

## **A MULTI-CENTRE INTERVIEW-BASED STUDY TO EXPLORE ENVIRONMENTALLY SUSTAINABLE SKIN SURGERY PRACTICES IN THE UK**

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### **ABSTRACT**

Skin surgery is a significant contributor to carbon emissions in dermatology. In this interview-based study, we explored clinicians' experience of environmentally sustainable skin surgery practices. Seven of 12 invited site leads in the UK took part in semi-structured 1:1 online synchronous or online asynchronous interviews. Field notes from online synchronous interviews and texts from online asynchronous interviews were analysed using descriptive thematic analysis. Three broad themes emerged from the data: (1) preparedness for environmentally sustainable skin surgery, (2) barriers and (3) facilitators to engage with environmentally sustainable skin surgery. Our study findings have provided contexts and potential explanations for our related study's findings on why some sites lacked access to reusable skin surgery instruments and recycling bins. Developing sustainability leadership and culture will promote engagement with sustainable skin surgery practices.

**Keywords:** interview, sustainability, skin surgery

### **INTRODUCTION**

Environmental sustainability of healthcare practices is a growing concern worldwide. The Royal College of Physicians reported a persistent theme of '*missed opportunities to recycle waste and reuse*' in clinical practice across the National Health Services (Royal College of Physicians London, 2018).

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Within health and social care in the UK, medical instruments and devices accounted for an estimated 13.2% of carbon emissions in 2017 (Sustainable Development Unit, 2018). Skin surgery is a major contributor of carbon emissions in dermatology. An Australian study estimated that 8,641 tonnes of CO<sub>2</sub>e were produced from dermatological surgery annually (Tan and Lim, 2021) although the data for the UK remain to be determined. Our recently reported UK-wide study found wide variability in the setup, resource consumption and waste management practices in skin surgery across 12 sites with a mean recycling rate of 16% (range 0–44%) for non-sharps waste generated from skin surgery (Shearman et al., 2023). However, there is a paucity of literature exploring the rationale behind such significant differences in sustainable skin surgery practices. In contrast to these real-world data, a lean skin surgery service utilising low-carbon alternative consumables following the British Society for Dermatological Surgery sustainability guidance (Ali et al., 2022) could realise a lower recycling rate of 3.3% theoretically (Tso, 2023). In this interview-based study, we explored clinicians' experiences of environmental sustainability in skin surgery.

## **METHODS**

This interview-based study was conducted in parallel to a larger UK-wide 12-site study to describe resource consumption and waste management practices in skin surgery including Mohs micrographic surgery (Shearman et al., 2023). Site leads (dermatologists) of participating sites sought an independent assessment from their respective organization's audit and clinical effectiveness department, or equivalent, and determined the project to be a service evaluation study without the requirement for research ethics committee review. Ten of the 12 site leads expressed initial interest in taking part. Seven of 10 site leads took part in the 1:1 semi-structured interviews in online synchronous or online asynchronous formats. Interviewer AZ made field notes (including verbatim comments) as online synchronous interviews were not recorded. Field notes and written responses (from online asynchronous interviews) were analysed using descriptive thematic analysis following the six-step approach by Braun and Clarke (2006) by AZ and ST. Table 1 shows the nine-question interview schedule. Participation in the study was entirely voluntary and the study was carried out in accordance with the Declaration of Helsinki.

## **RESULTS**

Three broad themes emerged from the data and they are summarised in Table 2.

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**Table 1. Interview questions**

How well would you rate your trust when it comes to sustainability in dermatology minor surgery?
Does your hospital/trust currently do anything to improve sustainability?
Do you think sustainability is an issue that is overlooked in your trust?
What dermatology minor surgery sustainability issues have you noticed in your hospital/trust?
Are there any sustainability issues that you have tried to address? And if so how did you try to address them and what was the result?
Are there any incentives or campaigns in place to encourage the identification/addressing of these issues?
Could you tell me about any key research questions in dermatology minor ops sustainability you would like future research to address?
Are there any identified issues you have not managed to address? And if so what are the perceived barriers to change?
What do you think is needed to help you make the changes?

**Table 2. Themes emerged from the interview**

Sub-themes	Description	Examples (quotations)
<b>Theme: Preparedness for environmentally sustainable skin surgery</b>		
Variability in preparedness and practices	Respondents described there are differences in sustainability practices amongst different staff groups (medical vs nursing), different specialities (dermatology vs plastics surgery) and different institutions. Some sites are routinely using reusable skin surgery instruments, some sites only have access to single-use instruments, and some sites are transitioning from single-use to reusable instruments.	<i>'...plastic surgeons and dermatologists operate in same theatres, same tumours. Yet plastics have a different way of doing things, always full gowns and scrubs'.</i>  <i>'Small (glass) vials (of local anaesthetic) in (site 1) go into a recyclable bin. In (site 2) these go in sharps bin'.</i>
Reflexivity on internal operations and care pathway	One respondent described variable level of staff awareness of internal operations (budget) that impacted their department's ability to acquire reusable instruments for skin surgery. Reflexivity requires an understanding of the internal process and the financial costs and carbon footprint of the care pathway.	<i>'They didn't have the budget to replace the single use instrument (with reusable instruments)... (name of dermatologist) was driving it (to transition from single use instrument to reusable instrument), colleagues not realised (for) 4 months (the department did not have the budget)'.</i>
Variability in waste management practices	Respondents reported differential access to recycling and general waste bins at different institutions and provided examples of inappropriate waste segregation.	<i>'Automatically putting stuff in clinical waste'.</i>  <i>'...some stuff that shouldn't end up in the recyclable bin'.</i>

(Continued)

**Table 2. (Continued)**

Sub-themes	Description	Examples (quotations)
<b>Theme: Barriers to engagement with environmentally sustainable skin surgery</b>		
Physical environment	Lack of space to physically accommodate recycling or general waste bins. One respondent reported their recycling bin was half the size of the clinical waste bin in their skin surgery facility due to lack of space.  One respondent described the relocation of their department has impacted on interests and engagement with sustainable skin surgery.	<i>'(we are) about to move site'.</i>
Funding	Lack of funding and institutional support to purchase reusable skin surgery instruments.	<i>'In the long run maybe (costing) less due to autoclave (reusable skin surgery instrument)... but (we) couldn't do it upfront. We're looking at green funding form Trust sustainability plan'.</i>
Procurement process	Procurement of poor quality, inappropriately sized or non-reusable consumables and instruments impacted engagement with environmentally sustainable skin surgery practices.	<i>'...don't have high quality apron, wasting plastics (break easily)'.</i>  <i>'Disproportionately large drapes'.</i>
Conflicting priorities	Respondents reported conflicting service priorities as a barrier to engagement with sustainable skin surgery.	
Individual factors	Respondents, who are dermatologists, described other staff/ staff groups had contrasting views, training and practices in infection control and environmentally sustainable skin surgery practices relative to themselves.	<i>'Everyone (dermatology staff) was wearing re-usable surgical skull caps. Masks reusable'.</i>  <i>'Absolutely meticulously sterile is prevailing view (for a staff group that are not dermatologists)'.</i>  <i>'(staff group that are not dermatologists) like to wash every time'.</i>
Research	Respondents reported there is a lack of research to generate evidence on sustainable skin surgery practices.	
<b>Theme: Facilitators to engage with environmentally sustainable skin surgery</b>		
Sustainability leadership	The development of the British Society for Dermatological Surgery Sustainability Guidance 2022 helped to foster a sustainable skin surgery culture.  Environmental advocacy from named individuals or organisations has helped to drive sustainable skin surgery initiatives.	<i>'(name of individual) leads the way (in environmentally sustainable dermatology)'.</i>  <i>'The Trust has encouraged individuals to apply to become Green Champions to pursue initiatives that will make our practices more sustainable'.</i>

*(Continued)*

**Table 2. (Continued)**

Sub-themes	Description	Examples (quotations)
Sustainability culture	A positive sustainability culture where staff are mentored and supported in engaging in sustainable skin surgery.	<i>'The Trust has partnered with Centre for Sustainable Healthcare to offer a Green Competition'.</i>
Collaborative working	Respondents discussed working collaboratively with different institutions and learning from one another about best practices.	
Sustainable procurement	One respondent discussed the importance of sustainable procurement of resources.	

***THEME: PREPAREDNESS FOR ENVIRONMENTALLY SUSTAINABLE SKIN SURGERY***

Respondents reported a general lack of preparedness for environmentally sustainable skin surgery at organisation, service and practitioner levels. Some respondents perceived that there was a lack of environmental sustainability culture and training at their workplace. This was associated with diversity in how skin surgery services at different institutions were organised, as well as practitioner beliefs and practices. Institutions with a relatively higher level of preparedness for environmentally sustainable skin surgery practices routinely used reusable skin surgery instruments, had access to recycling bins and used reusable personal protective equipment, whereas institutions with a lower level of preparedness reported a lack of access to recycling bins, reusable skin surgery instruments and funding to pursue green transformation of their skin surgery service. Respondents perceived that they have a relatively higher level of preparedness for environmentally sustainable skin surgery relative to other staff groups and specialities that also participate in the delivery of skin surgery services.

One respondent highlighted there were variable levels of staff reflexivity on the internal operations and economic and environmental sustainability of their skin surgery service. In this example, few staff at the dermatology department were aware of the budgetary constraints impacting their department's ability to acquire new reusable skin surgery instruments to transition away from using single-use instruments.

Access to recycling and general waste bins at skin surgery facilities in different institutions varies significantly. Respondents reported observations of waste from skin surgery being inappropriately segregated and disposed into incorrect types of waste bins.

***THEME: BARRIERS TO ENGAGEMENT WITH ENVIRONMENTALLY SUSTAINABLE SKIN SURGERY***

Potential barriers to engagement with environmentally sustainable skin surgery included a lack of staff education and training, lack of provision of recycling

and general waste bins due to lack of physical space, lack of access to capital funding to enable the transformation to a more sustainable way to deliver skin surgery, procurement of poor quality or inappropriate resources, staff perception of infection control requirements, conflicting service priorities and lack of research.

*THEME: FACILITATORS TO ENGAGE WITH  
ENVIRONMENTALLY SUSTAINABLE SKIN SURGERY*

Respondents described sustainability leadership and advocacy from professional bodies and individuals (as champions) facilitate engagement with environmentally sustainable skin surgery practices. A positive work culture (e.g., mentoring), sustainable procurement of resources and a willingness to work collaboratively with others promoted engagement with sustainable skin surgery.

## **DISCUSSION**

Our study identified variability in the level of preparedness for sustainable skin surgery practices and waste management practices at different institutions. Potential explanations for the variability in preparedness and practices may include organisational culture and local factors such as staff training and education, procurement processes, infection control and waste management policies. Furthermore, waste processing and management facilities (e.g., local government vs commercial facilities) in different parts of the UK could differ in what type of waste they could accept and process. Recycling services for single-use skin surgery instruments exist in the UK, but their services are currently confined to specific geographic regions and not universally available. Green transformation of skin surgery service should include education and training, with a focus on encouraging reflexivity on internal operations and understanding of the care pathway to help clinicians and managers identify opportunities to reduce resource consumption and switch to lower carbon alternatives and practices.

This study has provided further contexts and potential explanations towards our related study's findings on why some sites lacked access to reusable skin surgery instruments (e.g., lack of access to funding) and recycling bins (e.g., lack of physical space) (Shearman et al., 2023). In addition, this study has identified potential facilitators and barriers to sites transitioning to more environmentally sustainable skin surgery practices. Limitations to this study include being a small study with site leads whose views could not be generalizable to other staff groups and specialities that participate in skin surgery. Furthermore, this study has not explored potential hot spots in skin surgery such as patient travel and how skin surgery training is delivered to staff (Johnson-Ogbunike et al., 2023).

## CONCLUSION

The findings of this study have enriched our understanding on why there is wide variability in the level of preparedness and practice of sustainable skin surgery in different dermatology departments across the UK and identified potential barriers and facilitators to transform to sustainable skin surgery practices.

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## ETHICS

This study is part of a larger national project that was registered as a service evaluation study at individual participating sites.

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## REFERENCES

- Ali, F., Nikookam, N., Hunt, W., Holloran, S., Ang, E., Chaolin, C., Charalambides, M., Lowe, A., Brindley, L., Abbott, R., Wernham, A., and British Society for Dermatological Surgery Sustainability Guidance. (2022). *BSDS*, 2022, 1–55.
- Braun, V., and Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. doi: 10.1191/1478088706qp063oa
- Johnson-Ogbunike, J., Williamson, T., Gamal, N., Madhwapathi, V., Hunt, W., Wernham, A., and Tso, S. (2023). Sustainability in delivering skin surgery training: Additional resources consumed and opportunities for environmental gain using the Healthcare Environmental Performance Tool. *Clinical and Experimental Dermatology*, 48(3), 250–253. doi: 10.1093/ced/llac089
- Royal College of Physicians London. (2018). Less waste, more health; A health professional's guide to reducing waste. Available online at: <https://www.rcplondon.ac.uk/file/9498/download> (Accessed December 9, 2023).
- Shearman, H., Yap, S. M., Zhao, A., Passby, L., Barrett, A., Nikookam, Y., Stoneham, S., Myint, N. A., Phillips, D., Dalal, F., Wylie, G., Costley, M., Odedra, S., Phillips, M., Abbott, R. A., Wernham, A., Tso, S., and

- Dermatology Sustainability UK Group. (2023). A UK-wide study to describe resource consumption and waste management practices in skin surgery including Mohs micrographic surgery. *Clinical and Experimental Dermatology*, 48(9), 1024–1029. doi: 10.1093/ced/llad184
- Sustainable Development Unit. (2018). *Reducing the use of natural resource in health and social care [2018 report]*. Available online at: [https://networks.sustainablehealthcare.org.uk/sites/default/files/resources/20180912\\_Health\\_and\\_Social\\_Care\\_NRF\\_web.pdf](https://networks.sustainablehealthcare.org.uk/sites/default/files/resources/20180912_Health_and_Social_Care_NRF_web.pdf) (Accessed December 9, 2023).
- Tan, E., and Lim, D. (2021). Carbon footprint of dermatologic surgery. *Australasian Journal of Dermatology*, 62(2), e170–e177. doi: 10.1111/ajd.13522
- Tso, S. (2023). Dermatology sustainability: Case study of potential efficiency savings and waste reduction in dermatology punch biopsies using the Healthcare Environmental Performance Tool. *Clinical and Experimental Dermatology*, 48(1), 41–43. doi: 10.1093/ced/llac022