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Published

2025

Journal Title

International Emergency Nursing

Version

Version of Record (VoR)

DOI

10.1016/j.ienj.2025.101692

International Emergency Nursing 83 (2025) 101692

Contents lists available at ScienceDirect

International Emergency Nursing

journal homepage: www.elsevier.com/locate/aaen

Original Research

Using virtual reality to enhance procedure-related experiences in adult emergency departments: A qualitative study

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ARTICLE INFO

Keywords:
Virtual reality
Technology
Emergency department
Anxiety
Needle phobia
Procedural pain
Qualitative research

ABSTRACT

Introduction: Needle phobia is a common issue affecting many patients in emergency departments (EDs), including adults. Virtual reality (VR) has rapidly advanced in recent years and is increasingly used in patient care. However, there is limited research exploring the subjective experiences of VR users in this context.
Aim: This study aims to explore the experiences of both patients and clinicians during painful needle-related procedures, as well as identify the barriers and facilitators associated with the use of VR to manage these procedures in ED.
Design: An exploratory qualitative study.
Method: The study was conducted in one adult ED in Australia in 2024. VR was used as an intervention to help manage needle phobia among adult patients with moderate or high anxiety levels. Semi-structured interviews were conducted with ten patients and seven ED clinicians. Thematic analysis was employed to analyse the data.
Findings: Overall, participants reported positive experiences with the innovative technology. Four themes developed from patient interviews included *Communication with clinicians; The influence of current and past experiences*; *The VR experience*; and *Considerations for VR implementation.* Three themes emerged from Clinician interviews including: *Communication with patients*; *The VR experience;* and *Considerations for VR implementation.*
Conclusion: This study offers valuable preliminary insight into VR experiences from both patient and clinician perspectives in the ED setting.
Implications: Clinicians and researchers should consider the identified barriers, facilitators, and potential solutions when incorporating VR interventions into their clinical practice and research.

1. Introduction

Emergency department (ED) is often a highly anxiety-inducing environment for patients, largely due to the sudden and urgent nature of their visits. Uncertainty about the cause or severity of their condition, fear of a serious diagnosis, and unmanaged pain can intensify emotional distress and anxiety [1,2]. The chaotic and noisy setting, combined with limited communication and brief, task-focused interactions with clinicians, further contributes to patients' feelings of vulnerability and loss of control [1,2].

Within this already stressful context, needle-related procedures—as one of the most common procedures in EDs—can further heighten patient anxiety. Procedures such as intravenous catheter insertion, local anesthesia administration, and wound suturing often provoke fear and discomfort [3]. Although needle phobia is frequently associated with children, many adults also experience significant needle-related anxiety well into adulthood [4,5], making these routine procedures an additional source of distress and anxiety in the ED.

Despite this, there is a lack of research to guide clinicians on effective interventions to reduce anxiety and fear during painful procedures among adult populations in the ED [6]. Given the clear impact of inadequate anxiety management on the overall patient experience and satisfaction during hospitalisation, there is a pressing need for effective anxiety management strategies and interventions [7].

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https://doi.org/10.1016/j.ienj.2025.101692
Received 8 November 2024; Received in revised form 11 July 2025; Accepted 20 September 2025
Available online 1 October 2025

Virtual reality (VR) is a leading form of digital immersive technology that has seen widespread adoption in healthcare over the past decade. It refers to computer-generated, interactive virtual environments that allow users to engage in simulated real-life experiences [8]. VR can be fully immersive, using head-mounted displays, motion sensors, and audio feedback to create highly realistic environments, or semi-immersive, involving large screen projections with more limited interaction and tracking capabilities [8].

In healthcare, VR is commonly used for medical training and education, offering advantages such as enhanced realism, repeatability, better knowledge retention, and time efficiency [9–11]. A variety of VR applications support these goals, including simulations of technical procedures, team-based scenarios, de-escalation training, and anatomy education. Beyond education, VR is also used to manage pain and anxiety across different clinical settings, particularly in pediatrics, dental procedures, and perioperative environments [12,13]. Furthermore, VR is increasingly applied in therapeutic contexts, such as mental health treatment [14], and in patient education, where it helps individuals better understand their condition or engage in rehabilitation through interactive experiences [15,16].

VR has proven effective for managing pain and anxiety, particularly when used as a form of distraction therapy. By immersing users in engaging virtual environments, VR helps shift attention away from fear-inducing stimuli—such as those encountered during needle-related procedures—reducing discomfort and distress [10,11,15]. Unlike traditional distraction techniques, VR engage both visual and auditory senses, requiring more focused attention and offering a deeper sense of immersion. This multisensory experience enhances its effectiveness in lowering perceived pain and anxiety [15,16].

While most research is being conducted to explore the effectiveness of VR in medical applications [13,17,18], there is still a lack of studies examining the subjective experiences of VR users in clinical settings. Limited knowledge exists regarding its feasibility, acceptability, and the barriers and facilitators within hospital environments. These factors are crucial for determining the success of new technologies in being accepted and widely adopted within complex healthcare systems. Our study aims to (1) explore the experiences of patients and clinicians during painful needle-related procedures; and (2) identify the barriers and facilitators to using VR as a tool to manage these procedures in the ED setting.

2. Methods

This single-site, exploratory qualitative study was conducted as a part of a pilot randomised control trial. The study followed the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist [19] and received approval from both the Metro South Human Ethics Committee (HREC/2023/QMS/97902) and university Human Ethics Committees (Griffith University 2023/576; Queensland University of Technology 7507-HE26).

2.1. Settings, participants and recruitment

Interviews were conducted at a metropolitan ED in Southeast Queensland, Australia, between April and July 2024. The inclusion criteria comprised doctors and nurses who performed or assisted with needle-related procedures using VR in the VAS-ED trial [20] (trial registration number: ACTRN 12623000715673p), as well as patients in the intervention arm who were exposed to the VR intervention and provided informed consent. Exclusion criteria applied to individuals who did not participate in the VR trial, did not assist with needle-related procedures, or did not provide informed consent. Clinicians were recruited through emails, posters, or face-to-face by a Research Nurse. Purposive sampling was used to select clinicians and patients with varied experiences.

2.2. The trial and intervention

As outlined in our previously published trial protocol [20], eligible patients who provided informed consent were randomised to either the VR group—where they used a VR headset displaying calming scenes (e.g., ocean, winter landscape) during needle-related procedures—or the Standard Care group, which received no specific anxiety intervention as standard practice in the participating ED. VR content was delivered using the Oculus Quest 2 headset.

To familiarise patients with the device, the research nurse spent several minutes before the procedure explaining how to use the headset and controllers, addressing safety precautions and answering any questions until the participant felt comfortable. Patients were positioned in a single cubicle, either lying down or seated, while the VR headset was fitted. They were given the option to choose their preferred calming scenes based on personal preference. The duration of VR use depends on the length of the needle procedure and could be paused at any time upon the patient's request.

2.3. Data collection

Data were collected through semi-structured interviews using open-ended questions (see Supplementary File 1). Interviews were held either face-to-face or via Microsoft Teams or phone calls. Informed consent was obtained before the interviews. Interviews continued until the research team determined that sufficient information had been gathered to answer the research questions.

2.4. Data analysis

Interviews were transcribed using Microsoft Teams and revised by the research nurse and researcher (VB). Data were coded with NVivo 14 and analysed using an inductive thematic approach [21]. The analysis began with data familiarisation, followed by coding of the entire dataset. The codes were then reviewed to identify potential themes, which were refined through an iterative process until a clear understanding of the themes emerged. After initial coding by two researchers (VB and GX), one researcher (VB) analysed the remaining transcripts, with the second (GX) reviewing codes and themes until a consensus was reached.

2.5. Rigor

The trustworthiness and reliability of the findings were ensured through various strategies implemented during both data collection and analysis (Table 1). Dependability was supported by the involvement of researchers with qualitative expertise and the development of a codebook to guide data analysis. Two researchers (VB and GX) worked together to reach consensus on the main themes. Credibility was strengthened by having all interviews conducted by a single research nurse using a standardised interview guide to maintain consistency. Maximum variation sampling was employed to enhance the transferability of findings, and a sufficient number of interviews were conducted to ensure comprehensive data collection. All interviews were transcribed by an experienced ED research nurse and one ED researcher (VB) to ensure accuracy. Two researchers (VB and GX) independently analysed one transcript to trial the coding process, reached agreement on codes and themes, and then one researcher (VB) completed the coding of the remaining transcripts. The second researcher (GX) reviewed these, and a final consensus was achieved. Confirmability was supported by the clinical experience of both researchers (VB and GX) as senior ED nurses, which informed the study design and provided valuable insight into the challenges of managing patients with needle phobia in the ED setting.

Table 1
Strategies to maintain study rigor.

Rigor domains	Strategies
Dependability	• All researchers are experienced in qualitative research. • A codebook was created to guide the data analysis process, and consensus on the main themes was achieved among the research team (VB and GX).
Credibility	• To maintain consistency throughout the study, all interviews were conducted by a single research nurse using standardised interview guide questions [20]. • Maximum variation sampling was used to improve the transferability of the findings. • Comprehensive and detailed data were gathered through a sufficient number of interviews. • All recorded interviews were transcribed by an experienced emergency department (ED) research nurse and one ED researcher (VB) to enhance data rigour. • Two researchers (VB and GX) independently analysed one transcript to trial the coding and themes, reaching a consensus. Following this, one researcher (VB) independently coded the remaining transcripts. The codes and themes were then reviewed by the second researcher (GX), and consensus was reached.
Confirmability	• The clinical experience of two researchers (VB and GX) as senior ED nurses and their in-depth understanding of needle-related procedures in the ED environment impacted the design of the study and their perspectives on the challenges of managing patients with needle phobia in busy ED settings.

ED: emergency department.

3. Findings

3.1. Participant characteristics

Twelve patients (ages 19–60, average 43) and seven clinicians (three doctors, four nurses) participated in interviews. The majority of patients were female (n = 11), while most clinicians were male (n = 4). On average, clinicians had 3 years of ED experience and 6 years of experience performing needle-procedures. Most interviews with both patients and clinicians lasted approximately 20 min.

3.2. Patient interview findings

Four major themes, two with associated subthemes, were listed in Table 2.

3.2.1. Theme 1- communication with clinicians

Most participants felt that effective staff communication was key to reducing anxiety during needle-related procedures, regardless of VR use. Patients expect trust and respect from clinicians, with the intervention complementing, not replacing, the essential care and guidance clinicians provide about ED processes and treatment.

> 'It's the unknown, especially if you've been sitting there, you know, in the lurch, and you don't really understand what's happening'. (Pt 3)

Staff demeanour influenced participant anxiety levels. Clinicians who were perceived as more friendly and calm, and who did not rush the participant during these procedures, were preferred.

> 'Some doctors and nurses are…calming and make you feel better… but if they're like, oh, we just gotta get it done… that doesn't make us feel any better… because people don't like needles and it freaks you out even more when they're… gonna rush through it'. (Pt 4)

Participants expressed concern about procedures starting before they had enough time or information to understand them. Providing information beforehand was crucial in reducing anxiety.

> 'You don't know half the time that they're coming to do something until they're there with all their equipment, which immediately puts you on edge. For me it would definitely be better if they said, hey, our next step is going to be that we need a blood test or… we need to put [a] cannula in and… saying how do you feel about that?' (Pt 5)
> 'Information and like the ability to ask questions and process what's happening before they're just rushed in to do something'. (Pt 8)

3.2.2. Theme 2- The influence of current and past experiences

Most patients described other influential experiences that shaped the VR experience.

3.2.2.1. Subtheme 1- The ED experience. Participants experienced confusion, a lack of clarity, and a sense of powerlessness during these procedures, all exacerbated by the fast pace of the department. Their narratives depicted elevated levels of anxiety during their ED encounters.

> 'In itself is daunting… not knowing what the hell's going on in our situation or what we've done to ourselves… being in that whole emergency clinical situation where you don't really know what's going on'. (Pt 3)
> 'The problem is that emergency is emergency, and so everything's in a hurry. Everything's kind of you not knowing what's coming at you and when'. (Pt 5)

While participants valued medical assistance, they often felt fear and apprehension due to the nature and processes of the ED.

Table 2
Themes and subthemes derived from patient interviews.

PATIENT INTERVIEWS				
Themes	**Communication with clinicians**	**The influence of current and past experiences**	**The VR experience**	**Considerations for VR implementation**
Subthemes		1. The ED experience 2. Past experiences of procedures and associated emotions	1. Novelty 2. Time required for education and familiarisation 3. Difficulties 4. Effect on patient 5. Reduced anxiety during a later procedure	
CLINICIAN INTERVIEWS				
Themes	**Communication with patients**	**The VR experience**	**Considerations for VR implementation**	
Subthemes		1. Novelty and possibilities 2. Effect on patient	1. Barriers 2. Enablers 3. Potential uses for VR in ED	

VR: virtual reality.

3.2.2.2. Subtheme 2- past experiences of procedures and associated emotions. In addition to the ED environment influencing patients' expectations and emotions, they also recognised that previous negative experiences with procedures played a role in their current perceptions and influenced the effectiveness of the VR.

'It wouldn't matter how good that mask [VR goggle] was. It wasn't gonna help me because I had the memory of how bad it was last time, so that memory was stronger… I thought it was gonna be more painful than what it was.' (Pt 1)
'I'm just terrified of the damn things. It's… from past history. I know it is, but there's no way around it, and even though I know it's not rational, it doesn't make it go away.' (Pt 5)

It was important to consider that often participants arrived at the ED with past negative experiences, expecting pain and discomfort. These fears were heightened by uncertainty and the fast-paced environment, leaving them feeling uninformed.

3.2.3. Theme 3- The VR experience

The overall VR experience was found to be helpful, however, there were also challenges described related to the new experience, the hardware, and conflicting requirements for the use of the patient's hands.

3.2.3.1. Subtheme 1- Novelty. Most participants expressed genuine interest in and enthusiasm for engaging with the new intervention. It was seen as exciting and unusual with a high degree of novelty attracting them to participate.

'I was actually quite excited to see what was gonna happen.' (Pt 4)
'I was telling people about it afterwards…I tried this new thing today. It was so awesome.' (Pt 10)

Despite heightened levels of anxiety, the novel aspect of the intervention seemed to encourage participants to take part.

3.2.3.2. Subtheme 2- time required for education and familiarisation. Participants emphasised the need for adequate instruction and time to familiarise themselves with the intervention to fully benefit from the technology.

'So, while the technology is really great to use, if you've never used it before, it's another new thing on top of everything else. So that part of it was a little frustrating, but the nurse was really good at helping to explain it…' (Pt 5)
'It was just getting to know the controllers… it could be quite difficult for somebody else who's never used a VR headset before.' (Pt 2)

Most participants described struggling to navigate the intervention initially but eventually mastering its use. Dedicated time for familiarisation was seen to be essential.

3.2.3.3. Subtheme 3- difficulties. Participants faced challenges with the intervention, including some technical issues and, more commonly, difficulties using the controller while having a cannula placed.

'The music sort of undulated up and down. And when it got a little bit quiet, I was more aware of what was going on outside whereas when the volume went back up again, I got lost again in the [VR] world.' (Pt 5)
'I'm right-handed and…the cannula was…in my right hand and I found it hard [because] I'm not as coordinated with my left hand.' (Pt 4)

Some participants found the VR headset's full field of blocked view challenging, causing a sense of disconnection from clinicians and the external world. Maintaining a connection to the outside world was important for their experience.

'It can be quite claustrophobic…you're blacking out everything else around you.' (Pt 3)
'One negative was when the cannula was first going in. I like to see it for a bit and then look away. So, it was definitely a little bit unnerving…you can feel it going in, but you can't see it… there was a bit of a gap near my nose, so I was able to look a little bit…so I could know when it was coming.' (Pt 7)

Several participants also identified discomfort in relation to wearing the VR headset.

'You have to wear something heavy and tight on your head.' (Pt 11)
'The actual thing, it's… heavy and bulky and cumbersome.' (Pt 6)

Participants described several aspects of the intervention that could be modified to create a more comfortable experience for them.

3.2.3.4. Subtheme 4- effect on patient. Participants reported reduced anxiety with the VR intervention, attributing it to the distraction it provided during procedures, along with a decreased need for medication and analgesia.

'It was actually quite relaxing, like I honestly didn't even feel when they put the cannula in.' (Pt 2)
'I still felt like the pain and stuff, but it was a lot easier…mentally.' (Pt 11)
'Everybody thinks the only option is gonna be drugs, to either put you to sleep or numb you. But [the VR] did all that without you having those…. You're back to normal straight away, you can get behind the wheel of your car.' (Pt 1)

Participants generally had a positive experience. Ten of twelve rated the intervention's helpfulness (0–10), with eight scoring 9 or 10, and two scoring 7 or 8. The word cloud (Fig. 1) highlights key descriptors of their overall experience.

3.2.3.5. Subtheme 5- reduced anxiety during a later procedure. Not all participants had a second procedure after the VR intervention, but three who did noted that the initial VR experience helped reduce anxiety during the subsequent procedure, even without VR.

'I did keep thinking back to that [VR] field every time I got an injection. I kept thinking back to the bunny rabbits in the snow. So, it really helped…being able to use that thinking, OK, I'm in the virtual reality atmosphere now. I can just walk around and not think about it.' (Pt 10)
'I've had to have a cannula in, I've gotten quite used to it, so I think I'd be OK, now.' (Pt 9)

Given these participants described elevated levels of anxiety prior to their initial procedure, the reported anxiety reduction for their subsequent procedures is encouraging.

3.2.4. Theme 4- Considerations for VR implementation

Participants identified key barriers to future implementation, including funding, resources, and staff time to use the intervention.

'Funding is usually the problem.' (Pt 12)

Fig. 1. Word cloud of participants' overall summary of the VR experience.

'I guess timing, if you don't have time to use them.' (Pt 4)
'If there's only one or two [headsets] and you have a full emergency department, that would be pretty difficult to work around.' (Pt 2)

Effective communication was highlighted as crucial for informing patients about the intervention and offering the opportunity to use it, with several communication methods suggested.

'[The staff could] just float around the waiting room and show people… [There could be] videos and people that have used them playing in the waiting room for patients… [To identify that] this is a service we provide if you're interested.' (Pt 8)
'It could be something that's on a poster saying if you're feeling… nervous let us know.' (Pt 1)

Participants frequently suggested that the VR intervention could be used more broadly than for anxious adult patients and could potentially be used for different or more complex procedures.

'Any sort of procedure which they're anxious about.' (Pt 6)
'I don't think it should be just limited to people with anxiety.' (Pt 1)

Participants identified potential barriers, including funding, staff time, and resources. Effective communication of the intervention's availability to patients was emphasised, along with VR's potential for addressing various issues.

3.3. Clinician interview findings

Three themes, two with associated subthemes, were listed in Table 2.

3.3.1. Theme 1- communication with patients

Clinicians offered few insights into proactive strategies for reducing patient anxiety before procedures, with communication typically reactive after anxiety arose.

'You can sort of just read body language and sort of see how they are reacting to the cannula trolley coming over… then you can talk to them and say…are you ok with needles?' (S1)
'I always project as much confidence as possible, particularly if they have a known phobia… just trying to incorporate their feedback and make them feel…like they're part of it…as opposed to being done to.' (S7)

Most clinicians provided limited or no feedback on this aspect of patient care, making it unclear how they perceive their role in communicating with anxious patients.

3.3.2. Theme 2- The VR experience

Clinicians perceived the VR experience to be a positive one for patients, with the novel idea providing options for new possibilities.

3.3.2.1. Subtheme 1- Novelty and possibilities. Some clinicians found the idea of working with innovative technology appealing and suggested possibilities they felt may improve the patient experience.

'I would find it kind of exciting… it's adaptable in [the] sense that you can upload practically anything.' (S2)
'Maybe other sounds or like noise cancelling.' (S4)

VR technology is evolving, and clinicians displayed varying levels of understanding regarding how it could potentially be adapted to better meet the needs of patients.

3.3.2.2. Subtheme 2- effect on patient. Clinicians consistently identified the efficacy of VR to provide distraction, and in turn, decrease patient anxiety and pain.

'It was certainly positive, so they feel that it's…some level of distraction and…reduction in their anxiety and pain. Yeah, I think people are pretty excited about it, to be honest.' (S2)
'People are very easily distracted by it… it was very useful to allow the patient to feel a bit more at ease and I think it makes them feel like they're not in a hospital environment and I think that's very important.' (S3)

The intervention was seen as reducing clinician workload by alleviating patient anxiety and preventing issues like panic, vasovagal syncope, and failed cannulation due to movement.

'There's people, at least a couple a day…that will have a vasovagal… because [they are] needle phobic. And we think, "oh, we'll be alright". And then next minute you're…rushing in a bed, because… they're collapsing.' (S2)
'Especially with the anxious patients…because they barely even recognise they are being cannulated. And there is…none of that jumping and moving away…none of that.' (S1)

Clinicians' perceptions of the VR intervention were positive, with all seven rating its helpfulness as 8 or higher (on a 0–10 scale), except one who rated it between 7 and 8.

3.3.3. Theme 3- Considerations for VR implementation

Clinicians identified barriers to future VR implementation, including hardware accessibility, time pressures, unfamiliarity with the technology, and the goggles blocking external views. Cost and infection control were less frequently mentioned. Facilitators included education and staff "champions" to boost user confidence.

3.3.3.1. Subtheme 1- barriers. Most clinicians expressed concerns about hardware accessibility and reliability in the busy ED, worrying that equipment might be unavailable, hard to locate, or malfunction when needed.

'The hardest part would be…having enough equipment for everybody.' (S1)
'I know this person may be suitable, but I have to go find out where it is. Sometimes the internet connection doesn't work. Sometimes I can't get it to turn on, the battery's flat. Just any limitation, it doesn't need to take that much…to be like "screw it".' (S2)

Most clinicians highlighted time pressures and mental burdens in the ED as barriers to using the VR intervention, including remembering to use it, undergoing training, and setting up the equipment.

'Time to set up the machine and set up the goggles and everything.' (S1)
'So, it's not always going to be feasible for emergency clinicians to use, but when you have that little bit of extra time or someone is very anxious, then I think that will be very good.' (S3)

Clinicians explained that because the technology was novel, colleagues may not be familiar with the intervention specifically, but also, VR in general. This was perceived as a potential barrier.

'I think…there might be some sense that it's difficult to set up or some…barrier around technology that they feel like, well, I don't know if it's worth using. I think…the younger practitioners, probably more eager to try it because they have some experience or exposed to it already.' (S2)
'I guess then probably the other biggest thing is user confidence in terms of being able to set up in the technology side of things.' (S7)

Clinicians, like patients, felt the face-covering goggles hindered patient awareness of procedures and reduced effective communication.

'Although they don't want to have a look… they want to kind of… Yes, they want the control. They want to know when you're putting the needle in.' (S5)

Finally, infrequently cost was identified as a barrier, and possible issues with infection control related to the goggles were also cited.

3.3.3.2. Subtheme 2- Enablers. While time for education was a barrier, clinicians recognised the need for training to effectively use the novel technology.

'It's just going to be the training that we will need on it.' (S3)
'And that could probably be in the form of, you know, posters or emails or like a short training session.' (S4)

Participants suggested "champions" to lead training, as there was uncertainty about managing the intervention without their support.

'I think you need people who are going to champion the idea. So, certainly, people who see the benefits and have been educated in its benefits and…the actual user function of how it operates.' (S2)
'A couple of individuals who are relatively experienced, who you can contact on the shift… so you can kind of troubleshoot…or ask questions.' (S7)

3.3.3.3. Subtheme 3- potential uses for VR in ED. Clinicians suggested a broad variety of possible uses for VR in addition to using it for venepuncture and cannulation among anxious adults.

'For younger patients…paediatrics…or early teens with anxiety around being cannulated. I think the distraction would help a lot.' (S2)
'I think maybe even casting.' (S3)
'Very useful in maybe delirium [or] dementia.' (S4)

Clinicians acknowledged VR's potential to reduce anxiety in the ED but felt they should initiate the intervention rather than allow patients to choose it.

4. Discussion

To the best of our knowledge, this is the first qualitative study to examine both patient and clinician experiences with VR in an ED setting, identifying barriers and facilitators. While VR is appreciated for reducing patient anxiety, challenges include VR unfamiliarity, hardware issues, and time constraints. More training and dedicated "champions" could support VR use without adding to clinicians' workload. Our findings show both groups share similar experiences, detailed in Table 3 (barriers/facilitators) and Table 4 (barriers with potential solutions).

A common barrier that both patients and clinicians identified was how the overall ED environment impacted VR use. Consistent with a previous study [1], patients in our study expressed ambivalence, often driven by uncertainty about their condition and the fast-paced nature of the ED. Similarly, clinicians reported concerns related to time constraints and cognitive load [1]. These findings echo earlier research highlighting the importance of clear communication from clinicians to address patient concerns in advance [22], which is essential for the effective use of VR during procedures.

Another barrier was the lack of familiarity with the VR equipment among both patients and staff, leading to difficulties in its use. Although education and training could help overcome this issue, staff—constrained by time pressures—preferred brief, targeted training that would not increase their workload. This preference, consistent with findings from previous studies, is especially important in the fast-paced ED environment [10,23].

Clinicians suggested appointing "champions" as a potential solution—a strategy also supported by previous studies. These champions could lead staff training, troubleshoot technical issues, and address hardware-related barriers [24,25]. With their technical expertise, they could stay up to date with emerging technologies and recommend improvements to enhance patient comfort. In addition, clinical champions could help overcome another key barrier identified by clinicians: the limited accessibility and reliability of VR equipment. As highlighted in earlier research, unreliable or hard-to-access equipment discouraged use, especially in the context of high workloads and time constraints in the ED [26]. Champions could ensure the equipment is consistently functional, accessible, and easy to use, helping to reduce the burden on

Table 4
Practical solutions to overcome barriers to VR implementation.

Potential barriers	Possible solutions
Patients are not aware of the intervention, and clinicians may be too busy to inform patients about the intervention.	Posters, videos, or QR codes linked to a video introducing the intervention can be placed in waiting rooms and cubicles.
Patients need hands-on assistance to become familiar with VR before using it.	Involve VR champions who can assist patients while also helping other clinicians develop these skills.
Patients need privacy while using VR.	While privacy should be provided whenever possible, it may not always be feasible, and this should be clearly communicated to the patient.
Some patients were too anxious to try VR.	Incorporate training on how clinicians can effectively communicate with anxious patients into the VR training package, with support from clinical champions during shifts.
Clinicians may not have time to educate patients about VR.	Offer introductory education through an iPad or other pre-recorded formats.
Clinicians lack confidence in using VR.	Offer a brief hands-on training program with support from clinical champions.
Equipment is difficult to locate, malfunctioning, or not charged.	Assign VR champions to handle technical issues, oversee staff training, and assist with patient engagement.
Cost may limit implementation.	Consider exploring opportunities for research grants or health service funding.
VR goggles can feel claustrophobic.	Consider exploring the use of mixed-reality goggles as an alternative.
VR goggles are heavy.	Consider exploring the use of lightweight VR headsets.

Table 3
Comparison of facilitators and barriers between patients and clinicians.

	Barriers		Facilitators	
Similarities between patients and clinicians' perceptions of barriers and facilitators.	**Patients**	**Clinicians**	**Patients**	**Clinicians**
	The ED experience • Uncertainty • Fast pace • Lack of information provided	The ED experience • Time pressure • Mental burden	Novelty	Novelty
	Unfamiliar with the use of VR	Unfamiliar with the use of VR	Education and time for familiarisation	Education and training • Champions
	Hardware difficulties and discomfort	Concerns with the type of goggles	Distraction and anxiety reduction	Positive effect on patient
Other barriers and facilitators.	Past negative experiences with procedures and negative emotions	Accessibility and reliability of equipment	Effective communication provided by clinicians	Adequate resources in working order

other staff. As VR procedures become more integrated into routine practice and staff grow more confident in their use, the champions' active involvement may gradually become less necessary.

While both clinicians and patients shared some concerns, others were unique to each group. Patients emphasised the importance of clear, proactive communication from clinicians before interventions—a priority not reflected in clinician interviews. This suggests clinicians may underestimate how much effective communication can reduce patient anxiety, as previous studies indicate [27,28]. Patients also noted that anxiety, often tied to past negative experiences, affected their VR experience, potentially limiting its effectiveness. Our findings suggest that better training in communication skills for ED clinicians could improve patient experiences and reduce anxiety during interventions.

Clinicians felt they should decide when to offer the intervention, but time pressures are a barrier. Patients, however, preferred receiving information and deciding for themselves. Both groups agreed the intervention could benefit various issues beyond high anxiety. Therefore, a collaborative, flexible approach could better suit diverse situations.

4.1. Strengths and Limitations

This study's strengths include a diverse group of clinicians and patients, providing a reasonable range of perspectives on the VR intervention. However, it was conducted at a single Australian ED with a small sample size and predominantly female, English-speaking participants, which may limit generalisability. Additionally, the use of the Oculus Quest 2 headset and specific VR scenes may limit applicability to other VR products.

4.2. Implication for research and practice

Although the sample size in this study was small, the findings support the potential benefits of VR during needle-related procedures. Future research with larger and more diverse populations is needed to confirm these benefits and assess the generalisability of outcomes. For successful integration into routine practice, clinicians recommended the appointment of clinical champions to provide ongoing training, manage technical issues, and support implementation. However, the effectiveness of this strategy has yet to be fully evaluated. Future studies should explore the role of clinical champions in sustaining VR use, as well as the broader organisational and system-level factors needed to support successful and scalable implementation.

This study highlights both the promise of VR in reducing patient anxiety during needle-related procedures and the practical challenges that must be addressed for implementation. A patients emphasised the importance of clear and proactive communication from clinicians prior to procedures, underscoring the need for improved communication training is key. Enhancing ED clinicians' skills in this area could help reduce patient anxiety and improve overall experiences with VR interventions. Clinicians expressed a preference for brief, targeted training that would not add to their existing workload, suggesting that streamlined, practical education is essential for uptake.

5. Conclusion

This first qualitative study on VR use in the ED found strong agreement among patients and clinicians on its effect in managing anxiety during needle-related procedures. While VR is valuable for patient comfort, the ED environment poses implementation challenges. Suggestions include developing an implementation plan and ongoing monitoring to support research translation and best practices.

Ethics statement.

The study has received ethical approval from the Metro South Ethics Committee (HREC/2023/QMS/97902) and the University of Queensland Technology Human Ethics Committee (2023/7507).

Funding or sources of support in the form of grants

This work was supported by the Princess Alexandra Hospital Emergency Medicine Small Grant, Australia (2023).

CRediT authorship contribution statement

Hui Grace Xu: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Jed Duff:** Writing – review & editing, Supervision, Methodology, Conceptualization. **Vicki Binnie:** Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Formal analysis, Data curation.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgement

We acknowledge the funding that we received from Princess Alexandra Hospital Research Foundation, Brisbane, Australia to support our project.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ienj.2025.101692.

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