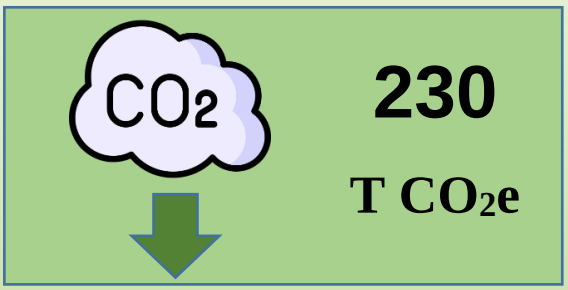
Green Healthcare Scotland

Opportunity for Change - Improving decontamination efficiency

through automated pre-cleaning systems

Date: July 2026



1. Description of action

1.1 This Opportunity for Change outlines the case for NHS Scotland Central Decontamination Units (CDUs) to explore the adoption of automated pre-cleaning systems within decontamination units to reduce the reliance on manual pre-cleaning processes.

1.2 This is not a mandate for national implementation or procurement. Rather, local services are encouraged to review this evidence-informed opportunity and assess whether automated pre-cleaning could be safely and effectively adopted within their own decontamination units.

1.3 Where appropriate, automated pre-cleaning systems have the potential to complement existing decontamination workflows, reduce reliance on manual pre-cleaning, improve cleaning consistency, lessen environmental impact and support staff wellbeing.

2. Background

2.1 There are currently 15 decontamination units operating across NHS Scotland, 14 of which are managed by NHS Scotland Health Boards. These services are responsible for ensuring that surgical instruments and reusable medical devices are clean, safe, fit for purpose and available for use in clinical care. Collectively, they process more than 38 million instruments each year.

2.2 Demand for surgical activity is expected to rise, placing additional pressure on decontamination capacity and instrument turnaround times. Manual pre-cleaning contributes to operational pressures, as it relies on staff time, technique, access to specialist training and availability of appropriate equipment and workspace.

2.3 Around 60% of instrument sets contain at least 1 device that requires pre-cleaning, equating to approximately 7.5 million instruments each year in Scotland [1]. Manual pre-cleaning remains the most commonly used method across NHS Scotland and continues to be required in certain circumstances, including where specified within manufacturer instructions for use (MIFU), or where there are questions about compatibility with other cleaning processes.

2.4 Reliance on manual pre-cleaning presents a range of operational, workforce and environmental challenges. These include variation in cleaning effectiveness, time constraints, potential exposure to sharps and contaminants, risk of musculoskeletal strain and avoidable detergent and water consumption.

2.5 To explore opportunities for improvement, the Decontamination Reusable Medical Devices Subject Expert Group D(RMD)-SEG and Green Healthcare Scotland commissioned a Task and Finish Group to evaluate the suitability and efficacy of automated pre-cleaning systems within NHS Scotland. The group reviewed evidence from a range of sources, including pilot work at Cowlairs Central Decontamination Unit within NHS Greater Glasgow and Clyde for rewash rate analysis, environmental assessment and a bone rasp cleaning study. The group's full recommendations can be found in appendix 1 of this document.

3. Who needs to be involved in this change locally?

3.1 Successful implementation requires multidisciplinary input. Local responsibilities should be agreed before procurement, installation or use on live instrument sets.

Role / stakeholder	Contribution to local change
Central Decontamination Unit (CDU) Manager / Decontamination Lead	Lead local assessment, oversee operational workflow review, confirm service requirements and coordinate implementation.
Decontamination staff	Provide practical insight into current pre-cleaning processes, workflow constraints, training needs and staff experience.
Infection Prevention and Control	Provide assurance that proposed changes maintain safe and effective infection prevention standards. Antimicrobial Resistance and Healthcare Associated Infection (ARHAI) Scotland are content that the technology presents no identifiable risk.
Quality Manager / Decontamination Quality Lead	Support validation, monitoring, non-conformance review and local governance documentation.
Authorising Engineer / technical decontamination expertise	Advise on technical feasibility, validation requirements and compatibility with existing systems.
Estates and Facilities	Assess space, utilities, installation requirements, maintenance access and any infrastructure constraints.
Procurement / Finance	Support procurement route, whole-life cost assessment, maintenance costs and contract considerations.
Local Sustainability Group / governance forum	Review the opportunity, agree local approach, oversee implementation and monitor outcomes.

4. Boundaries

4.1 The table below identifies the boundaries for this action:

In scope	Out of scope
Adoption of automated pre-cleaning system within CDU.	Use of automated pre-clean outside of CDUs.
Reusable surgical instruments requiring pre-cleaning before washer-disinfector processing.	
Assessment of workflow, space, staff training, quality, environmental impact and risk.	

5. What is the change and how will it be implemented?

5.1 The proposed change is the introduction of automated pre-cleaning systems as an alternative, or to complement, manual pre-cleaning where local assessment confirms that this is appropriate.

5.2 The Task and Finish Group concluded that automated systems can be incorporated into current processes. However, each decontamination unit should undertake a local assessment to determine whether installation is feasible within its current workflow, estate, staffing model and operational priorities.

5.3 As part of this assessment, services may wish to:

- Review current pre-cleaning activity, including volume, workflow, rewash rates and workforce pressures.
- Identify instrument sets or categories that may be suitable for automated pre-cleaning.
- Assess the potential impact on space, utilities, and maintenance access and workflow implications.
- Develop a local business case that considers purchase, maintenance, consumables, water, detergent, staff time and potential rewash impacts.
- Validate local process, provide staff training and establish appropriate standard operating procedures (SOPs).
- Monitor agreed quality, operational, environmental and staff-experience measures before and after implementation.

6. What are the potential co-benefits of this change?

6.1 The potential benefits below are based on the evidence reviewed by the Task and Finish Group (Appendix 1). Local benefits will depend on activity volume, baseline practice, system selected, workflow and local implementation approach.

6.2

Outcome	Potential benefits
Carbon reductions	The comparative environmental assessment found that the automated pre-cleaning system had the lowest carbon footprint at 0.077 kg CO_2 e per basket, compared with 0.393 kg CO_2 e for manual pre-cleaning and 1.50 kg CO_2 e for ultrasonic cleaning. Based on 728,000 baskets processed per year in Scotland, switching to automated pre-cleaning could reduce emissions by approximately 230 tonnes CO_2 e compared with manual methods and 1,034 tonnes CO_2 e compared with ultrasonic systems [2].
Financial savings	Potential savings may arise from reduced detergent use, reduced rewash activity, improved throughput and less staff time spent on manual cleaning [2]. Local financial savings should be quantified through a local business case because purchase, maintenance, repair, validation and installation costs will vary by site.
Staff experience	Automated pre-cleaning will reduce manual handling, repetitive manual cleaning, exposure to contaminants and potential musculoskeletal strain. The pilot work reported positive informal staff feedback and user experience.
Operational efficiency	Automated pre-cleaning completed the process in approximately 2 minutes compared with an average of 12 minutes for manual cleaning and 40 minutes for ultrasonic cleaning. The live-set assessment showed automated pre-cleaning reduced rewash rates in eight out of nine recorded weeks (Figure 2: Appendix 1).

Cleaning efficacy	The bone rasp study reported an average of 0.2 retained fragments following automated pre-cleaning, compared with 2 after ultrasonic cleaning and 4 after washer-disinfector processing without pre-cleaning (Section 3.2.5: Appendix 1).

7. Risks and issues

7.1

Description of risk or issue	Mitigation / Action Plan
There is a risk that automated pre-cleaning systems cannot be accommodated due to space, utility, or estates constraints, resulting in delayed or unsuccessful implementation.	Undertake an estates and facilities review before procurement, including consideration of utilities, floor space, and maintenance access and health and safety requirements.
There is a risk that use of automated pre-cleaning is considered off-label where it is not referenced within MIFU, resulting in governance and assurance concerns.	Review MIFU, complete a robust local risk assessment with relevant stakeholders and document agreed mitigations before using on live sets.
There is a risk that expected environmental or operational benefits are not realised due to differences in local activity volumes or baseline practice differ from the pilot context, resulting in poor value for money.	Develop a local business case and measurement plan, including baseline and post-implementation data.

8. Implementation guidance

8.1 This Opportunity for Change highlights the importance of assessing automated pre-cleaning systems where it may improve efficiency, staff experience and environmental performance. By embracing appropriate local change, sites can contribute to NHS Scotland's commitment to achieving net-zero emissions by 2040, as outlined in the NHS Scotland Climate Emergency & Sustainability Strategy 2022–2026.

8.2 Below outlines practical steps that local teams can take to assess and implement this change.

8.3 If further information or guidance is required, please contact the Green Healthcare Scotland programme team at: cfsdghs@nhs.scot.

Local Sustainability Group:	
1.	Review the Opportunity for Change and assess what it means for your local context.
2.	Provide Green Healthcare Scotland programme team with initial validated information/local targets.
3.	Facilitate a discussion with the staff responsible for implementing the change and those directly impacted by it, ensuring collaboration and shared understanding.
4.	Agree a local implementation plan, if applicable.
5.	Implement local plan.
6.	Undertake benefits realisation exercise to capture the impact of the technology.
7.	Monitor implementation of action.

9. Measurement

9.1 Reporting on this action will include providing feedback to Green Healthcare Scotland on whether your unit and Health Board intend to procure an automated pre-cleaning system. Where a decision is made not to proceed, the rationale should be clearly documented.

9.2 Units that implement the system, units will be asked to provide the number of instances the automated pre-cleaning system has been used per quarter. Assuming that the automated pre-clean (0.077kg/Co2e per wash) has negated a manual pre-clean (0.393kg/Co2e) Green Healthcare Scotland will infer an avoidance of 0.316kg/Co2e per automated pre-clean cycle.

9.3 For example, a unit reporting 3,000 automated pre-clean cycles will have reduced their environmental impact by 948kg/Co2e.

Appendix 1 – Recommendations paper (full text)

Assessing the suitability and efficacy of automated pre-clean systems in NHS Scotland

Recommendation paper from the commissioned Task and Finish group

June 2026

Executive Summary

NHS Scotland's 15 decontamination units process over 38 million surgical instruments annually, with demand projected to rise significantly. Current manual pre-cleaning methods are labour-intensive, inconsistent, and pose risks to staff safety, operational efficiency, and environmental sustainability. To address these challenges, the Decontamination Reusable Medical Devices Subject Expert Group D(RMD)-SEG and Green Healthcare Scotland (GHS) commissioned a Task & Finish Group to evaluate the suitability and efficacy of automated pre-cleaning systems within NHS Scotland.

Evidence from a pilot study at NHS Greater Glasgow & Clyde demonstrated that automated systems, can integrate effectively into existing workflows. Comparative trials indicated substantial benefits: reduced rewash rates, cleaning cycle times shortened from 12 minutes (manual) to 2 minutes (automated), and environmental impact significantly lowered - 0.077kg/CO_2 per basket (automated) versus 0.393kg/CO_2 (manual) and 1.50kg/ CO_2

(ultrasonic). Automated systems also eliminate detergent use and reduce water consumption.

While automation offers clear potential advantages, the Task & Finish Group emphasised that adoption should not be automatic. Each decontamination unit should undertake a local assessment to determine whether automated pre-cleaning aligns with existing workflows, space constraints, and operational priorities. Additionally, as this technology is not currently referenced within manufacturer instructions for use (MIFU), a robust local risk assessment must be completed in collaboration with key stakeholders before implementation. This approach ensures that any potential risks are identified and mitigated prior to deploying automated systems on live sets.

1. Purpose and scope

1.1 There are currently 15 decontamination units operating across NHS Scotland, 14 of which are managed by NHS Scotland Health Boards. These units are responsible for ensuring that surgical instruments and medical devices used in essential clinical services are clean, safe, fit for purpose, and ready for use. Collectively, the units process over 38 million instruments each year [3]. With ongoing pressures in the healthcare system and increased demand for surgical interventions, this number will rise, highlighting the importance of maintaining efficient and resilient decontamination services.

1.2 The rising demand for surgical services across NHS Scotland is placing extraordinary strain on decontamination units, many of which are already functioning at or near their operational limits. This sustained pressure not only risks delays in surgical schedules but also heightens the potential for bottlenecks in instrument turnaround times, directly impacting patient care and operational efficiency. To address this challenge, there is a clear and urgent need for innovative technologies that can enhance the speed, consistency, and safety of decontamination processes.

1.3 To address this challenge the Decontamination Reusable Medical Devices – Subject Expert Group D(RMD)-SEG and Green Healthcare Scotland (GHS) commissioned the establishment of a Task and Finish group consisting of subject matter experts across all key

stakeholder groups. Please see appendix 1 for full membership details. The aim of the group was to research the available automated pre-cleaning technologies and evaluate their suitability and effectiveness within NHS Scotland's decontamination services. It was expected that the introduction of automation in surgical instrument pre-cleaning will enhance operational efficiency, improve staff wellbeing, reduce the environmental footprint of decontamination services and contribute to addressing current capacity issues.

1.4 Group members followed an evidence-based approach, working within a pre-agreed remit, to examine how the identified systems may integrate with existing workflows, identifying both the potential benefits and any unintended consequences of implementation.

1.5 The scope and responsibilities of the group were defined in the Terms of Reference document, which was formally approved during the second meeting of the Task & Finish Group. The remit of the group is outlined below:

- To conduct a comprehensive assessment on the suitability of embedding automated pre-clean systems within existing infrastructure in NHS Scotland.
- To conduct an assessment on the efficacy of both manual pre-cleaning versus automated pre-clean alternatives, including ultrasonic baths.
- Review the environmental assessment comparing manual pre-cleaning process to the automated pre-cleaning process.
- Capture the benefits identified of implementing automatic pre-clean systems within Central Decontamination Units (CDU).
- Capture any unintended consequences of implementing automatic pre-clean systems within CDUs.
- Assess the feasibility of incorporating automated pre-cleaning systems into the manufacturer instructions for use (MIFU).
- Report clear outcomes and recommendations of the task and finish group to D(RMD)-DEG, GHS and other invested stakeholder groups.

1.6 This paper will demonstrate that the remit of the task and finish group has been achieved and provide the recommendations of the group.

2. Current challenge

2.1 Pre-cleaning surgical instruments often poses a significant challenge. Current regulations stipulate that instruments should be pre-cleaned at the point of use (POU). However, in practice, manual POU cleaning within the operating theatre is often limited or absent due to factors such as staff safety considerations, workflow constraints, resource availability, and the need for specialised training. In an effort to keep surgical instruments moist* prior to reaching decontamination units, guidance has been published for service users. Current guidance within, 'GUID 5017:2018 – Guidance for Service User states: "Medical device sets can be kept 'moist' during transportation by, for example, use of absorbent pads and several millilitres of purified water' [4]. Additionally, trays should be covered and sealed in a clear plastic bag. This will help prevent contaminants drying on instruments that can cause corrosion or damage to delicate instruments, shortening their usable life and posing potential risks to patient safety [5].

** Moist is considered to be high levels of relative humidity of the air in the pack*

2.2 On arrival at decontamination units certain medical devices and surgical instruments are required to be pre-cleaned as per the manufacturers instructions for use (MIFU). Approximately 60% of instrument sets require at least one device to undergo pre-cleaning, equating to around 7.5 million instruments annually in Scotland. The most commonly adopted method of pre-cleaning across NHS Scotland is currently manual pre-cleaning. This method relies heavily on human effort and technique leading to variability in the removal of organic debris, blood and tissue residues from complex instrument surfaces. It should be noted that SHTM 01-01[4] recognises that there are circumstances where manual pre-cleaning is necessary. These circumstances include when required by the MIFU or when there are questions about the compatibility of cleaning processes with the instrument.

**Ann Cosh (Head of Decontamination, NHS Highland) provided the figure listed.*

2.3 Additional challenges of manual pre-clean include:

- Requirement of specialist training
- Time constraints – dried on contaminants require soaking causing backlogs
- Staff safety issues – exposed to sharp injuries, infectious materials and airborne contaminants
- Staff absence due to musculoskeletal issues
- Releases harmful chemicals into water systems
- Significant amounts of water use

Figure 1(above) - manual pre-cleaning process

2.4 In addition to the manual pre-cleaning method, many decontamination units utilise ultrasonic baths, a method of automated pre-cleaning. The devices offer several advantages, including effective removal of soil and debris through microscopic cavitation bubbles that dislodge contaminants from hard-to reach areas such as hinges and lumens. This validated process is consistent and reproducible, reduces the need for manual scrubbing, and helps preserve delicate instrument surfaces by minimising mechanical damage. Additionally, thorough cleaning with ultrasonic baths supports more effective sterilisation [6].

2.5 However, ultrasonic cleaning is not a stand-alone method and requires gross soil to be manually removed beforehand. Its effectiveness is reduced if instruments are not kept moist after use, as dried debris can remain adhered to surfaces. Not all instruments are suitable for ultrasonic cleaning; items containing electrical components, glued parts, or certain delicate materials may be damaged by immersion. Incorrect loading or improper use can also result in surface damage, and the equipment itself requires regular validation and maintenance to ensure it performs as intended. Overall, ultrasonic baths are a valuable

component of the decontamination process when used appropriately but do not negate the need for manual pre-cleaning.

3. Analysis

3.1 To conduct a comprehensive assessment on the suitability of embedding automated preclean systems within existing infrastructure in NHS Scotland.

3.1.1 Extensive pilot studies were conducted at the Cowlairs Central Decontamination Unit within NHS Greater Glasgow & Clyde. These trials, carried out over two separate three-month periods, successfully demonstrated the viability of integrating automated pre-cleaning systems into the existing infrastructure and workflows. Additionally, SHTM 01-01 states: 'manual and/or ultrasonic cleaning should only be employed when: compatible automated cleaning processes are not available' [7]. The automation of pre-cleaning has the potential to remove any inconsistencies associated with manually cleaning instruments. It was the consensus of the group that this technology can be effectively incorporated into current processes, however, individual assessments at local decontamination units will be required to determine the feasibility of installing automated pre-cleaning solutions within each setting.

3.1.2 The Scottish Healthcare Technology Group (SHTG) within Healthcare Improvement Scotland were commissioned to conduct a topic exploration into the pre-cleaning of surgical instruments at the start of the decontamination process. Based on the available literature, health economics report and pilot work undertaken within NHS Scotland, SHTG were content with the recommendations provided within this report.

3.2 To conduct an assessment on the efficacy of both manual pre-cleaning versus automated pre-cleaning alternatives, including ultrasonic baths.

3.2.1 This assessment was conducted at Cowlairs over a nine-week period using live sets. The aim of the assessment was to compare rewash rates between manual and automated pre-cleaning methods. The results indicated that automated pre-cleaning reduced rewash rates in eight out of the nine weeks recorded. Please see figure two for the results, if you have

any specific queries or would like to know more information on the automated system used for the pilot, please contact: ghscfsd@nhs.scot

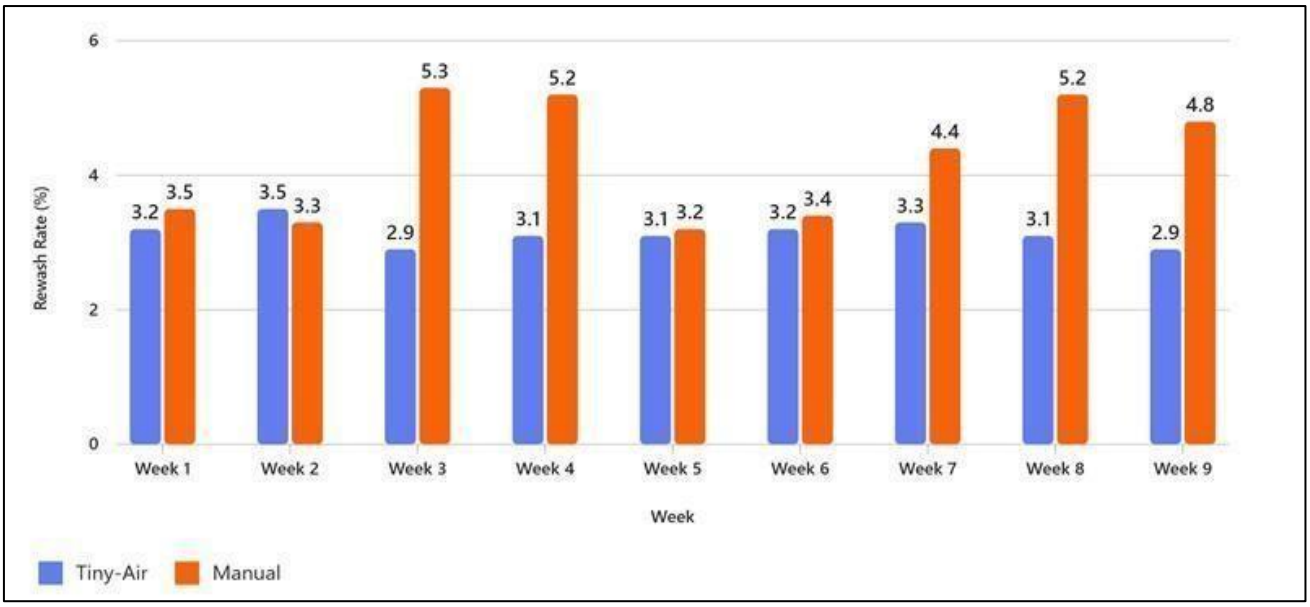


Figure 2: Rewash rates: Automated vs manual pre wash

3.2.2 Additional testing was undertaken by Shona McWilliam, Quality Manager, at Cowlairs focussing on maternity sets only. Maternity sets require pre-cleaning and traditionally have high rewash rates at the Cowlairs unit. A small sample trial of 20 sets was conducted where detailed records were kept of each set passing through the automated system.

3.2.3 The rewash data comparing manual pre-clean with automated pre-clean indicated that the automated pre-clean reduced rewash for maternity sets by a factor of between 10 and 20 times (from 5% using manual method to 0.25%-0.5% for the automated method). It is important to note that the statistical numbers are too small to conclude anything other than indicative findings of efficacy [1]. Please see figure three below for visual result.

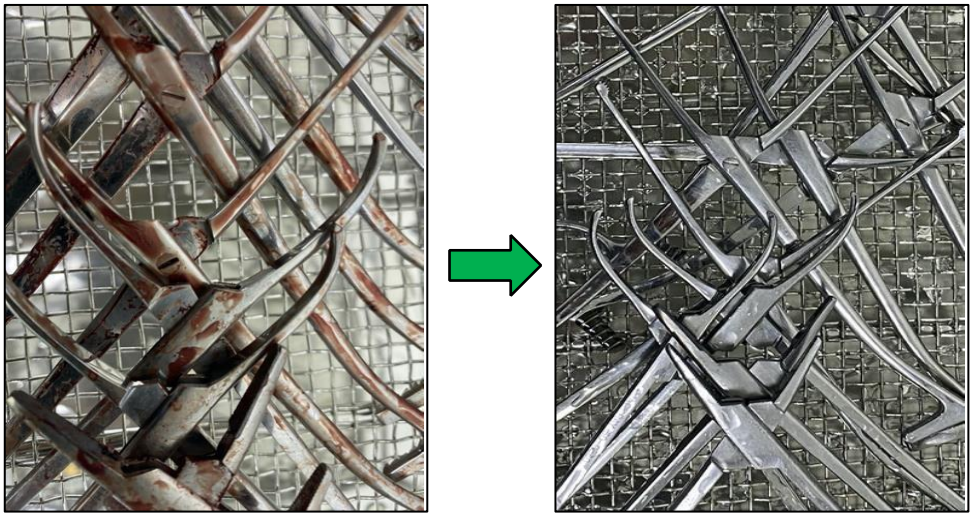


Figure 3: Automated pre clean before vs after

3.2.4 Rasp Cleaning Study

Cowlairs Decontamination Unit conducted a study on bone rasp cleaning to evaluate its effectiveness compared to existing methods. A bone rasp is a surgical instrument used to shape, smooth, or contour bone during certain surgical procedures. It resembles a metal file and typically has a textured or ridged surface designed to remove small amounts of bone tissue. Due to the complex surface and design bone rasps are prone to retaining bone fragments, tissue and debris making them extremely challenging to clean. Figure four illustrates an example of a bone rasp.

Figure 4: Bone rasps

3.2.5 The study, conducted over one week, was led by Andrew Birch, an

Authorising Engineer and member of the Institute of Healthcare Engineering and Estate Management (IHEEM).

The investigation utilised live, heavily contaminated Exeter bone rasps. Multiple rasp sets were tagged and randomly allocated into three groups, with each group assigned a distinct pre-cleaning process. Following pre-cleaning, all instruments were processed through the same standard washer-disinfector (WD) cycle to ensure consistency in subsequent decontamination. The study compared:

- Washer Disinfector (no pre-clean)
- Ultrasonic bath
- Automated pre-clean system

3.2.6 Following pre-cleaning and WD cycle the rasps were scanned using a ProReveal to quantify residual protein. The results were recorded by counting fragments of bone remaining trapped in the rasp teeth.
The average number of fragments remaining were:

- Washer Disinfector : 4
- Ultrasonic : 2
- Automated pre-clean system : 0.2

3.2.7 The results suggest that the automated pre-clean system is 10 times more effective at removing impacted bone from rasp teeth in comparison to ultrasonic pre-clean and 20 times more effective than the WD [1].

3.3 Review the environmental assessment comparing manual pre-cleaning process to the automated pre-cleaning process.

3.3.1 A comparative carbon footprint of pre-wash methods was undertaken by the University of Brighton. The goal of the study was to calculate and compare the environmental impacts of three pre-wash methods including manual, automated and Ultrasonic used for the decontamination of reusable surgical medical devices. The study was undertaken at Cowlairs Central Decontamination Unit using a Life Cycle Assessment (LCA) approach aligned with the International Organisation for Standardisation (ISO) and the International Reference Life Cycle Data System (ILCD) standards, the analysis focused on a single functional unit: a ½ DIN basket (250mm x 500mm) of contaminated devices.

3.3.2 Among the three methods, the piloted automated pre-wash system demonstrated the lowest environmental impact across all measured categories. It produced only 0.077 kg CO_2 -equivalent per basket, compared to 0.393 kg for manual and 1.50 kg for ultrasonic methods. On an annual scale, switching to automated pre-cleaning systems could reduce emissions by 230 tonnes CO_2 -eq compared to manual and 1,034 tonnes CO_2 -eq compared to ultrasonic systems, based on 728,000 baskets processed per year in Scotland.

3.3.3 Table one below highlights the key distinctions between each pre-wash method across three critical performance metrics:

- Water use
- Detergent use
- Time to completion of cycle or clean

Method	Water use – litres (per wash)	Detergent use – mls (per wash)	Time - minutes (per wash)
Manual	**32.5**	**150**	**12 (average)**
Automated	**30**	**0**	**2**
Ultrasonic	**84**	**125**	**40**

Table 1

3.3.4 As shown in Table 1, the automated pre-cleaning system used 2 litres less water per cycle in comparison to manual wash, eliminates the need to use detergents, and completes the process in one sixth the time compared to the next most efficient method.

3.4 Capture the benefits identified of implementing automatic pre-clean systems within Central Decontamination Units (CDU).

- Reduced rewash rates in comparison to manual pre-cleaning, as evidenced in section 3.2
- Reduced environmental footprint, as evidenced in section 3.3
- Increased efficiency: 2 minutes per automated pre-clean versus 12 minutes per manual pre-clean and 40 minutes per ultrasonic method, as evidenced in section 3.3.3
- Increased staff satisfaction, informal qualitative feedback from staff members reported positive feedback and user experience. The risk of staff exposure to airborne contaminants is reduced. It is also anticipated that units would benefit from lower rates of staff absence associated with musculoskeletal injuries due to reduced manual pre-cleaning, as shown in figure one.

3.5 Capture any unintended consequences of implementing automatic pre-clean systems within CDUs.

3.5.1 The following factors should be carefully considered ahead of procuring automated pre-cleaning systems:

- Consider the associated purchase and maintenance costs versus current practice
- Staff workflow considerations and space within individual units
- Off-label use, if not adhering to manufacturer's instructions for use (MIFU), this concern is addressed in section 3.6 of this document.

3.6 Assess the feasibility of incorporating automated pre-cleaning systems into the manufacturer instructions for use (MIFU).

3.6.1 It is important to note that the standard specifying the information manufactures must provide regarding the processing and reprocessing of medical devices, BS EN ISO 17664-1:2002, requires manufacturers to identify any processes that the device cannot tolerate. It is therefore reasonable to infer that, unless the MIFU explicitly states that an automated

3.6.2 Pre-clean must not be used it can be accepted that there would be no damage to the instruments by adopting this process.

3.6.3 The group acknowledged that, despite the standard referenced in section 3.6.1, the absence of the system within the MIFU represents a risk that requires consideration. The Task & Finish Group agreed by majority that decontamination units intending to implement automated pre-cleaning systems may proceed by undertaking a local risk assessment. This approach enables identification and appropriate mitigation of any potential risks associated with the systems use. An example of a local risk assessment is provided within figure five.

Issue	Risk	Current				Potential outcome	Recommended actions	Mitigation effective?	Target			
		Likelihood	Severity	Detection	Risk level				Likelihood	Severity	Detection	Risk level
Automated pre-clean systems not included in manufacturers instructions for use.	Process damages passive layer of surgical instruments processed	2	3	3	18	Damage through long-term use leading to instrument unsuitable for further use. Required to replace affected instruments	Carry out testing on instruments prior to installation to ensure instruments are robust enough to survive x processing cycles, and processing won't lead to any negative impact.					
	Litigation due to patient infection (due to no IFU this could be used as reason)	1	4	5	20	Damage to reputation of Board. Financial loss.						
Installation of pre-clean equipment impacts space in department	Workflow of department interrupted due to lack of space.	2	6	2	24	Reduction in throughput due to constraints in the Wash area.	Thorough investigation carried out to ensure pre-clean device does not impact service					

Additional weekly/quarterly/ annual testing required for Pre-clean equipment	No Estates capacity availabl e to include more testing	3	2	3	18	Missed testing resulting in undiagno sed fault/issu e. Cost for training	Ensure Estates have enough capacity before purchasing. Potential training required.					

Figure 5: Example risk assessment

3.6.4 This risk-based approach has been successfully implemented within NHS University Hospital Liverpool, where an automated pre-cleaning system is currently in use on live sets. If any units would like to connect with contacts at the trust, please email cfsdghs@nhs.scot. An online meeting or site visit can be arranged upon request. Additionally, NHS Lothian's decontamination unit has recently purchased two automated pre-cleaning units. For details on the system purchased please contact: cfsdghs@nhs.scot

3.7 Report clear outcomes and recommendations of the task and finish group to D(RMD)DEG, NGTP and other invested stakeholder groups.

3.7.1 Reported in section four, recommendations.

4. Recommendations

4.1 The objective of the Task and Finish group was to evaluate the suitability and effectiveness of automated pre-cleaning systems within NHS Scotland's Central Decontamination Units. It is important to note that the purpose of this report is to explore the potential for automation in the pre-cleaning of surgical instruments. This report does not constitute an instruction or mandate for units to invest in this technology.

4.2 The objective and remit of the Task and Finish group has been addressed and evidenced within section three of this document. The Task & Finish Group recommends that individual decontamination units undertake their own assessment to determine whether automated pre-cleaning systems could complement existing workflows, enhance efficiencies and improve staff working conditions while considering any associated costs such as maintenance and repair. In addition, as this technology is not currently referenced within the

MIFU, decontamination units should carry out a robust local risk assessment in collaboration with key stakeholders to identify and implement any necessary mitigations prior to using the system on live sets.

Appendix 2: Task and Finish Group Membership

Name	Title	Organisation
Anna Munro	Nurse Manager - Infection Prevention Control	ARHAI Scotland
Ashlin Harris	Project Support Administrator, Green Healthcare Scotland	Centre for Sustainable Delivery
David Taggart	Head of Climate Change Delivery, Green Healthcare Scotland	Centre for Sustainable Delivery
Kenneth Barker	Clinical Lead – Green Healthcare Scotland	Centre for Sustainable Delivery
Steven Chawk	Programme Manager, Green Healthcare Scotland	Centre for Sustainable Delivery
Laura Burnside	CDU Manager	NHS Ayrshire & Arran
Stephen Aird	Decontamination Production Manager	NHS Ayrshire & Arran
Donald Sands	Sterile Services Manager	NHS Borders
Gavin Train	Deputy Manager - ASDU	NHS Borders
Craig Hill	CSSD Manager	NHS Dumfries and Galloway
Zoe Craighead	Quality Assurance Manager - CSSD	NHS Dumfries and Galloway
Lee McArthur	Lead Tutor - Decontamination Team	NHS Education for Scotland
Anne Haythorne	Decontamination Manager	NHS Fife
Paul Bishop	Associate Director of Estates	NHS Fife
Jonathan Horwood	Infection Control Manager	NHS Forth Valley
Michelle Forsyth	Area Sterilisation and Decontamination	NHS Forth Valley

Andrew Smith	Consultant Microbiologist	NHS Golden Jubilee
Barbara Casey	Sterile Service Manager	NHS Golden Jubilee
Juliette Laing	Head of Decontamination and Linen Services	NHS Grampian
Matthew Taylor	Quality & Training Manager - Technical Services Sterile Services	NHS Grampian
Lynsay Gracie	Head of Decontamination	NHS Greater Glasgow & Clyde
Phyllis Watt	Sterile Services Manager	NHS Greater Glasgow & Clyde
Shona McWilliam	Quality Manager - Central Decontamination Unit	NHS Greater Glasgow & Clyde
Ellis Girvan	Decontamination Manager	NHS Highland
Mark Phinn	Decontamination Lead	NHS Highland
Lorna Barbour	Infection Prevention and Control Clinical Nurse Specialist	NHS Lanarkshire
Callum Gordon	Commissioning Manager - Strategic Planning & Modernisation	NHS Lothian
David Hill	Decontamination Lead	NHS Lothian
Jacek Nowicki	Sterile Services Supervisor	NHS Lothian
Michelle Black	Sterilisation and Disinfection Unit Area Manager	NHS Lothian
Robert Aitken	Associate Director of Operations - Facilities	NHS Lothian
Anna Suszko	Project Support Officer	National Services Scotland
David Ingle	Authorising Engineer Decontamination	National Services Scotland
Kathryn Allan	Assistant Project Manager	National Services Scotland
Neil Redhead	Assistant Director Facilities Services	National Services Scotland
Norman McLean	Decontamination Validation Manager	National Services Scotland

Pauline Matthews	National Facilities Service Advisor	National Services Scotland
Sulisti Holmes	Head of Decontamination	National Services Scotland
Gary Drever	CDU and Waste Manager	NHS Orkney
Carol Colligan	ICM/ Decontamination Lead	NHS Shetland
Joanna Orlowski	Decontamination Officer	NHS Shetland
Alan Simpson	Maintenance Manager	NHS Tayside
Laura Watt	Personal Assistant to Production Unit	NHS Tayside
Leigh Hunter	Head of Central Decontamination Unit	NHS Tayside
Mark Finnon	Podiatry Lead	NHS Tayside
Janice MacKay	Head of IPC, Decontamination and Cleaning Services	NHS Western Isles
Peter Wright	Decontamination Production Manager	NHS Western Isles
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Version Control

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