PROJECT CHARTER

Surgical Tray Optimization

Developed by: Dr. Julie Strychowsky, Jun Bo Wang, Jenna Vandenheuvel, Alina Zgardau, Dale Mardlin and Mac Barry

Team members: Operating Room Nurses, Surgeons, Procurement staff, Supply Chain staff, Medical Device Reprocessing Department (MDRD) staff

Executive Sponsor:

This project was undertaken with the financial support of the Government of Canada.

Ce projet a été réalisé avec l'appui financier du gouvernement du Canada.

Canada

CASCADES Climate Action Healthcare + Action climatique soins de santé

London Health Sciences Centre

OR-PHIT

Children's Hospital London Health Sciences Centre

A modifiable PPT version of this project charter can be downloaded to be applied to your own healthcare setting. To access all downloadable project charters featured in this playbook, click here.

Please contact CASCADES@utoronto.ca if you have any questions.

NAVIGATION

Goal & Scope

1 What do you want to achieve?

Optimize the surgical trays used in the OR to more closely reflect the actual needs of a given procedure, thereby reducing waste (or "overage"). *

*Can include other areas where surgical trays are used

2 Define the limits of what you want to be included in the project and consider the environmental impacts you are targeting for change.

Project Scope: The OR at a hospital and their procurement practices for surgical trays that generate unnecessary waste from the time the instruments for the tray are ordered until their disposal.

Emission Scope: Scope 3; these emissions arise from activities or products that are related to health sector activities, but not owned or controlled by the organization, such as pharmaceuticals and other medical products and devices.

Problem/Opportunity Statement

3 Briefly state the problem you want to solve or the opportunity you want to realize.

Surgical instrument trays are standardized groups of reusable items that are prepared in a hospital's medical device reprocessing department (MDRD), comprising one part of the pick-list*. Unfortunately, these trays typically contain items which are routinely prepared but seldom used.

- A North American vascular surgery department audited instrument usage on two types of trays and found that only **22.9%** and **12.5%** of packaged instruments were used.(1) Once a tray is opened, it is considered contaminated in its entirety.
- Single-use items are discarded, and reusable instruments (whether used or unused) are reprocessed in MDRD.
- Reprocessing commonly features steam sterilization, which is both energy- and water-intensive,(2) and in some settings also requires the use of detergents.
- Reprocessing accounts for approximately **20% of the carbon footprint** of surgical operations.(3,4) Repeated washing and sterilization also causes wear and tear on instruments such that they can require repair or replacement even after minimal use. (5)
- optimizing surgical trays can eliminate the waste and reprocessing of unused items. Several studies have reported that either surveying practice patterns or performing mathematical modelling can eliminate up to **50%** of instruments from surgical trays.(6,7)

A surgical pick-list (or "preference list") describes the full suite of equipment made available for a given procedure. Pick-lists can vary dramatically between surgeons across or even within institutions – standardization may be a sustainable solution to reduce unnecessary waste.

Problem/Opportunity Statement

3 Briefly state the problem you want to solve or the opportunity you want to realize.

Optimized trays take half as long to assemble and can be processed with half of the associated carbon emissions.(6) Generating both environmental and cost savings.

- The optimization of a single type of surgical tray can save an institution between **$32,000 CAD** and **$76,000 CAD** per year.(6,7)
- One study performed a post-optimization audit after removing **45.8%** and **62.5%** of instruments from two surgical trays and found that no instrument required reinstatement.(1)
- At London Health Sciences Centre (LHSC), efforts to optimize the ENT minor dissecting tray resulted in the removal of 5 instruments, which was projected to save **$52,360** and **106.4 kg of CO_2** emission annually. Scaling this effort to additional trays across service lines can further amplify these benefits (See: **LHSC infographic**).

Current State of the System/Process

4 What do things look like today?

1. Prior to a surgical procedure, pick-lists are used to determine what items are needed for a procedure including the instrument tray(s).
2. Multiple trays may be utilized for a single procedure.
3. Historically, items have been added to surgical trays on an ad hoc basis according to surgeon/charge nurse requests, resulting in large and inefficient trays.
4. A significant proportion of the instruments on a tray do not end up getting used (27.8% (+/- 13.1)), but all instruments in the tray get reprocessed regardless of use. (8)
5. MDR reprocesses 100,000s of trays each year, consuming water, detergents, energy, and human inputs, and emitting greenhouse gases and solid waste. (7,9-11)
6. Reprocessing increases wear and tear on instruments such that they require repair or replacement even after minimal use.

Cite
CC

Root Cause Analysis

5 What gets in your way?

Education & Awareness

- People are unaware of the magnitude of unused instruments and the environmental impact of reprocessing unused items.
- People are unaware of the benefits of optimizing trays, such as reduced reprocessing time, cost savings, and potentially reduced set up time.

Clinical workflow

- Many nurses and surgeons are accustomed to standard instrument trays. Some believe that instruments necessary for surgical procedures will be removed, impacting patient safety and workflow.
- Some may be unaware that due to new developments in surgical techniques some instruments that were once needed are no longer commonly used.
- Each surgeon has variations in practice and instrument use, which may cause some challenges in optimizing trays.
- A tray can used for different procedure types, but not all instruments from the tray are needed each time.
- The process of performing intraoperative audits to determine which instrument to remove is extremely time-consuming.
- The MDRD team is responsible for updating surgical count sheets when new instruments are added to trays. There may not be a process for ongoing review of count sheets and changes to trays.

Root Cause Analysis

5 What gets in your way?

Infrastructure

- If an instrument is removed but later turns out to be needed, it could cause delays in getting it to the OR in time.
    - Instruments may be individually wrapped or only found on another tray. Depending on the instrument that is needed an entire other tray may need to be opened to access it.
    - It may take a several minutes for a sterile item to come to the OR from MDRD.
- If multiple trays are optimized at the same time, storage capacity may become a concern. It will take time to determine whether instruments can be redistributed to other trays missing the same items, or if they are common enough to justify being individually wrapped for future use.

Finances & Procurement

- Instruments are typically owned by the OR. If an optimized instrument is not needed to complete another tray or is not used frequently enough to be kept individually wrapped, the item may need to be recycled, or the option of donation can be explored.

Design the Improvement & Define Change Ideas

6 What are your ideas to achieve your goals, address your root causes and close the gap from your problem statement?

Education & Awareness

- Educate OR leadership teams and decision makers that optimizing surgical trays save staff time, money and waste, without compromising patient safety. Emphasize the optimization process and ensure that the instruments frequently used will not be removed.
  - Leverage green team platforms to discuss the work and receive buy-in.
  - Leverage surgeon quality leads from each department to support the work.
- Establish a communication process for OR staff to request that unused instruments be removed from the surgical trays.
- Create a poster/infographic highlighting the success of an existing optimized tray – include the savings in time, emissions, and related costs to encourage further buy-in **(Resource: LHSC infographic).**
  - Share with OR clinical teams including surgeons and nurses, as their support for change is essential for the optimization process
  - Shares images of trays pre and post optimization to highlight the reduction in instruments (**Resource: Before vs After Optimization - ENT Minor Dissecting Tray).**
  - Share a chart outlining the number of instruments within a surgical tray before versus after optimization (**Resources: Tray Dissecting Instruments in Orthopedics Before vs After Optimization**).
  - Prepare a list of FAQs to clarify any confusion (**Resource: Surgical Tray Optimization FAQs**).

Design the Improvement & Define Change Ideas

6 What are your ideas to achieve your goals, address your root causes and close the gap from your problem statement?

Clinical workflow

- Administer a survey to OR nurses, surgeons, and learners to help understand instrument use (**Resource: Instrument Use Survey; Instrument Use Survey Overview**).
- Audit instrument use to see what tools are used in clinical practice. Ensure multiple surgeons and procedures are included in the audit to get a well-rounded understanding of instruments that can be optimized (**Resource: Orthopedic Dissecting Tray Audit Summary**).
    - Leverage a student/accommodated personnel to conduct in person audits of instrument use, utilizing an audit tool with pictures of each instrument (**Resource: Basic Laparotomy Tray Instruments; Pediatric General Surgery Tray Instruments**).
    - Have nursing staff fill out an audit form at the end of each case. These can be collected by the project team and analyzed for results (**Resource: Basic Laparotomy Tray Audit Form**). *Note that this task may lead to self-reporting bias and extra workload for nursing staff.*
- Create an optimized tray with certain instruments removed based on the survey and audit data. Conduct a 5-week trial of the optimized tray.
    - Place “removed” instruments in a separate bag that can be accessed if needed. Document how often the bag was opened and which instruments were used.
- Implement a post-implementation survey to assess staff feedback on the tray (**Resource: Post-Implementation Survey**).

Measure & Test Impact

7 How will you estimate the environmental impact of your changes?

Environmental impact was calculated from a combination of local data and published proxies from Rizan et al, 2023, where CO2 emission for each instrument was estimated using data from raw material extraction, transportation to primary processing/manufacturing site, steam sterilization, and disposal.(3) Their detailed method of calculation is outlined below.

Emission per Decontamination

[**Raw material weight times Disposal–related emissions factor:** Stainless steel (in tonne) times 21 kg CO2e/tonne + **Raw material weight times Production–related emissions factor, 'cradle to factory gate':** Stainless Steel (in kg) times 6.15 kg CO2e/kg] ÷ **Number of decontaminations sustainable before requiring replacement:** Specific to each instrument + **Emissions from the decontamination process:** Emissions were estimated for each tray, allocated across instruments within a tray according to instrument weight.

× **Number of Decontaminations**

Obtained the number of times the tray is decontaminated annually from the local Medical Devices Reprocessing Department. This is specific to each instrument tray.

= **Annual Environmental savings**

- The calculation will yield ESTIMATES only.
- Use the Natural Resources Canada Greenhouse Gas Equivalencies Calculator to translate your results to stakeholders.

Embed & Spread

8 What steps have been taken to ensure lasting change? How could it be spread to other contexts?

Micro (What can you do?)

- Conduct Plan-Do-Study-Acts (PDSAs) involving the change ideas presented in section 6.

Meso (What can you do within your organization?)

- Collaborate with the physicians' governing body to recognize this initiative as a means for physicians to meet their professional requirements.
  - **Example:** At LHSC, the instrument tray optimization project has been adopted as a CPSO Hospital Partnership QI Program. Physicians participating in the project can use their involvement to fulfill CPSO requirements.
- Collaborate with MDRD to support optimization of trays and ensure changes are feasible from their perspective.

Macro (What can your organization do?)

- Engage and inform multiple affiliated sites about this initiative to further obtain buy-in and recommendations of suitable trays for optimization.
- Share how your organization optimizes surgical trays without compromising patient safety with other hospitals.
- Share learnings and results from tray optimization with other hospitals/organizations so they can use these tools to advocate for change in their setting.

References

1. Knowles M, Gay SS, Konchan SK et al. Data analysis of vascular surgery instrument trays yielded large cost and efficiency savings. J Vasc Surg 2021; 73: 2144–53. https://doi.org/10.1016/j.jvs.2020.09.043.
2. McGain F, Moore G, Black J. Steam sterilisation's energy and water footprint. Aust Health Rev 2017; 41: 26–32. https://doi.org/10.1071/AH15142.
3. Rizan C, Lillywhite R, Reed M, Bhutta MF. The carbon footprint of products used in five common surgical operations: identifying contributing products and processes. J R Soc Med 2023; 116: 199–213. https://doi.org/10.1177/01410768231166135.
4. Rizan C, Lillywhite R, Reed M, Bhutta MF. Minimising carbon and financial costs of steam sterilisation and packaging of reusable surgical instruments. Br J Surg 2021; 109: 200–10. https://doi.org/10.1093/bjs/znab406.
5. Dobson G, Seidmann A, Tilson V, Froix A. Configuring surgical instrument trays to reduce costs. IIE Transactions on Healthcare Systems Engineering 2015; 5: 225–37. https://doi.org/10.1080/19488300.2015.1094759.
6. Van Osch K, Madou E, Belisle S, Strychowsky JE. Reducing Unnecessary Instruments in Tonsil Hemorrhage Trays at a Canadian Tertiary Care Center: A Quality Improvement Project. J Otolaryngol Head Neck Surg 2024; 53: 19160216241267719. https://doi.org/10.1177/19160216241267719.
7. Toor J, Bhangu A, Wolfstadt J et al. Optimizing the surgical instrument tray to immediately increase efficiency and lower costs in the operating room. Can J Surg 2022; 65: E275–81. https://doi.org/10.1503/cjs.022720.
8. Chin CJ, Sowerby LJ, John-Baptiste A, Rotenberg BW. Reducing otolaryngology surgical inefficiency via assessment of tray redundancy. Journal of Otolaryngology-Head & Neck Surgery. 2014 Jan;43(1):46. https://doi.org/10.1186/s40463-014-0046-2
9. London Health Sciences Centre. Medical Device Reprocessing changes in sterilization procedures over the years [Internet]. [cited 2026 Jan 10]. Available from: https://www.lhsc.on.ca/150/moment/medical-device-reprocessing-changes-in-sterilization-procedures-over-the-years/
10. Unity Health Toronto. This Unity Health team sterilized 16,000 surgical instruments in a month. Meet the people keeping patients safe [Internet]. 2023 Jan 18 [cited 2026 Jan 10]. Available from: https://unityhealth.to/2023/01/medical-device-reprocessing-department/
11. Sick Kids. Becoming a Medical Device Reprocessor for the day [Internet]. 2018 Nov 7 [cited 2026 Jan 11]. Available from: https://www.sickkids.ca/en/news/archive/2018/becoming-a-medical-device-reprocessor-for-the-day-/#:~:text=The%2050-staff%20team%20processes,eliminates%20errors%20which%20reduces%20risk