

RESEARCH REPORT

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Executive Summary

The research in this study considers the issues in emergency departments (EDs) relating to patient experience and flow. In contrast, increasing demand, staff shortages, and limited resources result in overcrowding and excessive waiting times, having a negative effect on both patients and clinicians. The aim of this project is to find solutions to improve patient care and maximize the flow of people in the ED environment.

Secondary research was conducted to review existing literature on ED processes, patient experience, and emerging healthcare technologies. Primary research also included interviews and questionnaires with ED patients and staff to gather first-hand information on existing processes and experiences.

It focuses on overcoming gaps in communication, comfort, and efficiency in the ED. By addressing approaches specific to emergency care, it sets the stage for developing solutions to maximize the overall experience of patients and staff in delivering timely and effective care.

Statement of Authenticity

This is to declare that, to the best of my knowledge, the work contained in this report is my own. This report has not previously been submitted for any other subject or purpose. I acknowledge that the intellectual content of this report is my own and that all sources of information and assistance used in its preparation have been clearly acknowledged.

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Statement of AI

I have used generative AI (Chat GPT) to help me in the following ways.
To help with structuring of some sentences and reducing word count.

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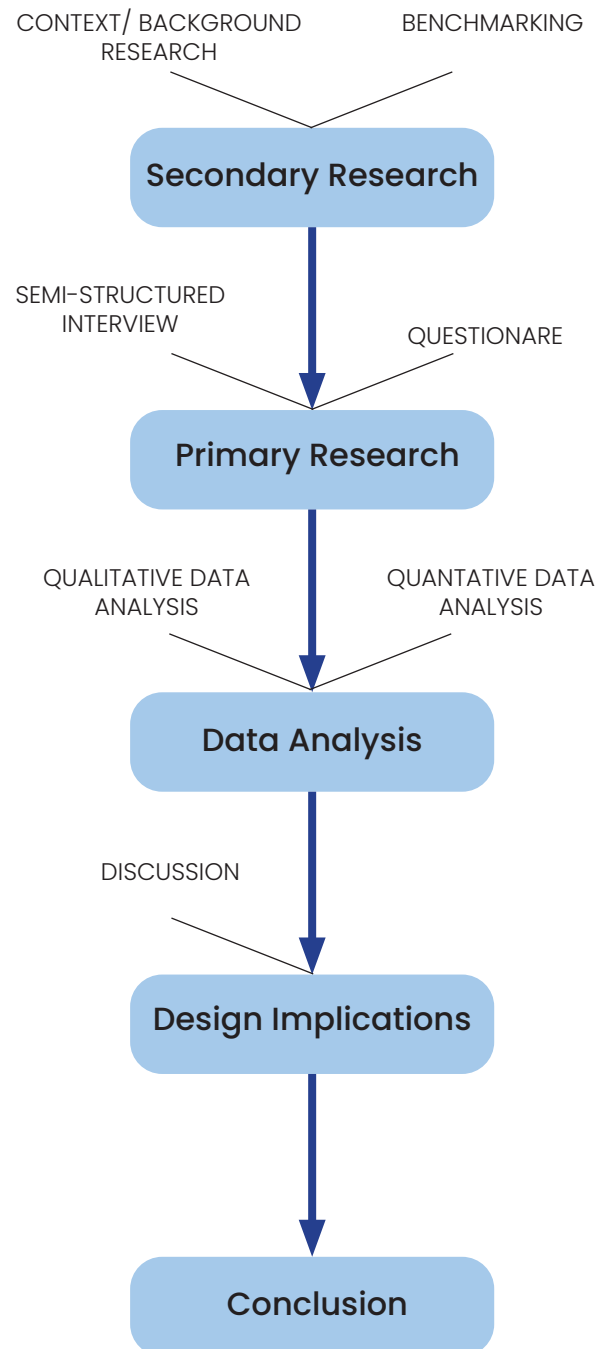
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INTRODUCTION

Emergency departments are a very important part of the health system since they offer quick care that is life saving. Yet, the majority of emergency departments throughout the world are extremely crowded with more and more patients, little space, and few staff. As a result of these problems, there are great issues like very long waiting times, too many patients at the same time, and less than optimal care. Having too many patients at the same time in the emergency department is not a recent problem. This has been happening since the 1980s, and it still prevents people from getting fast and quality emergency services even today (Savioli et al., 2022). This problem not only affects patient outcomes, but also leaves staff members more stressed and busy, and it is harder for them to excel in their work.

Having an excess of patients in the emergency room poses problems to both patients and staff. For patients, it takes longer to find out what's wrong, it makes people more stressed, and people are less happy with their care. For the staff, it translates to a high degree of stress while working, it makes them tired and unhappy at work. Keeping the emergency department running smoothly and getting the patients through it faster is very critical so that patients and staff would feel comfortable and safe.

This project will examine what health care workers and patients are going through in emergency rooms today, with a focus on patient flow and how it influences care quality and satisfaction. Understanding the key issues most responsible for causing the bottlenecks, this project aims to improve the emergency department to the point where care is quicker and more patient needs-oriented.



BACKGROUND

Introduction to Emergency Departments

Emergency Departments (EDs) are central to urgent care, serving as the first point of contact for patients with acute injury or illness (Knowles et al., 2021). They operate under tension, balancing the requirement for rapid assessment with the delivery of effective and safe care. According to the Australian Institute of Health and Welfare (2024), an excess of 8.9 million presentations were made to EDs across Australia in the period 2023–24, clearly illustrating the level of intense demand placed on these services. Increasing populations and ageing populations see the demand for EDs continue to escalate, thus the necessity for patient care and flow optimisation.

Emergency Department Overcrowding

Overcrowding is a common condition which occurs in EDs globally, resulting in prolonged waiting times, prolonged treatment, and increased stress for patients. In Australia, 50% received treatment within 18 minutes in 2023–24, and 90% received treatment within nearly two hours, with only 55% of presentations being treated within four hours (AIHW, 2024). These figures are lower than in the pre-pandemic years, where 69% of visits were handled within four

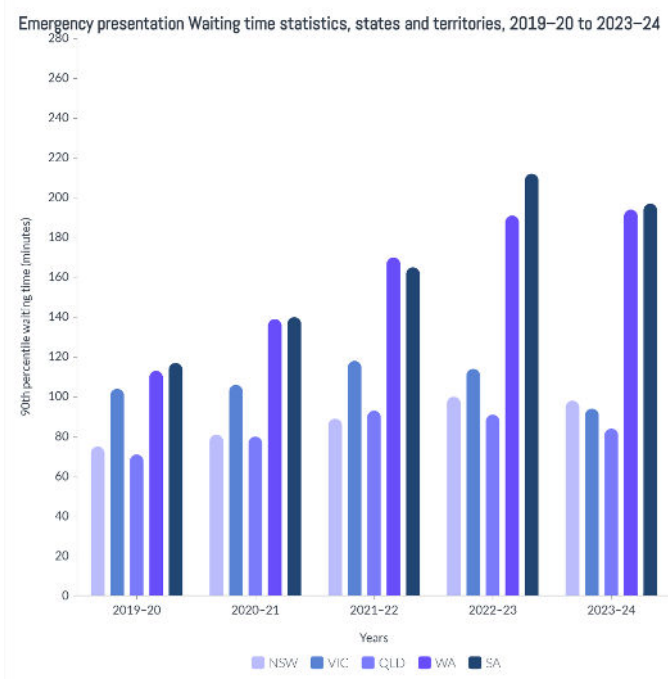
hours in 2019–20. Overcrowding is the result of various factors like increased patient arrivals, shortage of beds, and inefficiency in admissions and discharges (Savioli et al., 2022). The result is not only longer wait times but also greater stress for health care professionals and patients.

Patient Flow in the ED

Efficient patient flow is central to sustaining overcrowding. Benjamin’s (2020) study recognizes that nurses are at the center of managing flow, making rapid choices to sequence care and allocate resources to enhance the flow. Process improvement initiatives such as concurrent interventions between admissions and triage, for instance, have been shown to significantly reduce delays and increase throughput (Van der Linden et al., 2021). To sustain these improvements, however, still continues to need ongoing cooperation along with changes at the system level, and not just procedural adjustments.

Patient Experience in Emergency Departments

Patient experience is now being regarded as a core measure of ED performance. Sedgman et al. (2022) proved that long pre-triage waiting times lead to heightened patient and family anxiety, confusion, and



dissatisfaction. Efficient communication and reduced wait times are essential drivers of total satisfaction. This emphasizes the need for solutions striking a balance between operational efficiency and patient comfort.

Existing Tools and Technologies

Technology is also being viewed as a means to solve ED issues. AI-driven triage tools have been discovered to have the potential to facilitate prioritisation of patients and reduce mistakes (Da'Costa et al., 2023). Cognitive work analysis has also been used to design sustainable systems in which new technologies are integrated into the workflow within EDs (Austin et al., 2023). Despite these advances, enormous gaps remain in achieving seamless incorporation of these tools into practice, particularly in enhancing patient satisfaction. Wearable biosensors have been found to be rapidly deployable in the waiting areas of emergency departments, providing near-continuous, clinically complete vital sign data and being highly patient satisfying without adding additional workload to staff (Rovenolt et al., 2023).

Summary

Literature suggests that while current strategies improve some aspects of ED operations, overcrowding, patient dissatisfaction, and technology fragmentation are among the areas that continue to exist. Gaps here provide an opportunity to examine solutions that improve both patient flow and experience.

BENCHMARKING

Introduction

Benchmarking is a critical stage in the research and design process, through which products available can be compared in order to identify the best and worst practices, and areas where improvement can be made. When used in emergency departments (EDs), wearable monitoring equipment is being used more and more to track patient vital signs. EDs are under increasing pressure due to overcrowding, which leads to delays in patient care, extended wait times, and increased risk of deterioration while waiting for treatment (Pryce et al., 2023). This section reviews four leading wearable biosensors, Mindray mWear, Sotera ViSi Mobile, VitalConnect VitalPatch, and BioSticker, to evaluate their features, usability, and suitability for emergency triage environments. The purpose of this analysis is to identify gaps in the current market and define opportunities for a device specifically designed for the

Conducted benchmarking on wearable monitoring solutions, as highlighted in the background study, to explore how continuous, non-invasive vitals tracking could indirectly improve patient flow and overall experience.

Feature	MindRay mWear	Visi Mobile	VitalPatch	BioSticker
Continuous monitoring	Yes	Yes	Yes	Yes
ECG monitoring	Yes	Yes	Yes	Yes
Heart rate	Yes	Yes	Yes	Yes
Heart rate variability	No	Yes	Yes	Yes
Respiratory rate	Yes	Yes	Yes	Yes
SpO ₂	Yes	Yes	Yes	No
PR / NIBP / Temp	Temp only	PR / NIBP / Temp	Temp only	Temp only
Activity tracking	No	Yes	Yes	Yes
Position / posture tracking	No	Yes	Yes	Yes
Water resistanc	Yes	Yes	Yes	Yes
Hypoallergenic Adhesive	As required	As required	Yes	Yes
Reusable	Reusable	Reusable	Disposable	Both
Wireless Connectivity	Yes	Yes	Yes	Yes
Home Monitoring	No	No	Yes	Yes
Charging req.	Yes	Yes	No	Yes
Display on Device	No	Yes	No	No
Diagnostic report	Yes	Yes	Yes	Yes
Freedom of movement	Yes	Yes	Yes	Yes

Parameter	MindRay mWear	Visi Mobile	VitalPatch	BioSticker
Comfort	6	5	9	9
Feasibility in hospital	9	9	7	7
Reusability	9	9	4	6
No. of vitals recorded	8	10	7	7
Ease of use	7	6	9	8
Connectivity	8	8	9	9
Material quality	8	8	8	8
Device display	4	9	2	2
Patient Movement	7	7	9	9
Battery	6	6	9	8
Alarm	8	9	7	7
Home Usability	4	3	9	8
Hospital Integration	9	9	7	7
Accuracy & Reliability	8	9	8	8
Overall clinical utility	8	9	8	8

unique demands of ED overcrowding and high patient turnover. **Existing Device**

Current wearable devices offer advanced continuous monitoring and wireless data transfer, but they are largely designed for inpatient care or post-discharge home monitoring, rather than rapid ED triage.

Mindray mWear – A multi-parameter system capable of tracking several vital signs, including temperature and oxygen saturation, with strong hospital integration features. While versatile, it is less comfortable, requires charging, and its setup time makes it less suited for fast-paced triage scenarios.

Sotera ViSi Mobile – Excels at continuous monitoring and alert management with a wide range of vitals. Its size and technical sophistication, however, limit its use in short-term applications in busy EDs where patients are constantly transferred from station to station.

VitalPatch by VitalConnect – Very

comfortable, single-use, and no need to recharge, perfect for short-term monitoring. Its drawback lies in the limited range of vitals tracked and lack of reusability, leading to higher recurring costs.

BioSticker – The closest to meeting ED integration needs, this device supports both home and hospital monitoring, offering reliable data transfer and comprehensive features. However, its current design targets post-discharge monitoring, not high-volume intake departments.

Identified Gaps in the Market

The review highlights several critical gaps that limit these devices' suitability for emergency department triage:

Not Designed for ED Workflow

Most devices are intended for stable inpatient settings or home monitoring. They lack the speed and simplicity required for rapid triage and do not accommodate the high turnover of ED patients. Example: VitalPatch's adhesive system is ideal for stable patients but too slow to apply during peak triage hours.

Inadequate Integration with ED Systems

Current devices often don't communicate effectively with ED electronic health record (EHR) systems. Manual data entry or piecemeal monitoring increases the risk of delayed care and medical errors, especially in crowded environments.

Rapid Monitoring Needs

Unmet Monitoring delays during busy ED wait times pose significant safety risks because patients with deteriorating conditions may remain unrecognized (Pryce et al., 2023). There is evidence that continuous monitoring in the acute setting improves the detection of deterioration early and can even predict readmissions, allowing for early interventions (Pettinati et al., 2024). None of the devices available, however, are suited for triage monitoring in real time, where patients require immediate, high-frequency data monitoring.

Patient Comfort and Safety Concerns

Adhesive patches like VitalPatch are lightweight but may irritate or be painful, particularly for pediatric or agitated patients due to its airtight industrial type adhesion. In emergencies, this lowers compliance and delays application.

Opportunities for Innovation

The analysis sees a clear opportunity to design a wearable biosensor for emergency department intake and triage. The device would:

Be simple and fast to apply, with minimal staff training.

Deliver real-time, continuous monitoring of key vitals such as HR, RR, SpO2, temperature, and BP trends.

Easily integrate with ED monitoring dashboards for streamlined workflows.

Promote comfortable, minimal design for use on all patients.

Provide for infection control using single-use or easily sterilized materials.

Perform reliably in chaotic, high-volume environments, even with patient movement or skin prep limitations.

Evidence demonstrates that continuous and wireless monitoring significantly improves clinical outcomes, reduces missed deterioration events, and streamlines workflow efficiency (Rowland et al., 2023). BioSticker is the most among the products examined that meets these requirements since it is FDA approved with excellent connectivity. However, its current focus on home monitoring recognizes the gap in ED-specific solutions.

Summary

Benchmarking indicates that while wearable devices like VitalPatch and BioSticker exist and not much of them in use, they fall short of the specific needs of the emergency department. Currently, there is no device that best addresses the needs of expedited triage, real-time monitoring during waiting times, and discreet integration into ED workflow. This is a huge gap to look into for the development of a specifically designed wearable to help address patient safety improvement and burden reduction on emergency department staff during crowding.

RESEARCH

Research Scope

The purpose of this research is to investigate the problems for both nurses and patients within emergency departments (EDs), particularly during times of overcrowding and delayed patient flow. Overcrowding has been shown to be linked with significant danger to patient safety, causing delays in care and distress for healthcare personnel (Pryce et al., 2023). By examining both groups' experiences, this study aims to reveal deficiencies in current processes and equipment, with a particular emphasis on continuous vital sign monitoring as a potential solution. The ultimate goal is to offer design recommendations for an emergency department-specific wearable device to improve patient care, as well as nurse workflow, during intake and triage.

Methodology

A mixed-methods research design was taken for this study, combining qualitative interviews and quantitative surveys. Mixed methods are particularly well-suited to healthcare research as they facilitate the collection of both numerical data and in-depth personal accounts, bringing together a comprehensive image of complex environments like emergency departments (Grace et al., 2024).

This approach was taken in order to address two distinct yet related perspectives: Nurses, who are exposed to workflow interruptions, resource limitations, and intense cognitive loads in periods of high activity. Patients, who experience extended waiting, uncertainty, and anxiety while attending the ED.

By consolidating these perspectives, the research provides balanced findings that inform solutions serving the interests of both groups without sacrificing either

Interviews

ED nurses underwent two face-to-face, semi-structured interviews. Recruitment occurred through local healthcare contacts, although recruitment was not without challenge, based on staff availability and the high-pressure nature of ED working. Interviews lasted 15–25 minutes and were recorded audio with permission. Audio recordings were transcribed using AI transcription software, and major findings reviewed against notes from sessions for consistency of fit within broader literature.

The role of the interview was to split up into thematic areas to direct conversation but also leave room for participants to elaborate on their experiences. Sample questions can be found below:

"How do you prioritise tasks when more than one patient requires attention simultaneously?"

"What are the environmental or equipment-related issues that influence your capacity to perform your work effectively?"

"Have you ever had to improvise because of a lack of information or faulty equipment?"

This format encouraged participants to speak openly about their daily workflow and pain points. The freedom of the semi-structured format allowed participants to comment freely on their experiences, which was required for looking at context specific difficulties (Rowland et al., 2022).

Questionnaire

A paper-based questionnaire was distributed to five general ED patients who had previously visited an emergency department. This tool was designed to capture the patient perspective on arrival, waiting times, communication, and feelings of safety. It included multiple-choice questions for efficiency, as well as open-ended questions to allow participants to express their thoughts in detail. The survey

was divided into five sections:

Background: ED visit history and reason for visit.

Arrival & Initial Experience: Waiting times and first impressions.

Communication & Understanding: Clarity of information provided by staff.

Overall Experience & Environment: Comfort, noise levels, and privacy. Suggestions & Improvements: Desired tools or support systems.

Questionnaires were used to reach a somewhat higher number of participants and to track prevalent themes in ED visits. This enabled me to gain quantitative data too to offer complement to the qualitative data of the interviews and have the ability to cross-analyse the two perspectives.

provided more data, ethical considerations and patient confidentiality made this impossible.

Summary

This research engaged in a balanced mix of interviews and questionnaires to explore both perspectives of the emergency department, nurses and patients. The exploration of both groups unveiled widespread gaps in current ED processes and patient treatment during overcrowding periods.

Data Collection and Analysis

The interview and questionnaire information were examined in two stages: Thematic analysis of the responses in interviews to identify patterns of themes, such as workflow inefficiencies, patient safety concerns, and desired technology improvements. Descriptive analysis of the questionnaire data to find patterns in patient sentiment, including frustration with wait times and willingness to accept continuous monitoring. Both methods' results were combined to form an overall picture of the problem space so that the final design recommendations have both clinical as well as patient considerations.

Limitations

While this mixed-methods strategy provided rich information, the small sample size of this research limits generalisation of findings. Small samples are common in exploratory healthcare design research but need to be handled carefully, as they may represent only a subset of ED settings or patient populations (McDermott, 2001). The second constraint was that there were no observational data. Although direct observation of ED procedures would have

ANALYSIS & FINDINGS

This section presents the methods and results of both qualitative and quantitative data analysis conducted in this study. The qualitative data were collected from two ED nursing staff having semi-structured interviews, and the quantitative data were collected through five patient surveys. The effort was made to discern the key issues related to ED crowding, patient experience, and monitoring gaps and also opportunities for improving patient flow and safety.

Survey Findings

Survey data were analyzed in Excel using descriptive statistics and cross-tabulations to investigate associations among wait times, ESI scores, and patient-reported scores. This allowed for simple visualization of how triage prioritization impacted wait times and anxiety levels.

Waiting Times and ESI Severity

A clear pattern was observed between ESI (Emergency Severity Index) levels and waiting times:

More urgent patients (ESI 1–2) were seen more rapidly, with triage and initial assessment within 5–15 minutes.

Lower priority patients (ESI 3 and lower) experienced greater delays in triage and therapy, waiting 30–60 minutes or more to be evaluated by a doctor or to have preliminary test results.

Delay was found to be directly related to greater patient anxiety and dissatisfaction, especially in patients with ongoing pain or shortness of breath

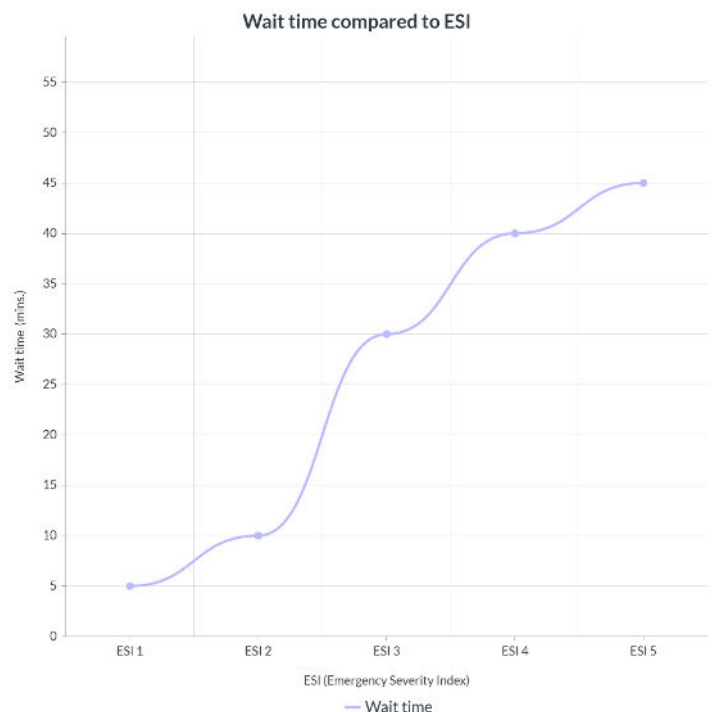
(Figure X will illustrate the correlation between ESI score and total wait time).

Stress and Emotional Experience

Stress levels reported by patients were consistently high, ranging from 6–9 out of 10, with the highest stress linked to prolonged uncertainty or severe symptoms such as chest pain and asthma.

Patients with lower ESI scores not only experienced longer waits but also greater emotional distress, with three respondents reporting uncertainty lasting over 60 minutes.

This finding suggests that timely updates and reassurance could significantly improve the patient experience during periods of extended waiting.



Communication and Information Gaps

While three participants indicated that staff “mostly” explained their condition and procedures clearly, two felt that medical terminology and rushed explanations limited their understanding. Suggestions for improvement included:

Real-time updates about test progress or waitlist position.

More frequent check-ins during peak periods to reduce uncertainty.

Patients who received clear explanations reported lower stress levels and higher satisfaction overall.

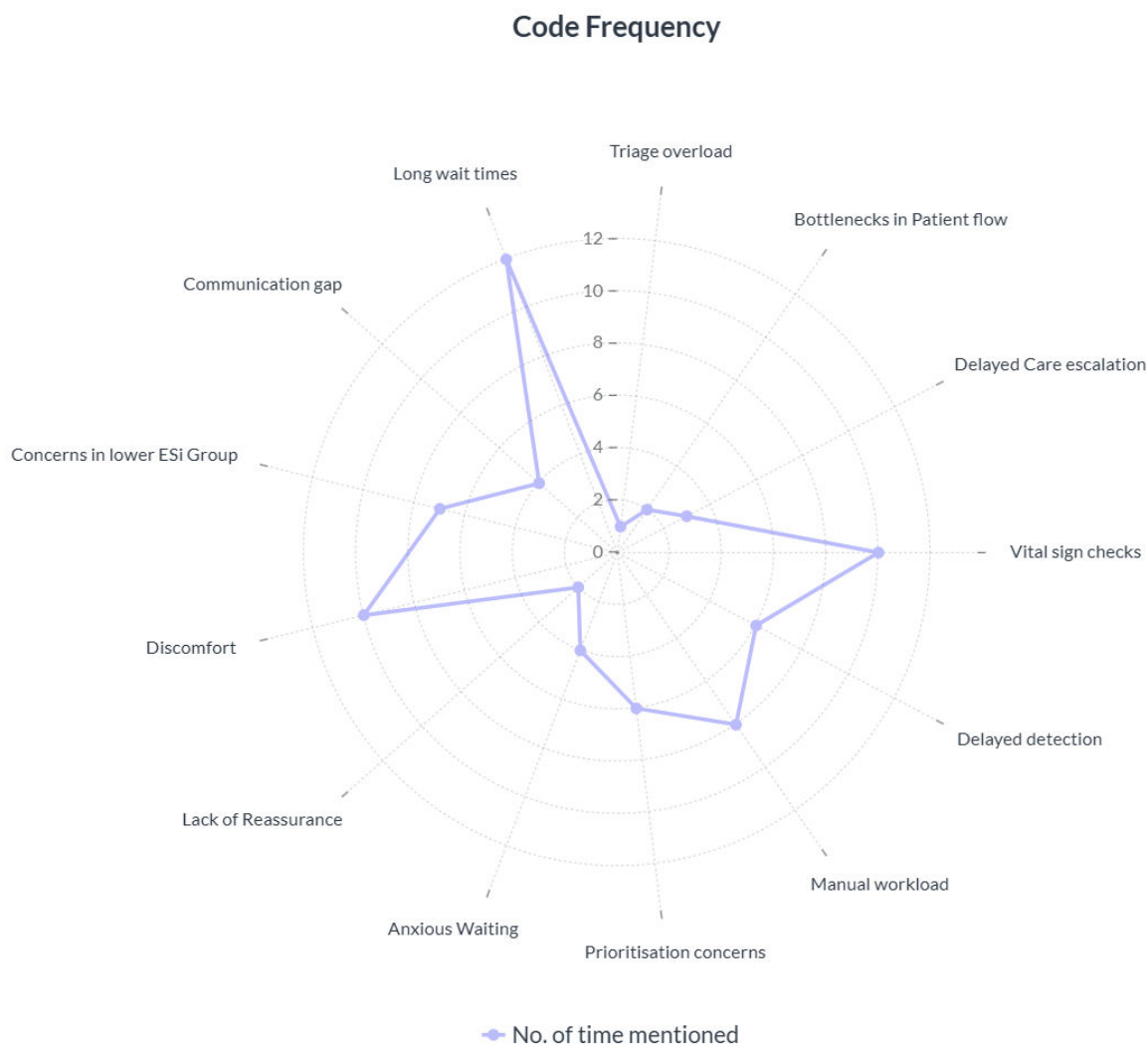
Physical Environment and Comfort

It was described as crowded and noisy by most of the participants, having bad seating and bad privacy.

These circumstances increased accounts of feelings of abandonment among lower-scoring patients on ESI, validating accounts of unfairness in treatment.

Interview Findings

Interview data were coded using thematic coding with NVIVO. Codes were aggregated into four themes: Monitoring Challenges, Patient Experience, Flow and Efficiency, and Opportunities for Improvement.



Theme	Sub-Code	Meaning
Monitoring Challenges	Intermittent Vital Sign Checks	Vitals are only checked when staff are available, leaving gaps in patient safety.
	Delayed Detection of Deterioration	Critical changes in patient condition often noticed late due to lack of continuous tracking.
	Manual Workload Burden	Repeated manual monitoring adds to staff fatigue, especially during peak hours.
	Prioritization Conflicts	Sicker patients are prioritized, causing lower-acuity patients to be monitored less frequently.
Patient Experience & Comfort	Anxiety During Waiting	Patients and families feel fearful while waiting, especially without clear updates.
	Lack of Reassurance & Communication	Minimal updates leave patients feeling uncertain about their status and care.
	Physical Discomfort in Waiting Areas	Crowding, noise, and uncomfortable seating worsen overall experience.
	Heightened Concerns in Lower ESI Groups (3–5)	Lower-priority patients express frustration and anxiety about not being seen quickly.
	Misunderstanding of Triage Priorities	Patients often upset when others are treated first, not understanding urgency levels.
Flow & Efficiency	Extended Wait Times for Lower-Acuity Patients (ESI 3–5)	Lower-priority patients consistently face significantly longer triage and treatment delays.
	Triage Overload During Surges	Sudden spikes in patient arrivals overwhelm triage nurses and disrupt workflow.
	Bottlenecks in Patient Flow	Delays caused by slow admissions or lack of downstream beds.
	Delayed Care Escalation	Slow recognition of deterioration due to manual monitoring and competing priorities.

1. Monitoring Challenges

Vital sign checks are performed manually every 20–30 minutes, creating gaps where patients in decline may not be detected. This was the most prominent issue, with vital sign monitoring (32%) and manual workload (26%) being the two biggest contributors.

“When it’s extremely busy, vitals might not get taken unless by chance a nurse notices a noticeable change.”

Delayed detection (19%) and prioritisation concerns (19%) were also highlighted, with nurses explaining that when patient numbers are high, staff must focus on visible deterioration or those in critical categories. Patients who are ambulatory and circulating in active waiting areas are harder to track and reassess, making timely monitoring inconsistent.

2. Patient Experience

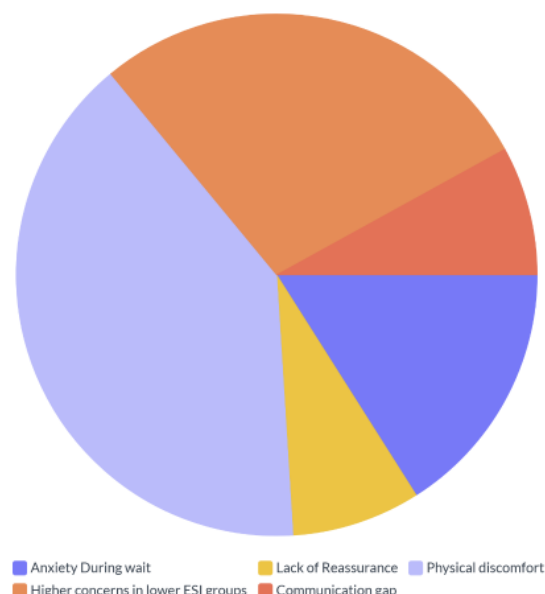
From the patient side, discomfort from wired monitoring devices was the most frequently mentioned issue (38%), with patients expressing frustration at restrictive and bulky equipment. This was followed by concerns from lower ESI groups (19%), where patients with triage levels of three or lower reported longer wait and triage times, increasing anxiety about being seen.

Multiple rounds of testing were sometimes confused with deterioration, causing anxiety during waiting (15%), while communication

SUB CODE Percentage in Monitoring challenges



SUB CODE Percentage in Patient Experience and Comfort



gaps (12%) and lack of reassurance (8%) were noted as secondary concerns. Long durations between vital sign checks left some patients feeling abandoned or forgotten, further impacting their overall sense of comfort and safety.

3. Flow and Efficiency

The most reported issue was extended wait times for ESI groups 3–5 (41%), leading to patient frustration and uncertainty. Triage overload (38%) also created delays, with nurses struggling to process incoming patients quickly.

“Sometimes, you’re stuck at triage because there’s a line of people waiting to be seen, and it just keeps backing up.”

Delayed care escalation (10%) and bottlenecks (7%) were less common but still disrupted patient flow, especially when critical cases diverted resources from lower-acuity patients.

4. Opportunities for Improvement

Staff identified several strategies to address these challenges:

Continuous, wearable monitoring devices to replace intermittent manual checks while allowing patient mobility.

Automated alerts for early detection of patient deterioration.

Integrated Insights

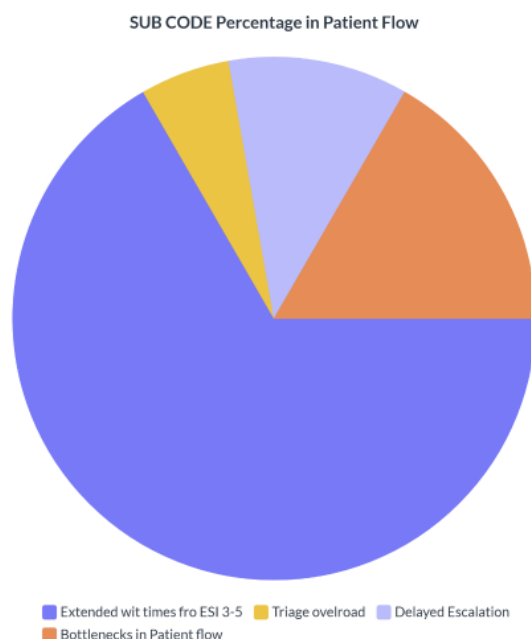
The combined data highlight two interconnected issues:

Risk to safety from delayed monitoring and belated detection of important changes.

Patient dissatisfaction from inordinate waits, inefficient communication, and unseemly conditions.

Lower ESI scorers are especially vulnerable, with longer waits and more emotional distress.

Continuous wearing monitoring, together with improved communications systems, offered an effective solution to bridge these gaps—improving clinical safety and patient confidence without increasing staff workload.



DISCUSSION

The objective of the study was to explore the intersection of emergency department (ED) wait times, patient experience, and vital sign monitoring procedures with a view to establishing the paths towards enhancing patient safety and comfort. The linkage between the primary data (interviews and surveys) and secondary data (literature analysis) came with a number of significant themes addressing the gaps in the prior research identified: the lack of continuous, patient-centered monitoring solutions within high-pressure ED environments.

Survey data revealed a linear relationship between wait times and ESI scores, as patients with lower priority (ESI 3 and below) experience much longer waits for triage, assessment, and treatment. This aligns with Rovenolt et al. (2023), where crowding during high-demand periods can result in delay in monitoring and escalation of care, particularly for low-priority patients. Such increased waiting times not only contributed to inducing patient anxiety but also created negative safety and comfort perceptions. Patients were “forgotten” during waits of extended durations, an outcome supported by the literature that identifies the psychological toll of uncertainty in the emergency department (Grace et al., 2023).

Staff interviews also provided further insight into system-level issues behind these issues. Staff indicated that intermittent monitoring of vital signs, usually every 20–30 minutes, was risky for missing subtle indicators of deterioration. This finding reaffirms McDermott (2023), which identified the limitations of human monitoring in high-demand care settings. Staff also noted that big, wired monitors added to patient discomfort and restriction of movement, further justifying the requirement for less invasive, continuous monitoring.

One of the most important findings to emerge from both data sets was the role of communication. Although occasionally delays were inevitable, patients indicated that real-time updates and clearer explanation could reduce stress. Staff also identified that automated reminders integrated into electronic health records could ease their workload and allow them to have more time to directly interact with patients.

By integration of these perspectives, the research demonstrates that continuous wearable monitoring with higher-quality communication resources may satisfy both clinical and experiential requirements. These findings contribute to the literature by summarizing that ED crowding interventions need to be safe, efficient, and comfortable for patients and not just throughput-focused. Satisfying these variables cumulatively may improve provider and patient outcomes.

DESIGN IMPLICATIONS

Through examination and discussion, a number of the most important issues and opportunities for making the emergency department (ED) patient experience better have been recognized. These implications form the model for designing solutions that address patient and staff workflow problems together, with emphasis on continuous vital sign monitoring, comfort, and communication.

1. Continuous & Passive Monitoring

Arguably most important of the issues revealed by interview was the absence of continuity between infrequent vital checking and the need for urgent escalation. Staff explained how, at busy times, patient vitals could go unmonitored for 20–30 minutes, potentially leading to late detection of deterioration. This suggests a strong potential for a non-invasive monitoring device.

Design requirements must include:

Data monitoring for simple vitals while waiting (heart rate, SpO2, respiratory rate).

Wireless compatibility with existing hospital systems to automatically notify when thresholds are breached.

A low-profile, ergonomic design that does not impede patient mobility, as opposed to existing larger wired monitors.

This is underpinned by literature (Rowland et al., 2023) that cites that continuous wireless monitoring can reduce critical response times and increase patient safety.

2. Reducing Anxiety Through Information

Survey results showed lower priority triage patients (ESI 3 and less) experienced longer delays and experienced higher stress. This stress was exacerbated by a lack of information regarding their status or condition.

The following design opportunities present themselves:

Real-time patient-facing displays showing approximately how long patients wait or where in the process of care they are.

Visual cues or plain infographics explaining the purpose of checks on vital signs and equipment.

Patient alerts to notify them that they are being watched round the clock, even when the staff are not present.

More openness can assist in curing both patient anxiety and perceived quality of care

3. Enhancing Staff Efficiency

Staff members complained about handling large numbers of patients while balancing labor-intensive monitoring procedures. A system designed optimally was capable of reducing cognitive load by:

Consolidating information from many patients into a streamlined one-screen dashboard.

Supplying tiered alarms, with most critical first to prevent alarm overload.

Supplying wearable products for staff members, facilitating mobility with continued access to patient data.

Summary

The study highlights the need for solutions that integrate continuous monitoring, patient-centered communication, and workflow refinement. Optimizing these factors enables future design to create a safer, less stressful ED experience while supporting clinicians in delivering timely, informed care.

CONCLUSION

Emergency rooms are high-stakes environments in which patient safety and timely care are primary concerns. Findings of this study determine patients' and staff's problems, in particular, with respect to monitoring vital signs, communication, and comfort while waiting.

Patient survey information showed that lower triage priority patients (ESI 3 and less) waited longer and were more anxious, particularly if updates regarding their status were not provided. Staff interviews also highlighted the failure of intermittent vital sign monitoring in delaying patient deterioration detection amidst periods of high demand.

These results suggest a possibility for an unobtrusive, ongoing monitoring system to be incorporated into existing hospital practice. Such a system can improve patient safety via prompting alerting, reduce workload for staff and reassure patients through visible reporting and open communication.

By synthesizing both healthcare provider and patient needs, future design interventions can optimize patient outcomes, reduce stress, and ensure effective decision- On the whole, this study demonstrates the value of design-driven innovation to improve emergency care experiences for clinical teams and

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INTRODUCTION

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