



SUSQI PROJECT REPORT

Project Title: Sustainability case study: lean pathway and low carbon alternatives in curette and cautery skin surgery

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Team Members:

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- With kind support from the Centre for Sustainable Healthcare and South Warwickshire University NHS Foundation Trust



Background:

There is a paucity of national guidance specifying how skin surgery should be conducted. This led to significant heterogeneity in the set-up, conduct and delivery of minor skin surgery services in the United Kingdom (1), including the environment of procedure rooms (2,3), practitioner selection of equipment and consumables (4) as well as procedure steps (5).

The British Society for Dermatological Surgery (BSDS) sustainability guidance 2022 (6) provided the first United-Kingdom wide recommendations on environmentally sustainable skin surgery that compliments existing national guidance on safe skin surgery. The BDS recommendations could be broadly categorised under reducing activities, low carbon alternatives, optimising operational resource usage, and research and innovation. Transforming to sustainable skin surgery practices as per BDS sustainability guidance could have implications on the environmental, social and financial aspects of the skin surgery service.

Curette and cautery minor skin surgery procedure is one of the most commonly performed procedures at the Dermatology Department at the South Warwickshire University NHS Foundation Trust (estimated up to 1,000 procedures per year). It is standard practice for practitioners to perform this procedure using sterile gloves (same as in all other minor skin surgeries such as excisions and diagnostic biopsies). This type of procedure has been identified by the project team (following consultation with stakeholders) as having the most potential scope for transformation to more sustainable practice and with the least perceived barriers (out of all types of skin surgery procedures) for practitioners to change their behaviours.



A new lean pathway with low carbon alternatives for curette and cautery procedures has been proposed and evaluated in this project (i.e. 'the change' in our practice).

In addition, the project team clinical lead, Dr Simon Tso, is a named contributor to the BSDS sustainability guidance 2022. Dr Tso also leads the Dermatology Sustainability UK Group ('the Group') which has undertaken national scale sustainability projects including a recently completed 12 sites study across all 4 nations of the UK to investigate baseline set up, resource consumption, waste management and recycling rate in skin surgery (1). The project team will disseminate findings and learning from our transformation to sustainable skin surgery practices at the South Warwickshire University NHS Foundation Trust to the Group (i.e. dermatology staff from 12 Trusts across the UK that actively participated in the Group's activities) with the aim of influencing other dermatology departments across the UK and other specialities that perform the same type of procedure to adopt new sustainable practices.

Specific Aims:

The aims of the project are:

- 1) Develop consensus on a lean pathway (including adoption of low carbon alternatives) for curette and cautery skin surgery procedures, and evaluate outcomes of this lean pathway clinically and across the triple bottom line (social, environmental and financial).
- 2) Educate dermatology staff (clinical, nursing and support staff) who undertake and assist with minor skin surgery at the South Warwickshire University NHS Foundation Trust about the BSDS sustainability guidance 2022 for skin surgery.

Methods:

1. Staff involvement in the development of the project

The project team conducted informal discussion with staff (clinicians, nursing and support staff) within and outside of the South Warwickshire University NHS Foundation Trust to explore their views and perceived barriers on transformation to sustainable skin surgery practices. Members of the Dermatology Sustainability UK Group were also consulted.

2. To understand current practice at South Warwickshire University NHS Foundation Trust and suggest leaner options

The dermatology department's standard practice is to perform all types of minor skin surgery procedures using sterile gloves regardless of infection control risks. The project team informed the dermatology department on the recommendations from the British Society of Dermatological Surgery Sustainability Guidance (BSDS) 2022 at a departmental meeting on 5 May 2023. The department discussed and debated about the evidence and recommendations stated in the guidance. The department discussed and defined an area of skin surgery that they would be amenable to change.

The project team examined the procedure steps involved in performing curette and cautery procedure with the aid of the Healthcare Environmental Performance Tool (8) - a prototype performance based decision tool). Process mapping was conducted to describe the existing common practices amongst departmental staff when performing curette and cautery skin surgery and proposed a new lean pathway for staff to consider as their standard practice. The historical and proposed lean pathway are shown below in Table 1.

Table 1. Historical pathway and new lean pathway to perform curette and cautery procedures, colour coded where the same colour refers to the same step. In the new lean pathway, one of the steps (step 3 from historical pathway) was eliminated and this has reduced the use of consumables (i.e. one Clinel 2% chlorhexidine in 70% alcohol skin wipe). In the process map steps 2, 3 and 5 (as stated in the new lean pathway) involved a reduction on the use of consumables (i.e. reuse one surgical marker pen over one skin



surgery list, if deemed appropriate) or the use of a low carbon alternative (i.e. switch from sterile gloves to clean nitrile gloves; and switch from using 2.2ml glass vial to 20ml glass vial of local anaesthetic). For the purpose of this report, the new lean process of performing curette and cautery procedure, including the use of low carbon alternatives, constitutes 'the change' in our practice being evaluated for its clinical, environmental, financial and social impact.

Step	Historical Pathway	New Lean Pathway
1	One clinician wear relevant PPE (1x single use plastic apron, 1x Type IIR fluid resistant mask worn through a surgical list of 5 patients); one support staff wear 1x Type IIR fluid resistant mask through a surgical list of 5 patients)	One clinician wear relevant PPE (1x single use plastic apron, 1x Type IIR fluid resistant mask worn through a surgical list of 5 patients); one support staff wear 1x Type IIR fluid resistant mask through a surgical list of 5 patients)
2	Mark Surgical Site with 1x surgical marker pen (single use)	Mark Surgical Site with 1x surgical marker pen (reuse throughout a surgical list of 5 patients)
3	Disinfect skin (surgical site) with one Clinel 2% chlorhexidine in 70% alcohol skin wipe	Hand disinfection with soap and water prior to procedure Wear non-sterile nitrile gloves
4	Local Anaesthetic drawn from 2.2ml glass vial of lignocaine and applied to surgical site using BD Safety Glide insulin syringe (also require 1/5 pack of non-women swab	Disinfect surgical site with Sterets solution 1pack
5	Hand disinfection with soap and water prior to procedure Wear sterile gloves	Local Anaesthetic drawn from 20mls glass vial of lignocaine and applied to surgical site using BD Safety Glide insulin syringe (also require 1/5 pack of non-women swab
6	Disinfect surgical site with Sterets solution 1pack	Perform Procedure using 1x 7mm curette (sharp), 1x hyfecator tip (sharp), 1x non-woven swab, 1x single use surgical pack
7	Perform Procedure using 1x 7mm curette (sharp), 1x hyfecator tip (sharp), 1x non-woven swab, 1x single use surgical pack	

3. Proposed lean pathway changes

Departmental consensus was reached in relation to curette and cautery skin surgery procedures performed under local anaesthetic is suitable for change to more sustainable practice. Departmental consensus was reached that, based on practitioner's risk assessment, they can choose to use clean non-sterile nitrile gloves (a low carbon alternative) or sterile gloves to perform this type of procedure. Consensus was further reached

to conduct a clinical audit to examine patient outcome in terms of the surgical site infection rate of curette and cautery procedures performed under clean nitrile gloves versus sterile gloves.

Measurement:

Social sustainability:

To explore staff perception about transformation to sustainable skin surgery including perceived barriers (qualitative data generated from discussions and field notes) and identifying an area of skin surgery practices that has lower perceived barriers for sustainable transformation.

Patient outcomes:

In order to determine the clinical impact of 'the change' in our practice, we examined the surgical site infection rate of curette and cautery procedures in our department. We have registered the clinical audit with the Trust's audit and clinical effectiveness department. Data collection period was 8 May to 7 July 2023. A convenience sample of patients who underwent curette and cautery procedures that were performed with clean nitrile gloves or sterile gloves were included into the audit. A member of the clinical team conducted telemedicine consultation with patients within a week of their procedure to determine if there are surgical site infections. It is noted that meta-analysis of surgical site infection rate from skin surgery (4 randomised controlled trials and 5 comparative observational studies) reported a surgical site infection rate of 2.2% from procedures undertaken with non-sterile gloves and 2.2% with sterile gloves (7). Thus, a surgical site infection rate of 2.2% or below was set as our local audit standard.

Economic sustainability:

To identify the commercial (non-NHS) costs of consumables used to perform curette and cautery procedures before and after 'the change' in practice.

Environmental sustainability:

To estimate the carbon footprint of the items being replaced a hybrid methodology was used. For the non sterile and sterile gloves and clinell wipe data was taken from existing life cycle assessment (LCA) studies (9). For the rest of the consumable including the skin marker pen and the pharmaceuticals, an environmentally extended input output analysis (EEIOA) was undertaken based on cost using emission factors taken from GreenerNHS. Emissions associated with waste were based on weight using factors taken from Rizan et al 2021 (10) and water and electricity emission factors were taken from the UK Government BEIS database 2023.

Results:

Social sustainability:

Outcome from the service user involvement in the development of the project

The emerging themes from the discussions included: strong staff interests to transform to sustainable skin surgery practices, lack of awareness of the BSDS sustainability guidance 2022 and its evidence base, the need to comply with local infection control processes, and perceived conflict between sustainable skin surgery practices (especially low carbon alternative such as clean nitrile gloves instead of sterile gloves) and management of surgical site infection risks. Curette and cautery procedures were perceived as of lower infection risks and practitioners would be more prepared to transform to sustainable skin surgery practices as per BSDS sustainable guidance.

Patient outcomes:

The surgical site infection rate post curette and cautery procedure performed with nitrile gloves was (0/8; Table 2) 0% and with sterile gloves was (0/12; Table 3) 0%, indicating no increased risk of infection with the lean pathway.



Table 2. Post-operative outcome of 6 patients following 8 curette and cautery minor skin surgery procedures. Surgical site infection rate was (0/8) 0%. Note: one case is one patient, and one patient may have undergone more than one procedure.

Curette and cautery procedures performed with nitrile gloves		
Case number	Site	Post-operative surgical site infection requiring antibiotics?
1	Scalp	No
2	Scalp	No
	Chest	No
3	Face	No
4	Lower limb	No
5	Face	No
	Face	No
6	Face	No

Table 4. Post-operative outcome of 9 patients following 12 curette and cautery minor skin surgery procedures. Surgical site infection rate was (0/12) 0%. Note: one case is one patient, and one patient may have undergone more than one procedure.

Curette and cautery procedures performed with sterile gloves		
Case number	Site	Post-operative surgical site infection requiring antibiotics?
1	Face	No
2	Face	No
3	Upper limb	No
4	Face	No
	Torso	No
5	Lower limb	No
6	Face	No
	Neck	No
7	Lower limb	No
	Torso	No
8	Scalp	No
9	Upper limb	No

Economic sustainability:

The commercial (non-NHS) costs for performing a single curette and cautery skin surgery procedure using the historical pathway is estimated at £12.87 (excl VAT) and £8.79 (excl VAT) using the new lean pathway. Thus, the change in practice resulted in £4.08 (excl VAT) per procedure of cost savings.

The dermatology department at South Warwickshire University NHS Foundation Trust is estimated to conduct up to 1,000 curette and cautery procedures per year. If the change in practice is embedded into standard practice, this could potentially lead to **£4,075.45 (excl VAT) per annum of cost savings.**



Note: Itemised raw data of all cost calculations are available on request.

Environmental sustainability

The carbon footprint for performing a single curette and cautery procedure (inclusive of consumables, electricity and water; but excluding travel) using the historical pathway is estimated at 5.78 kgCO₂e and 4.54 kgCO₂e using the new lean pathway. Thus, the change in practice resulted in a reduction of 1.24 kgCO₂e per procedure. This is achieved through reduction of one Clinel 2% chlorhexidine in 70% alcohol skin wipe, reuse one surgical marker pen over one skin surgery list before disposal instead of single usage, switch from sterile gloves to clean nitrile gloves and switch from using 2.2ml glass vial to 20ml glass vial of local anaesthetic.

The dermatology department at South Warwickshire University NHS Foundation Trust is estimated to conduct up to 1,000 curette and cautery procedures per year. If the change in practice is embedded into standard practice, this could potentially lead to a **reduction of 1,240 kgCO₂e per annum**, equivalent to driving 3,662.14 miles in an average car.

Note: Itemised raw data of carbon footprint estimation are available on request.

Discussion:

Our study identified curette and cautery skin surgery procedures to have lower perceived barriers for practitioners to adopt sustainable transformation of practices. We succeeded in reaching departmental consensus to enable staff (based on their risk assessment) to adopt low carbon alternatives and lean pathway (as described in Table 1) when performing curette and cautery procedures. Our surgical site infection rate audit to date has a small sample, but it has provided valuable initial data to inform staff there are no significant infection control concerns in the new lean pathway. It is anticipated that following completion of a larger scale surgical site infection rate audit this will give all staff the confidence to embed the new lean pathway (including low carbon alternatives such as wearing non-sterile nitrile gloves) as their standard practice and encourage staff to contemplate about adopting lean pathways for other types of skin surgery .

This study has limitations. This is a single site study with a small study sample. Carbon footprint calculations are partly based on EEIOA estimates due to limited life cycle assessment data for most of the consumables used to perform curette and cautery procedures. The scope of this project focused on the performance of curette and cautery procedure alone. Our project has not implemented changes targeting additional hotspots within dermatology such as hand disinfection technique, travel and how skin surgery appointments are organised.

We have disseminated our findings to the Dermatology Sustainability UK Group which generated interests and discussions from staff in different sites to consider adopting a more sustainable way to perform curette and cautery procedures. The Group has 12 active sites. Assuming each site delivers 1,000 procedures per annum, the change in practice could potentially result in £48,905.40 (excl VAT) annual savings and reduction of 14.88 tonne CO₂e per annum.

It should be further noted that curette and cautery procedures are also performed by other specialties such as ENT, Maxillofacial Surgery, Plastics Surgery team, General Practitioners, etc. The volume of curette and cautery procedures performed by other specialties are currently unknown - disseminating the findings and learning from this project to other specialties would further increase the impact of this project. Potential methods of disseminating our project findings could include direct discussion with colleagues in other specialties, presentation at multidisciplinary surgical conferences and publication in multidisciplinary surgical peer reviewed publications.



Future studies could evaluate the triple bottom line impact of introducing one-stop skin surgery services and artificial intelligence to triage referral directly for skin surgery.

Conclusions:

Our study demonstrated that transforming to sustainable practices for curette and cautery procedures can lead to significant triple bottom line benefits with no obvious adverse postoperative infection risks. We encourage dermatology staff from the public and private sector, as well as staff from other specialties, to consider adopting the recommendations from the BSDS sustainability guidance when performing curette and cautery procedures.

References and Resources

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