SUSQI PROJECT REPORT

Rationalisation of Arteriovenous Fistula Surgical Trays

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Date of Report: January 2025

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Background:

Operating theatres, though serving fewer than 5% of hospital inpatients, can account for up to 25% of a hospital's carbon footprint (NHS England)[1]. While single use medical instruments are often switched for reusable items to reduce the impact, this does not remove the environmental impact of equipment entirely. Equipment, while ordered less frequently, still contributes to supply chain emissions. Rizan et al. (2022)[2] estimated that decontaminating/sterilisation and packaging reusable surgical instruments involves substantial carbon footprints and financial costs. Additionally, many reusable items can be opened or included in surgical kits which are opened for surgeries, but not used, meaning they are sterilised unnecessarily while shortening the product lifespan.

Research indicates that the usage of surgical instruments ranges between only 13.0% and 21.9% of the total across different surgical instrument trays (SITs). Consequently, the majority of the instruments are returned to the CSSD unused, leading to unnecessary resource use and potential contamination risks during handling (Nieuwenhuizen et al, 2024)[3]. Reducing unnecessary instrumentation on surgical trays is one example of a simple, physician-led strategy for minimising waste and reducing healthcare costs. Excessive instrument opening can disrupt the operating room flow and put the patient at increased risk of potential infection (Nast et al 2019)[4]. Fu et al 2021[5] report that tray rationalisation is "*a simple, effective, and scalable strategy for reducing costs and improving OR efficiency without compromising patient safety*". Knowles at al 2021[6] report that *"the number of surgical instruments in surgical trays can be reliably decreased by 70% without compromising patient safety"*.

We currently use reusable equipment for arteriovenous fistula (AVF) surgeries - including radiocephalic, brachiocephalic, and first-stage brachiobasilic AVFs. However, it has been noted that the kits contain significantly more items than are required for the basic operation. Streamlining instrument sets and improving sterilisation efficiency could enhance both cost-effectiveness and environmental sustainability.

Specific Aims:

To streamline surgical kits by removing unused or low-use equipment from the standard kits for radiocephalic, brachiocephalic and 1st stage brachiobasilic arteriovenous fistula (AVF) procedures.

Methods:

Studying the system

Audit of current equipment and practice:

We created an inventory of all items provided in our current kits and completed an audit of current practice using a tray tracking form (Appendix 1). We analysed instrument usage within AVF surgical trays to identify opportunities for rationalization. The analysis of 25 cases utilized several key metrics:

1) % Cases Present – The percentage of cases where the instrument was available in the tray.
2) Absolute Usage % – The percentage of cases where the instrument was used across all cases.
3) Usage When Present % – The percentage of cases where the instrument was used, considering only cases where it was available in the tray.

The data for this analysis is summarized in the Appendix 2 ,which includes the absolute usage percentage, the standard number of items per tray, and the frequency of instrument usage (e.g., used 0, 1, or more times). Instruments with high usage percentages, such as the "Tray Liner" (100%) and "McIndoe Scissor" (96%), were identified as essential components of the tray. Conversely, instruments with low or negligible usage, such as the "Littlewood Forceps" (2%) and "Allis Tissue Forceps" (0%), were highlighted as potential candidates for tray rationalization.

To visualize these findings and connect them to CO2e emissions, we developed a heat map (Appendix 3) that uses a colour gradient to represent instrument usage levels and their associated environmental impact. Instruments with high usage percentages are displayed in green, signifying their frequent use, importance in the tray, and efficient contribution to lower CO2e emissions during sterilization. Conversely, instruments with low or negligible usage are depicted in red, indicating their potential for removal or reduction, as they contribute disproportionately to CO2e emissions relative to their utility. The gradient transitions from red (high CO2e impact, low usage) to green (low CO2e impact, high usage), providing an intuitive visual representation of the relationship between instrument usage and environmental sustainability. Furthermore, some instruments of the same type were found to be included in the tray in quantities exceeding their actual usage. For example, the "Towel Clip 3.5’ Backhaus (Ball)" was initially provided in greater numbers than required, but was rationalized based on usage calculations and data, reducing the excess instruments while ensuring clinical needs were met. This data-driven approach enabled the optimization of tray contents, improving efficiency, reducing CO2e emissions, and aligning with sustainable surgical practices.

This process identified that the following instruments were eligible to be removed from the primary tray. This adjustment would reduce the standard tray size by more than half, allowing the autoclave to accommodate 18 trays per cycle instead of the previous 9 trays. This efficiency improvement effectively halves the number of sterilization cycles required from two to one per week, significantly reducing operational costs and resource utilization.

Table 1: Unused instruments per procedure:

Instrument	Quantity
Littlewood Forceps	4
Allis Tissue Forceps	4
Small Watson Cheyne Dissector 5 1/4"	1
Langenbeck Retractors (Medium)	2
Morris Retractor (Medium)	1
Potts Smith Bulldog Clamps	2
Probe 5"	1
Bulldog Clamps (Small)	5
Mosquito Artery Forceps, straight 5"	1
Towel Clip 3.5" Backhaus (Ball)	2
BP Handle No: 3	1
Total	**24**

Staff engagement

We held initial meetings to plan the data collection process.

We also implemented a multidisciplinary team staff survey to gather information on the team's perception of our current kits and proposed changes (questions in Appendix 4). We received 16 responses from surgeons, staff and charge nurses, sterile department, and instrument coordinators.

56.3% of staff either agreed or strongly agreed the AVF trays contain instruments that were rarely or never used and that streamlining the tray would positively impact their workload. 68.8% agreed that it would reduce setup time for procedures, and 62.5% of staff agreed reducing the number of instruments in the trays would improve efficiency, and 68.8% that it would make the process of sterilisation easier. No staff were concerned that the change would compromise patient safety. Additional findings are summarised in the results section.

Implementation of change

A formal meeting was conducted with the surgeons and consultants within the department to discuss and finalise the proposed modifications to the AVF surgical tray. During the meeting, detailed images and a comprehensive list of instruments identified for removal were presented. The proposed changes were supported by data derived from the audit, and the rationale behind the modifications was extensively reviewed. The surgeons and consultants unanimously endorsed the changes, reflecting a collaborative and evidence-driven decision making process.

After this meeting, in-person training sessions were conducted with theatre staff to facilitate the implementation of the updated tray. These sessions provided a clear explanation of the modifications and outlined the appropriate usage of the new tray. Emphasis was placed on the principle that the new tray should serve as the primary option for surgeries, while the backup tray is intended for use only in exceptional circumstances, primarily during second-stage AVF operations, and should be positioned near the theatre to prevent delays. The training ensured that all staff members were fully informed, aligned with the updated protocol, and equipped to execute the changes effectively, thus supporting the seamless adoption of the revised practice.

From left to right: Standard Tray Before Reduction, Backup Tray and New Tray

The new tray is used for primary RCAVF, BCAVF, and 1st stage brachiobasilic AVF. The backup tray is opened alongside the new tray during 2nd stage AVF, which requires additional instruments for the larger operation.

Measurement:

Patient outcomes:

The same instruments will be used for al procedures. All equipment removed from the kits will still be available close by if required (e.g. in the stock-room next door). This is already standard practice for other equipment items and will not increase risk to patients. Based on existing literature there is potential that the project can reduce risks (e.g., infection) to patients, which is summarised in the results section.

More broadly, there is a potential that streamlining the kits could save time and allow faster turnaround of procedures. It was not possible to measure this with our electronic systems. In the future, we'll work on this and get feedback from theatre staff.

Environmental sustainability:

The carbon footprint (expressed in Carbon Dioxide Equivalents, or CO2e) is a common measurement used to show environmental impact.

The calculations for our project are based on the methodology outlined by Rizan et al (2022)[7]., which evaluates the carbon footprint of decontaminating surgical instruments. This includes emissions from energy consumption, instrument packing, and DIN basket utilization. Rizan et al. calculated a carbon footprint of 1,918g CO2e per sterilization for a standard tray (29 instruments) wrapped in single-use tray wrap. For trays occupying double the size in a sterilization machine, such as larger trays, the carbon footprint doubles to 3,836 gCO_2e per sterilization. This approach ensures that emissions are accurately attributed based on tray size and usage, rather than individual instruments. The calculations account for the efficiency of DIN basket loading and the emissions from sterilization resources (electricity, water, gas, detergent) and packaging materials.

Economic sustainability:
The Sterile Services Department (SSD) in the trust provided a sterilisation cost of £22.40 per tray. This value was used to calculate the cost per instrument by dividing the tray cost by the number of instruments, aligning with methodologies observed in NHS practices, where costs are often allocated based on tray sizes and the number of instruments they contain, as demonstrated in the Freedom of Information response from Tunbridge Wells Hospital. Tunbridge Wells NHS [8] , Additionally, the price of the removed equipment, if factored into the savings, will have a significant impact. According to the official quotes from UHCW hospital suppliers, these removed instruments are valued at £1,915. However, the estimated frequency of purchasing these instruments is not yet clear, and the lack of clear data on how often these instruments are purchased could affect the accuracy of the estimated cost savings.

Social sustainability:
We have detailed some potential impacts on staff and patients in the results section based on our initial staff survey. However, to evaluate the impact after implementation of the changes, a follow-up survey will be conducted after a defined period of use. This survey will aim to assess the influence of the new tray setup on key operational factors, including theatre workflow, staff workload, operating time, and ease of handling. The feedback obtained will provide valuable insights into the effectiveness of the modifications and identify any areas requiring further refinement. This iterative approach underscores the commitment to continuous improvement and the optimisation of theatre practices.

Results:

Patient outcomes:
As above, Literature suggests that patient safety can be optimised by streamlining surgical instrument trays. Van Nieuwenhuizen et al. (2024)[9] reported that minimising the inclusion of unnecessary instruments in trays enhances patient safety by improving clarity, reducing the chances of errors during instrument counting and evaluation. In their evaluation of new SIT contents (n = 7 procedures), the mean instrument utilisation (IU) increased from 28.4% (SD = 6.4%) to 46.5% (SD = 11.0%), with no missing instruments during surgery.

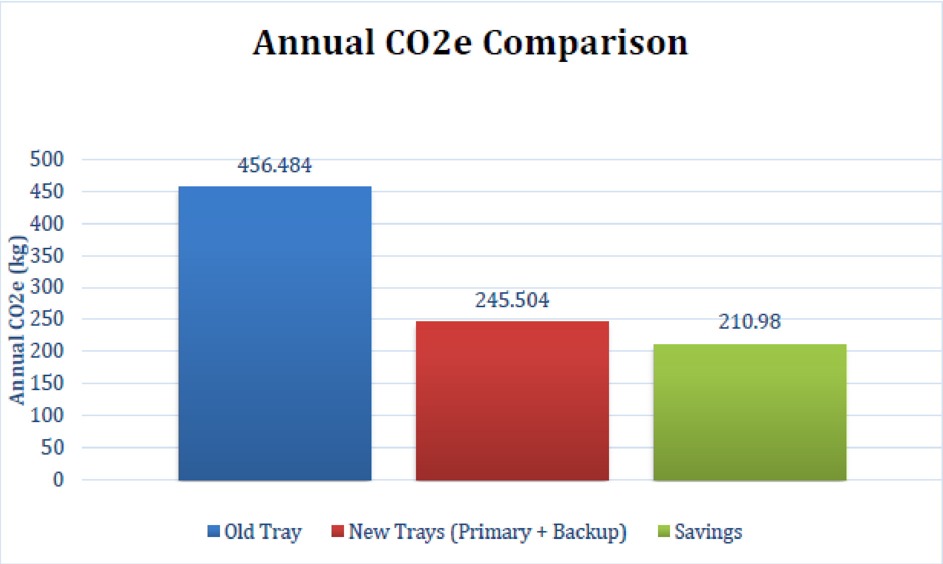
Also, the same literature highlights the infection risk, although not directly monitored or observed in this project, which indicates that surgical instruments are often underutilised, with only 13.0% to 21.9% of the total instruments in surgical trays being used. This results in unnecessary resource use and increases potential contamination risks during handling.

Environmental sustainability:
The change demonstrates a significant reduction in CO_2e emissions by optimizing surgical trays. As shown in table 2a and 2b, yearly emissions decreased from 456.48 kg CO_2 (old tray) to 245.50 (new tray), achieving reduction of 210.98kg CO_2e per year. Detailed data calculations can be found in Appendix 5.

Table 2a: Reduction in CO_2e emissions yearly achieved by using the new tray

	Old tray configuration	**New tray configuration**
Number of instruments per set	52	28 *(+ 24 in back up tray)*
Annual operations	119	119 *(+9 operations back up tray used)*
Sterilisation carbon footprint per year	**456.48 kgCO2e**	**245.50 kgCO2e** (228.24 kgCO2e for new tray + 17.26 kgCO2e for back up tray)

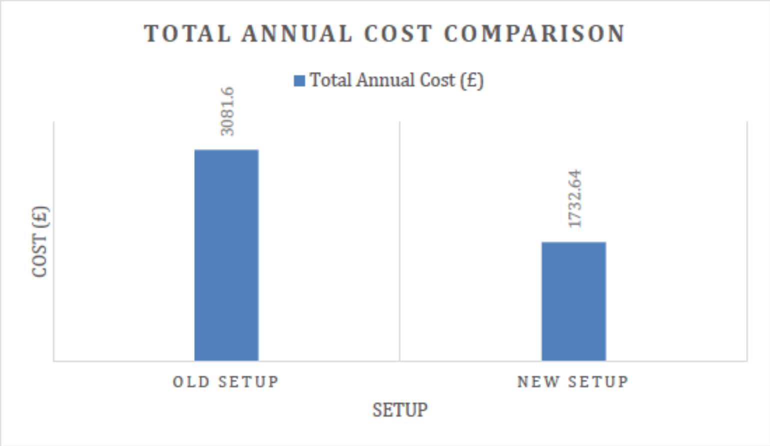
Table 2b: Reduction in CO_2e emissions yearly achieved by using the new tray.



These results focus on instrument sterilization and do not include potential CO_2e savings from reduced usage of electricity, water, gas, and detergent, which could further enhance the environmental impact. There will also be additional carbon savings from reduced purchasing of equipment. However, the estimated frequency of purchasing these instruments is not yet clear and so we have not estimated the potential CO_2e impact.

Economic sustainability:
The optimisation of sterilisation trays has yielded total annual cost savings of **£1,348.96,** comprising £1,233.84 from reduced tray sterilization costs and £208 from fewer sterilization cycles. Data calculations can be found in Appendix 6.

Figure 1: Annual Cost reduction achieved by using the new tray.



Additionally, the removal of instruments valued at £1,915 contributes to potential long-term savings by minimising unnecessary wear and replacement. The lifespan of these instruments may be prolonged by reducing unnecessary sterilisation cycles, leading to increased wear and tear. This could result in the need for more frequent replacements, thereby increasing overall costs. However, the estimated frequency of purchasing these instruments is not yet clear and therefore this impact has not been included in our projected annual savings.

Social sustainability:
As in our methods section, there was staff agreement that streamlining the tray would positively impact workloads, reduce setup time and improve efficiency, which can be supportive for job satisfaction. No staff were concerned that the change would compromise patient safety.

Research supports the set up time for procedures reducing with tray rationalisation. Lonner at al 2021[10] found mean set-up time decreased from 20.7 to 14.2 minutes, while 40-75 minutes were saved during the sterilization process, while Knowles et al 2021[11] found operating room table setup decreased from a mean of 7:44 to 5:02 minutes for the vascular tray (P < .0001)."

88.6% were already aware of the environmental impact of surgical care and waste, and 75% agreed the project would help in reducing the service carbon footprint (25% neutral). 87.5% believed the change would bring cost savings to the hospital.

Staff quotes:

- *"Mostly this will be positive as the time taken for preoperative preparation will be reduced. This will lead to more operating time availability and may even lead to doing more patients in a single theatre list"*
- *"Saving time to count unnecessary instruments"*
- *"This is a very good idea to improve sustainability and reduce costs to the trust"*

There were some concerns highlighted.
"This will prolong surgical time when you wait to find separately packed instruments which is not in the tray."

"This is detrimental if the patient is bleeding"

A high number of staff also either strongly agreed or agreed that the project should be applied to other types of surgeries and would be of benefit to other departments. Further context and actions to address staff concerns and potential application to other surgeries is explored in the discussion.

Discussion:

The removal of 24 unused instruments from AVF surgical trays has significantly improved financial efficiency, environmental sustainability, and operational workflows. The project demonstrated measurable reductions in sterilization cycles, waste, and carbon emissions while maintaining high surgical safety standards. By utilizing heat maps and staff surveys, the team ensured data driven decisions, making the rationalization process both efficient and effective. These results emphasize the importance of targeted interventions in improving surgical practices while contributing to broader NHS sustainability goals.

While the project achieved its objectives, it was limited to AVF surgeries. Expanding this approach to larger and more complex procedures needs additional testing and evaluation. Additionally, the project's outcomes were derived from a relatively small dataset of 25 cases, necessitating continued monitoring and data collection to ensure reproducibility and consistency in other contexts.

Initially, staff expressed concerns about potential disruptions to workflows and patient safety. This was addressed through formal training sessions that explained the rationale and benefits of the revised tray configurations, ensuring smooth adoption. The initial methods for carbon footprint calculations faced limitations. Collaboration with the SusQI Programme, The Centre for Sustainable Healthcare for Green Team Competition, helped refine these calculations, ensuring accurate environmental impact assessments.

The primary risk was the inadvertent removal of essential instruments, which could compromise surgical outcomes. This was mitigated by conducting initial trials, meeting with the department surgeons involved in these procedures, and gathering input from surgeons and theatre staff before finalizing the tray configurations. The probability of such risks occurring was minimized through iterative testing and thorough stakeholder engagement.

To ensure lasting impact, the revised tray configurations are planned to be embedded into standard operating procedures, supported by an ongoing staff training program and a structured feedback mechanism. This mechanism will be developed and monitored by the surgical team, in collaboration with theatre staff, to capture and address any issues or further optimization opportunities. Additionally, we plan to monitor the financial, environmental, and operational benefits after implementing the changes, ensuring the initiative's sustainability and adaptability. As part of these efforts, a new staff survey will be introduced to assess the impact of the changes, capturing detailed feedback on workflow adjustments, time savings, and perceived environmental improvements. This survey will help identify areas for further refinement and provide evidence for scaling the initiative to other surgical procedures.

This methodology has the potential for broader application in surgical specialties with extensive instrument requirements, such as kidney transplants, orthopaedics, and general surgery. These fields, with their extensive instrument requirements, represent significant opportunities for further cost and environmental savings. By reducing waste and improving efficiency in these contexts, the project's principles can generate even greater environmental and financial benefits. Expanding the initiative to larger and more complex procedures, beginning with kidney transplants, is a logical next step. Developing standardized guidelines and training materials will facilitate replication across different specialties. As the Royal College of Surgeons of England (2011)[12] emphasises, sustainability in surgery not only reduces resource wastage but also aligns with broader goals of operational efficiency and improved patient outcomes.

Conclusions:

The rationalization of AVF surgical trays has demonstrated notable benefits in enhancing financial efficiency, environmental sustainability, and operational effectiveness in surgical settings. By removing 24 unused instruments from the trays, the project achieved meaningful reductions in waste, sterilization requirements, and associated carbon emissions, while maintaining the highest standards of patient care and surgical safety. The change achieves a notable decrease in CO2e emissions. Yearly emissions decreased from 456.48 kg CO2 (old tray) to 245.50 kg CO2 (new tray), achieving a reduction of 210.98 kg CO2 per year. The optimization of sterilization trays has yielded total annual cost savings of £1,348.96. This initiative shows the importance of using data-driven solutions to fix inefficiencies and helps the NHS work towards net-zero carbon emissions.

The project's success in the context of AVF surgeries highlights its scalability and potential for greater impact when applied to larger and more complex procedures, and high-volume specialties..

Future data collection efforts will focus on understanding how well staff, the department, and the project team are engaging with the changes and ensuring sustainable practices become part of everyday routines. This will help the project leave a lasting impact, going beyond operational improvements to inspire long-term change in line with the NHS's sustainability goals.

Appendices

Type of Operation	2021	2022	2023	Average
BBAVF 1st Stage	12	11	9	
BCAVF	45	54	66	
RCAVF	67	57	37	
RCAVF+BCAVF+ 1st Stage	124	122	112	**119**
BBAVF 2nd Stage (back up tray)	10	8	9	**9**

Surgical Instrument Usage Tracker Form – AV Fistula Tray

Items	Standard # of items	If item present check ☑	# of items used	Item not used check ☒	Notes	Extra items seprately opened
Tray Liner	1					
Towel Clip 3.5" Backhaus (Ball)	5					
Rampley Sponge Holders 9"	2					
McIndoe Scissor 7"	1					
Mayo Scissor, straight 5"/6"	1					
Mosquito Artery Forceps, straight 5"	5					
Mosquito Artery Forcep, curved 5"	5					
Crilewood Needle Holder	1					
Littlewood Forcep	4					
Allis Tissue Forceps	4					
McIndoe Dissecting Forcep non toothed	1					
Gillies Dissecting Forcep	1					
Debakey Dissecting Forcep 6"	1					
BP Handle No: 3	2					
Small Watson Cheyne Dissector 5 1/4"	1					
Langenbeck Retractors (Medium)	2					
Morris Retractor (Medium)	1					
Potts Smith Bulldog Clamps	2					
Probe 5"	1					
Rake Retractor, small	2					
West Retractor	1					
Bulldog Clamps (Small)	5					
Baby Mixter	1					
Potts Scissor	1					
Alms Retractor	1					

Qick Giude
Items: List of instruments in the tray.
Standard # of items: Number of each instrument that should be in the tray initially.
If item present check ☑: Mark this box if the item is in the tray before the surgery.
of items used: Enter the number of items used during the surgery.
Item not used check ☒: Mark this box if the item was not used during the surgery.
Notes:
Use this section to add any observations, like if an item is missing, damaged, or if any special adjustments were made.
Note if the standard quantity was incorrect or if an instrument was needed but not in the tray.
Extra items separately opened: Note any additional instruments opened during the procedure that were not part of the standard tray setup.

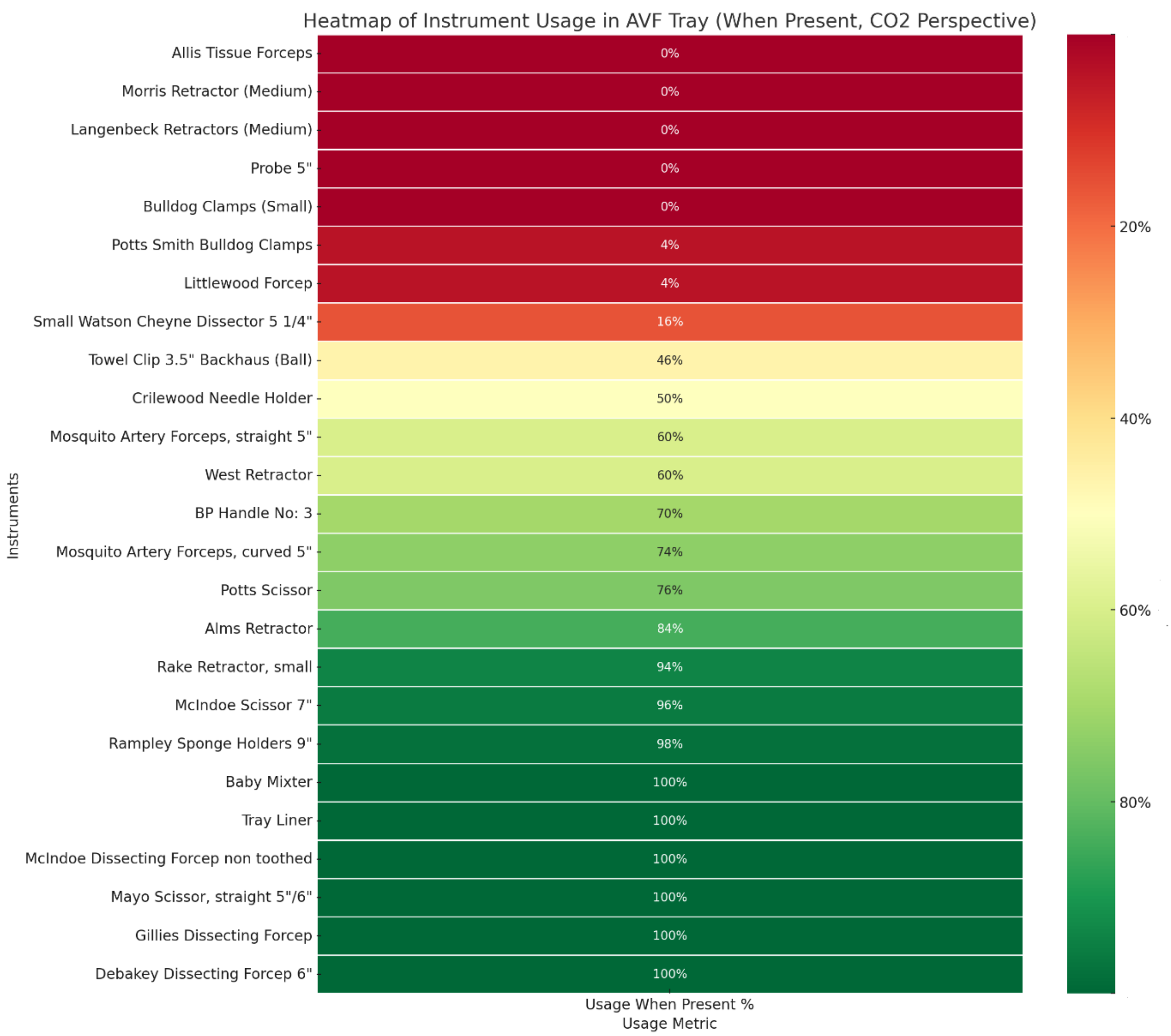
Date	Procedure	Lead surgeon

NOTES	

Appendix 1: Operation Counts and average Summary for 2021, 2022, 2023 and tacking form.

Instrument	Standard # of Items	# of Surgeries	# Cases Present	Absolute Usage %	Used 0 Instruments	Used 1 Instrument	Used 2 Instruments	Used 3 Instruments	Used 4 Instruments	Used 5 Instruments
Tray Liner	1	25	25	100	0	25	0	0	0	0
Towel Clip 3.5" Backhaus (Ball)	5	25	25	20	0	8	9	2	4	2
Rampley Sponge Holders 9"	2	25	25	50	0	1	24	0	0	0
McIndoe Scissor 7"	1	25	25	96	1	24	0	0	0	0
Mayo Scissor, straight 5"/6"	1	25	25	100	0	25	0	0	0	0
Mosquito Artery Forceps, straight 5"	5	25	25	19.2	1	3	8	2	5	6
Mosquito Artery Forceps, curved 5"	5	25	25	20	0	0	2	9	9	5
Crilewood Needle Holder	2	25	25	50	0	25	0	0	0	0
Littlewood Forcep	4	25	25	2	23	0	2	0	0	0
Allis Tissue Forceps	4	25	25	0	25	0	0	0	0	0
McIndoe Dissecting Forcep non toothed	1	25	25	100	0	25	0	0	0	0
Gillies Dissecting Forcep	1	25	25	100	0	25	0	0	0	0
Debakey Dissecting Forcep 6"	1	25	25	100	0	25	0	0	0	0
BP Handle No: 3	2	25	25	50	0	15	10	0	0	0
Small Watson Cheyne Dissector 5 1/4"	1	25	25	16	21	4	0	0	0	0
Langenbeck Retractors (Medium)	2	25	25	0	25	0	0	0	0	0
Morris Retractor (Medium)	1	25	25	0	25	0	0	0	0	0
Potts Smith Bulldog Clamps	2	25	25	4	23	2	0	0	0	0
Probe 5"	1	25	25	0	25	0	0	0	0	0
Rake Retractor, small	2	25	25	48	1	1	23	0	0	
West Retractor	1	25	25	60	10	15	0	0	0	0
Bulldog Clamps (Small)	5	25	25	0	25	0	0	0	0	0
Baby Mixter	1	25	25	100	0	25	0	0	0	0
Potts Scissor	1	25	25	76	6	19	0	0	0	0
Alms Retractor	1	25	25	84	4	21	0	0	0	0

Appendix 2: Instrument usage metrics table



Appendix 3: Heat map of usage and CO2e impact.

Topic	Agreement (%)	Key Insight
Surgical Efficiency	62.5%	Reducing instruments enhances surgical efficiency.
Team Focus	73.3%	Streamlining trays improves focus during procedures.
Workload Impact	56.2%	Positive impact observed on workload.
Environmental Awareness	87.5%	Raised awareness of environmental impacts.
Environmental Footprint	87.5%	Reducing tray size decreases environmental footprint.
Cost Savings	75.0%	Identified potential cost savings from rationalizing trays.
Rarely Used Instruments	56.2%	Need to eliminate rarely used instruments.
Regular Tray Review	93.8%	Strong support for regular reviews of surgical trays.
Setup Time	68.8%	Reduced setup time noted as a benefit.
Sterilization and Reprocessing	68.8%	Easier sterilization and reprocessing identified as an advantage.
Patient Safety	75.0%	Changes maintain patient safety.
Other Surgeries	81.2%	Support for extending the project to other surgeries.
Applicability to Departments	93.8%	Endorsed expanding the initiative across departments.

Appendix 4: Total agreement percentages (Agree + Strongly Agree) for each survey topic.

Detailed Co2e Calculations

Old Tray Configuration

- Number of Instruments: 52
- Annual Usage: 119 operations
- Carbon Footprint per Sterilization: 3,836 g CO_2e

Yearly Carbon Emissions:

3,836 g CO_2e × 119 operations = 456,484 g CO_2e (**456.48 kg CO_2e**)

New Tray Configuration

- Primary Tray Instruments: 28
- Backup Tray Instruments: 24
- Primary Tray Annual Usage: 119 operations
- Backup Tray Annual Usage: 9 operations
- Carbon Footprint per Sterilization: 1,918 g CO_2e for both trays

Yearly Carbon Emissions:

- Primary Tray: 1,918 g CO_2e × 119 operations = 228,242 g CO_2e (228.24 kg CO_2e)
- Backup Tray: 1,918 g CO_2e × 9 operations = 17,262 g CO_2e (17.26 kg CO_2e)
- Total New Tray Emissions: 228,242 + 17,262 = 245,504 g CO_2e (**245.50 kg CO_2e**)

Yearly Carbon Savings

- Old Tray: 456,484 g CO_2e (456.48 kg CO_2e)
- New Tray: 245,504 g CO_2e (245.50 kg CO_2e)

Total Savings:

456,484 - 245,504 = 210,980 g CO_2e (**210.98 kg CO_2e**)

Summary of Findings

1. Old Tray Yearly Emissions: **456.48** kg CO_2e
2. New Tray Yearly Emissions: **245.50** kg CO_2e
3. Yearly CO_2 Savings: **210.98** kg CO_2e

Appendix 5: CO_2e calculations

Methodology

1. Baseline Tray Composition:
The original tray contained 52 instruments.
The sterilization cost per tray was £22.40, calculated as £0.43 per instrument per cycle.

2. Optimized Tray Composition:
24 instruments were removed, reducing the tray to 28 instruments.
The new sterilization cost per tray was recalculated based on the per instrument cost of £0.43:
- For the optimized new tray containing 28 instruments: £28 × £0.43 = £12.04 per tray.
- For the backup tray containing 24 instruments: £24 × £0.43 = £10.32 per tray.

Old Setup:
Cost per tray sterilization: £22.40.
Trays used per operation: 1.
Total operations per year: 119.
Total cycles per year: 104 (2 cycles per week × 52 weeks).
Annual cost for cycles: 104 × £4 (cycle cost as provided from SSD) = £416.
Annual tray cost: 119 operations × £22.40 = £2,665.60.
Total annual cost: £2,665.60 + £416 = **£3,081.60.**

New Setup:
Cost per tray sterilization for main tray (28 instruments): £12.04.
Cost per tray sterilization for backup tray (24 instruments): £10.32.
Main tray usage: 119 operations per year × £12.04 = £1,431.76.
Backup tray usage: 9 operations per year × £10.32 = £92.88.
Total cycles per year: 52 (1 cycle per week × 52 weeks).
Annual cost for cycles: 52 × £4(cycle cost as provided from SSD) = £208.
Total annual cost: £1,431.76 + £92.88 + £208 = **£1,732.64.**

Savings: £3081.60 - £1732.64 = **£1,348.96** annually.

Appendix 6: Financial calculations

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Critical success factors

Please select one or two of the below factors that you believe were most essential to ensure the success of your project changes.

People	Process	Resources	Context
☐ Patient involvement and/or appropriate information for patients - to raise awareness and understanding of intervention X Staff engagement X MDT / Cross-department communication ☐ Skills and capability of staff ☐ Team/service agreement that there is a problem, and changes are suitable to trial (Knowledge and understanding of the issue) ☐ Support from senior organisational or system leaders	☐ clear guidance / evidence / policy to support the intervention. ☐ Incentivisation of the strategy – e.g., QOF in general practice X systematic and coordinated approach ☐ clear, measurable targets ☐ long-term strategy for sustaining and embedding change developed in planning phase ☐ integrating the intervention into the natural workflow, team functions, technology systems, and incentive structures of the team/service/organisation	☐ Dedicated time ☐ QI training / information resources and organisation process / support ☐ Infrastructure capable of providing teams with information, data and equipment needed ☐ Research / evidence of change successfully implemented elsewhere ☐ Financial investment	☐ aims aligned with wider service, organisational or system goals. ☐ Links to patient benefits / clinical outcomes ☐ Links to staff benefits ☐ 'Permission' given through the organisational context, capacity and positive change culture.

This template is adapted from SQUIRE 2.0 reporting guidelines.

Template References

- SQUIRE | SQUIRE 2.0 Guidelines (squire-statement.org)
- Home | Sustainable Quality Improvement (susqi.org)