerosol-generating procedures and with them the risk of transmission of COVID-19 and other respiratory viruses. Because of these multifold benefits – in addition to the known environmental benefits – breast surgery is identified as a strategic target for spread of regional anesthesia programs.

The majority of patients undergoing the breast and axillary procedures listed above are suitable candidates for regional anesthesia and we recommend that this be the preferred approach. However, for patients with severe anxiety, needle phobia, bleeding disorders, or neuropathy, a general anesthetic should be recommended.



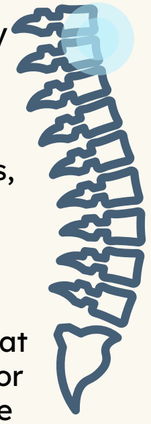
WHAT

The Tools for Change

1. Regional Anesthesia Techniques for Breast Surgery
2. Data Collection

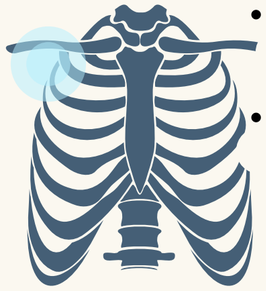
Regional Anesthesia Techniques for Breast Surgery

Thoraic paravertebral block (TVB)



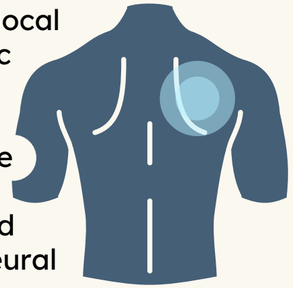
- Can be used as the primary anesthetic
- Higher risk of pleural puncture
- Requires multiple injections, especially for surgical anesthesia (three for unilateral and four, two on each side, for bilateral), although a single injection at T2 or 3 can be performed for analgesia >Potentially more uncomfortable for patients
- 15-minute onset time, 12-18 hours duration
- Lacks ability to provide analgesia to pectoral muscles
- May require adherence to ASRA guidelines on anticoagulation for neuraxial procedures (based on physician's clinical judgment)

Pectoral nerve block II (PECS II)



- Can be used as the primary anesthetic
- No available evidence to determine superiority of PVB versus PIECS
- One needle insertion with local anesthetic injection between two separate muscle planes
- Provides analgesia to pectoral muscles
- Can be done supine and may be more comfortable for patients or easier to perform in anesthetized patients

Erector spinae plane block



- Deposits local anesthetic posterior to transverse process
- Decreased risk of pleural puncture
- Not a neuraxial technique
- Technically easier to perform
- More research required to determine utility and efficacy of the block
- Likely will not provide surgical anesthesia and will be used for postoperative analgesia

Thoracic epidural block

- Can be used as the primary anesthetic or for postoperative analgesia
- High failure rate (approximately 20%)
- Increased risk of hypotension (with upper thoracic blockade), urinary retention, and side effects of >epidural opioid administration
- Can redose the catheter or run an infusion
- Requires adherence to ASRA guidelines on anticoagula1tion tor neuraxial procedures

Adapted from Steven Ethier, DO, and Ban Tsui, MD, MSc, FRCPC. How I Do It: Regional Anesthesia for Breast Surgery. ASRA News. 2020 May. Table 2: Differences between regional anesthesia techniques for breast surgery

"Regional anesthesia specialists within the department quickly became adept at performing these blocks. Soon, the team had a dozen anesthesiologists who could administer these nerve blocks, allowing them to offer this option on a daily basis." (15)

CASE STUDY

BRITISH COLUMBIA

Due to surgical challenges brought on by the COVID-19 pandemic Providence Breast Centre at Mount Saint Joseph's Hospital in Vancouver, B.C expanded their use of regional anesthesia in breast surgery.

As a result of this change in technique from general anesthesia to the nerve block, patients had shorter hospital stays, less pain, lower risk of viral transmission, and the Centre had an increased capacity for breast surgeries. (15)

RESOURCES:

- Paravertebral blocks
  - "Ultrasound guided thoracic paravertebral block." video by Regional Anesthesiology and Acute Pain Medicine (2021)
  - "LSORA: paravertebral block (US guided) tutorial." video by LSOregional anesthesiaVideos (2015)
- PECS blocks
  - "Pectoralis (PECS) blocks I & II." video by Regional Anesthesiology and Acute Pain Medicine (2020)
  - "LSORA: US guided PECS II (2) Block." video by LSOregional anesthesiaVideos (2014)
- Keeping it Local: Anesthesia Technique for Breast Surgery Shortens Recovery Time, 23 Feb 2021. The Daily Scan.

Data Collection

PROSPECTIVE DATABASE OF PATIENTS

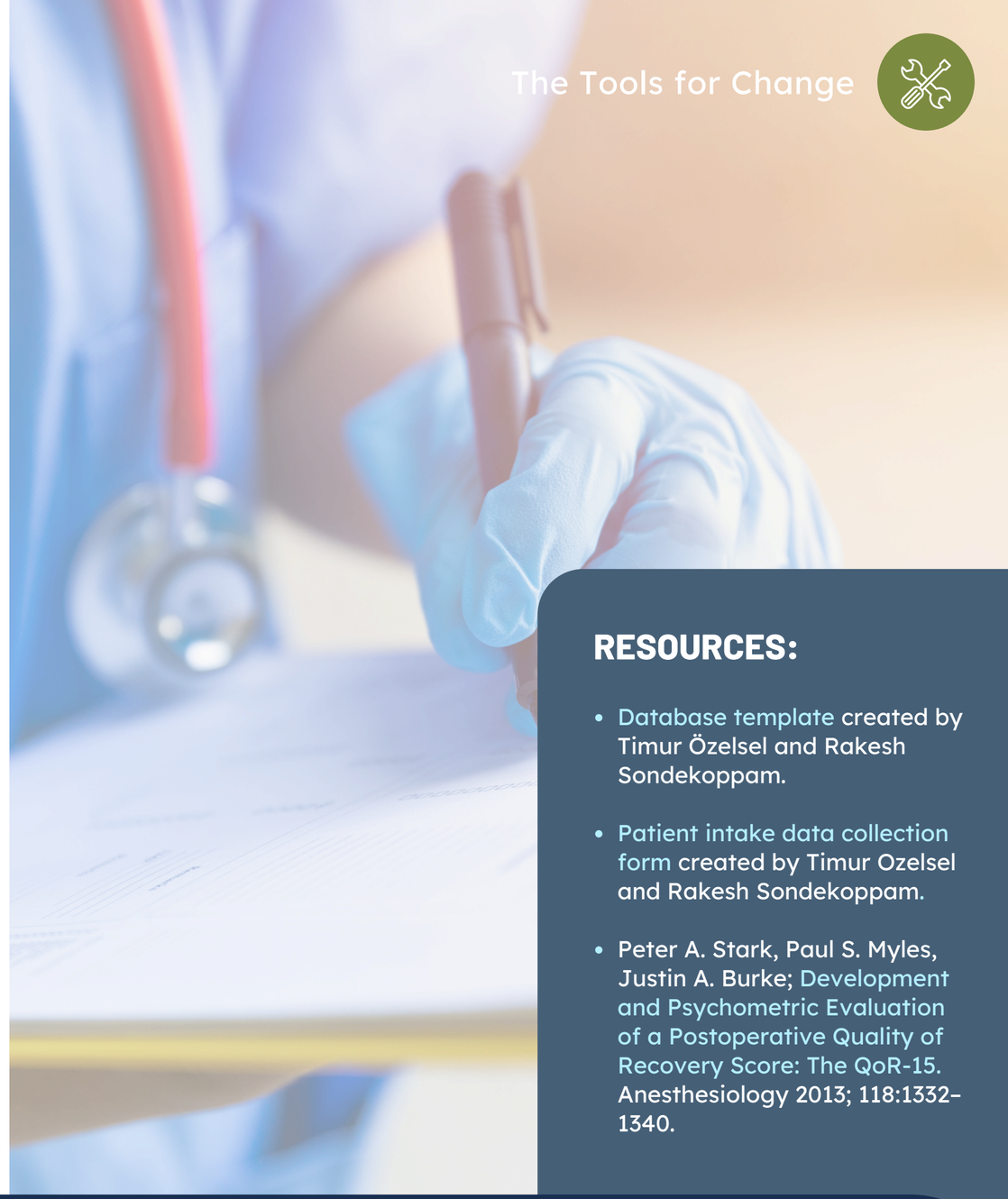
- This data collection tool contains all of the recommended parameters providers should follow to monitor the safety, efficiency, and outcomes of their breast regional anesthesiaprogram. This can be used for internal continuous quality improvement or for research purpose.

PATIENT INTAKE DATA COLLECTION FORM

- This form captures details of anesthesia, surgery, and immediate post-operative recovery including patient satisfaction with the experience. It can be filled out by the anesthesiologist intraoperatively, and follow the patient to PACU. A follow-up phone call is required.

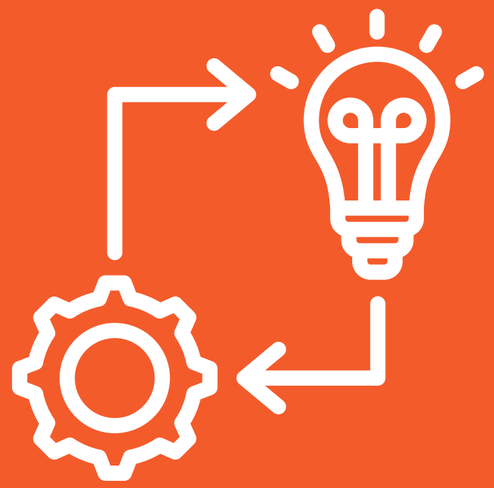
QOR-15: POST-OPERATIVE QUALITY OF LIFE QUESTIONNAIRE

- To capture relevant parameters describing patients' functional status and quality of life pre- and post-operatively.



RESOURCES:

- Database template created by Timur Özelsel and Rakesh Sondekoppam.
- Patient intake data collection form created by Timur Ozelsel and Rakesh Sondekoppam.
- Peter A. Stark, Paul S. Myles, Justin A. Burke; Development and Psychometric Evaluation of a Postoperative Quality of Recovery Score: The QoR-15. Anesthesiology 2013; 118:1332–1340.



HOW

Four Phases of Program Development

1. Engagement
2. Implementation
3. Patient Communication
4. Monitoring

Engagement

BUILDING RELATIONSHIPS WITH KEY STAKEHOLDERS

SENIOR LEADERSHIP AND ADMINISTRATION:

- Present the case for breast regional anesthesiaoutlining the patient, system, and environmental benefits
- Outline anticipated resource requirements and secure operational support

ANESTHESIOLOGISTS:

- Educate colleagues around multifold benefits of breast regional anesthesiaand identify core team of appropriately trained anesthesiologists to staff the program

SURGEONS:

- Meet with surgical colleagues who provide breast cancer care (general surgery, surgical oncology, breast surgery, plastic surgery), present case for breast regional anesthesiaand implications for them (OR booking, workflow, conversion of inpatient to ambulatory cases, need for patient communication)

NURSES:

- Provide inservicing to nurses from pre-operative and post-operative care units and OR, identifying a core group of nurses to assist with blocking (in some centres this may be done by anesthesia assistants) and establishing post-operative care plans for patients who have had regional anesthesia(may be able to bypass PACU)

STAFFING REQUIREMENTS FOR A REGIONAL BREAST PROGRAM

A minimum of 1 regional anesthesiologist and 1 or more trained assistant (nurse or AA) is required to staff a breast program. For maximal efficiency, a regional anesthesiologist is dedicated to blocking while a different anesthesiologist provides monitored anesthetic care during the case. This allows the regional anesthesiologist to block upcoming patients well in advance, giving adequate time for the blocks to take effect. In this scenario, the dedicated regional anesthesiologist is available to provide regional anesthesia for other, non-breast cases as well as they are not assigned to a room. In the absence of this supernumerary staff, a single anesthesiologist can carry out the breast blocks, but these are best done one case in advance to allow a generous amount of time for the blocks to take effect.

The initial stage of program development involves building relationships and getting buy in from key stakeholders, determining personnel and infrastructure requirements, and ensuring that staff are properly trained.

TRAINING AND INSERVICING REQUIREMENTS FOR STAFF

A regional fellowship is not felt to be necessary to provide safe breast RA, but it is important to have adequate experience in and comfort with regional anesthesia. For example, if you have a fellowship trained regional anesthesiologist at your site, they can train their peers in PECS and paravertebral blocks.

Recommendation: Create a work schedule that allows the team to learn from one another.
Nurses do not require additional training but only inservicing.

Recommendation: Nurses should have regular experience doing this role, as opposed to doing it infrequently.

ENGAGEMENT STRATEGY

Select a small group of engaged surgeons, anesthesiologists, and nurses/AAs to initiate the program, as this will allow agile learning and iterating. Seek ways to promote team building early on and encourage ownership of the program. Share outcomes with all team members as they become available, regularly reviewing the data and engaging in continuous quality improvement.

Recommendation: Tell your clinical colleagues that they are part of a pioneer program and explain how regional anesthesia will be much better for the patient by explaining the patient outcome benefits

STRATEGIES TO CONVINCE SKEPTICAL STAKEHOLDERS

In order to get buy in from skeptical stakeholders there are key messages, strat and resources that can be helpful.

- Share the research: Anesthetic gases primer and infographic poster can be helpful first step to understanding the impact of anesthetic gases on the environment.
- Read a success story: Learn how Mount Saint Joseph's Hospital in Vancouve expanded their use of regional anesthesia in breast surgery.

INFRASTRUCTURE REQUIREMENTS

- Block room: a dedicated space outside of the OR is required for block administration. Ideally this is a separate, dedicated block room containing all required equipment. In the absence of this space, a single bay within the pre-operative area can be equipped and used for blocks. This must be a monitored setting as some patients will require or appreciate sedation for the procedure.
- An ultrasound machine

BUDGET CONSIDERATIONS

- regional anesthesiadoes not typically incur additional or specific capital costs. If a centre does not have an ultrasound machine for anesthetic use, this will require approximately $50,000 to purchase.
- Intraoperative sedation can be given by propofol infusion, requiring Target Controlled infusion pumps (~$5,000 each)
- If a centre does not have adequate anesthesiologist coverage to provide routine regional services, funding may be required to recruit additional personnel

CONSIDERATIONS OF ADVERSE EVENTS

- There is a documented risk of pneumothorax with paravertebral blocks. It is recommended to have a contingency plan or standard operating procedure in the event of pneumothorax.

"It's true teamwork and very rewarding that will help you enjoy your work and provide excellent service...it is about trying to make medicine better tomorrow...and that extregional anesthesiawork is paid off with extreme satisfaction from patients' comments." - Timur Özelsel

Implementation

This stage includes considerations for how to optimize the early experience of all team members to ensure ongoing success. These include staff scheduling, workflows, and peer mentorship.

RECOMMENDATIONS FOR STAFF SCHEDULING

- 1 anesthetist with experience in regional
- 1-2 nurses or anesthetist assistants

*Note: It is helpful to create a work schedule that allows the team to learn from one another. Consider pairing anesthesiologists at the outset to allow for peer mentorship until mastery of the blocks has been achieved.

WORKFLOWS

- Note: PECS/paravertebral blocks require 20 min to set
- It is recommended that surgeons batch breast cases and book full slates of cases requiring RA
- At the outset of the program, it is recommended that surgeons underbook the day by 20% to allow time to establish workflows
- In the scenario of a dedicated regional anesthesiologist and a separate anesthesiologist to staff the room, surgical throughput can eventually be increased compared to baseline as there is no time required for induction and emergence
- Patients receiving no or minimal intraoperative sedation can potentially bypass PACU and be discharged immediately home.
- Many patients who historically would have required inpatient admission (e.g., mastectomy, ALND) can be considered for same-day discharge with a block in situ. In some instances, this may require drain teaching in PACU.

TECHNICAL CONSIDERATIONS

When the surgeon marks the patient for surgery preoperatively, this should include marks on both the anterior and posterior chest indicating the site of both surgery and regional block. Wrong side blocks have been reported and can be easily avoided by including this in the preoperative marking.

Patient Communication

Patients should be appropriately counseled regarding their anesthetic options and recommendations and given an opportunity to report back on their experience.

FRAMING THE CONVERSATION

Questions to consider (Ontario Health):

- ☑ Patients are typically given a choice between general and regional anesthesia, with a discussion of the benefits of regional anesthesiaand a recommendation that this be the default option.
- ☑ Surgeons can prepare patients for this aspect of their surgery at the time of initial consultation or final pre-operative visit. Surgeon endorsement is reassuring to patients and many patients are eager to avoid a general anesthetic. The preoperative education pamphlet can be provided at this time.
- ☑ Anesthesiologists or nurses can reiterate the rationale and recommendation for regional anesthesiaat the time of pre-admission clinic visit, if applicable.
- ☑ Communication with the patient should be framed as a choice for the patients, but that the preferred method is regional anesthesia for all of its multifold benefits.

EXPERIENCES IN COMMUNICATING WITH PATIENTS POST OPERATIVELY

Establish a process for routine phone follow-up with all patients between 1 and 3 days post-operatively. This can be done by a nurse, medical office staff, or research assistant. This both enhances patient care and allows for collection of early post-operative data points.

RESOURCE:

Regional Anesthesia. A Patient's Guide to Breast Surgery: What to expect before, during and after Day Surgery (p. 16). Providence Breast Centre, Mount Saint Joseph Hospital, Vancouver. December, 2021.

Monitoring

CAPTURING THE CHANGES AND IMPACTS

Data collection is important for continuous quality improvement of program performance, real time tracking of adverse events, and for research purposes if desired. A comprehensive suite of metrics is recommended to monitor block and operative times, case volumes and workflows, and patient outcomes and satisfaction. These enable calculations of cost and environmental implications of the program on an ongoing basis. It is recommended that prospective data collection be undertaken from the outset of the program and that data be regularly reviewed by the core team. Outcomes can also be reported to senior leadership/administration as desired.

A comprehensive suite of outcome measures will facilitate continuous quality improvement, enable reporting on patient, system, and environmental outcomes, and ensure transparency around adverse events.

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About this playbook

These materials are based on expert interviews with anesthetists, surgeons, administration leaders and patient partners from January through June 2022.

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