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ORIGINAL ARTICLE

WILEY

Implementing and evaluating patient-focused safety technology on adult acute mental health wards

Sarah Kendal[1] | Gemma Louch[2] | Lauren Walker[3] | Saba Shafiq[4] | Daisy Halligan[1] | Lyn Brierley-Jones[5] | John Baker[1]

[1]University of Leeds, Leeds, UK

[2]Bradford Institute for Health Research, Bradford, UK

[3]City of London University, London, UK

[4]University of Bradford, Bradford, UK

[5]University of Nottingham, Nottingham, UK

Correspondence
John Baker, University of Leeds, Leeds, UK.
Email: j.baker@leeds.ac.uk

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Accessible Summary

What is known on the subject:

- Mental health wards can feel unsafe. We know that patients and staff have different ideas about what makes a hospital ward safe or unsafe.
- Patients are often the first to know when the atmosphere on a ward becomes tense, but often, no one asks them for their views.
- Patients and staff are experts and should be included in discussions about how to make wards safer.

What this paper adds to existing knowledge:

- We got together with some service users and staff, and made an app that helps patients to tell staff when they are not feeling safe on a mental health ward. We tried it out on six wards and we asked patients and staff what they thought.
- The app was easy to use and most people liked the look of it.
- Patients said staff did not talk with them enough and so they liked using the app. However, some staff said they could tell how patients were feeling without an app and so they did not need it. Ward managers told us that staff were often very busy and did not always have time to use the app.

What are the implications for practice:

- This app could help staff know straightaway when patients do not feel safe on the ward, so that they can act quickly to calm things down.
- To make the most of the app, staff need to get used to it and bring it into ward routines.

Abstract

Introduction: Safety improvement on mental health wards is of international concern. It should incorporate patient perspectives.

Aim: Implementation and evaluation of 'WardSonar', a digital safety-monitoring tool for adult acute mental health wards, developed with stakeholders to communicate patients' real-time safety perceptions to staff.

Method: Six acute adult mental health wards in England implemented the tool in 2022. Evaluation over 10 weeks involved qualitative interviews (34 patients, 33 staff), 39 focused ethnographic observations, and analysis of pen portraits.

Results: Implementation and evaluation of the WardSonar tool was feasible despite challenging conditions. Most patients valued the opportunity to communicate their immediate safety concerns, stating that staff had a poor understanding of them. Some staff said the WardSonar tool could help enhanced ward safety but recognised a need to incorporate its use into daily routines. Others said they did not need the tool to understand patients' safety concerns.

Discussion: Foreseeable challenges, including staff ambivalence and practical issues, appeared intensified by the post-COVID-19 context.

Implications for Practice: The WardSonar tool could improve ward safety, especially from patients' perspectives. Future implementation could support staff to use the real-time data to inform proactive safety interventions.

KEYWORDS
digital technology, feasibility, inpatient, mental health, patient feedback, patient safety

1 | INTRODUCTION

The focus of this article is the WardSonar monitoring tool: a patient-focused, digital technology to monitor and improve safety on adult acute mental health wards. The tool was created from co-design with mental health experts including service users and healthcare staff. It facilitates the collection of real-time data about patient safety perspectives within the ward setting; and makes the data available to staff, thereby helping staff to be aware of tensions in the ward milieu so they may deliver timely and appropriate interventions. We report on a study to explore the tool's feasibility and acceptability in a real-world context.

2 | BACKGROUND

Recent media attention (Plomin & Telling, 2022), inquiries and CQC findings (Care Quality Commission (CQC), 2022) have reinforced long-standing concerns about safety on mental health wards (Albutt et al., 2021; Thibaut et al., 2019). Organisational priorities are oriented towards preventing or managing auditable incidents of violence; but this overlooks the fact that patient priorities can be quite different, for example, may focus on whether they feel safe. Consequently, patient priorities may be ignored or unknown (Berzins et al., 2020). Patient input enhances planning to improve ward safety (Mjøsund et al., 2017) and patients should be involved actively and meaningfully (Berzins et al., 2020).

Safety incidents can arise from tensions in the milieu of a mental health ward (Mahoney et al., 2009; Thibeault et al., 2010), so improving the milieu may improve safety (Magnowski & Cleveland, 2019). Staff may not always be sensitive to nuances in the milieu (Mjøsund et al., 2017). The therapeutic potential of the milieu therefore depends in part on the quality of communications between patients and staff (McKeown et al., 2020).

As a result of the way staff relate to them, patients have reported feelings of being 'othered' (Maccallum, 2002); excluded (Bowers et al., 2010); unheard (Berzins et al., 2020); unvalidated (Eriksen et al., 2012); incapable of recovery (Weight & Kendal, 2013) and disempowered (Newbigging et al., 2015). Such experiences do not contribute to a therapeutic ward experience (Jansen et al., 2019).

Appropriate technological innovations can assist effective communication in contexts of mental health (Brimblecombe et al., 2019) and safety monitoring (Flott et al., 2021).

2.1 | The WardSonar patient safety monitoring tool

WardSonar was conceptualised and developed in the United Kingdom from comprehensive collaborations with stakeholders (mental health inpatients, carers, mental health staff, service user networks and experts by experience who were co-applicants) and technical developers. Subsequently, the WardSonar safety monitoring tool was produced and refined by technical developers and co-design specialists in consultation with stakeholders, using a collaborative, human-centred and sprint-based/agile approach (Cooke, 2016). We used pre-existing links with local Patient and Public Involvement and Engagement networks, participating NHS Trusts and service user and staff contacts to facilitate participation. Cycles of co-design activities included workshops and attendance at service user forums, in addition to opportunistic discussions with health professionals at one NHS Trust. The technical developers

provided support during the course of the study reported here. The design and development processes are reported elsewhere (report in preparation).

2.1.1 | User interface

The above conceptual work resulted in the WardSonar monitoring tool in the form of a web app. The user interface had two components: a patient interface accessed through a tablet computer; and a staff dashboard designed for a tablet or desktop computer.

To collect patient safety perspectives, nurses and healthcare workers invited individual patients to record their real-time perceptions of the ward milieu via the web app. Patient reports were anonymised at the point of entry. The patient interface comprised a series of three screens based on a weather analogy, in which the word 'atmosphere' represented an in-the-moment impression of ward milieu. The first screen asked, 'How does the ward atmosphere feel right now?' The patient could choose one option from, 'Very calm', 'Calm', 'Neither calm nor stormy', 'Stormy' or 'Very stormy'. The second screen asked, 'Which direction is it going in?' and offered three options: 'It's getting worse', 'It's the same' and 'It's getting better'. The third screen asked, 'What is contributing to that feeling?', and offered four options: 'The ward environment', 'The staff', 'The other patients' and 'How I'm feeling'. There was also space for optional free text.

Staff could access aggregated patient reports, for their ward only, via the staff dashboard. The dashboard conveyed patients' collective real-time feeling about the ward. Staff could use this to inform appropriate and timely safety interventions, such as de-escalation (Haefner et al., 2021). The dashboard information was structured to be used as a safety resource in staff meetings such as handovers (Poh et al., 2013) and safety huddles (Improvement Academy, 2016).

2.2 | Study aim

The aim of this study reported here was to explore the feasibility and acceptability of a patient-focused, proactive, safety monitoring tool to improve patient safety on acute mental health wards, through the collection of daily data about the patients' perceptions of safety.

3 | METHODS

3.1 | Design

Exploration of feasibility and acceptability through qualitative interviews and focused ethnographic observations, informed by Proctor et al. (2010).

3.2 | Ethical approval

The research protocol stipulated that if the field researchers observed apparently unethical or poor practice, they would in the first instance to discuss the concern/s confidentially with the Chief Investigator and the research team (if appropriate), and the Chief Investigator would make a decision about further action that may be required, such as bringing the concern to the attention of the Director of Research at the participating Trust.

This study received ethical approval in November 2021 (East Midlands—Nottingham 2 Research Ethics Committee, reference: 21/EM/0247). Patients who used the app consented to participate in that aspect of the research via the app. Patients who participated in interviews were offered a shopping voucher as a thank you gift.

3.3 | Setting and participants

Two NHS Trusts in England each selected two adult acute mental health and one adult psychiatric intensive care unit (PICU), that is, six wards participated in total.

3.4 | Procedure

Prior to commencing the study, the research team met with Ward Managers on the participating wards to explain the tool's purpose and how to use it. On commencement of the study, each Ward Manager took charge of two customised tablet computers ('devices') loaded with the WardSonar web app. Ward Managers agreed that ward staff would take the devices around to patients, optimally three times per day, so that patients could enter real-time safety perspectives. The process was that staff brought the app to the patients and waited while they used it.

The national context of COVID-19 included systemic delays, interruptions and COVID-19 outbreaks on some wards. Hence, study duration overall was January–May 2022, but duration on each site was 14 weeks, consisting of a 4-week baseline period for setting up and collecting pre-study data, followed by 10 weeks of implementation. Figure 1 illustrates the study timeline.

Two researchers (R1 and R2) with psychology backgrounds were each allocated to one of the NHS Trusts for fieldwork. They conducted observations using a focused ethnography method suitable for relatively short studies (Cruz & Higginbottom, 2013). Observations took place in each ward on two occasions for 3–6 hours at three time points: Weeks 4, 6 and 9 (Figure 1). Detailed fieldnotes were taken.

R1 and R2 also conducted semi-structured qualitative interviews with patients and staff to elicit their views on the tool. Interview participation was voluntary and subject to written and verbal consent and interviewees could withdraw from the

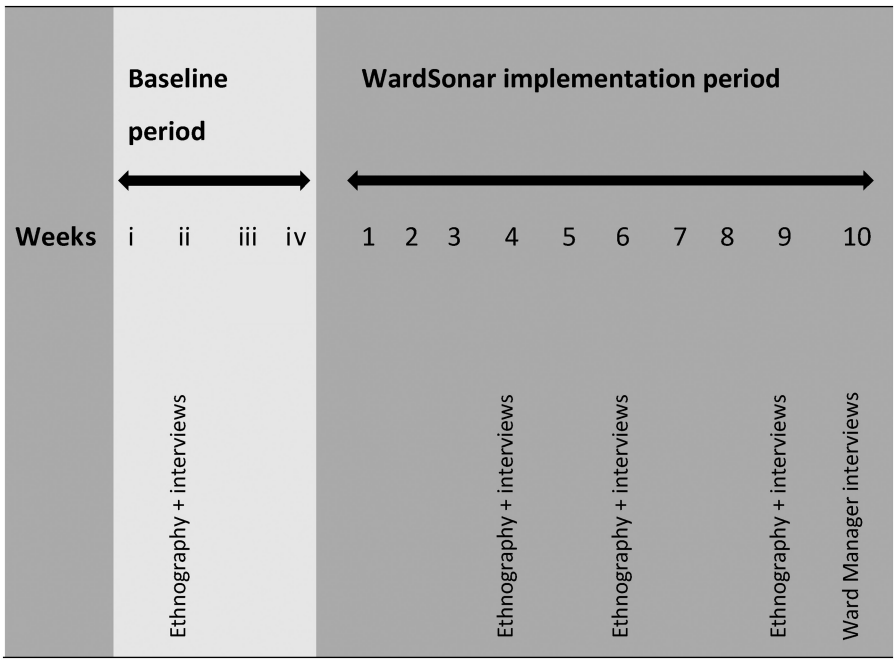

FIGURE 1 WardSonar study timeline.

PATIENT INTERVIEW TOPIC GUIDE (PROMPT FOR OPEN QUESTIONS)
How often have you been invited to use the WardSonar device?
Over what sort of time period?
What time of day?
Did staff explain it at all, when they asked you to take part?
Did you find it easy or difficult to answer the questions?
When you completed the survey, did it change the way that you felt about the ward in any way?
Do you have any ideas about how we can improve the tool?
STAFF INTERVIEW TOPIC GUIDE (PROMPT FOR OPEN QUESTIONS)
How long have you been using WardSonar?
Have you administered it to patients? (If yes, how have they responded?)
How was this process?
Barriers and enablers
Future implementation
In what ways have you used the information? (To manage safety? Can you expand?)
Timings and forums
Consequences of the data being available visually
How could WardSonar be improved? (questions or usage)
The dashboard
The process

FIGURE 2 Topic guide illustrating the scope of patient and staff interviews.

interview at any time. Figure 2 illustrates the interview topic guide. Interviewers asked open questions, using the topic guide as a prompt.

R1 and R2 could approach staff directly for interview but the protocol for patient interviews required staff to suggest individual patients with capacity to consent. At the end of the implementation period, Ward Managers were specifically targeted for interviews because their role gave them particular insights into how the study was received on the ward.

Interviews were recorded, anonymised and transcribed. Observation fieldnotes were cleaned to remove identifiers, converted into audio files and transcribed. All transcripts were imported into an NVivo 12+ project (QSR International, 2020) to support data management, retain links to source data during analysis and to facilitate within- and between-case exploration of the data (Ritchie & Spencer, 2002). In addition, the number of patient reports completed per ward was collected automatically via the tool. Data management was consistent with relevant protocols.

The range of data types enabled us to consider the feasibility and acceptability of our research methods, for example, whether we could collect sufficient data to evaluate the tool, as well as the feasibility and acceptability of the WardSonar tool itself.

3.5 | Analysis

R1 and R2 met frequently with other research team members during the study so that data interpretation could commence and further data collection could be responsive to questions suggested by the data (Hallberg, 2006).

We applied a pen portrait analytic process to the data. This is an emerging method in health services research (Sheard & Marsh, 2019). Pen portraits are particularly useful when researchers are working with multi-dimensional data sets with the aim of understanding processes within a healthcare setting (Sheard & Marsh, 2019). Our analysis was also informed by well-established principles for thematic analysis of qualitative data (Braun & Clarke, 2022).

Sheard and Marsh (2019) proposed a set of theoretically derived pen portrait guidelines which offer a structure, potentially tabulated, for consistent synthesis and reporting via succinct chronological accounts of what happened and what it means. We explored alternatives regarding structure, focus and length before developing a final format suited to this study.

We generated a tabulated pen portrait of approximately 1000 words for each of the six wards (sites). Guided by the methodological literature (Fram, 2013), we then added a further level of analysis. We created a second NVivo project (QSR International, 2020) to systematically compare each portrait with the other five, using a revised coding scheme and NVivo sets (i.e. smart data categories) to look within and between sites. We used this to produce a single, synthesised, succinct pen portrait that represents the key findings across the data.

4 | FINDINGS

Identifying details have been removed or replaced.

4.1 | Description of the data

The data set is summarised in Table 1. Two wards were all-female; one was all-male; two were mixed and one changed from mixed to all-male during the course of the study. The number of beds per ward ranged from 12 to 21, though the impact of COVID-19 meant that ward populations were unpredictable.

In total, 602 patient reports were recorded. R1 and R2 conducted 67 interviews and 39 observations. Each observation lasted at least 3 h and total observation was 145.45 h. Interview duration depended on each interviewee's (patient or staff) preference and availability. Patient interviews ($N = 34$) ranged from 5 to 15 min (mean 7.8 min).

TABLE 1 Summary of data set.

Hospital ward NHS Trust	Apple NHS Trust 1		Bramble NHS Trust 2	Cherry NHS Trust 1		Damson NHS Trust 2		Elderflower NHS Trust 1	Fir NHS Trust 2		Total
	Acute		Acute	PICU		PICU		Acute[a]	Acute		
Ward profile	F		M	M + F		M + F			F		
Data source											
Patient reports	67		45	216		105		58	111		602
Observations	8		5	8		5		8	5		39
Patient interviews	5		3	7		3		9	7		34
Staff interviews	5		5	7		6		5	5		33
All interviews	10		8	14		9		14	12		67

[a]Three weeks into the implementation period the ward change from being mixed to all male as a result of Covid-19 reconfiguration.

Staff interviews ($N = 33$) ranged from 4 to 12 min (mean 8.3 min). Mean interview duration was 8.3 min (staff) and 7.8 min (patients).

4.2 | Synthesis

The pen portrait in Table 2 synthesises feasibility and acceptability findings across the six wards. A sample pen portrait from one ward is available in the Appendix S1.

4.3 | Factors affecting feasibility and acceptability

We did not find notable differences between factors affecting patient or staff engagement with the research as distinct from engagement with the WardSonar tool. In relation to both the research and the tool, staff talked about the impact of COVID-19, lack of communication and understanding about WardSonar and practical barriers such as being unable to locate the device charger. Field researchers noted interpersonal dynamics on the wards that seemed relevant. For example, they encountered difficulties engaging with some staff, which may reflect staff ambivalence towards the research study.

Although R1 and R2 routinely promoted use of the devices amongst staff, they were not directly involved in encouraging patients to participate. Fluctuations in dashboard completion numbers (Table 1) suggest inconsistent engagement with the study between wards and over time.

4.3.1 | Practical barriers

Practical barriers to using WardSonar included uncharged (low battery) or missing devices and software update requirements. On rare occasions, the dashboard data could not be accessed due to a technical glitch, that was resolved by the software developers. Ward Managers were concerned about protecting the tablet computers from damage or theft and sometimes locked them away in their offices, with the result that they were occasionally out of use and could be hard to locate. The latter issue was an obstacle for the field researchers when they wanted to demonstrate the staff dashboard in order to explain the rationale and potential benefits of using the tool.

4.3.2 | The impact of COVID-19 on data collection

Data collection occurred during a major spike in infections (a third COVID-19 wave). COVID-19 infection control measures on mental health wards imposed significant restrictions on the use of space, for instance, group activities and communal eating were liable to be curtailed or cancelled and areas of wards were quarantined, with detrimental effects on patients and staff (Care Quality Commission (CQC), 2022). The field researchers were required to wear personal protective equipment. They noted that their face masks were a barrier to informal social interactions which might have promoted the study, and their scrubs meant they looked like staff, causing unhelpful confusion for both staff and patients.

Ward Managers pointed to the high proportion of temporary staff, shift patterns, disrupted routines and general busyness as factors affecting use of the devices. Normal admission patterns were disrupted during the pandemic. Admission numbers and ward capacity could fluctuate rapidly. Low patient numbers meant fewer patients to use the devices and/or be interviewed. Furthermore, during admission peaks, there were high proportions of individuals who were extremely unwell and potentially not available to engage with the study, which also impacted on opportunities for data collection.

4.3.3 | Communication about WardSonar

All Ward Managers highlighted efforts they had made to support the study. They emphasised how the process of adopting WardSonar was complicated by staff communication challenges, for example, verbal messages shared during the day might not reach night staff. One also suggested that top-down messaging was not an effective means of enthusing staff about WardSonar:

> Sometimes, when it comes from just a manager, 'it's just another thing we have to do'.
>
> Ward Manager interview, week 9, Bramble ward.

4.3.4 | Low understanding about WardSonar functionality

During WardSonar's development, staff had advised that the aggregated dashboard information would be most useful in staff meetings (e.g. handovers or huddles); however, there was no evidence that teams were referring to the information during meetings. Ward Managers stated that staff needed to perceive tangible benefits from WardSonar before they would embed use of the tool in ward routines; yet, many staff seemed unaware that they could use the staff dashboard data to inform proactive safety interventions. When R1 or R2 had opportunities to demonstrate the dashboard, staff usually seemed surprised and reacted favourably, for example:

> Staff: I didn't even know…you could see [the patient data]in that context…I just thought it was just, do this, and then I thought the data was for you to look at, rather than for us to look at…
>
> Interviewer: So do you think it would be useful to see the data about the, kind of, tension on the ward, from the patients' perceptions?

TABLE 2 Synthesised account of feasibility and acceptability across six wards.

Changes over time	Insights into feasibility and acceptability
Baseline/Context	• COVID restrictions: Patients cannot go off the ward, facilities are reduced and routines disrupted. • Researchers R1 and R2 are required to stay in the communal areas of the ward while conducting observations. Staff keep mainly to the office and patients keep mainly to their rooms. • Staff are tired, wards busy. Researchers note alarms going off frequently, lots of staff movement (i.e. an unsettled feeling), tensions and some instances of dismissive behaviour from staff towards them and/or patients. • When restrictions combine with a spell of hot weather, R1 and R2 note a stifling atmosphere.
Week 4	• Device use not incorporated into ward routines and seems to rely on presence and encouragement of Ward Manager, for example, staff may not use device unless Ward Manager actively requests it. • R1 struggles to find people (staff or patients) to interview. She reflects, 'This might have something to do with …the Ward Manager, not being present'. (R1 fieldnotes, Apple ward). • Patients broadly supportive: o 'I felt it was like a way to let people know how I was feeling. And it was, like, an easy way'. (Patient, Apple ward) • There are some views that WardSonar is not particularly useful. o 'As it stands, I think, yeah, it's telling us what we already know' (Staff interview, Cherry ward). • Staff perspectives vary. Though typically being unfamiliar with staff dashboard, many staff are interested in the web app and positive about the user interface and design and the opportunity to engage with patients: o 'It's a way of almost having an engagement with them when they don't always feel like they're having to talk'. (Staff interview, Bramble ward) o 'It's definitely provided insight into how service users are feeling which is obviously always good, because it might not be something they'd want to tell us outright'. (Staff interview, Elm ward)
Week 6	• R2 notes that staff do not appear to know why she was on the ward and some are dismissive with her and with patients. • Researchers likely to find that the devices are not ready for staff to use, for example, needing a battery recharge or a software update, or the dashboard not working properly. • This week, there is some in-house training for staff in NHS Trust 2 on how to use the device. R2 notes that this seems quite late on in the study. • Ward atmosphere is volatile at times. A member of staff says: o 'I'm finding that, sometimes, because of the acuity of the ward, it's getting missed, and it's mainly because we don't want to be carrying a tablet round … some shifts, it can be a bit of a hindrance'. (Staff interview, Bramble ward) • Staff describe the realities of collecting patients' perspectives on the device and R2 learns that staff may be completing the reports themselves: o '[A member of staff says that] patients on PICU wards don't always fill out the device, they decline to do most things anyway, so to do this was a big ask. She also said how staff had been completing the questions instead. I did say that it's just for patients…' (R2 fieldnotes, Damson ward) • Staffing levels can be low, for example: o 'The nurse in charge said that there are only five members of staff on the ward today, and there are meant to be double this'. (R1 Fieldnotes, Elderflower ward) • Sometimes there are high proportions of agency staff, and these are not familiar with the device.
Week 9	• Many staff seem in principle to be open to using device, but without having a clear understanding of what it is for. • Two staff on different wards (Cherry and Damson) mention they have used the tool themselves, that is, entered their own perceptions of the atmosphere. • Some staff express doubts about how the collected data can be useful—however, the dashboards are rarely accessed so they are unlikely to be seeing the aggregated information. • Additional difficulties accessing the devices prevent the researchers from demonstrating how to use the dashboard: Devices might be locked away 'just to try and be a bit safer with it' (Ward Manager, Apple ward). o 'We did get asked [to use the device] quite a lot [a few weeks ago] but it's just completely stopped now…When the staffing got really bad' (Patient interview, Apple ward). • COVID-19 outbreak in one ward creates major disruption to use of space and shifts staff priorities, affecting opportunities for data collection.
End of study ward manager interview	• There is a general interest in the device as a conversation prompt, but Ward Managers do not necessarily demonstrate a good understanding of the dashboard data. o 'I'll be honest with you, I haven't done any of [the dashboard]… it is useful, but apologies that I forgot that it was on the device'. (Ward Manager interview, Fir ward) o 'I genuinely thought that it might spark more conversations' (Ward Manager interview, Cherry ward) o 'R2: Have you been able to use [the dashboard data] in any meetings or any handovers?' o 'Ward Manager: I haven't so far…' (Ward Manager interview, Damson ward) • General busyness and staffing difficulties affect resumption of pre-COVID routines as well as adoption of the technology. o For a week we had COVID-19 on the ward, so it was really busy …we've had an influx of admissions and within those admissions, we've had quite a few poorly people. During that 2-week period, we had two serious assaults on the ward…So, there was possibly a week and a half, 2 weeks period where we've not completed any. (Ward Manager interview, Fir ward) o 'We still haven't started the safety huddles again' (Ward Manager interview, Elderflower ward) o 'I know I showed quite a few [staff] the staff dashboard. I don't know how many people checked it regularly but they did find it interesting when I pointed it out to them…A lot of the patients really valued being asked about their thoughts on things…[We had] a lot more conversations about patients being involved and that sort of thing, which was really good'. (Ward Manager interview, Elderflower ward) • All Ward Managers describe difficulties encouraging staff to engage with the study and emphasise importance of embedding use of the device in daily routines.

> Staff: Yeah, definitely, it would. Because you're not expected to have…because you often don't, you don't really get that, as a collective. You just get, like, the individuals, not to see it as a whole. I think it would be good.
>
> Staff interview, Cherry Ward, Week 4.

The example above is from Cherry, a PICU ward. However, PICU staff tended to express that they did not need such information, as they were sensitive to the ward atmosphere and conducted frequent assessments of patients' mental state.

> I think [staff] don't obviously see the utility in it, given they feel that they are used to or already privy to whether people feel safe or not on the ward. Because I think the nature of how we work on a PICU, in particular, is everybody is seen in review, every single day by at least a doctor and a nurse and often by more people.
>
> Ward Manager post-intervention interview, Cherry Ward.

4.3.5 | Context of ward culture

The field researchers reported some instances when staff behaved in a dismissive manner towards them and/or patients. There were also some suggestions that staff could be dismissive of patient perceptions, for example, describing it as 'daft stuff' (Staff interview, Damson ward, week 6) or pointing out that problems perceived by a patient could be due to their illness rather than tensions on the ward.

> If somebody's got schizophrenia, they're going to hear voices, you know. Or they could be hallucinating, you don't know.
>
> Staff interview, Damson ward, week 9.

The quotation below illustrates a dynamic that could potentially deter patients from reporting ward issues.

> A patient keeps asking who is on tomorrow. And when the nurse names the member of staff who will be working on the following day, the patient says, oh, I don't like [Name], and refers to them as Rottweiler. The nurse just says that all staff members are nice, and then the service user says, no, they are not.
>
> Observer fieldnotes, pre-implementation period, Elm ward.

Many interviewees said that staff were supportive to patients and had good relationships with them. Some patients pointed out that it was other patients who made the ward feel unsafe.

> One of the questions [on the device] was, who makes the ward calm or noisy, and my answer was, which was true, it depends on the patients, because if the patients are calm, the staff are calm. If the patients are not calm, the staff is moving, running helter skelter.
>
> Patient, Elm ward, week 6.

5 | DISCUSSION

This study aimed to explore the feasibility and acceptability of a patient-focused, proactive, safety monitoring tool to improve patient safety on acute mental health wards, through the collection of daily data about the patients' perceptions of safety. In this discussion, we reflect on the study methods as well as the WardSonar tool, with a view to further evaluation of the tool in future research.

5.1 | Reflection on methods

The use of focused ethnography and observations, though challenging at times, seemed to fit the context and generated rich data. Pen portraits were a useful mechanism for pulling several data sources together (i.e. field notes, interviews and ward profiles) and conducting a first-level data analysis. This was particularly relevant because like other research conducted during the COVID-19 pandemic (Mitchell, 2021), the study had been subject to many delays and interruptions that interfered with a smooth process. Synthesising the six pen portraits enabled us to create a single, concise account of the evidence concerning feasibility and acceptability across the sites.

One possible moderator of data collection was staff gatekeeping (Bell et al., 2020). Staff in healthcare settings may fear overburdening vulnerable patients, or have paternalistic attitudes such as an assumption that patients would not want to talk about the issue in question (Kars et al., 2016). As patients in our study could participate by using the monitoring tool and/or being interviewed, gatekeeping could apply to both activities. Another potential challenge is staff's personal perceptions of whether patients were eligible to participate, regardless of the study criteria. There may also be doubts about the value of the specific study; a general reticence towards research, especially from dominant team members; and a perception that research activity is a low priority for the organisation and/or cannot fit into a normal working day (Bell et al., 2020). Future WardSonar testing could consider how to monitor and/or mitigate the effect of staff gatekeeping on data collection.

5.2 | Stakeholder involvement

The broad approval given to the user interfaces (patient screens and staff dashboard) suggest that we gained clear and direct benefits from involving stakeholders in our research. Co-production is an important component of digital transformation in patient safety

research (Flott et al., 2021). The views of mental health patients can be undervalued or marginalised, irrespective of policies and principles governing research. Lay expertise is recognised as valuable and relevant (Berzins et al., 2020) and in some contexts is a mandatory element of a research funding application, yet it can be tokenistic: for example, it has been suggested that the main influence of lay expert groups is to help secure funding applications (Jackson et al., 2020).

A point consistently raised by patients in our study was that staff did not spend enough time with them to know what they were experiencing. McKeown et al. (2019) draws on theories of institutionalisation and power to explain the 'othering' (Maccallum, 2002) of patients on mental health wards, arguing that staff reluctance to engage with patients is broadly driven by the cultural norms in which they work. Qualified staff use favourite narratives, for example, about staffing issues, risks from patients and onerous administrative tasks, to explain why they spend much of their time in staff-only spaces such as the staff room (McKeown et al., 2019).

5.3 | Feasibility and acceptability

5.3.1 | Study context

The immediate context for WardSonar was the aftershock of the COVID-19 pandemic, but acute adult inpatient mental health services in the UK NHS were experiencing long-standing pressures and repeated safety concerns before this study (Thibaut et al., 2019). Therefore, the new conditions of the pandemic were layered on top of chronic difficulties. Everyday routines of inpatient care were disrupted, affecting patients (Szmulewicz et al., 2021) and staff (Galanis et al., 2021). Mental health staff who worked through the pandemic were exposed to exacerbation of familiar stressors plus many new ones, such as making moral choices about whether to remove personal protective equipment in order to appear more reassuring to patients (Liberati et al., 2021).

Pre-pandemic research identified the designation of ward spaces that are out of bounds to patients, such as the staff office, as a common but unhelpful feature of the ward milieu (McKeown et al., 2020). Similarly, in this study, researchers found it challenging to communicate with staff and patients or observe ward communications, because they were required to stay largely in the communal ward areas, which at the time were rarely used.

5.3.2 | Leadership

At its most basic, WardSonar was a mechanism for collecting real-time data that relied on staff behaviours, that is, patients could only enter data into the tool if staff brought a device to them. Given the influence of Ward Managers in setting local agendas, the success of the study seemed to rely on their support on each ward. According to the observation field notes reported above, Ward Managers appeared to set a tone for how ward staff received and responded to the study. This in turn may have affected how available and motivated staff were in facilitating interviews with patients or being interviewed themselves. This finding is consistent with findings from previous research (Damianopoulos et al., 2022).

Furthermore, it has been reported that during the pandemic, there were high levels of anxiety among Ward Managers (Middleton et al., 2021). This may have been detrimental to effective leadership practices, such as good communication within nursing teams (Amos et al., 2005) and may perhaps have been a factor in the slow spread of information to staff about the WardSonar tool. In addition, issues within ward leadership may have inadvertently cultivated unhelpful power dynamics such as those noted in the ethnographic observations (see Table 2, week 6). Such dynamics can make patients feel unsafe and can cause harm by exposing them to staff who are experiencing job dissatisfaction and burnout (Maccallum, 2002).

5.3.3 | Barriers to adopting innovations in healthcare settings

Previous research has identified challenges to innovation in healthcare settings, including: burnout (Laker et al., 2019), staff resourcing (Cowie et al., 2020), lack of technology training (Umstead et al., 2021) and ineffective leadership (Strudwick et al., 2019).

In our study, Ward Managers attributed inconsistent staff engagement to a pandemic-related exacerbation of patient acuity, issues with staffing and low staff motivation. According to recent studies, these latter factors seem to be interdependent (Gemine et al., 2021; Liberati et al., 2021). Appropriately skilled and supported staff are needed to improve staff working conditions and quality of care on mental health wards (NHS England, 2021). Potentially, adoption of WardSonar may more easily be achieved in a ward where staff feel they have the energy to be personally invested in promoting a therapeutic milieu (Mahoney et al., 2009). Therefore, exhausted staff may be part of change resistance on acute mental health wards (Laker et al., 2020).

There are health professional norms around resisting research studies and innovations in the work setting (Damianopoulos et al., 2022; Laker et al., 2020; NHS England, 2022). NHS strategy encourages healthcare providers to support research, but staff's capacity to be involved is a recognised barrier (NHS England, 2022) and was noted in this study. Furthermore, hospital staff may be disinclined to change their working practices: One study found that doctors did not use their iPads to help explain matters to patients on a ward round, despite both patients and doctors recognising the value of doing this (Baysari et al., 2014).

Innovations that promote the voice of patients may encounter additional barriers. Hospital staff have articulated tensions between the theory and practice of patient involvement, relating to their concerns about the safety implications of sharing power and decision-making (Oxelmark et al., 2018). Previously noted barriers to embracing technical innovation in a hospital may include poor

understanding of its purpose, and technical issues—both of which were highlighted in this study; as well as lack of customisation (Tariq et al., 2018).

5.4 | Factors affecting motivation to engage with WardSonar

Figure 3 summarises factors influencing motivation to engage with WardSonar. In identifying noticeable differences between what motivates staff (Cowie et al., 2020; Laker et al., 2019) and patients (Berzins et al., 2020; Care Quality Commission (CQC), 2022), our findings support evidence from previous studies.

5.5 | Strengths and limitations

This study demonstrated that patient involvement in safety research is feasible and acceptable, appreciated by patients and that WardSonar can be implemented and perceived as useful in a range of acute adult mental health wards. These findings add to knowledge and can inform further testing of the specific technology. WardSonar was implemented in all six wards, but as yet, we cannot report on its sustainability.

Stakeholder influence on WardSonar development appeared to benefit the design of the tool; equally, the decision to provide staff, rather than patients, with the WardSonar web app, came out of extensive discussions with stakeholders but may be a limitation within the study.

Self-evidently, the data may not represent views of individuals who were not interviewed (Milliken et al., 2003). This is a concern, as those most acutely unwell or vulnerable are often excluded from studies. The study duration excluded an extended longitudinal ethnography, but the application of focused ethnography seemed to suit the context.

The tool was not used by ward staff as intended, that is, to inform ward safety huddles or similar meetings, therefore, this study reports only that staff did not use these data.

Findings should be also interpreted with caution because patients are vulnerable and may 'regard being asked about care as an occasion to show gratitude rather than appear critical' (Salmon & Young, 2018, p. 1516).

The challenges for ward-based research that would be expected pre-pandemic were amplified by the impact of COVID-19 on acute mental health wards (Gemine et al., 2021). The findings should be viewed in that light. WardSonar as described here is a prototype, and its impact on ward safety is not reported.

6 | CONCLUSION

The WardSonar tool was implemented and evaluated in a real-world setting, and within the limitations of the data, appeared to be feasible and largely acceptable, particularly from the patient perspective. The findings reported here highlight patients' willingness to use new technology and be actively involved in improving ward safety, despite the adverse circumstances of the time. The favourable response to the design of the user interface, and the fact that the tool

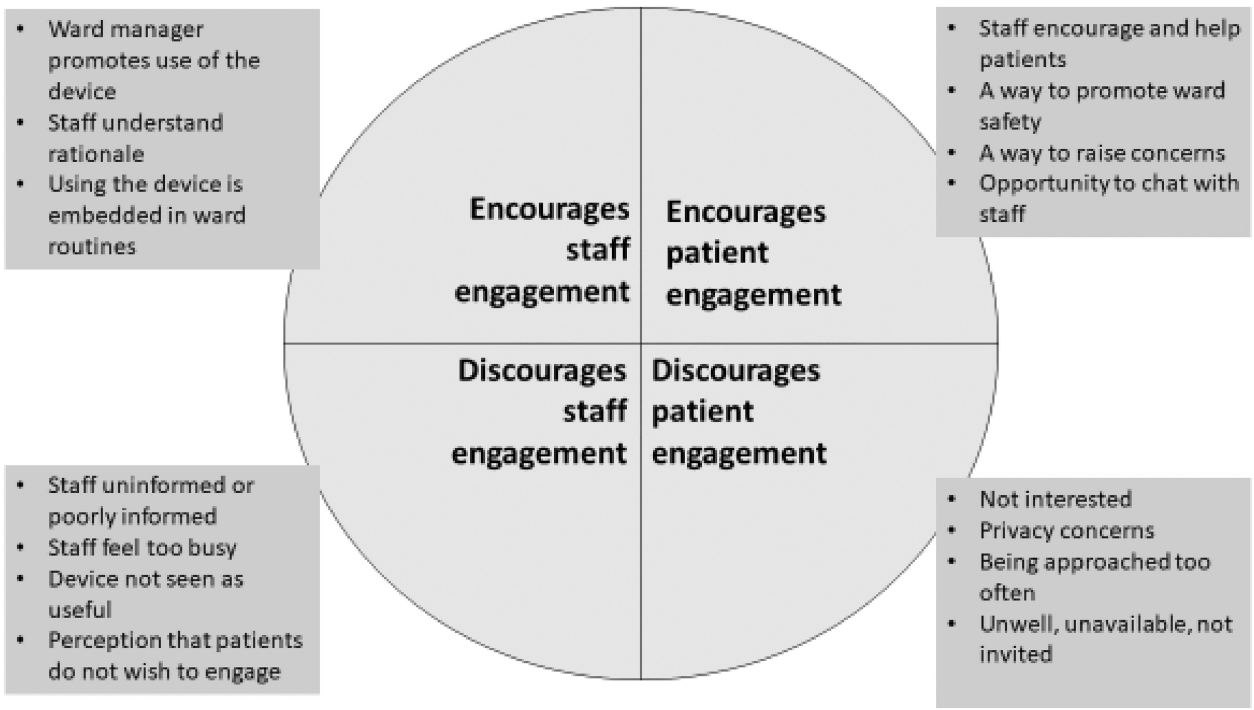

FIGURE 3 Factors affecting patient and staff motivation to engage with WardSonar.

worked with minimal hitches on the ward, suggests that including stakeholders in the design processes was a key component of the project.

The findings highlight patients' motivation and capacity for engaging in safety research, and the more ambivalent response of staff. This has several possible implications. It may be feasible to influence staff motivation; for example, a future trial could ensure staff have a good level of understanding about the tool and are confident to use it. Staff motivation to engage with WardSonar could be also encouraged if they can see their colleagues in leadership roles are positive about and engaged with the study. Finally, a perception that using the device will benefit patients, and/or staff, and/or enhance ward safety, seems to be a strong motivator and may help to address staff gatekeeping.

A future trial of WardSonar could explore its impact when wards are more settled, with the aim of collecting and using real-time data on acute mental health wards that lead to the deployment of safety interventions to improve ward milieu.

7 | RELEVANCE STATEMENT

Acute mental health wards are unsafe. Nursing research into promoting safety is scarce. This study introduced a real-time, digital, patient-focused, safety-monitoring tool into adult acute mental health wards. Qualitative evaluation suggests that patients were broadly enthusiastic about the tool's potential. However, some staff did not consider it useful and the digital tool was not fully used. Prompting patients to discuss their perception of safety may be beneficial to patients and ward safety. Staff need to reflect that patient perceptions about safety may be different from their own perceptions. Staff may need additional support with technology to enable maximum benefit.

AUTHOR CONTRIBUTIONS

Sarah Kendal contributed to analysis and prepared the article. Gemma Louch contributed to all aspects of the study and reviewed the article. Lauren Walker provided lived experience advice and reviewed the article. Saba Shafiq and Daisy Halligan contributed to data collection and reviewed the article. Lyn Brierley-Jones contributed to data collection and analysis and reviewed the article. John Baker led and contributed to all aspects of the study and reviewed the article.

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CONFLICT OF INTEREST STATEMENT

John Baker: Selection Committee Chair for the HEE/NIHR ICA Programme from March 2022, committee member of NIHR Advanced Fellowship panel until July 2022. Chris Bojke: Committee member of NIHR HS&DR funding panel up to 30th September 2021.

DATA AVAILABILITY STATEMENT

All data requests should be submitted to the corresponding author for consideration. Access to anonymised data may be granted following review.

ETHICS STATEMENT

The study received ethical approval in November 2021 from East Midlands-Nottingham 2 Research Ethics Committee (IRAS project ID: 300833; REC reference: 21/EM/0247).

PATIENT CONSENT STATEMENT

All participants provided written informed consent.

ORCID

Sarah Kendal https://orcid.org/0000-0001-8557-5716
Gemma Louch https://orcid.org/0000-0001-6946-3693
Lauren Walker https://orcid.org/0000-0003-2459-7860
Saba Shafiq https://orcid.org/0000-0001-5506-8692
Daisy Halligan https://orcid.org/0000-0003-0354-759X
John Baker https://orcid.org/0000-0001-9985-9875

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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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