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End-user perceptions of sub-epidermal moisture scanning (SEMS) acceptability: A descriptive qualitative study

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Abstract

Aims: To assess patients' and nurses' perceptions and experiences of subepidermal moisture scanning acceptability.

Design: Descriptive, qualitative, sub-study, embedded within a pilot randomized control trial.

Methods: Ten patients who were in the intervention arm of the pilot trial and 10 registered nurses providing care for these patients on medical-surgical units participated in individual semi-structured interviews. Data were collected from October 2021 to January 2022. Interviews were analysed using inductive qualitative content analysis, and perspectives (patient and nurse), were triangulated.

Results: Four categories were found. The first category 'Subepidermal moisture scanning is acceptable as part of care' showed that patients and nurses were willing to use subepidermal moisture scanning and viewed subepidermal moisture scanning as non-burdensome. The category 'Subepidermal moisture scanning may improve pressure injury outcomes' demonstrated that although subepidermal moisture scanning was believed to prevent pressure injuries, more research evidence about its benefits was required. 'Subepidermal moisture scanning augments existing pressure injury prevention practices', the third category, highlighted that subepidermal moisture scanning aligns with current pressure injury prevention practices while making these practices more patient-centred. In the final category, 'Important considerations when making subepidermal moisture scanning routine practice', practical issues were raised relating to training, guidelines, infection control, device availability and patient modesty.

Conclusion: Our study demonstrates that using subepidermal moisture scanning is acceptable for patients and nurses. Building the evidence base for subepidermal moisture scanning and then addressing practical issues prior to implementation, are important next steps. Our research suggests that subepidermal moisture scanning enhances individualized and patient-centred care, persuasive reasons to continue investigating subepidermal moisture scanning.

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Impact:

- For an intervention to be successfully implemented it must be both effective and acceptable, however, there is limited evidence of patients' and nurses' views of SEMS acceptability.
- SEM scanners are acceptable to use in practice for patients and nurses. There are many procedural aspects that need to be considered when using SEMS such as frequency of measurements.
- This research may have benefit for patients, as SEMS may promote a more individualized and patient-centred approach to pressure injury prevention. Further, these findings can assist researchers, providing justification to proceed with effectiveness research.

Patient or public contribution: A consumer advisor was involved in study design, interpretation of data and preparation of manuscript.

KEYWORDS
interview, nurses, nursing assessment, patient acceptance of health care, patients, point-of-care systems, pressure ulcer, qualitative evaluation, wounds and injuries

1 | INTRODUCTION

The global prevalence of hospital-acquired pressure injuries (HAPI) is 8.4%, as reported in a systemic review of 15 studies with >1.8 million patients (Li et al., 2020). These pressure injuries (PIs) are estimated to cost the Australian health system $9.11 billion per annum (Nghiem et al., 2022). PIs are associated with adverse consequences including pain, increased risk of infection, subsequent lower limb amputation, malignant transformation, disability and prolonged hospitalization (Hajhosseini et al., 2020; Moore & Patton, 2019). For healthcare professionals and organizations, the impact of PI includes financial penalties, risk of litigation and reputational loss (Moore & Patton, 2019).

Current gold standard practice to assess PIs includes visual skin assessment (VSA) and the use of risk assessment tools like the Waterlow tool and the Braden scale. However, the validity and reliability of VSA assessment varies, with only moderate agreement found among assessors (Beeckman et al., 2007; Defloor et al., 2005). VSA relies on changes at the skin surface; when PIs become visible, damage to the underlying tissue may be more extensive than it appears, and it can be too late for PI prevention. In terms of risk assessment tools, a recent Cochrane review found no difference in PI incidence when assessed using the Braden scale, and no difference in PI incidence or severity when using the Waterlow tool (Moore & Patton, 2019). Yet, the success of PI assessment and prevention depends on timely detection of tissue damage in patients' anatomy (Moore et al., 2017).

2 | BACKGROUND

Subepidermal moisture (SEM) scanners are a novel point-of-care technology that may influence clinical outcomes in PI prevention and treatment. SEM scanners are handheld, wireless device that detect localized oedema under the skin before it becomes visible to the naked eye. This information may inform clinical decision-making in implementing targeted interventions to address the progression to PI (Gefen & Ross, 2020; Moore et al., 2017). Abnormal SEM readings can identify tissue oedema approximately 4 days prior to VSA confirmation (Chaboyer et al., 2022). Subepidermal moisture scanning (SEMS) may result in cost-savings for hospitals and better outcomes for patients. It is estimated that for every 1000 admissions, a SEM scanner could avert approximately 7 HAPI-related deaths and decrease HAPI-related re-hospitalization by about 206 bed-days (Padula et al., 2020). In some UK settings, SEMS is beginning to be used in routine practice (Musa et al., 2021; Ousey et al., 2022; Raizman et al., 2018). However, researchers state that better quality evidence of SEMS effectiveness is still required (Chaboyer et al., 2022; Moore et al., 2017).

For an intervention to be successfully implemented into practice, it needs to be both effective and acceptable. The updated Medical Research Council (MRC) framework recommends evaluation of intervention acceptability during pilot testing (Skivington et al., 2021), however evidence of the acceptability of SEM scanners is lacking. One UK study showed that nurses' confidence improved as their experience with SEMS increased, and that initial training and follow-up checks were important considerations (Raizman et al., 2018). Yet there was no information about how many nurses provided this feedback or how the data were collected. Another UK survey of 34 nurses identified all agreed SEM scanners were easy to learn to use and operate yet only 18 (34%) thought scanning patients was quick and easy (Musa et al., 2021; Nightingale & Musa, 2021). Overall, the acceptability data in these studies were brief.

Conducting a study that investigates the anticipated acceptability of SEM scanners in the real-life clinical environment

is required. Successful implementation of interventions is underpinned by end-users' perceptions of acceptability (Sekhon et al., 2017). Thus, addressing acceptability questions now may allow end-users to identify issues early and speed up the translation of research findings into routine practice. Additionally, the call for randomized control trials (RCT) to demonstrate SEM scanner effectiveness provides another reason to explore SEM scanner acceptability (Chaboyer et al., 2022). Researchers have demonstrated a correlation between anticipated intervention acceptability and experienced acceptability. This suggests that asking end-users about acceptability early can result in improvements to interventions before conducting expensive trials (Bartlett et al., 2021). Further, when an intervention is unacceptable, it can hinder the success of trial processes (i.e. recruitment) (Sekhon et al., 2021). Thus, a qualitative exploration of SEMS acceptability may provide better insights into the use of SEMS for both research and clinical practice.

3 | MATERIALS AND METHODS

3.1 | Aim

The aim of this research was to assess patients' and nurses' (i.e. end-users) perceptions and experiences of SEMS acceptability. Specific objectives included:

1. Describe medical/surgical patients' perceptions and experiences of SEMS acceptability.
2. Describe nurses' perceptions and experiences of SEMS acceptability.
3. Identify potential avenues for further research in this area.

3.2 | Design

This qualitative descriptive sub-study (Sandelowski, 2010) was a component of a pilot RCT that assessed the feasibility of undertaking a definitive RCT on SEMS (ACTRN12621000946819p). The reporting of this interview study was guided by the consolidated criteria for reporting qualitative research (COREQ) reporting guidelines (See Data S1).

3.3 | Sample and setting

This study was conducted in a 630-bed tertiary referral hospital in southeast Queensland, Australia. Patients and registered nurses in four medical and four surgical wards participated. Purposive, maximum variation sampling was used to obtain a range of patients and nurses (i.e. patients with different baseline variables, and nurses that differed in years of experience).

3.3.1 | Patients

The inclusion criteria for this qualitative sub-study were patient participants already recruited in the pilot study who were randomized to the intervention arm (i.e. had daily SEM readings). Patient inclusion criteria for the pilot study were: ≥18 years of age; medical or surgical patient; expected length of hospital stay ≥48 h following recruitment; at risk of PI as measured by limited mobility (i.e. requiring physical or mechanical assistance to reposition or ambulate); screened within 36 h of admission; able to provide informed written consent either in person or via a family member or legal guardian. Exclusion criteria were: previous participation in this trial; the presence of sacral or heel PI; the presence of broken skin at sacrum or heels; physical, structural or other limitations preventing assessments required in this study (e.g. suspected, or actual injury preventing turning); and receiving palliative care or dying.

3.3.2 | Registered nurses (RNs)

Registered nurses working on the participating wards for ≥3 months, in a permanent full-time or part-time position, who provided care to patients in the intervention arm of the pilot RCT were invited to participate in this qualitative sub-study. Nurses who were casual, relief or agency nurses or who provided care to patients in the control arm were excluded.

3.4 | The intervention

In the pilot study, the intervention group had daily SEM readings of the heels and sacrum conducted by a research assistant (RA) as well as routine care which included risk assessment using the Waterlow score (the risk assessment tool used at the research site), regular visual skin assessment, the use of specialist Support Surfaces, individualized regular repositioning, mobilization plans and preventative skincare. SEM readings were taken on weekdays until their hospital discharge or death, transfer to intensive care, development of a PI or reached 2 weeks, whichever came first, using the Provizio® SEM scanner (BruinBiometrics). SEM readings were reported to the nurse. In-depth details of the intervention and pilot study are available elsewhere (Campbell et al., 2022).

3.5 | Data collection

Patients who agreed to interviews when consenting to the pilot study were approached by the study RA to re-confirm consent. For nurses, the ward nurse unit manager (NUM) or designate, identified nurses that met inclusion criteria and informed the nurse about the study. If the nurse agreed to be approached, the RA engaged them in the informed consent process. After consenting, nurses provided

demographic data. For patients, demographic data was collected as part of the pilot study.

Individual, semi-structured interviews were conducted by RAs or an experienced researcher (JC) throughout the pilot study, at a time and place of mutual convenience for the patient or the nurse. Interviews were undertaken between October 2021 and January 2022. The interview guide focussed on intervention acceptability (see Appendix S1). Interviews were audio-recorded and transcribed verbatim by a professional transcription service. Prior to all interviews, the RA/researcher showed the patient/nurse an SEM scanner, demonstrated its use and educated them on its purpose and use. All patients had experienced SEM scanning as part of the intervention prior to the interviews, and that the nurses interviewed had cared for patients in the intervention group.

3.6 | Ethical considerations

Ethical approval was granted from the participating health service and university. All patients and nurses provided written informed consent, including providing a written and verbal overview of the research.

3.7 | Data analysis

Data analysis followed an approach that facilitates the triangulation of perspectives (patients and nurses) (Vogl et al., 2019). First, traditional qualitative data analysis was undertaken, which in this study, involved inductive qualitative content analysis (Elo & Kyngäs, 2008). After content analysis, comparisons were made between the patient and nurse perspectives to triangulate these perspectives. This analysis approach provides a fuller understanding of the phenomenon by seeing how different groups experience the same event (Vogl et al., 2019).

First, one researcher (JC) read through the interview transcripts to become immersed in the data. Next, line-by-line coding occurred; the researcher labelled each line of the interview transcripts with headings or sentences (i.e. codes) that described the content of the line (Elo & Kyngäs, 2008). The codes were hand-written in the margins of printed transcripts. Next, the codes were typed into a Microsoft Word document, and patient codes and nurse codes were typed into separate documents. In each document, similar codes were grouped together to reduce the number of codes by grouping them into subcategories (Elo & Kyngäs, 2008). Finally, subcategories were grouped together if they showed similar events, to form categories (Elo & Kyngäs, 2008).

At this point, three researchers worked together to triangulate patient and nurse perspectives, by synthesizing separate patient and nurse perspectives into broader multi-perspective categories. Patient and nurse categories and sub-categories were compared to find where they converged, complemented or diverged from each other (Vogl et al., 2019). The researchers used different coloured highlighting, to identify where convergence/divergence/complement occurred across patient and nurse documents. Next, a new document was created with new multi-perspective categories and sub-categories that were the results of grouping patient and nurse categories and sub-categories together. Descriptions for the multi-perspective categories were created and quotes were extracted to highlight sub-categories and categories (Vogl et al., 2019). The analysis was scrutinized by the entire research team.

3.8 | Rigour

To enhance credibility, the researchers conducting interviews were either doctorally trained or were RAs who were provided with training in qualitative interview techniques. RAs and the researcher had no prior relationships with the patients or nurses interviewed. Having a set interview guide ensured internal consistency in the interview approach. We also triangulated patient and nurse perceptions to confirm all aspects of the phenomenon investigated. During this process, we documented our audit trial by maintaining documents of each version of the analytic process. Finally, while one researcher led data analysis, two other researchers were involved in questioning the triangulated categories, to increase confirmability.

3.9 | Patient or public involvement

In this sub-study, the same consumer advisor from the pilot study reviewed the participant information sheet and consent form, the consent/recruitment procedure, and interview question guide. The consumer advisor also reviewed study findings and provided their interpretations; these insights guided the discussion and recommendations (see Appendix S2). Further, the consumer advisor was involved early in deciding whether SEMS was an important area for research. Reporting of consumer involvement in this study reflects the 'Guidance for Reporting Involvement of Patients and the Public 2' (GRIPP2) checklist.

4 | FINDINGS

Ten patients and 10 RNs were interviewed. No patients refused participation in interviews, while two nurses refused participation due to busy shifts. Patients had a median age of 73.5 years, and; slightly more males and more surgical patients participated (see Table 1). No patients developed a PI during the study. It was common for patients to receive Support Surfaces and patient education for PIP (Campbell et al., 2022). Nurses were mostly females on surgical wards, who had worked in nursing for about 5 years.

Table 2 summarizes the categories and sub-categories identified from the analysis. Most interviews lasted less than 10 min.

TABLE 1 Participant characteristics.

Patient characteristics, $n = 10$	*n* (%)
Age (years) (median, IQR)	73.5 (17.0)
Females	4 (40)
Clinical specialty:	
Medical	4 (40)
Surgical	6 (60)
Nurse characteristics, $n = 10$	***n* (%)**
Females	9 (90)
Clinical specialty:	
Medical	3 (30)
Surgical	7 (70)
Time as RN (years), median (IQR)	5.4 (7.2, 0.5–25.0)
Time working in the current ward (years), median (IQR)	2.8 (2.6)

TABLE 2 Categories and sub-categories found.

Categories	Sub-categories
SEMS is acceptable as part of care	• Willing to use SEMS • Integrating SEMS into clinical practice is attainable
SEMS *may* improve PI outcomes	• A step forward in preventing PIs • More evidence about the benefits of SEMS is needed
SEMS augments existing pressure injury prevention (PIP) practices	• SEMS is an adjunct to PIP care • SEMS aids a patient-centred approach to PIP care
Important considerations when making SEMS routine practice	• Ensuring consistent use of SEMS • Maintaining the SEM scanner • Availability of the SEM scanner • Maintaining dignity when using SEMS

4.1 | SEMS is acceptable as part of care

Overwhelmingly patients and nurses were prepared to use SEM scanners for patient care. Driving acceptability was the view that SEMS did not create burden for patients or nursing practice.

4.1.1 | Willing to use SEMS

All patients and the majority of nurses accepted the use of SEM scanners, showing complimentary views. Patients described using SEM scanners as *excellent (patient 1)*, *good (patients 1 and 2)*, *fine (patients 2–4)* and *all right (patients 5 and 6)*. Patients reported that they would be happy and reassured to see SEMS used as part of their everyday care, as it was viewed as an advancement in care and acceptable to patients: *I think that would be a really important thing…a step in the right direction for all patient care (patient 1)*. Nurses were also willing to use the SEM scanner and stated they would be comfortable and confident using the technology: *It's very straightforward, just point and press essentially (nurse 1)*.

4.1.2 | Integrating SEMS into clinical practice is attainable

Both patients and nurses found SEMS to be appropriate because it was non-burdensome. Their views were complimentary, patients found the device non-burdensome because of the lack of any effect on their body, while nurses commented on the lack of burden for their job. Patients described the device as *gentle (patient 1)*, *non-invasive (patients 1 and 4)*, *non-threatening (patient 7)*, *quick (patients 2, 3 and 7)*, *with no pain or discomfort (patients 1, 2, 5, 7 and 8)*; as one patient stated: *It was just like somebody touching with a finger. I felt nothing (patient 8)*. Not only was the device non-intrusive, but it could also be easily accommodated within existing routines: *when I was being turned to be washed anyway, it was just a case of beep, beep, beep at the same time (patient 3)*. Nurses expressed that SEM scanners would require minimal effort to use: *It's so small, easy to use. It's not heavy or anything. We can easily handle it (nurse 2)*. Further, it could be easily integrated into practice: *…very handy because it's just putting it directly on the skin and on three areas, just the same as looking out for pressure injuries that we do for our daily skin checks anyway (nurse 3)*.

4.2 | SEMS *may* improce PI outcomes

Patients and nurses acknowledged the burden of PIs. SEMS was viewed as a solution to improving this problem. However, both nurses and patients said more evidence for the effectiveness of SEMS for addressing this problem was required.

4.2.1 | A step forward in preventing PIs

Patients and nurses had converging views; SEM scanners could be beneficial in preventing PIs. Overall, patients were positive regarding the potential for SEMS: *I think it's… giving you early detection…if something might be wrong so that they can take action to prevent it (patient 4)*. This was perceived as a *bonus (patient 3)*, *can only be a good thing (patient 9)*, and a patient stated they: *hope the people in the future are better off (patient 5)*. Most nurses commented that SEM scanners provided objective data and was a novel method for early detection and nurse intervention to prevent PIs: *I think it [SEMS] would probably influence it [care]…in a positive way…We can identify them early and pick them up early so we can put in our interventions - so it doesn't progress into something worse… that's – best practice (nurse 4)*.

4.2.2 | More evidence about the benefits of SEMS is needed

There was some scepticism about the benefits of SEMS. Both nurses and some patients recognized that the SEM scanner was being tested as part of the pilot RCT, and its effectiveness was yet to be determined. Thus, they stated more evidence was required to enable them to trust the results of SEM scanner reading: *I think if it's going to help… the end result [of the research] is going to show that (patient 10).* If the research evidence was favourable, patients and nurses would be comfortable and happy to use the technology: *I think if the evidence comes back and says it's beneficial, for sure (nurse 5).*

4.3 | SEMS augments existing PIP practices

For nurses, SEMS was viewed to align with current PIP practices and was perceived to make PIP more patient-centred. However, this was an area of divergence in the interviews, as patients were silent on this topic.

4.3.1 | SEMS is an adjunct to PIP care

All but one nurse expressed that SEMS would *add to it, rather than replace (nurse 6)* existing PIP strategies, as it provides an extra strategy to identify *those ones [PIs] that are not as easy to visualise where it [SEM scanner] detects the more subtle (nurse 5).* For instance, risk assessment and visual assessment would continue: *it wouldn't necessarily replace them, but it might enhance them. We've got the [Waterlow] and you've got physically checking them but if you've got something else that shows what we can't see on skin level that's always going to help (nurse 1).* Additionally, nurses trusted their clinical judgement: *It would be in addition to… it will not override all the clinical judgment (nurse 3).*

4.3.2 | SEMS aids a patient-centred approach to PIP care

Nurses stated that the *standardized (nurse 7)* and *objective measurement (nurse 5)* (i.e. the Delta score) specific to each patient and anatomical location guided patient-centred PIP interventions: *… it would be great to use that [SEM scanner] because it could give you a guide… we need to pull other things into place like the heel wedge or maybe they need something more (nurse 8).* Nurses said that data from SEM scanners may support them to deliver targeted interventions: *it's not just a one-size-fits-all…we can resource other equipment that's available to help that individual person (nurse 9).*

4.4 | Important considerations when making SEMS routine practice

Despite viewing SEMS as acceptable, patients and nurses articulated concerns regarding the practical aspects of how the SEM scanner would be integrated into the workflow. Examples included training and guidelines required, infection control procedures, availability of devices and strategies to ensure patients' modesty is maintained.

4.4.1 | Ensuring consistent SEMS practices

Nurses stated that training and guidelines were required to understand normal ranges and ensure proper and consistent use of the SEM scanner across nurses: *feel okay once I had a bit more training with it (nurse 7).* Patients did not comment on the need for training/guidelines. Nurses thought the frequency of measurement needed to be standardized. Most nurses thought SEMS should be used in conjunction with hospital admission risk assessment (e.g. Waterlow tool): *On admission we have a checklist of things we need to do when we roll them. If that was put on that checklist, easy done (nurse 10).* However, there was variation in nurses' views about the frequency of SEM scanning for the remainder of the hospital stay, ranging from every 4 h to weekly. Justifications for varying frequencies included beliefs that SEMS should only be used during risk assessment, SEMS should be used based on nurses' clinical judgement and patient deterioration, SEMS should be part of routine observations, and SEMS should be tailored to the patient group. Patients' views were complimentary; while they did not emphasize the need for standardized frequency of measurement, they shared their preferences for frequency of measurement. Most patients were comfortable with daily use of the SEM scanner; however, one patient did question this frequency: *I'd ask what benefit that they're getting out of it by using it every day because that's a lot (patient 9).*

4.4.2 | Availability of the SEM scanner

Most nurses expressed some concern about the cost of the device, which may preclude clinical areas from having sufficient devices available. Having one device per ward could be inconvenient and burdensome for nurses: *…if there's one [SEM scanner] it makes it hard - if there were enough per area… when we do pressure area, we could just carry it with us then we'd just do it then and there (nurse 8).* Nurses were apprehensive about the compact nature of the device, suggesting it could easily go missing: *finding it would be the other issue in our ward. I don't know if you know about the bladder scanner, but it quite often goes walking and no one can find it (nurse 7).* There was divergence in patient views, as patients did not discuss issues related to SEM scanner availability.

4.4.3 | Maintaining the SEM scanner

Several nurses stated that device care and maintenance needed to be promoted during implementation. This was area of divergence, as nurses focused on the practical maintenance of the device, however, patients did not: *probably one of the things that we need to consider*

if we have that in place is, how often do we calibrate, or how often we check the device? (nurse 3). Both patients and nurses recognized the importance of infection control, one patient stated: *The only problem would be if the scanners not cleaned between patients, that there might be a cross-infection. I know that's unlikely but that thing's just always in your mind (patient 2)*. The cost and environmental impact of the single-use caps were only a concern for nurses: *I mean it [single-use caps] will end up in landfill, will not it? (nurse 10)*.

4.4.4 | Preserving dignity when using SEMS

For patients, a key consideration was maintaining dignity. This was an area of divergence, as nurses were silent on the topic. In particular, sacrum readings necessarily require exposure of patients' bodies: *examination of my coccyx is not a pleasant thing, but [it's necessary, I agree]…there's no pain. It's just a matter of modesty, isn't it? (patient 5)*. However, in the broader context of a hospital admission, other procedures caused more intrusive body exposure, which patients were accustomed to: *I think the only problem people would have would be the same in a normal assessment for pressure injury and that's just having someone look at your body (patient 1)*.

5 | DISCUSSION

In this study we found four categories, which demonstrated that patients and nurses viewed SEMS as an acceptable adjunct to PIP care. While both groups thought SEMS could enhance PI care and a patient-centred approach to care, they did want more research evidence to demonstrate the benefits of SEMS. Many useful considerations were identified that need to be addressed prior to implementing SEMS into practice.

End-user acceptability of any new innovation is an important consideration prior to adoption. An overview of 43 reviews, concluded that acceptability is a multi-faceted construct that includes the dimensions: affective attitude, burden, perceived effectiveness, ethicality intervention coherence, opportunity costs and self-efficacy (Sekhon et al., 2017). While our interview questions were not structured around these dimensions, the findings support them. For example, the category of 'SEMS is acceptable as part of care' reflects the dimensions of affective attitude, self-efficacy and ethicality, described as the extent to which the intervention fits with the individual's values. The category 'SEMS may improve PI outcomes' is consistent with the dimensions of opportunity costs and perceived effectiveness. The category 'important considerations when making SEMS routine practice' is congruent with the dimensions of burden, opportunity costs. Finally, 'SEMS augments existing PIP practices' is reflective of opportunity costs and possibly also ethicality. We suggest that future researchers shape their interview guide around the dimensions of acceptability to ensure all aspects of acceptability are covered.

While acceptability of the technology to the user, which we showed in respects to the SEM scanner, is important (Quinn et al., 2016), other important considerations include their accuracy, reliability and effectiveness (Drain et al., 2014; Wang & Kricka, 2018). Patients and nurses in our study desired more high-quality evidence about SEMS, potentially influencing acceptability and highlighting the need for further research. It is interesting to see that despite the fact there is limited RCT evidence for SEMS effectiveness, some research showing limitations in the predictive value of SEMS (Okonkwo et al., 2020) and other work identifying variation in site-specific SEM values in healthy participants with no tissue loading (Jayabal et al., 2021) it is being used routinely in some settings (Musa et al., 2021; Nightingale & Musa, 2021; Ousey et al., 2022; Raizman et al., 2018). Thus, given this study has demonstrated SEM scanner acceptability, it provides good foundations to plan effectiveness research.

We found that nurses were concerned that deploying the device in routine clinical practice could be cost prohibitive. The initial costs of point-of-care-technology is often a major reason why healthcare professionals do not adopt new practices, with costs including both direct costs (e.g. purchase/lease of equipment, consumables), but also indirect costs (e.g. staff training) (Quinn et al., 2016). However, researchers have demonstrated the long-term cost savings of SEMS; the early identification of non-visible tissue damage, higher detection of stage 1 HAPIs and avoidance of unnecessary PI interventions would have an estimated cost savings of £0.6million–£3.3million per annum for an average National Health Service (NHS) trust (Gefen et al., 2020). Other researchers have demonstrated that prevention protocols with SEMS cost US$912, whereas standard care costs US$4966 (Padula et al., 2020). Convincing stakeholders that the substantial initial outlay will eventually be cost-effective is required. Implementation strategies that address nurses' beliefs about consequences could be essential for future success (Cane et al., 2012).

Our findings show that SEMS could facilitate targeted and patient-centred approaches to PIP. Researchers have reported that PIP is practiced inconsistently, with patients receiving PIP strategies a median 50% of less of the time (Chaboyer et al., 2017). Nurses in our study stated that the SEM scanner could allow them to deliver tailored PIP, suggesting a more targeted approach to PIP. Given the patients in our study were keen to engage with SEMS, there may be scope to encourage patient participation, such as involvement in decisions when tailoring care. In previous research, patients have reported mixed preferences for the level of participation they want in PIP decisions ranging from passive to active. However, they want their preferences to be acknowledged, as assuming a patient does not want to participate in PIP can cause frustration for the patient (Latimer et al., 2014). Overall, our findings uncovered an interesting cultural shift; SEMS could be used to promote individualized, patient-centred approaches to care.

5.1 | Limitations

This research has limitations. This study was conducted at one site which could limit transferability of findings. However, we have

provided details about the setting and sample to allow readers to determine the applicability of findings for their setting. Inductive content analysis employs researcher interpretation which could be seen as a limitation. Yet, having three researchers involved in questioning and confirming the findings enhanced credibility in this study. Finally, our interviews were short in duration, but the practical nature of acceptability interview questions encourages more pointed and direct responses from participants.

6 | CONCLUSION

Overall, our findings show patients' and nurses' willingness to use SEM scanners; it is acceptable. This is an important consideration prior to contemplating undertaking resource-intensive research into its effectiveness, which would require a large and expensive multicentre trial. But there are issues to address for successful implementation of SEM scanners. As our nurses pointed out, measurement issues, such as how frequently SEM readings should be collected, requires further research. Additional considerations include addressing patients' and nurses' perceptions about the effectiveness of SEMS and long-term cost benefits may facilitate successful adoption in practice. The potential for SEMS to provide individualized, patient-centred care in the future is a compelling argument to continue research in this field.

In light of the study findings, recommendations for clinical practice are presented. Given nurses perceived that SEM scanners were easy to use and minimal effort, it is critical that they receive training to use the device in a standardized manner to get consistent and comparable results. Additionally, nurses want information about practical aspects of SEMS such as infection control, patient modesty, number of devices required and frequency of measurements. Clinical practice guidelines should be created that cover these more procedural aspects of SEMS. However, decisions like frequency of SEM readings should be evidence-based. Thus, guidelines need to be developed in tandem with emerging evidence. Once evidence-based guidelines are developed, robust implementation research using well-tested implementation strategies such as education meetings and outreach visits (Cassidy et al., 2021) will be essential to achieve clinical benefit in daily practice (Wang & Kricka, 2018).

AUTHOR CONTRIBUTIONS

All authors have agreed on the final version and meet at least one of the following criteria (recommended by the ICMJE*):

1. substantial contributions to conception and design, acquisition of data or analysis and interpretation of data;
2. drafting the article or revising it critically for important intellectual content.

*http://www.icmje.org/recommendations/

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CONFLICT OF INTEREST STATEMENT

- Jill Campbell has provided educational consultancy for Hartmann Pty Ltd.
- Zena Moore is a member of the BBI Global Scientific Advisory Board and the School of Nursing & Midwifery, RCSI, has a research collaboration with BBI.
- Gary Allen is the General Manager of the Australasian Human Research Ethics Consultancy Services.
- Fiona Coyer holds an educational consultancy with Molnlycke Pty Ltd.

PEER REVIEW

The peer review history for this article is available at https://publons.com/publon/10.1111/jan.15630.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request, and in consultation with your ethics committee.

CLINICAL TRIAL REGISTRATION NUMBER

This is a sub-study of a pilot RCT which was registered (ACTRN12621000946819p).

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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