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Sustainability in delivering skin surgery training: additional resources consumed and opportunities for environmental gain using the Healthcare Environmental Performance Tool

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Dear Editor, The National Health Service (NHS) has a commitment to achieve net zero for the carbon emission it directly controls and is able to influence by 2040 and 2045, respectively.[1] Engagement with sustainability is a key pillar of professional development in dermatology enshrined in the British Society of Dermatological Surgery sustainability guidance 2022 and in the training curriculum for postgraduate doctors.[2] There is a paucity of literature examining the environmental impact of delivering medical education. This letter reports our personal experience of the perceived additional consumable resources used to deliver supervised skin surgery training to postgraduate doctors and specialty nurses at different stages of their career and identifies opportunities for environmental gain, which to the best of our knowledge, has not previously been examined in the literature.

For the purpose of this study we have only examined the additional consumables used within a skin surgery facility by trainer and trainee in a supervised skin surgery setting as compared with the same procedure theoretically being carried out by the trainer without the presence of a trainee. Resources related to travel, energy and support services are not included. The project has been registered as a quality improvement project. Table 1 shows the profile of trainees and trainers, type of procedure, additional resources consumed and opportunities for environmental gains using the Healthcare Environmental Performance Tool.[3] Both trainer and trainee in each case reached consensus on what the additional resources consumed were that were needed to deliver supervised skin surgery training.

We found that delivering supervised skin surgery training has environmental costs as it consumes resources and generates wastes. Our observations suggest that factors such as level of prior dermatological minor surgery

Table 1 Profile of trainees and trainers, type of procedure, additional resources consumed and opportunities for environmental gains using the Healthcare Environmental Performance Tool

Case	Trainee and trainer profile	Intensity of supervision	Type of procedure	Additional consumables used	Opportunities for environmental gain[a]
1	Trainee: FY2 with no prior dermatology or minor surgery experience Trainer: consultant dermatologist	Trainee received direct assistance from trainer on every aspect of the procedure	Punch biopsy on scalp	1 × pair nitrile gloves (cost £0.07; 8 g waste), 1 × pair sterile gloves (cost £2.16; 40.7 g waste), 1 × sterile hand towel (cost £0.35; 12.4 g waste), 1 × type IIR respiratory mask (cost £0.01; 0.6 g waste),[b] 1 × disposable apron (cost £0.03; 10.9 g waste), 1 mL 1% xylocaine in 1 : 200 000 adrenaline (cost £0.21; 1.6 g sharps waste), 1 × BD micro-fine 1 mL insulin syringe (cost £0.12; 5.4 g sharps waste), 4 L water,[c] 6 mL of 0.05% w/v chlorhexidine gluconate solution (cost £0.17) Total costs = £3.12 and 79.6 g waste (excluding cost of water and energy)	Switch from sterile to nitrile gloves (save £2.09; 32.7 g waste) Switch from sterile hand towel to paper towel (save £0.30) Switch hand disinfection technique to alcohol gel (save £0.10 plus 4 L of water) Total potential savings = £2.49 and 32.7 g waste (excluding water and energy)
2	Trainee: MTI with 4 years' experience and 3 months' experience of performing diagnostic biopsies (all sites) and excisions (exclude head and neck) independently, respectively Trainer: consultant dermatologist	Trainer as observer providing verbal guidance	Punch biopsy on scalp	Nil Total costs = £0 and 0 g waste (excluding cost of water and energy)	N/A Total potential savings = £0 and 0 g waste (excluding water and energy)
3	Trainee: as above Trainer: consultant dermatologist	Trainer provided limited assistance during wound closure stage	Excision on torso	1 × pair sterile gloves (cost £2.16; 40.7 g waste), 1 × sterile hand towel (cost £0.35; 12.4 g waste), 4 L water,[c] 6 mL of 0.05% w/v chlorhexidine gluconate solution (cost £0.17) Total costs = £2.68 and 53.1 g waste (excluding cost of water and energy)	Switch from sterile to nitrile gloves (save £2.09; 32.7 g waste) Switch from sterile hand towel to paper towel (save £0.30) Switch hand disinfection technique to alcohol gel (save £0.10 plus 4 L water) Total potential savings = £2.49 and 32.7 g waste (excluding water and energy)
4	Trainee: dermatology ST5 with over 3 years' and 2 years' experience of performing diagnostic biopsies and excisions (all sites) independently respectively; observed but not performed purse string closure previously Trainer: consultant dermatologist	Trainer provided limited assistance during the wound closure stage	Excision on torso with purse string closure	1 × pair sterile gloves (cost £2.16; 40.7 g waste), 1 × sterile hand towel (cost £0.35; 12.4 g waste), 4 L water,[c] 6 mL of 0.05% w/v chlorhexidine gluconate solution (cost £0.17), 1 × 3-0 Prolene suture (cost £4.51; 5.5 g sharps waste) Total costs = £7.19 and 58.6 g waste (excluding cost of water and energy)	Switch from sterile to nitrile gloves (save £2.09; 32.7 g waste) Switch from sterile hand towel to paper towel (save £0.30) Switch hand disinfection technique to alcohol gel (save £0.10 plus 4 litres of water) Total potential savings = £2.49 and 32.7 g waste (excluding water and energy)
5	Trainee: as above Trainer: consultant dermatologist	Trainer as observer providing verbal guidance	Excision cyst on torso	1 × pair sterile gloves (cost £2.16; 40.7 g waste) Total costs = £2.16 and 40.7 g waste (excluding cost of water and energy)	N/A Total potential savings = £0 and 0 g waste (excluding water and energy)

(*Continued*)

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Table 1 (*Continued*)

Case	Trainee and trainer profile	Intensity of supervision	Type of procedure	Additional consumables used	Opportunities for environmental gain[a]
6	Trainee: dermatology specialist nurse with over 12 years and 1 year experience of performing diagnostic biopsies (all sites) and excisions (exclude head and neck) independently, respectively Trainer: consultant dermatologist	Trainer provided limited assistance	Punch biopsy and curette and cautery on facial area (involved a change of procedure)	1 × pair sterile gloves (cost £2.16; 40.7 g waste), 1 × sterile hand towel (cost £0.35; 12.4 g waste), 4 L water,[c] 6 mL of 0.05% w/v chlorhexidine gluconate solution (cost £0.17) Total costs = £2.68 and 53.1 g waste (excluding cost of water and energy)	Switch from sterile to nitrile gloves (save £2.09; 32.7 g waste) Switch from sterile hand towel to paper towel (save £0.30) Switch hand disinfection technique to alcohol gel (save £0.10 plus 4 L water) Total potential savings = £2.49 and 32.7 g waste (excluding water and energy)
7	Trainee: post-CCT Mohs fellow Trainer: consultant dermatologist and Mohs surgeon	Trainer scrubbed for stage to assist with cautery after layer taken by fellow and tissue being mapped by fellow Unscrubbed intermittent direct supervision of repair	Mohs stage to BCC forehead (2 blocks), clear after first stage and subsequent repair with M-plasty on forehead	1 × pair sterile gloves (cost £2.16; 40.7 g waste), 6 mL 0.05% w/v chlorhexidine gluconate solution (cost £0.17) Total costs = £2.33 and 40.7 g waste (excluding cost of water and energy)	Switch from sterile to nitrile gloves (save £2.09; 32.7 g waste) Switch hand disinfection technique to alcohol gel (save £0.10 plus 4 litres of water) Total potential savings = £2.19 and 32.7 g waste (excluding water and energy)
8	Trainee: dermatology ST5 with over 3 years' experience doing excisions Trainer: consultant dermatologist and Mohs surgeon	Trainer assisted and supervised the ST5, donor site repaired by the consultant while the graft was sutured by the trainee	Graft on the scalp	1 × pair nitrile gloves, 1 × pair sterile gloves, 1 × sterile hand towel, 1 × disposable glasses, 1 × disposable apron, 1 × surgical gown, 1 × tenotomy scissors, 1 × Kilner needle holder, 1 × scalpel holder and 15 blade, 4 litres of water,[c] 6 mL of 0.05% w/v chlorhexidine gluconate solution Total costs not calculated as local data not available	Switch from sterile to nitrile gloves Switch from sterile hand towel to paper towel Switch hand disinfection technique to alcohol gel Switch from gown to disposable apron
9	Trainee: skin cancer specialist nurse with 3 years' experience Trainer: consultant dermatologist and Mohs surgeon	Trainer excised the lesion and supervised the flap repair, consultant and nurse sutured simultaneously	Rotation/ advancement flap on the cheek	1 × pair nitrile gloves, 1 × pair sterile gloves, 1 × sterile hand towel, 1 × disposable glasses, 1 × disposable apron 1 × surgical gown, 1 × tenotomy scissors, 1 × Kilner needle holder, 1 × scalpel holder and 15 blade, 3 mL subcutaneous tranexamic acid (100 mg mL^{-1}), 4 L water,[c] 6 mL 0.05% w/v chlorhexidine gluconate solution Total costs not calculated as local data not available	Switch from sterile to nitrile gloves Switch from sterile hand towel to paper towel Switch hand disinfection technique to alcohol gel Switch from gown to disposable apron

[a]Opportunities for environmental gain if transitioning to best sustainable practices with the aid of the Healthcare Environmental Performance Tool; [b]pro rata cost and weight for one patient when a face mask is worn for one surgical list with five patients; [c]handwashing for 60 s equates to the use of at least 4 L water. BCC, basal cell carcinoma; FY2, foundation year 2 doctor (in their second year of postgraduate training in the UK); MTI, medical training initiative (a scheme open to international doctors at different stages of their career to undertake training placements in the UK); N/A, not applicable; post-CCT, post certificate of completion of training (post-CCT Mohs fellows are doctors on the specialist register of the General Medical Council, UK, in dermatology who are undertaking subspecialty training in Mohs micrographic surgery); ST5, specialty trainee year 5.

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experience (early stages of training), learning to perform a new technique and the complexity of the procedure (excisions and Mohs micrographic surgery) may be associate with increased levels of supervision, resulting in increased resource consumption and waste generation in the delivery of this training.

In case 6, the dermatology specialist nurse was experienced in performing minor surgery independently. The nurse was allocated a case intended for curette and cautery on the facial area and had correctly identified the requested procedure was no longer appropriate on the day of the procedure. Working within the constraints of the nursing role and local safety standards for invasive procedures, she requested medical review and supervision and the consultant stepped in to review, change the procedure and assist the nurse to complete the required procedure. By transitioning to best sustainable practices, with the aid of the Healthcare Environmental Performance Tool,[3] it is possible to reduce resource consumption and waste generation in the delivery of training.

Our case study has limitations. It is a small case series of supervised skin surgery training that examined a limited scope of resource consumption and its environmental impact. Our findings highlighted that training can have an impact on the environment and although it is important to provide trainee doctors with the best learning, it is just as important to ensure it is being done in the most sustainable way.

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Data availability: data are available on request from the corresponding author.

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