

National Green Theatres Programme

Prògram Nàiseanta Lannsaireachd Uaine

Embed Rubbing not Scrubbing

Published: October 2023

An opportunity to save across NHS Scotland:



135

Tonnes of
CO₂e



£40, 959

1. Description of action

- 1.1 This action relates to the replacement of traditional scrub solutions with Alcohol Based Hand Rubs (ABHR) within surgical environments, which will greatly reduce water waste in surgical settings.

2. Background

- 2.1 Water shortage, in the wider context of climate change, is projected to become a more commonplace occurrence within the next few years¹.
- 2.2 Large quantities of water, heated to a high temperature, are used every day during surgical scrubbing. A 'typical' surgical scrub uses up to 20 litres of water; equivalent to quarter of a bath of water. Water usage and carbon emissions are closely linked, and when consideration is given to the number of theatre staff undertaking surgical scrubbing on a daily basis this highlights the fact that large amounts of energy and money are currently being spent on the supply, heating and disposal of water which is going down the drain.
- 2.3 The introduction of automatic or pedal-operated taps to prevent free-flow water waste during surgical scrubbing has been considered as a possible solution, however the introduction of these taps requires a significant amount of resources and funding. Such taps will save money and energy in the long-term², but the costs of installation can be prohibitive for Health Boards. In addition, whilst significant volumes of water can be saved by switching to pedal-operated taps during the scrubbing process², ABHR would save significantly more again³.
- 2.4 ABHR has been identified as an alternative option; one that saves both water and energy⁴, and has been shown to be just as effective as the traditional scrubbing technique.⁵ It is estimated that across NHS Scotland the equivalent of 135 tonnes of CO₂ emissions could be avoided through the implementation of this action. A breakdown of the carbon savings can be found in Appendix 2, Table 1.
- 2.5 A 2011 study by Suchomel et al. demonstrated that ABHR formulations with an alcohol concentration of 60-80% produced similar bactericidal effects to the chlorhexidine scrubbing solution (the control), with solutions of >85% being significantly more effective than the control⁶.

¹ Centres for Disease Control and Prevention (CDC) 'IMAGE: Impact of Climate Change on Human Health' *Climate and Health*. Accessed on 12/01/23, via: <https://www.cdc.gov/climateandhealth/effects/default.htm>

² Somner, J. E. A.; Stone, N.; et al. 'Surgical scrubbing: can we clean up our carbon footprints by washing our hands?' *Journal of Hospital Infection* (Volume 70, Issue 3). 2008.

³ Wormer, B. A.; Augenstein, V. A. et al. 'The Green Operating Room: Simple Changes to Reduce Cost and Our Carbon Footprint' *The American Surgeon* (Volume 79). 2013.

⁴ Tavalacci, M. P.; Pitrou, I.; et al. 'Surgical hand rubbing compared with surgical hand scrubbing: comparison of efficacy and costs' *Journal of Hospital Infection* (Volume 63, Issue 1) 2006.

⁵ Tanner, J.; Dumville, J. C.; Norman, G. et al. 'Surgical hand antisepsis to reduce surgical site infection.' *Cochrane Database Systematic Review*. 2016.

⁶ Suchomel, M.; Rotter, M. 'Ethanol in pre-surgical hand rubs: Concentration and duration of application for achieving European Norm EN 12791.' *Journal of Hospital Infection* (Volume 77). 2011.

- 2.6 Current NHS National Services Scotland National Infection Prevention and Control Manual guidance states that surgical scrubbing/rubbing should be performed prior to donning sterile theatre garments. The current national policy position is that surgical scrubbing using an antimicrobial surgical scrub product should be used for the first surgical hand antisepsis of the day. ABHR can then be used between surgical procedures if there is no visible soiling of the hands (for example, if a glove was torn). <https://www.nipcm.scot.nhs.uk/chapter-1-standard-infection-control-precautions-sicps/#a1069>. (Accessed 10/08/23)
- 2.7 Significant financial savings can also be made when taking into account the greater cost of procuring scrub solution in addition to the purchase and disposal of sterile towels and the cost of water heating. It has been estimated that across the NHS in Scotland there would be a reduction in cost of £40,959. A breakdown of the financial savings can be found in Appendix 2, Table 2.
- 2.8 ABHR is already used consistently across multiple health boards, with the Infection Prevention and Control Manuals of NHS Borders and Greater Glasgow and Clyde both promoting the use of ABHR in surgical environments⁶. The standardised protocol that is used in these health boards, and that would be followed when ABHR is used in a surgical environment, can be found in Appendix 3.
- 2.9 A poster has been developed to be used as a resource to support promotion of this action, and can be found in Appendix 4.

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

- 3.1 In order to implement this action it is recommended that the following groups should be consulted and involved:
- Anaesthetists
 - Surgeons
 - Theatre Managers/Staff
 - Infection protection control
 - Procurement Staff
 - Pharmacy Services

4. Boundaries

- 4.1 The table below identifies the boundaries for this action:

In scope	Out of scope
Introduction of 'Rubbing not Scrubbing' to all operating theatres in NHS Scotland	Instances where use of ABHR is contra indicated, for example sensitivity to the rub, broken skin)

- 4.2 To note - the boundaries within which the carbon and cost savings were calculated:
- 4.2.1 The calculations do not include the first hand wash of the day. This will increase the amount of water used and therefore reduce both carbon and cost savings.
 - 4.2.2 The calculations are based on 3 people scrubbing in to each procedure. It is recognised that there could be between 2 and 5+ people scrubbing in depending on the procedure.
 - 4.2.3 The calculations assumes that the carbon associated with traditional chlorhexidine scrubbing solution and ABHR are equal.
- 4.3 It is anticipated that the variance in points 4.2.1 and 4.2.2 may balance each other out.

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

- 5.1 Health Boards have the opportunity to replace traditional scrub solutions with Alcohol Based Hand Rubs (ABHR) within surgical environments, greatly reducing water waste in surgical settings. This change has already been implemented in a number of NHS Scotland Health Boards.
- 5.2 It is recommended that in-person training is provided to promote confidence in this change.

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

- 6.1 Based on the pilot at NHS Highland the estimated national benefits through the implementation of this action are detailed in the below:

Outcome	Potential Benefits
Carbon reduction	135.11 tonnes of carbon saved annually
Cost savings	£40,959 potential annual saving
Patient outcomes	No change to patient outcomes
Staff experience	Less time spent scrubbing Potentially less irritation for hands

- 6.2 In addition to the contribution this action will make to the NHSS net zero ambitions the action will also contribute to reducing the water demands of the NHS in Scotland.

7. Risks and Issues

- 7.1 As part of the development of this action a number of risk and issues have been identified below:

Description of risk or issue	Mitigation / Action Plan
NHS Boards will not implement the action	Discussion with and endorsement by executive and non-executive sustainability leads via regular engagement meetings with NGTP team.

8. Implementation Guidance

- 8.1 The opportunity for change highlights the importance of implementing this action. This modification will help your site and NHS Scotland achieve net-zero emissions by 2040 as stated in NHS Scotland's Climate Emergency & Sustainability Strategy 2022-2026
- 8.2 Below the National Green Theatres Programme has provided guidance on how you can implement this change within your area. If you require any further information or guidance, please contact the National Green Theatres programme team on: cfdsgreentheatres@gjnh.scot.nhs.uk.

Local Sustainability or Green Theatre Group:	
1.	Review opportunity for change and validate what this means locally.
2.	Provides National Green Theatre Programme Team with validated information/local targets.
3.	Convene a discussion with the staff who need to implement it and those who are impacted by the action.
4.	Understand what the opportunity is for implementing the action locally: work already undertaken and challenges.
5.	Agree a local implementation plan.
6.	Implement local plan.
7.	Provide data as per measurement plan.
8.	Monitor implementation of action.

Appendix 1 – Measurement plan

Name of Measure (carbon, cost, staff experience and patient outcome)	Type of measure (Outcome, Process, Balancing)	Concept being measured?	Where is the data available from?	Who is collecting the data?	Frequency of collection
Carbon	Outcome	Decrease in CO ₂ e resulting from the reduction in amount of water being heated	Health Board collect data to be made available to NGTP	Health Boards	Quarterly
Cost	Outcome	Financial savings resulting from switching from scrubbing to rubbing	Health Board collect data to be made available to NGTP	Health Boards	Quarterly
Staff Experience and Engagement	Process	Staff Engagement	Verbal	Health Boards who feedback to SDG	Quarterly

The above calculations are based on the following assumptions

*Annual no of procedures based on number of elective procedures undertaken - Public Health Scotland Data Tables

<https://publichealthscotland.scot/publications/cancelled-planned-operations/cancelled-planned-operations-month-ending-31-august-2023/> (accessed 03.11.23)

20 litres of water per scrub, 3 staff members per scrub

**Energy required to heat 1 litre of water – 0.04kW

**Electricity Consumption – Scope 2 and Scope 3 – 0.224kg/kWh

*** Water being supplied to a heater @ average temperature of 10°C. Water must then be heated to 60°C before being mixed with cold to reach 43°C.

Calculating to 43°C will allow for variance in the volume of water required to reach this temperature.

****Water supply carbon emissions = 0.177 tCO₂e per 1 million litres

Appendix 2 – Carbon and cost calculations

Table 1: Carbon

Health Board	*No of Procedures Annually	Volume of Water (Litres)	**Energy Used to Heat Water (kW)	Carbon Emissions			Total Carbon Emissions (tCO ₂ e)
				Heating water (tCO ₂ e)	*Water Supply (tCO ₂ e)	*****Water Treatment (tCO ₂ e)	
National	249,649	14,978,940	575,316.12	129.44	2.65	3.02	135.11

The above calculations are based on the following assumptions

*Annual no of procedures based on number of elective procedures undertaken - Public Health Scotland Data Tables

<https://publichealthscotland.scot/publications/cancelled-planned-operations/cancelled-planned-operations-month-ending-31-august-2023/>
(accessed 03.11.23)

20 litres of water per scrub, 3 staff members per scrub

**Energy required to heat 1 litre of water – 0.04kW

**Electricity Consumption – Scope 2 and Scope 3 – 0.224kg/kWh

*** Water being supplied to a heater @ average temperature of 10°C. Water must then be heated to 60°C before being mixed with cold to reach 43°C. Calculating to 43°C will allow for variance in the volume of water required to reach this temperature.
















****Water supply carbon emissions = 0.177 tCO₂e per 1 million litres

Table 2: Cost

Health Board	*No of Procedures Annually	Water Costs				****Product Savings – Switch from Scrub to ABHR	Total Cost Savings
		*Heating water (£)	**Water Supply (£)	***Water Treatment (£)	Total Water Costs (£)		
National	249,649	£1,415.28	£12,881.89	£13,930.41	£28,227.58	£12,732.10	£40,959.68

Average energy purchasing price of 0.246p/per kW
 **Water supply charge £0.8581 / 1000 litres
 ***Waste Water charge 95% of £0.975 / 1000 litres = £0.92625 / 1000 litres
 *****Price calculation based on estimated costs provided by NHS Lothian
 In instances where PVP Iodine Scrub is used cost savings will be greater than figures shown

Appendix 3 – Standardised protocol

<p>1</p>  <p>Put approximately 5ml (3 doses) of alcohol-based hand rub in the palm of your left hand, using the elbow of your other arm to operate the dispenser.</p>	<p>2</p>  <p>Dip the fingertips of your right hand in the hand rub to decontaminate under the nails (5 seconds).</p>	<p>3</p>  <p>Steps 3-4. Smear the hand rub on the right forearm up to the elbow.</p>	<p>4</p> 	<p>5</p>  <p>Steps 5-7. Ensure that the whole skin area is covered by using circular movements around the forearm until the hand rub has fully evaporated (10-15 seconds).</p>
<p>6</p> 	<p>7</p> 	<p>8</p>  <p>Repeat steps 1 to 7 for the left hand nails and arm.</p>	<p>9</p>  <p>Put approximately 5ml (3 doses) of alcohol-based handrub in the palm of your left hand, using the elbow of your other arm to operate the distributor. Rub both hands in the same time up to the wrists, and ensure that all the steps presented in steps 9-14 are followed.</p>	<p>10</p>  <p>Cover the whole surface of the hands up to the wrist with alcohol-based hand rub, rubbing palm against palm with a rotating movement.</p>
<p>11</p>  <p>Rub the back of the hands up to the wrist with alcohol-based handrub, rubbing palm against palm with a rotating movement.</p>	<p>12</p>  <p>Rub the back of the left hand, including the wrist, moving the right palm back and forth and vice-versa.</p>	<p>13</p>  <p>Rub palm against palm back and forth with fingers interlinked.</p>	<p>14</p>  <p>Rub the thumb of the left hand by rotating it in the clasped palm of the right hand and vice versa.</p>	<p>15</p>  <p>When the hands are dry, sterile surgical clothing and gloves can be donned.</p>

Via: <https://www.nipcm.hps.scot.nhs.uk/appendices/appendix-4-best-practice-surgical-rubbing/> (accessed 15/11/2023)

Appendix 4 – Rub, don't scrub poster

National Green Theatres Programme

Centre for
Sustainable
Delivery



NHS
SCOTLAND

Rub, don't scrub!



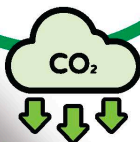
IPC position – hands should be washed with antibacterial soap and water prior to the first surgical rubbing of the day.



It's safe to use Alcohol Based Hand Rub (ABHR) after your first surgical scrub of the day.

Cleaning your hands with Alcohol Based Hand Rub saves NHS Scotland water, energy and money every year.

Potential carbon saving of **135 tonnes** of CO₂ emissions



Rubbing will reduce incidences of contact dermatitis.

Potential cost saving of **£40,959**



Annual saving of **60 million litres** of water



[Click here to download this poster.](#)