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Patient and Clinician Perspectives on Smart Stoma Monitoring: A Cross-Sectional Survey

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Research Article

Keywords: stoma, ostomy, digital health, remote monitoring, leakage, patient experience

Posted Date: November 18th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11606111/v1

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Additional Declarations: No competing interests reported.

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Abstract

Background: Smart stoma monitoring refers to digital or sensor-based methods that track stoma output, pouch **Background:** Smart stoma monitoring uses digital or sensor-based methods to track stoma output, pouch filling, or leakage and provide information or alerts to patients or clinicians.

Aims: To assess current stoma-management practices, patient experiences, and patient and clinician views on smart monitoring.

Methods: A survey at University Hospital Galway included 28 participants: 14 patients living with a stoma and 14 clinicians involved in stoma care. Patient questionnaires covered management, self-management confidence, stoma-related experiences, and views on smart monitoring. Clinician questionnaires explored current practice, clinical challenges, potential uses

of monitoring data, and implementation barriers. Responses were summarized using descriptive statistics, and short free-text responses were grouped by reported benefits or concerns.

Results: No patient routinely recorded stoma output or used monitoring technology. Median self-management confidence was 5 (IQR 5–5), and median perceived clinical usefulness of smart-monitoring data was 2.5 (IQR 1–4). Leakage-related worry was reported by 10/13 patients (76.9%), while 9/14 (64.3%) identified reduced leakage or accidents as a potential benefit of smart stoma monitoring. High output/blockage was the most frequently reported clinical challenge, identified by 12/14 clinicians (85.7%). Clinicians' most frequently reported barriers were cost/funding (11/14, 78.6%), patient acceptance (10/14, 71.4%), and reliability (8/14, 57.1%).

Conclusions: Patients considered leakage prevention and practical reassurance potential benefits of smart monitoring. Clinicians highlighted high output/blockage as a common clinical challenge and identified cost, patient acceptance, and reliability as key implementation barriers. These findings can inform future development and evaluation of smart stoma monitoring.

Keywords: stoma, ostomy, digital health, remote monitoring, leakage, patient experience

Introduction

In this study, smart stoma monitoring refers to digital or sensor-based methods that track stoma output, pouch filling, or leakage and provide information or alerts to patients or clinical teams. We will be reviewing surveys which have focused on these possible functions rather than a specific device.

Stoma formation is an essential component of surgical care for a range of malignant and benign conditions, but the consequences extend beyond the operative episode. People living with colostomies, ileostomies, and urostomies must incorporate appliance management, peristomal skin care, output management, dietary adaptation, and recognition of complications into daily life. These demands may affect physical, psychological, sexual, and social well-being. The Stoma-QoL (Quality of Life) instrument was developed to capture several of these domains, reflecting the multidimensional consequences of living with a stoma.[1]

Leakage remains among the most consistently reported problems in contemporary stoma populations. In the multinational Ostomy Life Study, leakage under the baseplate or onto clothing remained common and was associated with restrictions in physical and social activity.[2] A UK analysis similarly reported widespread leakage-related worry and substantial peristomal skin morbidity.[3] Peristomal skin complications are also common after ostomy formation and affected both quality of life and healthcare utilisation.[4]

Output monitoring has additional clinical relevance in people with ileostomies. A systematic review including more than 82,000 patients assessed a 30-day dehydration-related readmission rate of approximately 6% after ileostomy formation and an all-cause readmission rate of approximately 20%.[5] Risk-factor analyses similarly demonstrate that dehydration-related readmission is an important and potentially preventable source of morbidity.[6] These findings support efforts to improve patient education, recognition of abnormal output patterns, and timely escalation of care.

Digital health has provided new mechanisms for supporting these activities. Early telemedicine work has demonstrated that remote assessment of ileostomy output was feasible and showed findings which hightly matched with the in-person clinical assessment.[7] More recently, random studies of digital leakage-notification systems have been evaluated. A pilot study with 25-patients reported reductions in leakage events and leakage-related worry.[8] A randomised ASSISTER crossover trial demonstrated improvements in emotional burden and participation with a

digital leakage-notification system as compared with standard care.[9] A subsequent multicentre study also reported reductions in leakage-related worry and improved self-management routines.[10]

Digital support does not necessarily require continuous sensor monitoring. A randomised trial of the 'Better Stoma App' found an improvement in early stoma-related quality of life with personalised digital guidance,[11] while a 2026 systematic review and meta-analysis reported improvements in stoma adjustment and self-efficacy following telehealth interventions, although effects on anxiety and quality of life were less consistent.[12] A further meta-analysis of randomised trials found overall benefits of digital health interventions for self-management and quality of life, while highlighting heterogeneity across intervention designs.[13]

Whether continuous monitoring is useful or acceptable to all people living with a stoma remains uncertain. Additional equipment, alerts, data sharing, and changes to established routines may affect whether patients choose to use such technology or not. Clinicians must also consider reliability, cost, workflow, and how additional patient-generated data would be reviewed. Patient and clinician views are therefore important when deciding which monitoring functions are worth developing.

This study aims to assess patient and clinician views on current stoma management and smart stoma monitoring. The survey examined current monitoring practices, stoma-related experiences, perceived benefits and concerns, clinical challenges, and barriers to implementation.

Methods

Study design and setting

A survey was conducted at the University Hospital Galway Stoma Care Department in collaboration with the University of Galway between 1 October 2025 and 10 September 2026. It assessed current stoma-management and monitoring practices, patient-reported experiences, and patient and clinician views on smart stoma monitoring.

Participants and recruitment

Patients were recruited through stoma-care services, patient support groups, and online networks. Clinicians were recruited through professional networks and institutional contacts. Patient participants were adults able to provide informed consent and complete the survey in English and had experience managing a stoma. Clinician participants were healthcare professionals directly involved in stoma care.

Survey instrument

Patient questionnaire

The patient questionnaire included 10 core questions covering stoma type and duration, appliance management, current output monitoring, use of monitoring technology, confidence in self-management, perceived clinical usefulness of smart-monitoring data, and perceived benefits and concerns. A further 20 stoma-related experience items covered leakage, pouch-related anxiety, skin problems, social participation, activity, body image, and other effects of living with a stoma.

The survey materials included the validated 20-item Stoma-QoL questionnaire.[1] In the final dataset, the 20 experience items were recorded using agreement-response categories rather than the validated Stoma-QoL frequency scale. The items were therefore reported individually, and a total Stoma-QoL score was not calculated.

Clinician questionnaire

The clinician questionnaire included 10 questions covering professional background, current stoma-care practice, common clinical challenges, methods used to obtain or record output information, potential uses of smart-monitoring data, perceived benefits, barriers to implementation, and views on adoption into practice. Four potential uses were rated on 5-point scales: earlier identification of complications, fewer unnecessary appointments, improved patient confidence, and better data for clinical review.

Data analysis

Categorical responses were summarised as counts and percentages. Five-point ratings were summarised using medians and interquartile ranges (IQRs), with means and standard deviations also reported for comparison with the figures. Item-specific denominators were used where a response was unavailable or could not be interpreted.

Short free-text responses were reviewed and grouped according to the issue or benefit described. Descriptive categories were labels for similar content, such as reduced leakage or accidents, improved confidence, or complexity and technology burden. These categories summarised the content of brief responses rather than representing an in-depth thematic analysis. Counts and percentages were used to report how many respondents mentioned each category. A response could contribute to more than one category if it raised more than one issue; percentages for these items therefore do not necessarily sum to 100%.

Ethics

Ethical approval was granted by the Clinical Research Ethics Committee, Merlin Park Hospital, Galway University Hospitals (reference C.A. 3512). All participants provided informed consent for participation and research data processing before their responses were included in the analysis.

Results

Study sample

Thirty questionnaires were available for review. Two questionnaires were excluded because consent for research data processing had not been provided. The remaining 28 questionnaires were included in the analysis. Fourteen were completed by patients living with a stoma, and 14 were completed by clinicians involved in stoma care. Each group therefore accounted for 50.0% of the analysed sample.

Patient survey results

Fourteen patients completed the patient survey. Eight patients (57.1%) had an ileostomy, 5 (35.7%) had a colostomy, and 1 (7.1%) had a urostomy. Seven patients (50.0%) had lived with a stoma for more than 5 years, 4 (28.6%) for 6–12 months, 2 (14.3%) for 3–5 years, and 1 (7.1%) for 1–3 years (Table 1; Fig. 1).

Seven patients (50.0%) changed their appliance every 2 days, 4 (28.6%) changed it daily, and 3 (21.4%) changed it every 3 days. No patient reported routinely recording stoma output or using technology to monitor the stoma.

The median self-management confidence score was 5 [IQR 5–5] (mean 4.71 ± 0.61). Eleven patients (78.6%) rated their confidence as 5/5, 2 (14.3%) as 4/5, and 1 (7.1%) as 3/5. The median perceived clinical usefulness score for smart-monitoring data was 2.5 [IQR 1–4] (mean 2.71 ± 1.73). Six patients (42.9%) rated usefulness as 1/5, 1 (7.1%) as 2/5, 1 (7.1%) as 3/5, 3 (21.4%) as 4/5, and 3 (21.4%) as 5/5.

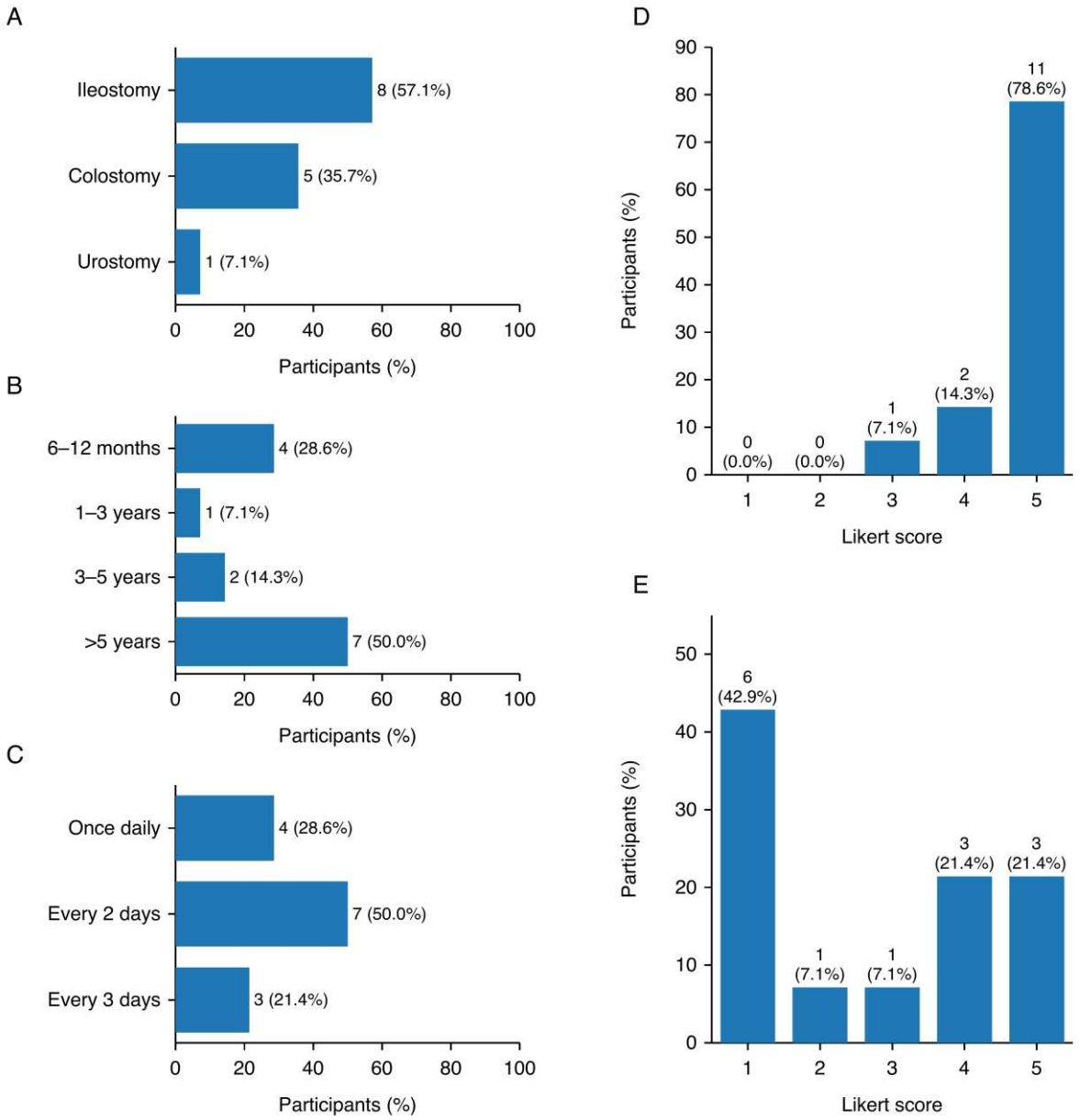


Fig. 1 Patient characteristics, current stoma-management practices and perceived usefulness of smart monitoring. A Stoma type. B Duration living with a stoma. C Appliance-change frequency. D Self-management confidence. E Perceived clinical usefulness of smart-monitoring data. N=14

Ten of 13 patients who answered the leakage item (76.9%) reported worry about stoma leakage. Nine of 13 (69.2%) reported needing to know the location of the nearest toilet, 7/12 (58.3%) reported worry about skin problems around the stoma, 8/14 (57.1%) reported worry about stoma noises, 7/14 (50.0%) reported anxiety when the pouch was full, and 7/14 (50.0%) reported worry that the pouch might smell. Eleven of 13 patients (84.6%) reported enjoying hobbies and leisure activities, and 9/12 (75.0%) reported feeling comfortable around other people (Table 2).

Nine patients (64.3%) identified reduced leakage or accidents as a potential benefit of smart monitoring. Six (42.9%) identified easier travel or social activity, 5 (35.7%) identified better communication with clinicians, 5 (35.7%) identified improved confidence, and 1 (7.1%) identified potential night-time use. Four patients (28.6%) reported no perceived benefit, and 1 (7.1%) did not record a benefit (Table 3).

Four patients (28.6%) reported no concerns about smart monitoring, and 4 (28.6%) reported complexity or technology burden. Two patients (14.3%) stated that they would not use the technology or did not consider it useful. Size or bulk, excessive sensitivity or false alarms, and the burden of managing an additional item were each reported by 1 patient (7.1%); 1 patient (7.1%) did not record a concern (Table 3).

Clinician survey results

Fourteen clinicians completed the clinician survey. Nine clinicians (64.3%) were nurses, including 1 surgical nurse, 4 (28.6%) were stoma/colorectal nurses, and 1 (7.1%) was a surgeon. Six clinicians (42.9%) had 5–10 years of stoma-care experience, 3 (21.4%) had at least 10 years, 3 (21.4%) had 3–5 years, 1 (7.1%) had 1–3 years, and 1 (7.1%) had less than 1 year of experience (Table 4; Fig. 2).

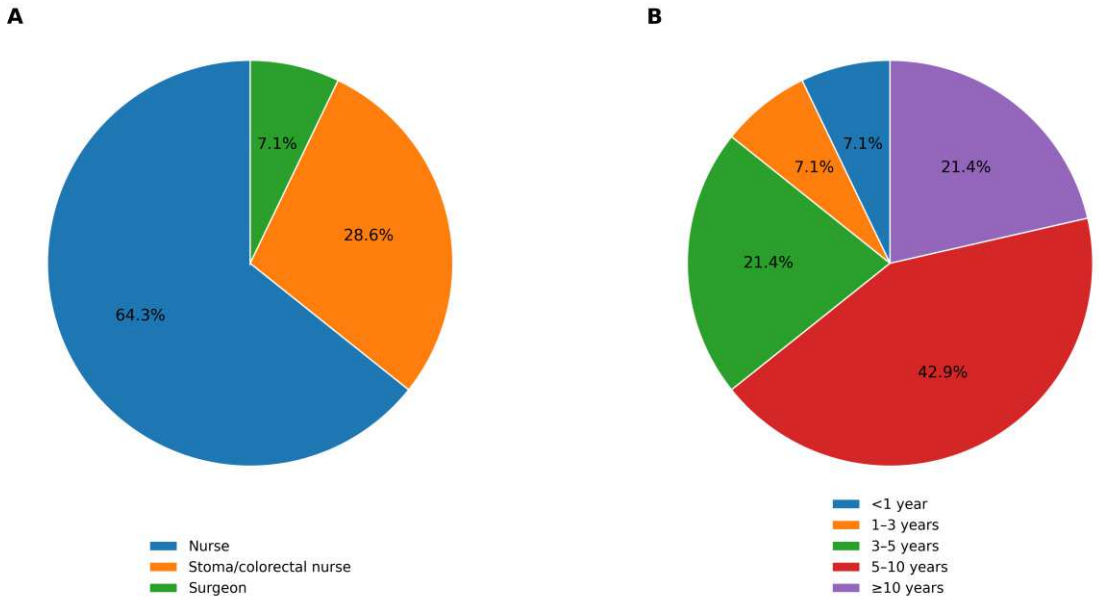


Fig. 2 Clinician characteristics. A Professional roles. B Years of stoma-care experience. N=14

High output/blockage was reported as a current clinical challenge by 12 clinicians (85.7%). Leakage and skin irritation were each reported by 8 (57.1%), while retraction/prolapse and hernia were each reported by 2 (14.3%). Verbal reporting was used to obtain stoma-output information by 10 clinicians (71.4%), paper logs by 8 (57.1%), and the patient file by 1 (7.1%); 1 clinician (7.1%) did not specify a method (Table 4).

Clinicians rated four potential uses of smart-monitoring data on a 5-point scale. Improved patient confidence had a mean score of 3.14 ± 1.61 and a median of 3.5 [IQR 2–4.75]. Better data for clinical review had a mean score of 3.00 ± 1.52 and a median of 3 [IQR 2–4]. Earlier identification of complications had a mean score of 2.93 ± 1.54 and a median of 3 [IQR 1.25–4]. Fewer unnecessary appointments had a mean score of 2.54 ± 1.33 and a median of 3 [IQR 1–3] based on 13 valid responses (Table 5; Fig. 3).

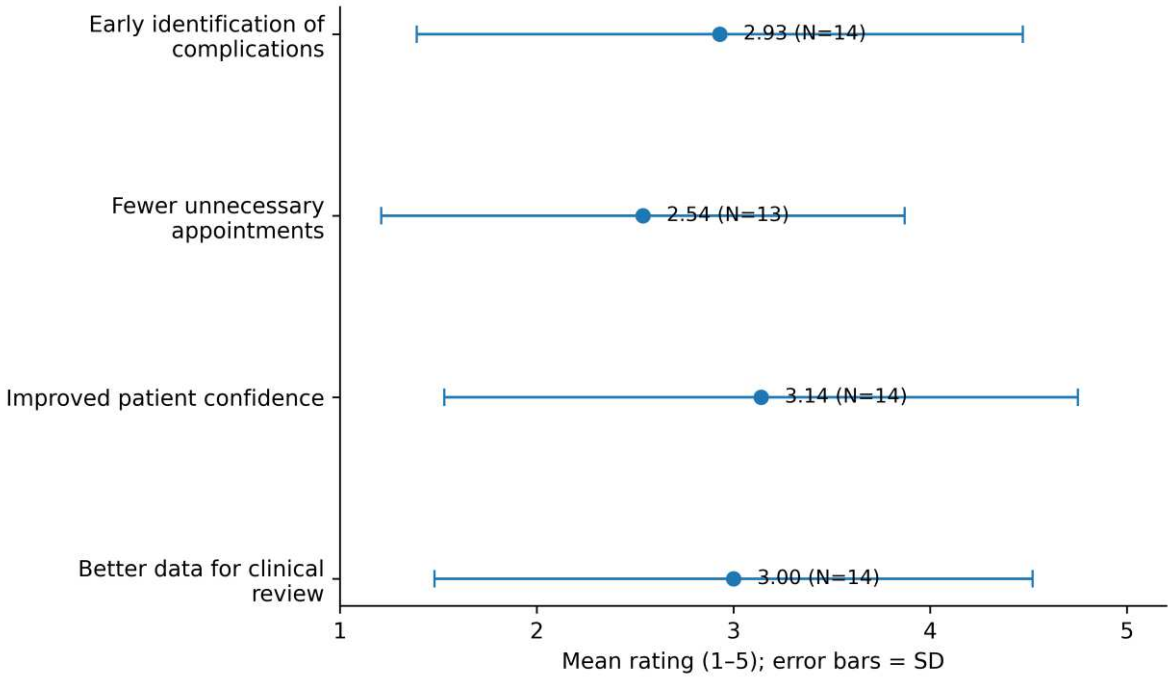


Fig. 3 Clinician ratings of the potential value of smart-monitoring data. Points show mean ratings and error bars show standard deviations on 5-point scales. The fewer-unnecessary-appointments item has N=13; all other items have N=14

In the clinician free-text responses, improved patient confidence was identified as a potential benefit by 8 clinicians (57.1%), earlier identification of complications by 4 (28.6%), better data for clinical review by 3 (21.4%), and fewer unnecessary appointments by 1 (7.1%). Two clinicians (14.3%) reported no perceived benefit, and 2 (14.3%) did not record a benefit (Table 5; Fig. 4A).

Clinician-reported implementation concerns were cost/funding (11/14, 78.6%), patient acceptance (10/14, 71.4%), device reliability (8/14, 57.1%), integration with existing systems (5/14, 35.7%), data privacy (4/14, 28.6%), and hygiene (1/14, 7.1%) (Table 5; Fig. 4B).

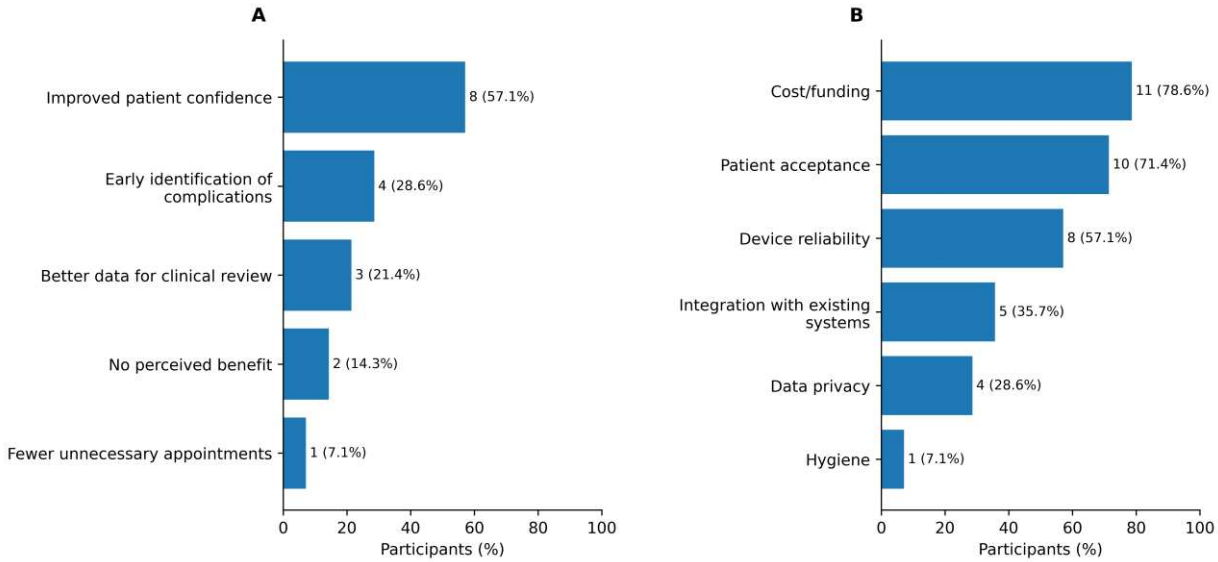


Fig. 4 Clinician perceptions of smart stoma monitoring. A Clinician-perceived benefits. B Implementation concerns. Multiple responses were permitted. N=14

Discussion

Principal findings

The survey showed that patients generally reported high confidence in day-to-day stoma management, while ratings of the additional usefulness of smart-monitoring data varied across the full 1–5 scale. This suggests that the value of monitoring may depend on whether it addresses a specific problem for the individual patient.

Leakage was the most common patient concern relevant to smart monitoring. Worry about leakage was frequently reported, and reduced leakage or accidents was the most frequently identified potential benefit. Travel and social activity were also commonly mentioned. These findings suggest that monitoring may be most useful when it provides reassurance in situations where leakage or pouch filling is difficult to predict.

Clinicians most frequently reported high output/blockage as a clinical challenge. Cost, patient acceptance, and reliability were the most frequently reported barriers to implementation. These findings indicate that any future monitoring system would need to address a clear clinical problem while remaining practical for patients and staff.

Leakage as a patient-centred target

The prominence of leakage in the present patient responses is consistent with the wider literature. The Ostomy Life Study found leakage to be common and linked frequent leakage with greater emotional impact and loss of control.[2,14] UK data similarly demonstrate that leakage-related worry may persist and may coexist with peristomal skin complications.[3] These findings help explain why the strongest patient-identified benefit in the current study was not “more clinical data”, but reduced leakage and accidents.

For patients, monitoring may be more useful when it gives a clear warning of leakage or abnormal pouch filling rather than simply collecting more data. Previous studies of digital leakage-notification systems have reported reductions in leakage-related worry and improvements in participation and stoma-care routines. [8–10] These studies do not establish the effectiveness of the monitoring approach considered in this survey, but they show that leakage-related outcomes can be measured in future evaluations.

Output monitoring and clinical deterioration

Clinician respondents most frequently identified high output or blockage as a current challenge. This is particularly relevant to ileostomy care, where excessive output may precipitate dehydration, electrolyte disturbance, acute kidney injury, and hospital readmission. Vogel et al. estimated that dehydration accounts for approximately 6% of readmissions within 30 days after ileostomy creation,[5] while Liu et al. identified clinically relevant risk factors for dehydration-related readmission.[6]

None of the patient respondents reported routine output recording, although eight had an ileostomy. Half of the patient group had lived with a stoma for more than 5 years, so continuous quantitative monitoring may not be necessary for every patient. Future work should assess whether monitoring is more useful in defined situations, such as after new ileostomy formation, during high-output episodes, after discharge, or during medication and dietary changes.

Remote assessment is feasible in such contexts. Bednarski et al. demonstrated 95% agreement between telemedicine and in-person decisions when evaluating ileostomy output in a feasibility trial.[7] The value of digital monitoring may therefore be greatest when linked to a defined clinical pathway and escalation threshold rather than implemented as permanent surveillance for all patients.

Self-management confidence and perceived usefulness

A notable finding was the contrast between very high self-management confidence and the wide distribution of perceived clinical usefulness ratings. Although 11/14 patients rated their self-management confidence as 5/5, 6 selected the lowest usefulness rating of 1/5, while another 6 rated usefulness as 4 or 5. Nearly two-thirds nevertheless identified leakage reduction as a potential benefit.

These measures capture different aspects of stoma care. A patient may feel confident managing a stoma independently while still valuing a targeted function such as a leakage alert during travel, social activity, or sleep. The spread of usefulness ratings suggests that preferences for monitoring are unlikely to be uniform across patients.

Future systems may need different options for monitoring and data sharing. Some patients may prefer local alerts only, while others may want longer-term self-tracking or clinician access to selected data. The broader digital-health literature also supports tailored approaches to stoma support, although effects vary across interventions and outcomes.[11–13]

Clinician implementation priorities

Clinician responses show that practical barriers will be important in determining whether smart monitoring can be used in routine care. Cost/funding was reported by 78.6% of clinicians, patient acceptance by 71.4%, and reliability by 57.1%.

Reliability would need to be established before clinical use. False alarms could increase anxiety and alert fatigue, while false reassurance could have clinical consequences. One patient specifically raised concern about excessive sensitivity and unwanted alerts. More than one-quarter of patients reported no perceived benefit, and some stated that they would not use the technology or considered it unnecessarily complex. Use of smart monitoring should therefore be based on patient preference rather than applied to all patients.

Cost and funding were the most commonly reported clinician barriers. Future evaluation should assess whether any clinical benefit justifies the costs of sensors, software, maintenance, clinician time, and data review. Integration with existing records and workflows will also be important. Studies should define which readings require action, who reviews them, and how alerts are managed inside and outside normal working hours.

Implications for smart stoma technology development

Further development should focus on the needs identified by patients and clinicians rather than treating continuous monitoring as a default. The survey points to leakage, abnormal output, patient reassurance, and clinically useful information as priorities for future work.

Future development should examine four main functions: detection of leakage or impending pouch problems, monitoring of abnormal output in selected patients, patient alerts that are simple and useful, and optional sharing of relevant information with clinical teams.

Patients and stoma-care nurses should be involved in designing and testing these functions. Early studies should assess technical performance and usability before evaluating clinical outcomes. Later studies should determine whether alerts change patient behaviour or clinical management and whether monitoring reduces leakage episodes, peristomal skin complications, dehydration-related presentations, or unplanned contact with healthcare services.

Strengths and limitations

A strength of this study is the inclusion of both patient and clinician perspectives, allowing the priorities of end users and healthcare professionals to be considered separately. The survey also captured both structured ratings and free-text responses, providing quantitative summaries alongside participant-defined benefits and concerns. The patient sample included individuals with established stomas, with half reporting more than 5 years of stoma experience.

Several limitations should be considered. The sample was small, comprising 28 participants, and was drawn from a limited clinical and professional context, reducing generalisability. The clinician sample was predominantly nursing-based, with only one surgeon. Patient age, sex, indication for stoma formation, temporary versus permanent status, comorbidity, socioeconomic circumstances, and digital literacy were not available in the final dataset, although these factors may influence perceptions of monitoring technology.

Recruitment denominators were unavailable, so a response rate could not be calculated and self-selection bias is possible. The final patient sample included ileostomy, colostomy, and urostomy respondents, while the recruitment documentation did not consistently describe all stoma types. In addition, the study materials contained more than one questionnaire version, and the final dataset included patient-experience items recorded differently from the validated Stoma-QoL format.

The 20 patient-experience items were therefore analysed individually rather than combined into a Stoma-QoL total score. Short free-text responses were grouped into descriptive categories only. Larger studies are needed to determine whether the priorities identified in this survey are associated with technology uptake, clinical outcomes, or healthcare use.

Future research

Future studies should involve patients and stoma-care clinicians in the design of monitoring systems and should recruit a larger and more diverse population across stoma type, age, indication, time from surgery, digital literacy, and level of self-management independence. Patient-reported outcomes should use validated instruments without modification, including an appropriately administered Stoma-QoL and, when leakage is a specific target, a validated leakage-impact measure.

Future studies should measure leakage episodes, appliance changes, peristomal skin status, output abnormalities, dehydration events, unscheduled clinical contacts, and hospital readmissions. Evaluation should proceed in stages, beginning with technical testing and usability, followed by short-term home testing and prospective clinical studies. Future protocols should also state which data should trigger clinical action, who is responsible for reviewing them, and what should happen after an abnormal reading.

Conclusion

In this survey, patients most often identified leakage prevention, travel and social reassurance, and improved communication or confidence as potential benefits of smart monitoring. Clinicians most frequently identified high output/blockage as a clinical challenge and reported cost, patient acceptance, and reliability as the main barriers to implementation.

These findings provide initial priorities for future development and evaluation. Larger and more diverse studies are needed to determine which patients are most likely to benefit, which monitoring functions are clinically useful, and how smart stoma monitoring could be incorporated into routine care.

Statements and Declarations

Ethics approval and consent to participate

Ethical approval was granted by the Clinical Research Ethics Committee, Merlin Park Hospital, Galway University Hospitals (reference C.A. 3512). All participants provided informed consent for participation and research data processing before their responses were included in the analysis.

Consent for publication

Not applicable, only aggregate, anonymised survey findings are reported.

Funding

No funds, grants, or other support was received for this work.

Competing interests

The authors have no relevant financial or non-financial interests to disclose.

Author contributions

D.R.P.: Investigation, Data Curation, Formal Analysis, Visualization, Writing - Original Draft. M.N.: Methodology, Supervision, Writing - Review & Editing. I.M.: Resources, Writing - Review & Editing. A.D.: Writing - Review & Editing. N.C.: Writing - Review & Editing. D.O.K.: Conceptualization, Methodology, Supervision, Project Administration, Writing - Review & Editing.

Data availability

Individual-level participant data are not publicly available because the approved study materials restrict access to the research team and the source files include participant-level research records. Aggregate data supporting the findings

are reported in the article tables and figures. Any additional data sharing would require appropriate institutional and ethical governance.

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Tables

Table 1. Patient characteristics and current stoma-management practices (N=14)

Characteristic	n/N (%) or summary
Stoma type	
Ileostomy	8/14 (57.1%)

Characteristic	n/N (%) or summary
Colostomy`	5/14 (35.7%)
Urostomy	1/14 (7.1%)
Duration living with stoma	
6–12 months	4/14 (28.6%)
1–3 years	1/14 (7.1%)
3–5 years	2/14 (14.3%)
>5 years	7/14 (50.0%)
Appliance-change frequency	
Once daily	4/14 (28.6%)
Every 2 days	7/14 (50.0%)
Every 3 days	3/14 (21.4%)
Currently records stoma output	
No	14/14 (100.0%)
Uses technology to monitor stoma	
No	14/14 (100.0%)
Confidence managing stoma, 1–5	
Median [IQR]	5 [5–5]
Mean ± SD	4.71 ± 0.61
Score 5	11/14 (78.6%)
Score 4	2/14 (14.3%)
Score 3	1/14 (7.1%)
Perceived clinical usefulness of smart-monitoring data, 1–5	
Median [IQR]	2.5 [1–4]
Mean ± SD	2.71 ± 1.73
Score 1	6/14 (42.9%)
Score 2	1/14 (7.1%)
Score 3	1/14 (7.1%)
Score 4	3/14 (21.4%)
Score 5	3/14 (21.4%)

Table 2. Agreement with patient-reported stoma-related experience statements

Statement	Agree/strongly agree, n/N (%)
I enjoy my hobbies and leisure activities	11/13 (84.6%)
I worry about stoma leakage	10/13 (76.9%)
I feel comfortable around other people	9/12 (75.0%)
I feel the need to know where the nearest toilet is	9/13 (69.2%)
I feel sexual desire	7/12 (58.3%)
I worry about skin problems around the stoma	7/12 (58.3%)
I worry about noises from the stoma	8/14 (57.1%)
I become anxious when the pouch is full	7/14 (50.0%)
I feel attractive	7/14 (50.0%)
I worry that the pouch may smell	7/14 (50.0%)
I worry that other people might hear the noises of the stoma	6/13 (46.2%)
I need to rest during the day	4/12 (33.3%)
I worry about being a burden to people close to me	4/13 (30.8%)
I feel tired during the day	4/14 (28.6%)
I have difficulty doing strenuous activities (sport, gardening, etc.)	3/14 (21.4%)
I worry about the stoma	3/14 (21.4%)
I worry that the pouch will loosen	3/14 (21.4%)
My stoma pouch limits the choice of clothes that I can wear	3/14 (21.4%)
I am afraid of meeting new people	2/14 (14.3%)
I feel ashamed of my body because of the stoma	1/13 (7.7%)

Denominators vary because unanswered or ambiguous items were excluded.

These statements were analysed individually and were not combined into a validated Stoma-QoL score.

Table 3. Patient-perceived benefits and concerns regarding smart stoma monitoring

Response category	n/N (%)
Potential benefits*	
Reduced leakage or accidents	9/14 (64.3%)
Easier travel/social life	6/14 (42.9%)
Better communication with clinicians	5/14 (35.7%)
Improved confidence	5/14 (35.7%)
No perceived benefit	4/14 (28.6%)
Potential night-time use	1/14 (7.1%)
Benefit not recorded	1/14 (7.1%)
Concerns*	
No stated concern	4/14 (28.6%)
Complexity/technology burden	4/14 (28.6%)
Would not use / did not consider useful	2/14 (14.3%)
Size or bulk	1/14 (7.1%)
Excessive sensitivity/false alarms	1/14 (7.1%)
Additional item to manage	1/14 (7.1%)
Concern not recorded	1/14 (7.1%)

**Free-text categories were non-mutually exclusive, percentages need not sum to 100%.*

Table 4. Clinician characteristics and current stoma-care practice (N=14)

Characteristic	n/N (%)
Professional role	
Nurse, including surgical nurse	9/14 (64.3%)
Stoma/colorectal nurse	4/14 (28.6%)
Surgeon	1/14 (7.1%)
Experience	
<1 year	1/14 (7.1%)
1–3 years	1/14 (7.1%)
3–5 years	3/14 (21.4%)
5–10 years	6/14 (42.9%)
≥10 years	3/14 (21.4%)
Common practice challenges*	
High output/blockage	12/14 (85.7%)
Leakage	8/14 (57.1%)
Skin irritation	8/14 (57.1%)
Retraction/prolapse	2/14 (14.3%)
Hernia	2/14 (14.3%)
Methods of recording/obtaining output data*	
Verbal	10/14 (71.4%)
Paper log	8/14 (57.1%)
Patient file	1/14 (7.1%)
Not specified	1/14 (7.1%)

**Multiple responses were permitted, percentages do not sum to 100%.*

Table 5. Clinician perceptions of the potential value and implementation of smart stoma monitoring

Domain	Result
Potential value, 1–5	
Early identification of complications	2.93 ± 1.54, median 3 [1.25–4]
Fewer unnecessary appointments (N=13)	2.54 ± 1.33, median 3 [1–3]

Domain	Result
Improved patient confidence	3.14 ± 1.61, median 3.5 [2–4.75]
Better data for clinical review	3.00 ± 1.52, median 3 [2–4]
Perceived benefits*	
Improved patient confidence	8/14 (57.1%)
Early identification of complications	4/14 (28.6%)
Better data for clinical review	3/14 (21.4%)
No perceived benefit	2/14 (14.3%)
Benefit not recorded	2/14 (14.3%)
Fewer unnecessary appointments	1/14 (7.1%)
Implementation concerns*	
Cost/funding	11/14 (78.6%)
Patient acceptance	10/14 (71.4%)
Device reliability	8/14 (57.1%)
Integration with existing systems	5/14 (35.7%)
Data privacy	4/14 (28.6%)
Hygiene	1/14 (7.1%)

**Benefits and concerns were multiple-response categories.*

One clinician entered 9 for "Fewer unnecessary appointments" on a stated 1–5 scale, this out-of-range value was treated as invalid/missing for that item (N=13).