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RESEARCH ARTICLE

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Swedish emergency nurses' experiences of the preconditions for the safe collection of blood culture in the emergency department during the COVID-19 pandemic

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Abstract

Aim: To describe how Swedish emergency nurses experience the preconditions of providing safe care during the COVID-19 pandemic when collecting blood culture in the emergency department.

Design: A qualitative exploratory design using content analysis with a manifest approach.

Method: Semi-structured interviews were conducted with 13 emergency nurses working in the emergency department.

Results: The analysis resulted in one main category: unprecedented preconditions create extraordinary stress and jeopardize safe care when collecting blood culture. This main category includes four additional categories: organizational changes, challenges in the isolation room, heavy workload creates great stress, and continuous learning.

Conclusion: The COVID-19 outbreak has made the emergency department a workplace where constant changes of routines combined with new information and reorganization risk jeopardize safe care during blood culture sampling. Accordingly, high workload and stress have been identified as a reason for emergency nurses not following guidelines. It is therefore necessary to optimize the preconditions during blood culture sampling and identify situations where there are shortcomings.

KEYWORDS
blood culture contamination, COVID-19, emergency nursing, emergency service, qualitative research, safe care

1 | INTRODUCTION

In Sweden, blood culture sampling is a frequently used technical procedure carried out by the emergency nurses in the emergency departments (ED) and requires sufficient time and attention when being performed. Contamination during blood culture sampling is a frequent problem, especially in EDs, which can lead to difficulties in giving the patient the right diagnosis and treatment (Cervero et al., 2019). The contamination usually occurs when the microorganism, mainly coagulant negative staphylococci (CNS), which normally exists on the patient's skin, come into contact with the sterile blood culture equipment (Garcia et al., 2015). The negative consequences of contaminated blood culture are prolonged patient treatment with increased healthcare costs and possible

suffering for the patient (Alahmadi et al., 2011; van der Heijden et al., 2011).

Studying and optimizing the procedure of blood culture sampling has several advantages (Lamy et al., 2016). For the emergency nurse, it can bring about increased awareness and understanding of where the risks and challenges are to be found in the clinical practice and how to contribute to safe care in a stressful work environment (Bentley et al., 2016). Safe care is one of the core competencies in the nursing profession and an essential foundation for providing health care of high quality (Svensk Sjuksköterskeförening, 2016). Safe care means minimizing the risk of harm to the patient and an active risk prevention approach taken by all healthcare professionals (Socialstyrelsen, 2019). Previous studies have shown that increased awareness of safe care in EDs reduces the number of negative incidents (Zwang & Albert, 2006), improves the safe administration of medication (Di Simone et al., 2018; Santos et al., 2019), and indicates the need of continuing education in safer care (Lee & Oh, 2020; Salgueiro-Oliveira et al., 2019). The emergency nurses' perceptions about aspects concerning safe care in EDs revealed risk factors such as high workload, a shortage of professionally trained emergency nurses in clinical practice, and an absence of support from managers (Bampi et al., 2017). Competence development and adequate staffing are considered to be important factors to maintain safe care (Bampi et al., 2017).

Overloaded and crowded EDs are an international phenomenon and one of the greatest challenges in emergency care today (Burstrom et al., 2013). A high patient influx to the ED, alongside a low discharge rate due to shortages of available beds in the hospital wards, risks turning the ED into an exhausting and stressful workplace for healthcare personnel (Klim et al., 2013). In addition, the Coronavirus disease (COVID-19), declared a pandemic by the World Health Organization (2020) in March 2020, has placed extra workload and stress on the ED. Under these extraordinary conditions, the emergency nurse in the ED experiences moral distress in giving care to the patients (Hou et al., 2020), physical and mental burdens owing to the heavy workload, and discomfort wearing personal protective equipment (PPE) (Xia et al., 2020) and high levels of stress caring for patients with COVID-19 (Ruiz-Fernández et al., 2020). Furthermore, the need to reorganize the ED in order to manage the COVID-19 outbreak and the challenges of communication and information management threaten safe care in the ED. Providing care for infected patients as well as patients seeking emergency care for other reasons has been an unprecedented challenge (Xia et al., 2020).

There are specific challenges for the emergency nurse under these extraordinary conditions in providing safe care when collecting blood cultures and risks related to ongoing and continued patient care if blood culture is contaminated. To the author's knowledge, an understanding of how Swedish emergency nurses experience the preconditions for providing safe care during the COVID-19 pandemic, when collecting blood cultures in the ED, is limited.

Thus, it is essential to acquire a broader knowledge of the subject.

2 | AIM

The aim of the study was to describe how Swedish emergency nurses experience the preconditions for providing safe care during the COVID-19 pandemic when collecting blood cultures in the ED.

3 | DESIGN

A qualitative exploratory interview study with 13 emergency nurses working at an ED was conducted, using inductive content analysis in accordance with Elo and Kyngäs (2008). Inductive content analysis is used in cases where there are no previous studies dealing with the phenomenon or when the knowledge of the studied area is limited or fragmented (Elo & Kyngäs, 2008).

4 | METHOD

4.1 | Study setting

This study was performed in a larger academic ED in southern Sweden. The ED has 48 beds and offers emergency care for both adults and children with approximately 76,000 visitors seeking care during 2019. The ED is staffed by emergency physicians and physicians from other specialties, emergency nurses and nurse assistants', who treat and care for patients. Due to the COVID-19 outbreak, the ED was reorganized in March 2020, opening a COVID-ED with 14 isolation rooms in facilities close to the ED. Facilities in part of the ordinary ED were then partially closed, due to the need to staff the COVID-ED and as a part of the escalation plan for managing the pandemic. After admitting a lower number of patients seeking care for COVID- 19 related symptoms at the end of the summer and beginning of fall 2020, the incidence of cases and patients seeking the ED with COVID-19-related symptoms started to increase rapidly again during mid-October.

4.2 | Selection of participants

Using purposive sampling to identify participants (Satu et al., 2014), this study recruited 13 emergency nurses working a three-shift schedule (day, evening and night) in the ordinary ED and COVID-ED. Inclusion criteria for participation were: being an emergency nurse and having a minimum of approximately 1 year's work experience in the ED. This was considered a reasonable timeframe to be accustomed to the working demands and different parts of the ED. The first author of the study visited the ED during a staff meeting and presented the purpose of the study, enabling potential participants to ask questions (Polit & Beck, 2021). Written information and an inquiry of interest were then sent to all, at the time approximately 90 emergency nurses working at the ED. Information about the study was also included in weekly newsletters sent to all emergency

TABLE 1 Examples of the analysis process.

Participant	Meaning unit	Code	Subcategory	Category	Main category
P5	"So confusing, there were changes in routines and guidelines from day to day…one could start a dayshift on Monday and everything had changed during the weekend."	Confusing with constant changes to routines	Constant alterations of routines and new information	Organizational changes	Unprecedented preconditions create extraordinary stress and jeopardize safe care when collecting blood culture
P13	"…if more material is needed, it will take longer time… you either doff and don PPE or wait for help."	The procedure takes a longer time	Working in the isolation room	Challenges in the isolation room	
P10	"…some days you are responsible for 30 patients…you do not have the right conditions… everything goes too fast…one gets stressed".	Feeling of always having to work fast	High stress levels in the ED	High workload creates great amounts of stress	
P12	"Feedback…absolutely, it is our profession, we must work safely…it would have been very interesting".	Feedback regarding contamination enhance reflection	Feedback on contamination rates	Continuous learning	

nurses by one of the nurse managers. The emergency nurses who expressed interest in participating in the study were asked to sign a paper of written consent and return it by mail to the first author. As the written consents were received, participants were contacted consecutively for interviews by the first author.

4.3 | Data collection

In the data collection process, no new information emerged after 11 participants, although two more participants were included to ensure that informational redundancy had been achieved (Saunders et al., 2018). Hence, the subjects were enrolled until data saturation was observed. Since no new information emerged after 13 interviews data collection ended, and data analysis commenced. Interest from one more potential participant was then received, but due to the above was not included for the above reason. The interviews took place between October and November 2020. Ten interviews took place in facilities set apart from the ED and the last three through the video communication software Zoom, due to the increasing spread of the COVID-19 virus. All interviews were digitally recorded on a dictaphone and no other than the interviewer and the participant were present during the interviews. A diary was kept throughout the data collection process (Polit & Beck, 2021). A semi-structured interview guide with open-ended questions was used and demographic data were collected at the beginning of every interview.

The interview guide was developed through reading literature on safe care in the ED, blood culture sampling, and challenges in emergency care during the COVID-19 pandemic in addition to the interviewer's own experiences of working as an emergency nurse. A pilot test was conducted to evaluate the length of time required to obtain valuable and meaningful data. No modifications were required as the questions were understood and answered satisfactorily.

The opening question was: *What does safe care mean to you, during existing COVID-19 pandemic, when collecting blood cultures in the ED?* Interviews lasted between 33 and 60 min with a total length of 498 min. To guarantee anonymity, each participant received a code name (P1, P2, P3…P13) that was used throughout all further data processing.

4.4 | Data analysis

Data were transcribed by the first author verbatim prior to the data analysis and manifest content analysis with an inductive approach, as described by Elo and Kyngäs (2008), was performed. The analysis process was divided into three phases: (1) preparation, (2) organizing and (3) reporting.

The analysis was made by the first author with guidance from the third author and scrutinized by the second author. First, the transcripts were read several times to become familiar with the material. Next, the text was divided into meaning units, which could be sentences or phrases containing the participants' experiences of the preconditions for providing safe care when collecting blood cultures. These meaning units were then condensed and labelled with codes. The codes were compared with each other and those with similar content were grouped into nine subcategories that were named after the specific content. At the end of the analysis phase, the subcategories were grouped into four categories, which created

the main category. Throughout the analysis process, the content was discussed between the authors of this study (Table 1). This was done to provide a means to illustrate the studied phenomenon (Elo & Kyngäs, 2008). The results of the study are exemplified by quotes, which were translated into English by the first author.

4.5 | Ethical considerations

Permission to conduct this study was approved by the ED manager. According to Swedish Law (SFS, 2003:460) written consent is not necessary for studies that do not explore sensitive issues (e.g., politics or religion), and therefore no ethical review was needed. However, the ethical guidelines referred to were applied in this study. To minimize risk and ensure the integrity of the participants, facilities set apart from the workplace were used during the interviews (Polit & Beck, 2021). All participants were informed that they were free to withdraw at any time, without needing to give any reason. The data material was anonymized and presented confidentially. Computers used in the process of analysing data were secured and protected by means of passwords and kept offline when in use. Access to the data was only given to the authors of this study. The first author's pre-understanding of the problem area consists of her present clinical work as an emergency nurse at an ED (not the one where the study was conducted). The first author has no working relationship with the participants.

5 | RESULTS

In total, 13 emergency nurses participated in the study, eight women and five men. The participants mean age was 36 years (26–59) and the total general nursing experience ranged from 3 to 29 years, whilst the length of time the participants had worked in the ED ranged from 10 months to 20 years.One main category: Unprecedented preconditions create extraordinary stress and jeopardize safe care when collecting blood cultures, was identified and underpinned by four categories described by their nine subcategories. High workload and stress are considered the primary reason for not following guidelines, leading to the potential risk of blood culture contamination. The main category, categories and subcategories are presented in Table 2.

5.1 | Organizational changes

This category was supported by three subcategories: *constant alteration of routines and new information*, *reorganization of the ED and support from managers*. The participants described how the reorganization of the ED due to the effects of the pandemic had caused new challenges and threats to the already existing preconditions for the blood sampling procedure.

5.1.1 | Constant alteration of routines and new information

The constant alteration of routines was experienced as confusing, took a lot of energy and created uncertainty due to not knowing what the latest information was. It was also not possible to implement certain routines regarding working in isolation rooms. This could contribute to confusion among colleagues and negatively affect safe care when collecting blood cultures. One participant described how the feeling of uncertainty could lead to nurses making their own decisions regarding routines.

> It was new information every day when I came to work. In the end I did not know what was correct… It was very difficult to keep updated with all new directions.
>
> (P 9)

The overwhelming flood of information was described by all participants and was mentally stressful. Information was given at daily morning meetings, at the beginning of every work shift, by e-mail, and on the ED's webpage. Due to a lack of time for reading information during a work shift, verbal information passed between colleagues was crucial. Some participants stated that the information channels worked relatively well

TABLE 2 Identified main category, category, and subcategories.

Main category	Categories	Subcategories
Unprecedented preconditions create extraordinary stress and jeopardize safe care when collecting blood culture	Organizational changes	Constant alterations of routines and new information
		Reorganization of the ED
		Support from managers
	Challenges in the isolation room	To be well prepared
		Working in the isolation room
	High workload creates great amounts of stress	High stress levels in the ED
		Managing the stress
	Continuous learning	Education and reflection
		Feedback on contamination rates

but it was a great challenge to process all the information daily. Due to difficulties in information management, certain guidelines could not be followed. Constant changes to routines and a high information flow were experienced, especially during the first months of the pandemic.

5.1.2 | Reorganization of the ED

The opening of the COVID-ED in March 2020 was perceived by all participants as positive, enabling access to 14 isolation rooms, although it was very challenging at the beginning due to the new routines, work environment and need to ensure adequate staffing. The changes came at the expense of the ordinary ED, which was considered by the majority of participants to be more difficult to work in with fewer and narrower facilities and fewer staff. This could imply that blood cultures had to be collected in waiting rooms and hallways, with an increased risk of contamination. One participant stated:

> Since COVID, we've refurnished [the ordinary ED] and it was okay at the beginning, with small numbers of patients. But now we have the same influx of patients with half the facilities and fewer staff, it's completely unreasonable… standing by yourself with 20 patients, it's very hard, then you don't have the preconditions needed to take blood samples.
>
> (P 4)

5.1.3 | Support from managers

A specific group of physicians and an experienced emergency nurse were established, who created routines and guidelines for managing the care in the ED, gave updated information at daily meetings, and organized PPE education. The group alongside the managers was support for the staff, being available when questions arose. Some participants, however, expressed the desire for the managers to be more present in the ED.

5.2 | Challenges in the isolation room

This category is supported by two subcategories: *to be well prepared and working in the isolation room*. Collecting blood culture in the isolation rooms of the COVID-ED was experienced by all participants as a task that was time-consuming, required a great deal of planning and was complicated when the need for more equipment emerged.

5.2.1 | To be well prepared

Being well prepared before entering the isolation room was crucial. The use of PPE and the constant changes in what PPE to wear made the sampling procedure an unprecedentedly challenging task. One participant described this as meaning that all the uncertainty about what PPE to wear, or not, took the focus away from the actual blood sampling and preparing for it.

> One was not used to prepare oneself, so it was common to forget something and not easy to estimate how much material I needed to take with me into the isolation room. I think that was the greatest difference [prior to the pandemic].
>
> (P 12)

The PPE made the procedure more complicated due to the visor becoming fogged. It was difficult to get a clear view and to see if sufficient blood had been infused into the blood cultures bottles. In addition, the situation was perceived as very stressful when the shortage of PPE arose. The situation was exhausting, especially the first months, before routines became settled and less changes were made in what PPE to use.

5.2.2 | Working in the isolation room

All participants stated that safe care when collecting a blood culture means following the guidelines, but with new and challenging preconditions. When in the isolation room, if more material for the procedure was needed, e.g. gloves, alcohol swabs or other crucial elements to make the procedure safe and avoid contamination, the participants pushed the assistant button and waited for a colleague to respond. If no help came within a reasonable time, the emergency nurse had to leave the isolation room, remove the PPE, go outside and enter the COVID-ED once more. The procedure was perceived as frustrating due to the prolonged time and having to work alone, and as challenging to safe care.

> I experience that it [blood sampling] takes longer time in the COVID-ED. The other two staff nurses are occupied with other patients, it can take 5–10 min before somebody can get me more material. It can be that I must skip the blood cultures, go out, doff the PPE and then enter again. It's very stressful.
>
> (P 2)

Due to the new routines, the participants stated that many errors had occurred. Incorrectly marked blood cultures and accompanying request forms, and patient identification not having been established, led to confusion over results, which all jeopardized safe care. The crucial moments usually occurred when, still dressed in PPE in the isolation room, the emergency nurses handed over the blood cultures to a colleague, according to routines. Due to the high incidents of errors, the routine of collecting blood culture was changed. A high number of incidents was reported, especially during the first months of the pandemic.

5.3 | High workload creates a great amount of stress

This category is supported by two subcategories: *high stress levels in the ED* and managing the stress. All participants said that a high workload and stress were an everyday conditions when working as an emergency nurse in the ED even under normal circumstances. However, because of the pandemic, the conditions were experienced as extremely exhausting and both physically and emotionally challenging.

5.3.1 | High stress levels in the ED

The high workload created stress in abundance and contributed to negligence in following the procedure, in order trying to work faster. The emergency nurses needed to find ways to handle the situation and cutting corners when collecting blood cultures was common. One participant said:

> To go into the patient [in isolation] when you know you have three to four more acutely ill patients that are alone in an isolation room… waiting for me…it didn't make things easier. I can't spend enough time with the patient…but it's clear, one gets careless in one's work, you don't let the skin dry enough or you use the alcohol swabs too little.
>
> (P 10)

High stress levels and the feeling of always being on the run, even if you do not need to, influenced safe care when collecting blood culture. This could result in not following the chlorhexidine process for prepping the skin, touching the skin after prepping the site, or collecting to small a blood volume. High stress levels were also perceived by the participants when working with an acutely ill patients in the ED and the need for rapid blood sampling before the administration of antibiotics. Experiencing difficulties in finding sufficient recovery, due to the working demands of high numbers of patients seeking care and a new virus, caused mental fatigue among the emergency nurses.

> At the beginning I didn't reflect so much. I had to give everything, for ethical reasons … I took extra work shifts, I didn't ask any questions then and when it all started to slow down a little bit, I thought; Oh my, I'm so tired!
>
> (P 5)

5.3.2 | Managing the stress

Lack of time was considered a dominant component in not providing safe care during the procedure. One way to handle the situation and try to work calmly instead of rushing was to think about the risks of contamination for the patient.

> Sometimes we should think about [the consequences] …instead of rushing… either more time or contamination.
>
> (P1)

Focusing on one task at a time, even with a long list of nursing duties waiting to be done, was another approach.

> In these extremely stressful situations, one has to take a deep breath and consider; what is most important? Many times, it's about caring for several acutely ill patients at the same time. The work in the ED is all about prioritizing.
>
> (P 10)

5.4 | Continuous learning

This category is supported by two subcategories: *education and reflection, and feedback on contamination rates*. Continuous learning through reflections between colleagues and feedback regarding contamination were described as important preconditions for providing safe care during the procedure.

5.4.1 | Education and reflection

The majority of the participants expressed a need for regular training and reflection on safe care between colleagues. The education was to be given to all staff collecting blood cultures once a year.

> We could have a small rehearsal just to repeat what we know and that we need to be more observant and more aware of doing it in the right way.
>
> (P 7)

Education in the procedure had been offered 1 year prior to the COVID-19 outbreak and was also given at the beginning of the pandemic due to the new situation, such as working in the isolation room. The educational sessions were very much appreciated. One participant brought up the importance of learning from each other when involve in clinical work and using reflection as a method to improve safe care in this procedure. Having a positive attitude towards collegial learning was seen as important, but also acknowledging that not everyone is used to this or appreciates it.

> To understand, to reflect over the fact that the procedure can take the same amount of time, but be safer… I think one needs to teach as an experienced colleague.

> I think we're a little scared of teaching hands-on, not wanting to cause offense to a colleague.
>
> (P 1)

5.4.2 | Feedback on contamination rate

Participants said that safe care when collecting blood culture could be jeopardized due to ignorance of safe practices, or sometimes being unaware of the consequences for the patient. All the participants were positive about and desired individual feedback regarding the contamination rate as well as the total contamination rate for the ED. One participant said:

> Why not? Then I would get a clear view of whether I'm doing it right or not. If many are contaminated, I will have to think through how I do it, I would also consider the workplace and bring up the question; what is it that's not working?
>
> (P 3)

6 | DISCUSSION

The objective of this study was to describe how Swedish emergency nurses experience the preconditions for providing safe care during the COVID-19 pandemic when collecting blood cultures. The unprecedented conditions that have emerged due to the COVID-19 outbreak have made the ED into an extremely stressful workplace with new routines, constant changes to information and reorganization of the physical layout. These aspects have also been shown in other studies (Hou et al., 2020; Shanafelt et al., 2020). However, the results of this study can contribute to a deeper understanding and insight into the challenges of providing safe care when collecting blood cultures in the ED. This understanding is based on a profession-specific perspective, namely the emergency nurses' perspective during the COVID-19 pandemic.

One of the findings of this study shows that the emergency nurses have knowledge about safe practice when collecting blood cultures, but the information management, with constant changes of routines, leads to great uncertainty, with emergency nurses not knowing what the latest information is. This could contribute to confusion among colleagues due to lack of opportunities to be updated during a work shift. This is in line with other studies revealing challenges in internal communication (Freund, 2020) and having to familiarize oneself with new and changing protocols and pharmacological treatments (González-Gil et al., 2021). Information management is known for being a challenging task, especially in large EDs. In this study, a specific group was established early on to develop new routines and provide conditions for the emergency nurses to ensure safe care, as well as provide daily updated information. However, almost all the participants described an overwhelming information flow and their struggle to keep up with it. This implies a need to take steps to reevaluate information channels to ensure safe care and provide opportunities for emergency nurses to reflect upon new routines. In addition, protocols and guidelines developed during the pandemic need to be followed up and readjusted for specific clinical settings (Moeller, 2017).

Working in the isolation room during the COVID-ED, with a high incidence of suspected cases every day, was a new phenomenon. The participants stated that it was as important to work fast, with a high workflow, enabling new patients to be seen in the COVID-ED, findings also reported by Comelli et al. (2020). Adequate preparation before entering the isolation room was crucial. This corresponds with the finding of González-Gil et al. (2021), indicating that emergency nurses are exposed to numerous new working conditions and an elevated workload while having to take on more responsibilities when caring for patients with suspected COVID-19.

PPE was mandated for the participants while caring for suspected or confirmed COVID-19 patients, and the constant donning and doffing were experienced as exhausting. Ong et al. (2020) confirm this, reporting that PPE often felt awkward, uncomfortable and caused headaches, which affected the level of work performance. One participant in the present study also described the mental impact of being exhausted working in PPE for a long time, and the influence of this on decision-making ability. When possible, the charge nurse should consider positioning emergency nurses evenly across the ED, enabling them to work in other areas where PPE is not needed.

During the COVID-19 pandemic, emergency nurses have been more likely to experience an excessive workload than previously (An et al., 2020). In this study, stress and high workload were perceived as the primary reason for not following guidelines. It is the responsibility of emergency nurses to understand the factors contributing to contamination and bring up problems when they arise (Lee & Oh, 2020), which also was done, according to the participants. However, due to the extremely high workload, the participants not being able to control the influx of patients to the ED and the feeling of being short-staffed, it was difficult to avoid cutting corners when collecting blood cultures. This supports other findings showing that overcrowding and a stressful work environment contribute to unsatisfactory patient care and are identified risk factors for increased blood culture contamination (Kilcoyne & Dowling, 2007; Lee et al., 2012). The physical and mental pressures experienced by the participants, due to the overwhelming workload and the stress of working in a fast-paced and a high-risk environment, require attention. The healthcare organization should ensure that the RNs are not overworked and fatigued since they need to perform to their utmost potential over a long period of time. Furthermore, the feeling of always being stressed, as expressed by some of the participants, even in calmer periods in the ED, is an urgent issue for the managers to handle in order to avoid job dissatisfaction, fatigue and burnout among the emergency nurses (Lai et al., 2020).

In this study, the majority of participants expressed the need for regular education and feedback on contamination rates. Previous research has shown that staff education in aseptic technique, with

a focus on teamwork, standardized guidelines for blood culture collection and feedback regarding contamination rates, reduces the number of contaminated specimens (Bowen et al., 2016; Denno & Gannon, 2013). One participant suggested using patient cases to demonstrate the consequences of contamination, as well as identifying possible challenges in the clinical setting of the ED, and practical training. The need for hands-on training, in contrast to conventional teaching and computer-assisted learning strategies, cannot be emphasized enough (Dawn Moeller, 2017; Shaheen et al., 2020). Learning while working (Davis et al., 2016) as well as end-of-shift debriefing methods to improve performance have also been shown to enhance safe care in the ED (Servotte et al., 2020).

6.1 | Methodological considerations

In this interview study, content analysis according to Elo and Kyngäs (2008) and Elo et al. (2014) was used for analysing data involving preparation, organizing, and reporting of results. Trustworthiness was assessed and described through, credibility, dependability, conformability, and transferability. To ensure credibility the participants were described accurately and with a range from 3 to 29 years of work experience between the participants, the width of the data was promoted. Among the participants (n 13) there was a predominance of women (n 8) as opposed to men (n 5) reflecting the gender inequality within the nursing profession in Sweden. A semi-structured interview guide was used and followed throughout all the interviews ensuring all the participants were asked the same questions and thereby dependability was strengthened. The first author, also the interviewer, was aware of her pre-understanding of the problem area, working as an RN in an ED in southern Sweden. However, the author's purpose was to acquire knowledge of the specific conditions, as experienced by the participants of the studied ED, previously unknown to the first author. In addition, to ensure credibility, a diary was kept enabling evaluation and continuous reflection during the data collection (Elo et al., 2014).

To ensure and increase the trustworthiness of the material the author read through the material several times and discussed the content with the mentor. The analysis process continued by returning to the data, changing, and creating categories that belonged and responded to the objective of the study. Trustworthiness was met by using citations from the participants in the interpretation and presentation of results (Elo et al., 2014).

6.2 | Limitations

The data collection occurred during October and beginning of November 2020, with the last three interviews occurring as the spread of the virus was rapidly increasing. The collected data might have been different if all the interviews had taken place during a period of the high, rapid spread of the COVID-19, or in a situation where low numbers of patients with COVID-19 were presenting at the ED. Furthermore, it is possible that the results of the data collection would have been different if the study had had a greater number of participants or had taken place in a different cultural context. In addition, the last three interviews were carried out using Zoom, which could also have affected the result. Transferability to other EDs and healthcare settings may be modest, due to different organizational contexts and each ED being unique its organization and premises.

6.3 | Implications for emergency nurses

As the pandemic continues, protocols and guidelines need to be continually adjusted to the clinical setting, with an awareness that a rapidly increased workload can generate hazardous incidents. It is therefore important to ensure that the emergency nurses have sufficient time to reflect upon and adjust to new routines, enabling a uniform approach.

The stressful and overloaded work conditions in the ED during the COVID-19 pandemic need to be addressed, thus enabling the RNs to give safe care when collecting blood cultures, and as a result, reduce the contamination rate. Hence the importance to provide regular training based on patient cases, reflection between colleagues and feedback regarding contamination rates, in order to ensure the competence of the emergency nurses when collecting blood cultures.

7 | CONCLUSION

The results indicate that factors influencing safe care when collecting blood culture during the COVID-19 pandemic are the successful flow of information, proper use of personal protective equipment, and a good reorganization strategy. In addition, constant changes in routines lead to great uncertainty for the emergency nurses, due to not knowing what the latest information is. The emergency nurses indicated that a rapidly increasing and very high workload created a great amount of stress and that cutting corners was a way to handle the situation.

As the pandemic continues, it is important to ensure safe care, keep track of contamination rates and make efforts to understand the probable reasons for cutting corners when collecting blood culture, as well as finding innovative solutions to enhance safe care.

AUTHOR CONTRIBUTIONS

GL carried out the conception of the study design, data collection, analysis, and drafting of the paper. MB and AL contributed by reviewing the analysis and the collected and transcribed data. GL carried out the drafting of the manuscript, MB and AL made critical revisions to the manuscript.

All authors have agreed on the final version and meet at least one of the following criteria [recommended by the ICMJE (http://www.icmje.org/recommendations/)]:

- substantial contributions to conception and design, acquisition of data or analysis and interpretation of data;
- drafting the article or revising it critically for important intellectual content.

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CONFLICT OF INTEREST

The author(s) declare(s) that they have no conflict of interest.

DATA AVAILABILITY STATEMENT

The data set generated and analyzed during the current study are not publicly available due to privacy or ethical reasons and protection of the participants' identity.

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REFERENCES

Alahmadi, Y. M., Aldeyab, M. A., McElnay, J. C., Scott, M. G., Darwish Elhajji, F. W., Magee, F. A., Dowds, M., Edwards, C., Fullerton, L., Tate, A., & Kearney, M. P. (2011). Clinical and economic impact of contaminated blood cultures within the hospital setting. *The Journal of Hospital Infection*, *77*(3), 233–236. https://doi.org/10.1016/j.jhin.2010.09.033

An, Y., Yang, Y., Wang, A., Li, Y., Zhang, Q., Cheung, T., Ungvari, G. S., Qin, M. Z., An, F. R., & Xiang, Y. T. (2020). Prevalence of depression and its impact on quality of life among frontline nurses in emergency departments during the COVID-19 outbreak. *Journal of Affective Disorders*, *276*, 312–315. https://doi.org/10.1016/j.jad.2020.06.047

Bampi, R., Lorenzini, E., Maroso Krauzer, I., Ferraz, L., Franco da Silva, E., & Dall'Agnol, C. M. (2017). Perspective of the nursing team on patient safety in an emergency unit. *Journal of Nursing UFPE /Revista de Enfermagem UFPE*, *11*(2), 584–590. https://doi.org/10.5205/reuol.10263-91568-1-RV.1102201713

Bentley, J., Thakore, S., Muir, L., Baird, A., & Lee, J. (2016). A change of culture: Reducing blood culture contamination rates in an emergency department. *BMJ Quality Improvement Reports*, *5*(1). https://doi.org/10.1136/bmjquality.u206760.w2754

Bowen, C. M., Coleman, T., & Cunningham, D. (2016). Reducing blood culture contaminations in the emergency department: It takes a team. *Journal of Emergency Nursing*, *42*(4), 306–311. https://doi.org/10.1016/j.jen.2015.10.021

Burstrom, L., Starrin, B., Engstrom, M. L., & Thulesius, H. (2013). Waiting management at the emergency department - A grounded theory study. *BMC Health Services Research*, *13*, 95. https://doi.org/10.1186/1472-6963-13-95

Cervero, M., Quevedo, S., Del Alamo, M., Del Valle, P., Wilhelmi, I., Torres, R., Agud, J. L., Alcazar, V., Vazquez, S., & Garcia, B. (2019). Efficacy of an information system addressed to nursing staff for diminishing contaminated blood cultures: A blind clinical trial. *Revista Española de Quimioterapia*, *32*(2), 130–136.

Comelli, I., Scioscioli, F., & Cervellin, G. (2020). Impact of the COVID-19 epidemic on census, organization and activity of a large urban emergency department. *Acta Biomed*, *91*(2), 45–49. https://doi.org/10.23750/abm.v91i2.9565

Davis, K., White, S., & Stephenson, M. (2016). The influence of workplace culture on nurses' learning experiences: A systematic review of qualitative evidence. *JBI Database of Systematic Reviews and Implementation Reports*, *14*(6), 274–346. https://doi.org/10.11124/jbisrir-2016-002219

Denno, J., & Gannon, M. (2013). Practical steps to lower blood culture contamination rates in the emergency department. *Journal of Emergency Nursing*, *39*(5), 459–464. https://doi.org/10.1016/j.jen.2012.03.006

Di Simone, E., Giannetta, N., Auddino, F., Cicotto, A., Grilli, D., & Di Muzio, M. (2018). Medication errors in the emergency department: Knowledge, attitude, behavior, and training needs of nurses. *Indian Journal of Critical Care Medicine*, *22*(5), 346–352. https://doi.org/10.4103/ijccm.IJCCM_63_18

Elo, S., Kääriäinen, M., Kanste, O., Pölkki, T., Utriainen, K., & Kyngäs, H. (2014). Qualitative content analysis: A focus on trustworthiness. *SAGE Open*, *4*(1), 1–10. https://doi.org/10.1177/2158244014522633

Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, *62*(1), 107–115. https://doi.org/10.1111/j.1365-2648.2007.04569.x

Freund, Y. (2020). The challenge of emergency medicine facing the COVID-19 outbreak. *European Journal of Emergency Medicine*, *27*(3), 155. https://doi.org/10.1097/mej.0000000000000699

Garcia, R. A., Spitzer, E. D., Beaudry, J., Beck, C., Diblasi, R., Gilleeny-Blabac, M., Haugaard, C., Heuschneider, S., Kranz, B. P., McLean, K., Morales, K. L., Owens, S., Paciella, M. E., & Torregrosa, E. (2015). Multidisciplinary team review of best practices for collection and handling of blood cultures to determine effective interventions for increasing the yield of true-positive bacteremias, reducing contamination, and eliminating false-positive central line- associated bloodstream infections. *American Journal of Infection Control*, *43*(11), 1222–1237. https://doi.org/10.1016/j.ajic.2015.06.030

González-Gil, M. T., González-Blázquez, C., Parro-Moreno, A. I., Pedraz-Marcos, A., Palmar-Santos, A., Otero-García, L., Navarta-Sánchez, M. V., Alcolea-Cosín, M. T., Argüello-López, M. T., Canalejas- Pérez, C., Carrillo-Camacho, M. E., Casillas-Santana, M. L., Díaz-Martínez, M. L., García- González, A., García-Perea, E., Martínez-Marcos, M., Martínez-Martín, M. L., Palazuelos- Puerta, M. D. P., Sellán-Soto, C., & Oter-Quintana, C. (2021). Nurses' perceptions and demands regarding COVID-19 care delivery in critical care units and hospital emergency services. *Intensive & Critical Care Nursing*, *62*, 102966. https://doi.org/10.1016/j.iccn.2020.102966

Hou, Y., Zhou, Q., Li, D., Guo, Y., Fan, J., & Wang, J. (2020). Preparedness of our emergency department during the coronavirus disease outbreak from the nurses' perspectives: A qualitative research study. *Journal of Emergency Nursing*, *46*(6), 848–861.e41. https://doi.org/10.1016/j.jen.2020.07.008

Kilcoyne, M., & Dowling, M. (2007). Working in an overcrowded accident and emergency department: Nurses' narratives. *The Australian Journal of Advanced Nursing*, *25*(2), 21–27.

Klim, S., Kelly, A. M., Kerr, D., Wood, S., & McCann, T. (2013). Developing a framework for nursing handover in the emergency department: An individualised and systematic approach. *Journal of Clinical Nursing*, *22*(15–16), 2233–2243. https://doi.org/10.1111/jocn.12274

Lai, C. C., Wang, C. Y., Wang, Y. H., Hsueh, S. C., Ko, W. C., & Hsueh, P. R. (2020). Global epidemiology of coronavirus disease 2019 (COVID-19): Disease incidence, daily cumulative index, mortality, and their association with country healthcare resources and economic status. *International Journal of Antimicrobial Agents*, *55*(4), 105946. https://doi.org/10.1016/j.ijantimicag.2020.105946

Lamy, B., Dargère, S., Arendrup, M. C., Parienti, J. J., & Tattevin, P. (2016). How to optimize the use of blood cultures for the diagnosis of bloodstream infections? A state-of-the art. *Frontiers in Microbiology*, *7*, 697. https://doi.org/10.3389/fmicb.2016.00697

Lee, C. C., Lee, N. Y., Chuang, M. C., Chen, P. L., Chang, C. M., & Ko, W. C. (2012). The impact of overcrowding on the bacterial contamination of blood cultures in the ED. *The American Journal of Emergency Medicine*, *30*(6), 839–845. https://doi.org/10.1016/j.ajem.2011.05.026

Lee, Y. M., & Oh, H. (2020). The influence of patient safety culture and patient safety error experience on safety nursing activities of emergency nurses in South Korea. *Journal of Emergency Nursing*, *46*(6), 838–847.e32. https://doi.org/10.1016/j.jen.2020.05.019

Moeller, D. (2017). Eliminating blood culture false positives: Harnessing the power of nursing shared governance. *Journal of Emergency Nursing*, *43*(2), 126–132. https://doi.org/10.1016/j.jen.2016.07.001

Ong, J. J. Y., Bharatendu, C., Goh, Y., Tang, J. Z. Y., Sooi, K. W. X., Tan, Y. L., Tan, B. Y. Q., Teoh, H. L., Ong, S. T., Allen, D. M., & Sharma, V. K. (2020). Headaches associated with personal protective equipment - A cross-sectional study among frontline healthcare workers during COVID-19. *Headache*, *60*(5), 864–877. https://doi.org/10.1111/head.13811

Polit, D. F., & Beck, C. T. (2021). *Nursing Research: Generating and assessing evidence for nursing practice*. Wolters Kluwer.

Ruiz-Fernández, M. D., Ramos-Pichardo, J. D., Ibáñez-Masero, O., Cabrera-Troya, J., Carmona-Rega, M. I., & Ortega-Galán, Á. M. (2020). Compassion fatigue, burnout, compassion satisfaction and perceived stress in healthcare professionals during the COVID-19 health crisis in Spain. *Journal of Clinical Nursing*, *29*(21–22), 4321–4330. https://doi.org/10.1111/jocn.15469

Salgueiro-Oliveira, A. S., Braga, L. M., Arreguy-Sena, C., Melo, M. N., & Parreira, P. M. S. D. (2019). Nursing practices in peripheral venous catheter: Phlebitis and patientsafety. *Texto & Contexto - Enfermagem*, *28*. https://doi.org/10.1590/1980-265X-TCE-2018-0109

Santos, P., Rocha, F. L. R., & Sampaio, C. (2019). Actions for safety in the prescription, use and administration of medications in emergency care units. *Revista Gaúcha de Enfermagem*, *40*, e20180347. https://doi.org/10.1590/1983-1447.2019.20180347

Satu, E., Maria, K., Outi, K., Tarja, P., Kati, U., & Helvi, K. (2014). Qualitative content analysis. *SAGE Open*, *4*. https://doi.org/10.1177/2158244014522633

Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., Burroughs, H., & Jinks, C. (2018). Saturation in qualitative research: Exploring its conceptualization and operationalization. *Quality & Quantity*, *52*(4), 1893–1907. https://doi.org/10.1007/s11135-017-0574-8

Servotte, J. C., Welch-Horan, T. B., Mullan, P., Piazza, J., Ghuysen, A., & Szyld, D. (2020). Development and implementation of an end-of-shift clinical debriefing method for emergency departments during COVID-19. *Adv Simul*, *5*(1), 32. https://doi.org/10.1186/s41077-020-00150-0

SFS. 2003:460. Lag om etikprövning som avser forskning på människor. http://www.notisum.se/rnp/sls/lag/20030460.htm.

Shaheen, N., Zeeshan, M., Fasih, N., Farooqi, J., Jabeen, K., & Irfan, S. (2020). Efforts to improve diagnosis of bacteraemia by reducing blood culture contamination in an emergency department: Strategies and outcome. *The Journal of the Pakistan Medical Association*, *70*(5), 835–839. https://doi.org/10.5455/jpma.12462

Shanafelt, T., Ripp, J., & Trockel, M. (2020). Understanding and addressing sources of anxiety among health care professionals during the COVID-19 pandemic. *JAMA*, *323*(21), 2133–2134. https://doi.org/10.1001/jama.2020.5893

Socialstyrelsen. (2019). *Tillståndet och utvecklingen inom hälso- och sjukvård och tandvård. Lägesrapport 2019*. https://www.socialstyrelsen.se/globalassets/sharepoint-dokument/artikelkatalog/ovrigt/2019-3-2.pdf

Svensk sjuksköterskeförening. (2016). *Säker vård – En kärnkompetens för vårdens samtliga professioner*. https://www.swenurse.se/download/18.1dbf1316170bff6748cd964/1584345995743/s%C3%A4ker%20v%C3%A5rd%202016.pdf

van der Heijden, Y. F., Miller, G., Wright, P. W., Shepherd, B. E., Daniels, T. L., & Talbot, T. R. (2011). Clinical impact of blood cultures contaminated with coagulase-negative Staphylococci at an academic medical center. *Infection Control and Hospital Epidemiology*, *32*(6), 623–625. https://doi.org/10.1086/660096

World Health Organization. (2020). *WHO Director-General's opening remarks at the media briefing on COVID-19 the 11.03.2020*. https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020

Xia, W., Fu, L., Liao, H., Yang, C., Guo, H., & Bian, Z. (2020). The physical and psychological effects of personal protective equipment on health Care Workers in Wuhan, China: A cross-sectional survey study. *Journal of Emergency Nursing*, *46*(6), 791–801.e797. https://doi.org/10.1016/j.jen.2020.08.004

Zwang, O., & Albert, R. K. (2006). Analysis of strategies to improve cost effectiveness of blood cultures. *Journal of Hospital Medicine*, *1*(5), 272–276. https://doi.org/10.1002/jhm.115

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