



## Emergency nurses' knowledge and understanding of their role in recognising and responding to patients with sepsis: A qualitative study<sup>1</sup>

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### ABSTRACT

**Aim:** Sepsis is a significant and time-sensitive clinical concern for patients who present to Emergency Departments (EDs). Existing guidelines do not define nurses' roles in managing sepsis. This study explored ED nurses' experiences and perceptions around recognising and responding to patients with sepsis, and their awareness of sepsis screening and prognostic tools. The knowledge and insights gained from this study may be used to inform local and international ED policies, and enrich nursing educational packages that may be used to improve quality of patient care and patient outcomes.

**Methods:** Qualitative design incorporating semi-structured interviews with 14 ED nurses was undertaken. Thematic and consensus-based content analyses were used to explore transcripts.

#### Findings.

Six key themes were identified; (1) contribution of the organisation, (2) appreciation of knowledge, (3) appreciation of clinical urgency, (4) appreciation of importance of staff supervision, (5) awareness of the importance of staff experience, and (6) awareness of the need to seek advice.

**Conclusion:** ED nurses' identified deficits in their capacity to recognise and respond to patients with sepsis, despite their vital role within the multidisciplinary team that cares for patients with sepsis. The knowledge and insights gained from this study can be used to inform ED policies, to enrich context-specific educational packages that aim to improve quality of patient care and outcomes and identify areas for further research. Development and implementation of a nurse-inclusive sepsis pathway may address many deficits identified in this study.

### 1. Introduction

Worldwide there are approximately 18 million cases of sepsis annually [1]. In Australia, around 500,000 Emergency Department (ED) visits per year are sepsis related with the incidence projected to grow at a rate of 1.5% per year [1]. As many as 18,000 patients require intensive care annually in Australia/New Zealand as a result of sepsis [2,3]. Improvements in the care of the patient with sepsis is recognised at local, national and international levels and this is reflected in the emerging literature emphasising the importance of evidence-based

guidelines [1,3,4]. Sepsis is a time-sensitive illness, so early recognition and response by nurses at initial points of care supports prompt escalation of treatment, minimising patient deterioration [5] and death [6,7]. This early recognition might include application of screening and prognostic tools such as systemic inflammatory response syndrome (SIRS) criteria or the quick sepsis-related organ failure assessment (qSOFA) [8]. It may also include other assessment components, however currently there are no definitive diagnostic tests or gold standard criteria to identify sepsis. Evidence-based sepsis bundles have been implemented with the aim of improving morbidity and mortality

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**Table 1**  
Interview questions/prompts.

1	Can you tell me what you think sepsis is?
2	What do you think are the causes of sepsis?
3	How often do you think that you care for patients with sepsis?
4	Can you tell me about the last time you cared for a patient with sepsis in the ED?
5	What are your perceptions about caring for a patient with sepsis in the ED?
6	What cues might you use to recognise a patient with sepsis?
7	Are there any tools you utilise to assist you to recognise a patient with sepsis?
8	Have you heard of 'SIRS' criteria and, if so, do you recall what they are?
9	Have you heard of qSOFA and, if so, can you give me some idea of your understanding of what qSOFA includes?
10	How confident are you about recognising a patient with sepsis on a quiet shift at [study site] ED?
11	How confident are you about recognising a patient with sepsis on a busy shift at [study site] ED?
12	How confident are you about recognising a patient with sepsis in the Resuscitation pod at [study site]?
13	How confident are you about recognising a patient with sepsis in the Short Stay Unit at [study site]?
14	How confident are you about recognising a patient with sepsis in the Minor Injuries Unit at [study site]?
15	How confident are you about recognising a patient with sepsis in the triage at [study site]?
16	Do you have typical or 'standard' expectations of care patterns or pathways for the management of patients with sepsis?
17	What do you think is your primary role in caring for patients with sepsis?
18	What do you believe are the important factors in managing a patient with sepsis?
19	What do you consider the impact of sepsis to be at [study site]?
20	Are there any changes you believe that could be introduced to [study site] ED in order for nurses to effectively recognise sepsis? What elements or components might you improve? Why have you chosen these components? How might you introduce such changes?
21	What are the barriers to recognising sepsis at [study site]? How could they be overcome?
22	Are there other thoughts you have about sepsis in ED and nursing roles in managing these patients?

[4,9,10]. Despite a decline in case-fatality rates, the incidence rate for sepsis has been increasing over the past two decades driving an increase in the number of deaths [11].

The value of the multidisciplinary team has been emphasised in international sepsis guidelines [10]. Yet there is no specific mention of the role of nurses in current sepsis guidelines [1,12]. Emergency nurses are key to early recognition and response to patients with sepsis [6,10,12,13]. However, how ED nurses recognise and respond to patients with sepsis is not clearly understood [10,14] and a gap in research exploring this complex but important phenomenon is evident. Without a clear understanding of the capacities and supports for ED nurse recognition and response to people presenting to EDs with sepsis, care bundles are likely to be applied inconsistently and this may hamper care delivery [15]. In this study we sought to explore and understand ED nurses' knowledge of sepsis, and identify gaps in clinical practices surrounding the ability to recognise, respond and manage sepsis within the ED. The knowledge and insights gained from this study may be used to inform local and international ED policies pertaining to sepsis recognition, escalation and management, and enrich nursing educational packages that may be used to improve quality of patient care and patient outcomes.

## 2. Methods

A descriptive qualitative design was chosen for this study. Data was collected using semi-structured interviews exploring ED nurses' experiences and perceptions of recognising and responding to patients with sepsis.

### 2.1. Setting

The hospital setting is a 750-bed public tertiary teaching facility. The census in 2016 was 102,286 ED attendances, of which 24.4% were paediatric. The ED has a single-point central triage system, triaging ambulance arrivals and public walk-ins at two adjoining counters via two separate triage-competent nurses. Thus the triage nurse is the first point of contact within the ED, responsible for preliminary assessment and triaging of patients according to the Australasian Triage Scale (ATS) [16]. The triage nurse assigns patients a triage category and allocates the clinical area in ED that the patient will be transferred to; for example, minor injuries or the resuscitation zone. The ATS provides consistent standards for the maximum time patients are considered safe to wait for emergency care [16].

### 2.2. Sample

A purposeful sample of consenting registered nurses who worked clinically in the ED and who had previously cared for a patient with sepsis were invited to participate in this study. Data collection occurred over a three-week time period in August and September 2017. Participants were recruited by an invitation issued to all nursing staff by the primary researcher (AH) at staff meetings and education sessions over the span of two months. The ED registered nurses (RNs) who met the inclusion criteria contacted the researcher if they were interested in being interviewed. Participants met the inclusion criteria if they were currently employed and had cared for a patient with sepsis within the ED. Purposively selected participants were provided with a verbal explanation of the project and also a participant information sheet to keep (as per ethical approval requirements) and, once they indicated understanding of the project and foci, they signed a consent form. Participants ranged from new graduate registered nurses (NGR) to clinical nurses (CN). In this study participants with a variety of clinical experience were recruited.

Face-to-face interviews were held between each participant and a trained researcher (AH). Participants were not clinically responsible for patients during the interview period. The initial pilot interview was undertaken with two interviewers (AH and AJ), one experienced and one inexperienced, to ensure that the interview guide was effective in practice and that the interview process was effective. This included a specific participant consent. Interviews were conducted in a room at the hospital separate to the ward area and were arranged at a date and time convenient for the participant. The lead researcher (AH) was familiar with the organisation and structure of the ED, working clinical shifts within the ED in which the research took place. Recruitment of participants continued until data saturation was reached with no additional information (new themes/concepts) revealed.

### 2.3. Data collection and analysis

All interviews were recorded using a digital recorder and transcribed by the researcher. Interviews took between 30 and 60 min. Given that factors affecting ED nurses' experiences, perceptions, and practices of recognising and responding to the patient with sepsis has been explored in a limited manner, interview questions were broad (see Table 1), giving participants the opportunity to tell their stories and recount their experiences. The questions used in the interview guide

were developed in response to limitations and research recommendations noted in existing literature. The interview guide questions were reviewed and refined by several members of the research team and then pilot tested with two research RNs prior to application in the pilot interview. Interview questions/prompts are included in Table 1.

We used a qualitative content analysis method described by Graneheim and Lundman (2004) [17] to deductively analyse the data. Content analysis is a method of analysing written or verbal communication in a systematic way [18]. Qualitative content analysis focuses on subject and context and emphasises variation between the text, thus it offers researchers the opportunity to analyse manifest and descriptive content as well as latent and interpretative content [17]. Content analysis is suitable for simple reporting of common issues mentioned in the data; as in this study. The process of content analysis enables data to be analysed qualitatively, and at the same time quantify data [19].

First, we read the interviews through several times to obtain a sense of the whole, then the text was divided into meaningful units that were condensed, coded and sorted into groups with similar content as a form of data categorization. These were then abstracted into subthemes. The subthemes were subsequently abstracted into tentative and emerging themes. Three researchers (AH, AJ and DM) discussed and revised these emerging themes. A process of reflection and discussion resulted in agreement of how to sort the data. Finally, the underlying meaning, that is the latent concept, of the categories were assigned a final theme. An example of the data synthesis progression from a free text data sample to code, subthemes and final theme is given in Fig. 1.

#### 2.4. Ethical considerations

Approval from the hospital’s Human Research Ethics Committee was obtained (HREC/17/QGC/41) for this study. The study was also supported by the ED clinical managers (nursing and medical).

#### 2.5. Rigour

To limit risks of errors, and to ensure dependability, transferability, confirmability and credibility, clear analysis guidelines were used [21]. Prolonged engagement with the data through repeated review and discussion of the interview transcripts by the research team enabled a deeper understanding of the data and helped ensure the credibility of the study. Independent review of the transcripts by researchers with different clinical and research lens’ enhanced the veracity of the theme identification. Contextual data from the setting was reported to enable reviewers/readers to evaluate applications to other settings (transferability), and findings.

### 3. Results

A total of 14 RNs employed in the ED were recruited. Five nurses declined to provide demographic data, thus demographic data is based on the remaining nine participants. The mean number of years of nursing experience of the participants was 7.8 (range: 6 months–25 years). Both male (13%) and female nurses with a range of seniority were interviewed. Senior (clinical) nurses (20%) and RNs were included. Each participant was assigned a code. The code was based on nursing grade and years of experience. Narratives cited reflect all 14 participants and range from NGR to CNs.

Six key themes were identified, (1) contribution of the organisation, (2) appreciation of knowledge, (3) appreciation of clinical urgency, (4) appreciation of importance of staff supervision, (5) awareness of the importance of staff experience and (6) awareness of the need to seek advice. These themes were mentioned with both positive and negative perspectives (see Table 2). These aligned with the work of McQuillan et al.[20] in their work on suboptimal patient care pertaining to recognising and responding to patient deterioration prior to Intensive Care Unit (ICU) admission.

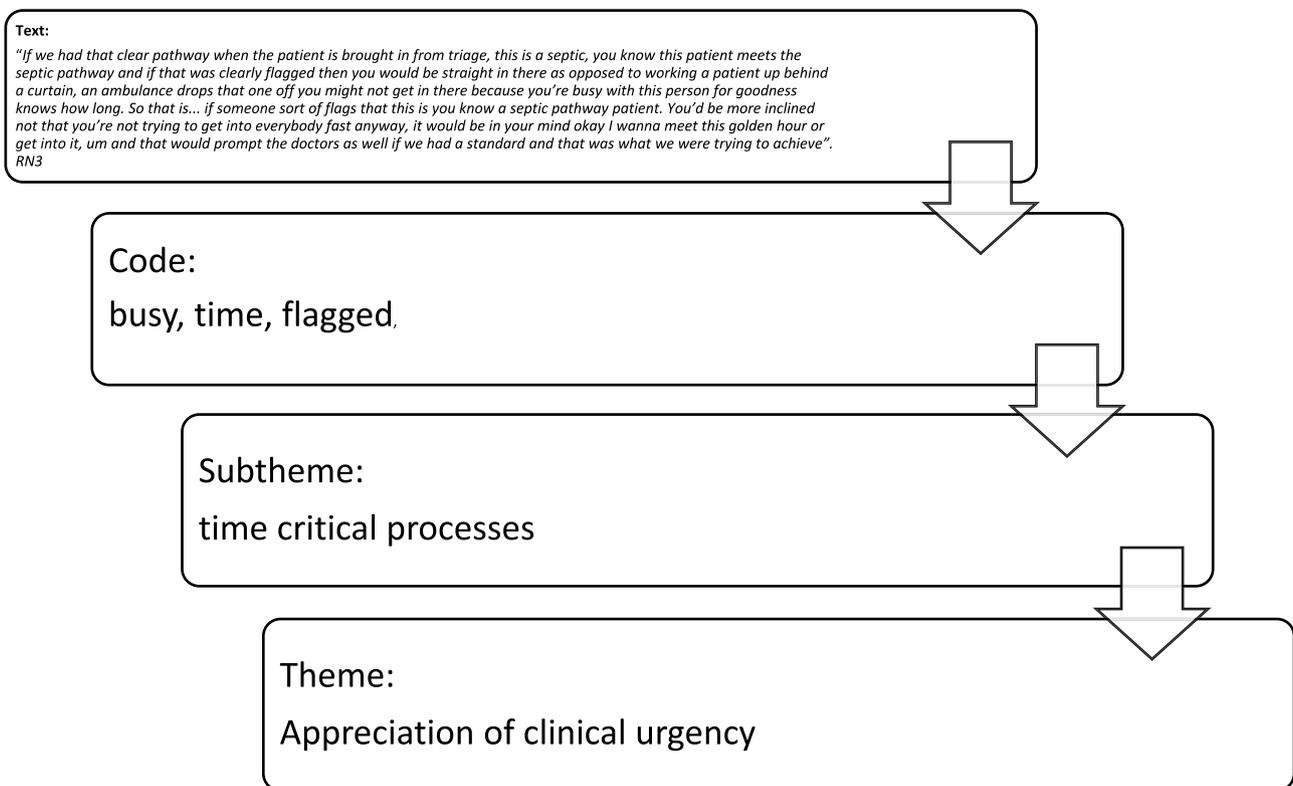


Fig. 1. Exemplar of the process of development of codes, subthemes and themes. Data synthesis from free text to subthemes was undertaken via team discussion, reflection and consensus agreement. Subthemes aligned with the work of McQuillan et al.’s study (1998) in their work regarding suboptimal patient care pertaining to recognising and responding to patient deterioration.

**Table 2**  
Content analysis of interview data by identified themes.

Number of participant references in transcript data	Contribution of organization	Appreciation of knowledge	Appreciation of urgency	Appreciation of clinical supervision	Awareness of importance of staff experience	Awareness of importance of staff advice
Positive appreciation	61	115	78	13	41	63
Negative appreciation	136	50	60	48	43	27

### 3.1. Theme one: Contribution of the organisation

The contribution of the organisation was identified by participants as important in inhibiting or facilitating their capacity to recognise and respond to the patient with sepsis. Participants highlighted that organisational factors were often related to processes and models of care, and that the availability of resources impacted on their ability to recognise and respond to the patient with sepsis. For example;

*“You don’t actually think really about the patient’s well-being. You know they’re unwell, but you don’t um you’re more interested and the pressures about the [patient] flow. The majority of our shift is all about flow, it’s about flow of the inpatients by ambulance and looking at maybe it’s because I have done a lot of BPIO [Business Practice Improvement Officer] stuff and NEAT [National Emergency Access Target] stuff I tend to look at the time a lot... From, a nursing point of view and it sounds really horrible to say out of my mouth, but I think that the patient comes second as the flow of the department comes first, which is against everything that you’ve trained for. It’s so fast changing. You don’t have the time and with flow your patients have been ripped out from under you and your getting new ones in. I just don’t think that you’ve got time to fully assess them and work them up until the next one arrives”. CN1*

*“Time constraints make nurses not have time to ‘think’ therefore being task orientated and less likely to recognise sepsis- not engaging your brain as much when you are busy, and task orientated. You write the observations down so all the boxes are ticked, patient can be moved into next area and so busy between different jobs that you are not actually thinking about what you are doing. You are not in a space to think as it is so fast”. RN4*

*“When you are really busy you um, people go into auto pilot and then they’re just as opposed to assessing what’s actually on in their head they become more task orientated in saying ok this is what I need to do and they focus more on putting the dots on the lines on a piece of paper rather than what the dots on the lines actually mean”. NGR*

A common theme amongst all the participants was that the organisation situational factors including the high volume and acuity of patients presenting to the ED, increased demands for flow, NEAT and the triage system used to assess patients presenting to ED all impacted on nurses’ ability to recognise and respond to the patient with sepsis. These factors limited or prevented holistic patient assessment, diminished critical thinking and clinical reasoning, and directed resources away from recognition and response to patients with sepsis.

### 3.2. Theme two: Appreciation of knowledge

Despite participants acknowledging the provision of sepsis-specific education, when asked about criteria for diagnosis and clinical indicators of sepsis, only one was able to recall the screening tool for sepsis (i.e. SIRS criteria). None of the participants were able to identify qSOFA criteria (see Table 3). Participants’ definitions and symptoms of sepsis were not aligned with recognised definitions of sepsis and participants were not aware of SIRS or qSOFA criteria.

*“I guess there are tools that I don’t know about. I think if I was assessing more patients I would probably... literally just triage the patient and go give them a category two and move them in”. CN1*

**Table 3**  
ED nurses’ awareness of common sepsis screening and prognostic tools.

	Awareness (#)
Recognition/application of recognised sepsis identification tools (qSOFA/SIRS)	1
Evidence of identification/clinical use of components of sepsis recognition tools (e.g. QADDS, vital signs)	26

“I think a lot of people have, kind of have basic knowledge of what they think sepsis is, but no one really knows how to look after septic patient... it's, I just don't think anyone really has a really good grasp on what we're doing”. RN4

### 3.3. Theme three: Appreciation of clinical urgency

Participants identified that, in combination with knowledge and the use of clinical deterioration tools such as the Queensland Adult Deterioration Detection System (Q-ADDS; see Table 3) based on combined vital signs, they were mostly able to appreciate the urgency of sepsis recognition and management. Participants reported that the seniority of the ED nurse attempting to escalate, and thus expedite patient care as well as the seniority of the treating medical officer impacted care by means of a more timely review. Failure to appreciate urgency was intimately linked to inability to rapidly escalate care because of the time-poor senior medical and nursing staff working in an ED; a phenomenon exacerbated by high patient volume and acuity. Participants identified that they were responsible for recognising patients with sepsis and escalating to a medical officer, as well as for the direct administration of antibiotics once they had been prescribed; these multiple and complex activities all impacting on timely care delivery. Participants felt that they would have greater success in timely identification of patient deterioration and in rapid escalation of their concerns if they had more time to assess the patient; either at triage or when first assigned to them. Participants acknowledged that a sepsis pathway would empower them to escalate care in a more timely manner. These are exemplified by the following quotes:

“If we had that clear pathway when the patient is brought in from triage, this is a septic, you know this patient meets the septic pathway and if that was clearly flagged then you would be straight in there as opposed to working a patient up behind a curtain, an ambulance drops that one off you might not get in there because you're busy with this person for goodness knows how long. So that is... if someone sort of flags that this is you know a septic pathway patient. You'd be more inclined not that you're not trying to get into everybody fast anyway, it would be in your mind okay I wanna meet this golden hour or get into it, um and that would prompt the doctors as well if we had a standard and that was what we were trying to achieve”. RN3

“I went and did the pH and as I was walking back with it because I was significantly concerned about the patient I actually highlighted it to the consultant at that stage, and I actually physically pushed a patient through to a resus bed I was concerned that they were deteriorating”. RN2

### 3.4. Theme four: Appreciation of the importance of staff supervision

Increasing patient acuity, patient flow, and challenging models of care were reported to limit participants' abilities to supervise patients and other staff. In their interviews, participants spoke of how important senior staff were in assisting to recognise and respond to the patient with sepsis; for example:

“I think you have experienced nurses that may be looking after the right place [patient] at the right time, you may have inexperienced nurses that are new to the department, new to ED assessment skills who may not be looking after the right patients at the right time and I think that is variable every day in every situation and every place. And I think that would play a part in the recognition of sepsis... Someone that's there being able to go over those things”. RN1

“I think we've got a lot of junior staff that have not been supported I have grave concerns for nurses going to triage too early... I think really that it would be nice if we could start off in one area and become confident and

then by the time you came to certain areas you would be confident in what you do. There are patients in the waiting room and they're (nurses) meant to be spotting acutely ill patients”. CN1

### 3.5. Theme five: Awareness of the importance of staff experience

Participants highlighted the impact of inexperienced nurses who may have difficulties recognising sepsis and deterioration and that lack of experience lead to delays in escalation, lack of recognition of red flags and deficits in utilising critical thinking; all skills that take time to develop over the course of ED nursing experience. Participants related sepsis recognition to ‘piecing together a puzzle’; at times ‘gut instinct’ was all they had to go off - as vital signs alone were not enough to reliably identify patients with sepsis. Participants also reported that the inexperience of junior doctors impacted on their ability to respond to patient with sepsis with perceived delays in antibiotic prescribing, and communication.

“I think it's experience, umm, and probably our education. Experience is the biggest thing though, because you can look at a patient and know that they're unwell, as oppose to, you know, having to go through and talk to the patient. You just get that look, you know that, bottom of your stomach feeling? Yep, gut instinct. Yeah, and that takes time to learn, your gut instinct”. CN1

“I think it just comes with clinical experience um those who have been exposed to a patient with sepsis they then know the signs and symptoms where a junior nurse may not know some of the subtle signs of a septic patient, um some of the junior staff are just fixated on vital signs and early warning tools so looking at that and not looking at the actual picture of the patient itself and assessing the colour of the patient and rashes and things like that they just look at observations and that's all there focused on um so I think it just comes with clinically experience and expose to different cases”. RN4

“... You can go to a junior doctor and say, ‘this is what I have’ but...they will not actually recognise that you have seen that you have a sick patient and you want them now...as opposed to being able to go up to a senior... and they will come usually straight away”. CN1

### 3.6. Theme six: Awareness of the need to seek advice

Nurses in EDs work as part of a hierarchical multidisciplinary team that should, in theory, ensure that inexperienced nurses or those who are uncertain about the constellation of observations from a specific patient can seek input from more senior and experienced clinicians. Many factors seemed to influence failure to seek out advice about recognising and responding to the patient with sepsis. Some participants talked about how the capacity to seek advice was empowering and added to patient safety. For example:

“I know when to escalate, um we have good relationships with doctors I'm not a scared nurse anymore. [...] [What gave you the power to go to another Dr?] It's my patient advocate, it's the patients declining, it's not a straight forward thing obviously, GCS is dropping, blood pressure's dropping, there's something wrong”. RN3

“they [nurses] might not want to speak up, or, feel confident to speak up to say that somethings not right”. RN2

“Yeah to go and find someone definitely... and it's interesting to think depending on who your team leader, can also affect whether or not you might escalate it or you don't because sometimes certain personalities, you know I was just thinking about what we, you know sometimes you might intimidated by that person so you might not want to go and say something. You know what I mean yep so you might hold back a bit and that may delay things”. RN3

#### 4. Discussion

This is the first study to explore ED nurses' experiences and perceptions of recognising and responding to patients with sepsis, and thus makes an important and unique contribution to knowledge about this complex clinical phenomena. Recognising and responding to the patient with sepsis can be challenging and is dependent on appropriately trained clinicians. Nurses' roles in recognising and responding to the patient with sepsis in the ED cannot be understated, yet international sepsis guidelines [1] do not specify the role of the nurse in sepsis management. This study is important because it acknowledges the clinical and organisational factors that influence ED nurses' roles in recognising and responding to the patient with sepsis and informs understanding of the unique contribution ED nurses make to recognising and responding to the patient with sepsis.

Nurse participants who contributed to this study identified several strengths and deficits in their knowledge of sepsis. They highlighted a number of positive and negative factors that impacted on their knowledge and clinical practice and that of other nursing staff in the ED. They identified a number of components of clinical care gaps that aligned well with previously described models of suboptimal care [20]. These identified gaps and deficits can be used to inform the development of local and international ED policies and to enrich clinical educational packages that seek to improve quality of care and outcomes for patients with sepsis.

The participants' perspectives were aligned with six main inter-related themes; including contribution of the organisation, appreciation of knowledge, appreciation of clinical urgency, appreciation of importance of staff supervision, awareness of the importance of staff experience and awareness of the need to seek advice. Each of these themes could be addressed via targeted educational packages that can be used to develop nursing contributions to sepsis clinical management pathways to support future care and promote ED nurses' roles in sepsis recognition and management [9,10].

In this qualitative study emergency nurses identified important organisational and professional structures and processes influencing their capacities to respond appropriately to patients with sepsis. A key component of being an ED nurse is assessment; having a keen eye for recognition of deterioration [20]. The importance of early recognition and response to sepsis to prevent patient deterioration has been identified by numerous researchers [4,5,7,22]. Rapid response to sepsis and initiation of appropriate treatment is critical to patient survival and recovery [6,7]. Many of these themes have been identified as important by other researchers who have explored factors influencing nurses' recognition of and response to patient deterioration in other in-hospital settings [10,13,23].

Participants in this study consistently emphasised the importance of their nursing role in sepsis recognition and management and the importance of organisational structures and processes that assist or prevent them from recognising and responding to the patient with sepsis. Organisational factors were highlighted by the nurses interviewed in this study, often in conjunction with identified limitations of staff supervision and influencing elements perceived by nurses to seek advice when caring for patients with sepsis. Supervision has been defined as an exchange between practicing professionals to enable the development of professional skills [24]. Emergency nurses, particularly triage nurses, are often the first line responders to patients with sepsis and thus should be experienced with and knowledgeable about sepsis presentation and management. They should also be well supported organisationally and by more senior staff to help ensure appropriate and timely patient care. Of particular concern from these data were the apparent impacts of ED time pressures on nursing assessments that could be used to inform recognition of sepsis in presenting patients, coupled with the common lack of awareness of and familiarity with tools, namely SIRS criteria and qSOFA, that aim to identify those patients who may have sepsis and those who are likely to have poor outcomes from sepsis, respectively.

Lack of knowledge and thus capacity to recognise sepsis at the bedside by ward or paediatric nurses has been highlighted in other studies [14,25]. This may result in delayed interventions and increased mortality and morbidity. The solution posed previously has been provision of education to nurses, however nurses in this study identified that education alone can be insufficient or ineffective and that it needs to be delivered in a contextually appropriate setting with appropriate timing. This is challenging in a busy ED where capacity to escalate care and access and support may be impeded by lack of confidence to seek assistance with initial identification.

#### 5. Strengths and limitations

In this study a detailed exploration of ED nurses' experiences and perceptions of practices around recognising and responding to patients with sepsis was undertaken. In reporting the results of this study, we offer an improved understanding of this complex clinical and important topic. Accessing and exploring the experiences and perceptions of frontline staff within the clinical environment adds to the strength of this study. However, a limitation of the study was that participants were interviewed retrospectively about their experiences and perceptions of recognising and responding to patients with sepsis and it is possible that the interview data could have been affected in part by this delay between care delivery and interview. Another limitation of undertaking the research in the clinical environment is that the ED environment is extremely busy, which may have impacted on participants' availability to participate in the study. Some of the participants were still busy or tired after a long shift and this may have impacted on the quality of data. The data analysed was based on self-reported practice that may or may not reflect actual clinical practice. In addition, this study was conducted in a single site. The inclusion of multiple sites may have presented a more comprehensive understanding of the phenomenon of interest and provided findings that were more transferable and generalisable to other settings.

#### 6. Recommendations

Despite its limitations, this study has contributed to the body of knowledge about how ED nurses recognise and respond to patients with sepsis. The nurses interviewed in this study identified that they often struggled to recognise and escalate patients with sepsis and were unable to identify recognised sepsis tools (i.e. qSOFA and SIRS criteria). This finding suggests that further opportunity exists to prepare for ED nurses to identify and manage patients with sepsis. We recommend that context-specific nursing educational packages to support an informed multidisciplinary team approach to sepsis in EDs be explored.

Organisational factors were identified as a significant barrier to recognising and responding to patients with sepsis in the ED. Quality time-based ED indicators like NEAT appeared to negatively impact on participants' clinical reasoning skills. We propose that further research exploring the impact of time-based indicators on recognising and responding to the patient with sepsis in the ED is required.

Nurses interviewed in this study identified that organisational, professional and clinical barriers existed in their clinical practice that impacted on their ability to recognise and respond to the patient with sepsis. A number of participants acknowledged that a clear evidence-based sepsis pathway would be a useful adjunct to clinical practice and promote early recognition and response to the patient with sepsis. It may therefore now be timely, for researchers and clinicians to explore the feasibility of developing a nurse-inclusive sepsis pathway.

#### 7. Conclusion

Recognising, and responding to the patient with sepsis in the ED is complex, challenging, and multifaceted. The value of the ED nurse's role in recognising and responding to the patient with sepsis cannot be

understated. Nurses in this study described a range of factors that affected their ability to recognise and respond to the patient with sepsis in the ED setting. Research, education and health care providers will need to ensure that nursing educational programs and system modifications are developed to promote ED nurses' recognition and response to the patient with sepsis. Many of these barriers could be addressed in a well-developed clinical care sepsis pathway.

## 8. Disclosure

None of the authors has any conflict of interest. Several of the authors are/were employed where the study took place. All authors made substantial contributions to the following: (1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, and all provided (3) final approval of the version that was submitted.

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