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Experiences of compliance with standard precautions during emergencies: A qualitative study of nurses working in intensive care units

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ABSTRACT

Aim

To explore factors that influence intensive care nurses' experiences of being compliant with standard precautions (SP) during emergencies.

Background: Intensive care nurses can be exposed to a greater risk of biohazardous exposure during an emergency. The primary strategy to address the complex variety of biological hazards in clinical practice is represented by the implementation of SP guidelines. Previous research has indicated that nurses' compliance rates with SPs are suboptimal, but no study has focused on the factors influencing compliance during an emergency.

Design: A descriptive qualitative study was conducted in an Italian university hospital with 19 intensive care nurses who had at least two years of work experience in critical care. The nurses were interviewed in four focus groups and were asked about their experiences of being compliant with SPs during an emergency. Data were analyzed using conventional content analysis.

Results: Three themes emerged: conflict, competencies, and context. Conflict was reported regarding the need to save the patient and the need for self-protection through the use of SPs. In particular, nurses had to manage the pressure of limited time. Competencies were identified by nurses' knowledge, attitude, skills, training, and experience. Context was related to the work and organizational conditions during the emergency, including overcrowding.

Conclusion: To support intensive care nurses' compliance with SPs during emergencies, conflict, competencies, and context should be audited regularly in clinical practice. The findings of this study could inform infection control programs and training that targets intensive care nurses.

1. Background

Hospital-acquired infections (HAIs) represent a major public health problem that can involve both patients and healthcare workers while in a hospital or other healthcare facility (Kärki, Plachouras, Cassini, & Suetens, 2019; World Health Organization [WHO], 2011). Regarding patients, HAIs are defined as an infection that was not present or incubating at the time of admission (WHO, 2011). Regarding healthcare workers, HAIs include occupational infections contracted during clinical practice (WHO, 2011).

Nurses seem to be the professionals most exposed to occupational biohazards, such as tuberculosis, hepatitis, or HIV/AIDS (Luo, He, Zhou, & Luo, 2010). Nurses' occupational infections have the highest prevalence (47.4%) among all possible occupational injuries (Bagheri Hosseinabadi et al., 2019). Such prevalence might be explained by the direct, repeated, and longer duration of nursing patient care (Melia, 2014). In fact, during their clinical work, nurses could be exposed to contact with blood, body fluids, mucous membranes of the eye or mouth, non-intact skin, or percutaneous injuries that represent the most prevalent and preventable occupational accidents (Kasatpibal et al., 2016; Lam, 2014; Saia et al., 2010).

In particular, nurses working in intensive care units (ICUs) could be

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considered among those who are at major risk of exposure to microorganisms. This risk is due to the high frequency of emergencies and the need to care for patients using invasive procedures and devices (Silva et al., 2017). Furthermore, the ICU could be considered a stressful environment for nurses because of the presence of a high concentration of critically ill patients, sophisticated equipment, and a large number of specialty professionals (Dietz et al., 2014; Silva et al., 2017).

The primary strategy used to contrast the complex variety of biological hazards during clinical practice is represented by the implementation of standard precautions (SPs), which are guidelines for the prevention of infectious risk (Centers for Disease Control and Prevention [CDC], 2004; Lam, 2014; Pereira, Lam, Chan, Malaguti-Toffano, & Gir, 2015; WHO, 2004). SPs are based on the principle that all patient blood and body fluids may contain transmissible infectious agents (CDC, 2004; Siegel, Rhinehart, Jackson, Chiarello, & Health Care Infection Control Practices Advisory Committee, 2007; WHO, 2004). SP guidelines include appropriate hand hygiene, use of gloves and other personal protective equipment (PPE), appropriate cleaning and disinfection of patient care equipment and environment surfaces, correct waste disposal, management of used needles and other sharp objects, and appropriate cough etiquette (CDC, 2004; Siegel et al., 2007; WHO, 2004).

Although nurses' compliance with SPs can reduce the spread of germs in the healthcare setting to reduce HAIs (Moralejo, El Dib, Prata, Barretti, & Corrêa, 2018; Pratt et al., 2007), current evidence indicates that compliance rates with these guidelines are universally suboptimal; this issue has crucial implications for staff and patient safety (Cheung et al., 2015; Donati, Biagioli, Cianfrocca, De Marinis, & Tartaglini, 2019; Moralejo et al., 2018; Pereira et al., 2015; Powers, Armellino, Dolansky, & Fitzpatrick, 2016). Examples of inadequate compliance include failure in hand hygiene practice, inappropriate use of PPE, and ineffective management of needles (Donati et al., 2019; Siegel et al., 2007). On the one hand, scholars described several barriers to the correct implementation of SP guidelines among nurses, such as poor training, risk behaviors, insufficient availability of PPE, unawareness of the importance of SPs, and inappropriate work conditions (e.g., excessive workload and understaffing) (Porto & Marziale, 2016). On the other hand, emergencies have been described as major obstacles for ICU nurses in the implementation of SPs (Efstathiou, Papastavrou, Raftopoulos, & Merkouris, 2011).

Although emergencies can increase the risk of biohazard exposure, the reasons why ICU nurses are less compliant with SPs in emergencies must be explored further. Nurses' experiences in caring for patients during an emergency might reveal attitudes and behaviors associated with suboptimal SP compliance in an ICU. No qualitative study has targeted the factors influencing ICU nurses' compliance with SPs during an emergency. Instead, scholars have mainly focused on measuring the level of compliance with SPs among nurses (Donati et al., 2019; Valim, Marziale, Richart-Martínez, & Sanjuan-Quiles, 2014). Only one instrument has been developed to assess the factors that influence adherence to SPs, but that instrument is not specific to emergency care (Bouchoucha & Moore, 2018). Therefore, this study aimed to explore factors that influence intensive care nurses' experiences of being compliant with SPs during emergencies.

2. Methods

2.1. Research design

This paper's design was a descriptive qualitative study that used content analysis to describe nurses' experiences of being compliant with SPs during an emergency. We conducted 4 focus groups (FGs) to collect qualitative data (Krueger & Casey, 2014). Krueger and Casey (2014) have defined FGs as a "carefully planned series of discussions designed to obtain perceptions on a defined area of interest in a permissive, non-threatening environment."

Since the phenomenon under study addressed nurses' everyday interactions occurring in a shared context, FGs were utilized as the data collection method. Moreover, we used this approach for the possibility to have several nurses working together in an ICU at one time and to explore, confirm, reinforce, or contradict emergent ideas at the same time. We chose a homogenous group, based on the topic being investigated, to obtain rich data generated by individuals prepared to engage fully in the discussion, in accord with Krueger and Casey (2014).

2.2. Sampling

The research was conducted with nurses employed in the ICU of an Italian university hospital in Rome, Italy. ICU nursing team (24 health professionals) received clear information about the study procedure and the aims of the research. The main inclusion criterion was to be a critical care nurse who had worked for at least 2 years in an ICU. The nurse coordinator was excluded from the FG sessions to encourage a confidential climate among nurses.

Participants were enrolled voluntarily and informed consent was required. Anonymity was guaranteed by ensuring each participant that all data recorded would be de-identified during transcription; the research was approved by the medical directorate of the university hospital where this study was conducted.

The FGs were planned after ensuring the participants' availability and took place at the end of the morning work shift. Refreshment was provided to encourage participation and to promote a confidential climate before each session.

2.3. Setting and data collection

The data collection took place in August 2018. As suggested by Krueger and Casey (2014), all FGs were conducted at the participants' place of employment, in a meeting room close to the ICU. In each FG session, a moderator (D. D.) and an assistant moderator (C. C.) were present. The moderator was responsible for starting and facilitating the discussion and also used a set of questions to encourage recollection of the nurses' experiences. The FGs included the following questions: "What is your experience with compliance with SPs during emergency situations?"; "In your experience, what are the barriers for SP application during an emergency situation?"; and "What are the facilitators of the correct application of SPs during an emergency situation?" The assistant moderator was responsible for audio-recording the sessions, taking notes, and creating an environment conducive for group discussion. Four FGs were required to reach the theoretical saturations, as described by (Sandelowski, 2008). To provide participants with an opportunity to share their ideas, we chose to run each FG with 4 or 5 nurses. Such small groups could be preferable when participants have specialized knowledge or experiences to discuss in the group (Krueger & Casey, 2014). The minimal time to get the maximum amount of information on the topic being discussed was about 45 min for each FG.

2.4. Characteristics of the sample

The research was carried out with 19 ICU nurses, including 11 females and 8 males. The sociodemographic characteristics of the sample are summarized in Table 1. The average age of the participants was 35 (range: 25–49) with professional experience in critical care of an average 8.1 years (range: 2–18). The majority of participants ($n = 10$) achieved a master's (1 year post-graduate education of at least 60 European Credit Transfer and Accumulation System [ECTS] credits) or higher educational level ($n = 6$), while few participants ($n = 3$) had only the first-level degree. This amplitude aimed to guarantee a more complete expression of the studied phenomenon (Krueger & Casey, 2014).

Table 1
Characteristics of the sample.

Focus group	Participant	Sex	Age	Experience[a]	Education
FG1	N1	F	49	18	Master's degree
	N2	M	33	7	Degree
	N3	M	30	8	Degree
	N4	F	32	5	Master's degree
	N5	F	45	6	Master
FG2	N6	F	31	3	Master
	N7	F	40	14	Master's degree
	N8	F	37	8	Degree
	N9	M	30	5	Master's degree
	N10	F	41	9	Master
FG3	N11	M	32	10	Master
	N12	F	39	12	Master
	N13	M	25	2	Master
	N14	M	29	7	Master
FG4	N15	F	45	9	Master's degree
	N16	F	35	10	Master
	N17	M	34	10	Master
	N18	M	30	8	Master's degree
	N19	F	36	3	Master

[a] Nurses experience in critical care settings in years.

2.5. Data analysis

The findings of the FGs were analyzed according to the method of "conventional content analysis" (Elo & Kyngäs, 2008). Content analysis is well-suited to analyze the multifaceted, important, and sensitive phenomena of nursing (Elo & Kyngäs, 2008). Qualitative content analysis is defined as a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns (Hsieh & Shannon, 2005).

The assistant moderator verified the data and helped the researcher/moderator to analyze and interpret the FG data (Krueger & Casey, 2014). Two researchers transcribed the FG interviews verbatim. Also, the assistant moderator added the field notes and nonverbal responses collected during the FGs to the main text.

In order to ensure trustworthiness, two researchers read the raw data several times to grasp a general sense of the situation in which the experiences occurred. Next, the two researchers independently divided the data into parts, marking different meaning units defined as words, sentences, or paragraphs containing aspects related through their content and context (Graneheim & Lundman, 2004). Subsequently, each meaning unit was condensed while preserving the core of the meaning, and then abstracted and labeled with a code through a peer debriefing process.

A group of four researchers then compared the codes, based on semantic and conceptual similarities, and sorted them into sub-categories and categories, which constitute the manifest content of the text (Downe-Wamboldt, 1992; Kondracki, Wellman, & Amundson, 2002). Finally, the emerged categories were further analyzed and formulated into themes to identify the latent content of the text (Downe-Wamboldt, 1992; Kondracki et al., 2002). Codes, sub-categories, categories, and themes were revised in the process of reflection and discussion by the researchers until a common agreement was reached.

2.6. Rigor

Rigor was achieved through credibility, transferability, dependability, and confirmability (Guba & Lincoln, 1981). Before starting the data collection, the researchers discussed ideas derived from the previous study regarding nurses' compliance with SPs to be able to leave every preconception and ensure reflexivity during the research process. During the FGs, the researchers were responsive and open to the nurses' arguments, showing the ability to clarify and summarize the emergent concepts. During the data analysis, a decision trail was used to ensure auditability (Burns, 1989). Four researchers discussed the findings during peer debriefing to ensure that the description gained was data driven.

3. Findings

The content analysis process led to the identification of three themes that describe the nurses' experiences of being compliant with SPs during an emergency. The three themes addressed are conflict, competencies, and context.

3.1. Theme 1 - conflict

The concept of conflict emerged from participants when describing their experiences of being compliant with SPs during an emergency. Dealing effectively with conflict was essential in realizing the benefits for patients. Despite high competencies and a positive context, nurses had to manage the pressure of limited time, which represents a heavy barrier to compliance with SPs:

> "The timeliness that you must have is the first reason for a lower compliance" (N11, FG3).

Due to the need to be quick during a rapidly evolving situation, participants reported they often opted to use only gloves. Thus, they neglected to apply SPs and failed to wear a gown, mask, or visor; also, participants reported that they often failed to complete the cleaning procedures correctly:

> "If I have to intervene immediately, I do not waste time wearing a gown or looking for a visor" (N18, FG4).

In fact, complete compliance was considered possible only when time was available, such as when another colleague was already performing cardiopulmonary resuscitation:

> "When you take the place of a colleague who is already working on the patient, you have more time, and you can put on everything, otherwise you can't" (N8, FG2).

In particular, compliance with SPs sometimes conflicted with the priority to save the patient. Participants stated that their attention to the patient's life used to get the best of them:

> "The first action is starting CPR and doing everything you need to save the patient, without thinking of protecting yourself" (N1, FG1).

As a result, PPE usage was considered to be of secondary importance, and was taken into account only when the patient was in a stable condition:

> "You wear the minimum necessary, and then, in a more stable situation, you put everything on" (N18, FG4).

During an emergency perceived as difficult to control, compliance with SPs was bypassed to remain focused on the patient:

> "In that moment, all your attention is on the patient, who comes first. Anything potentially interfering with effective care is often bypassed. It is because you perceive that the risk to lose the patient is greater than the risk to be infected" (N17, FG4).

3.2. Theme 2 - competencies

The participants believed that competencies were identified by nurses' knowledge, attitude, and skills, and were acquired through education and professional experience. These competences influenced their compliance with SPs during an emergency. Regarding knowledge, a nurse said,

> "It is essential to have adequate knowledge on the use of PPE in

order to choose the correct equipment in a timely manner during an emergency and prevent accidental contamination" (N12, FG3).

Participants argued that there is still a lack of knowledge about SPs and that colleagues often underestimated the importance of appropriate knowledge about preventive behaviors. Participants believed that training courses could influence their level of knowledge positively, and they thought it was useful to plan these courses periodically within the clinical environment to maintain an appropriate level of knowledge in the team. One participant stated,

"Periodical training should be done to raise the team's awareness of the concept of risk infection during an emergency. I received the appropriate training during my master's education in emergency nursing, and it helped me to understand how many risks of biological casualties are behind an emergency and how dangerous it could be" (N3, FG1).

A fundamental role was also identified in the ICU nurses' skills concerning infection risk assessments. Participants noted that a correct risk assessment influenced their compliance with SPs. However, this skill seemed to be influenced by the visual perception of risk and the awareness of the patient's infectious status. For example, if nurses had an emergency with a patient who was visibly contaminated with biological materials or known to be positive for specific bacterial or virus infections, the nurses were more inclined to follow the SPs; the reason was primarily for self-protection. In this context, nurses showed less ability to account for infection risks during an emergency, to the detriment of full compliance with SPs. A participant said,

"If there is blood everywhere, it is normal that I use all the necessary PPE; on the opposite side, during an urgent invasive procedure, I wear just gloves and then, if necessary, I ask a nearby colleague for other PPE" (N19, FG4).

Participants described their assessment as being influenced mostly by visual observation rather than the prevision of the infection risk. Even though participants could accurately describe the fundamental concept of SPs (to consider each patient as potentially infected), one of them confessed:

"If the patient is in isolation or has a known positivity, it is easier to adopt the precautions because we know that there is an established infectious risk" (N13, FG3).

Moreover, the participants reported that experience was one of the key points for compliance with SPs during an emergency in the ICU. On the one hand, the participants reported experience as being related to the number of emergencies managed by the nurse. On the other hand, participants considered experience as reflecting an accidental exposure of the staff member to the patient's infected (or potentially infected) biological materials. In the first case, nurses believed that experience was essential to predict, and possibly avoid, the risk of exposure to infection during an emergency. A nurse said,

" …also it depends on the experience - if you have more experience and skills to predict the emergency somehow, maybe you'll be ready by taking all the required precautions. If you have little experience in emergencies, you may not be able to predict what precautions you'll need or, even worse, you may find yourself unprepared" (N11, FG3).

Another participant focused on newly hired ICU nurses and how their limited experience in managing an emergency can affect their compliance with SP:

"Taking prompt precautions, however, is linked to the experience of the nurse. In this regard, the new staff is less used to managing an emergency, so their attention is focused more on the patient himself rather than on using the necessary precautions" (N18, FG4).

In all four FGs, at least one experience of injury or accidental exposure to biological risk was described. Sometimes, it was a personal experience, but more often it was a witnessed experience of a colleague's exposure during the same shift. In both cases, nurses who had this experience learned how to become more compliant with SP during an emergency. A participant said,

"This was a lesson for a future time [experience of accidental contamination with biological fluids]. One can get screwed once, but if you get scared enough, the next time you think twice before leaving the necessary PPE aside. Now I always check the visor and other PPE availability on my patient's station" (N7, FG2).

3.3. Theme 3 - context

Participants described how the context, based on work and organizational conditions during the emergency, influenced their experiences of being compliant with SPs. The participants described the essential context as a situation where the entire medical-nursing team was strongly committed to the importance of applying SPs. In this regard, the need for a person capable of being vigilant about the correct application of these measures was also valid, particularly in emergencies where overcrowding occurred:

"It happens that you have to resume your colleagues in excess to let the staff involved in the emergency to work more effectively and safely" (N14, FG3).

Another nurse stated,

"The more serious the emergency is, the more unnecessary people stop by to have a look at it. In addition to the nurses and anesthetists treating the patient, you can see the doctors of the patient's admitting department intervening, other consultants casually passing by and looking, or university students" (N7, FG2).

In fact, an overcrowded context during an emergency was often described as a barrier that hinders the use of SPs, and also increases the risk of infection:

"Overcrowding makes it dangerous to move with needles, contaminated objects, or biological samples that you could use, especially when there is a need to place invasive devices in an emergency" (N14, FG3).

Also, participants described the importance of a well-organized context, with PPE close to the patient station. This aspect was essential to prevent the nurse from moving away from the patient to find a certain PPE during an emergency. In fact, it could easily be the case that no colleague was nearby to provide the equipment. In this regard, a participant said,

"One thing that hinders the use of precautions is the distance to where the PPE are kept...for example, if I notice an emergency, I do not leave the patient but immediately start to organize assistance. The first thing I do is to bring the code cart closer" (N8, FG2).

Finally, participants described how a safety climate, where the team in the emergency context collaborated in the use of SPs, positively influenced their compliance. Participants stressed the importance of always considering the possibility of a sudden decline in patients' clinical conditions in ICU; for this reason, they discussed the need to avoid the sharp biological waste bins being almost full and to check and ensure availability of PPE in the patient station.

In this regard, one of the participants said,

"I believe that there also must be a collaboration between us, more oriented on safety measures. This would allow me, for example, to start my shift without having the sharps container already full, or the bedside without the visor because it has been used on another

patient and not put back in place" (N16, FG4).

4. Discussion

This study aimed to explore ICU nurses' experiences of compliance with SPs during emergencies. One finding that emerged from this study was the nurses' conflict between the need to save the patient's life and the need for self-protection through the use of SPs. Participants reported being partially compliant with SPs and using only gloves when the patient's life was at risk. The reason behind this conflict could be related to the prosocial nature of the discipline of nursing (Biagioli, Prandi, Giuliani, Nyatanga, & Frida, 2016). Since advocacy can be considered the core of caring for patients during an emergency (Enns & Sawatzky, 2016), nurses are encouraged to demonstrate professional responsibility by protecting vulnerable patients (Benner, Benner, Tanner, & Chesla, 2009). Although Gershon et al. (1995), found a similar result among healthcare workers, i.e., the conflict between the need to provide care and the use of self-protection, this issue emerged as the main reason for low compliance with SPs when ICU nurses had to act during an emergency. Therefore, ICU nurses should be supported by a strong institutional commitment that encourages nurses' rights to protect themselves from potential biological injury while providing care during an emergency.

When nurses have little time, they might think they must choose between being fully compliant with SPs and immediately beginning emergency care. Since ICU nurses describe their main concern as protecting the patient's life, as also found by a previous study (Efstathiou et al., 2011), it is important to reduce time pressure to promote self-protection. In particular, participants underlined that the more competent they were and the more supportive the context, less time was needed to protect themselves before acting to save the patient. An emergency is an event that is strongly time-dependent, and participants described how important it is to be prepared with a well-organized patient station. ICU nurses should always be able to start promptly and conduct patient assistance safely.

Since the participants also identified the influence of their competencies on their SP compliance during an emergency, providing specific SP training courses appears to be essential in improving compliance, which has been supported by several previous studies (Donati et al., 2019; Gershon et al., 1995; Luo et al., 2010; Valim et al., 2014). Participants showed several educational needs, particularly referring to their specific knowledge, skills, and attitude toward infection control and the use of SPs during an emergency. A good educational strategy might be to provide interactive training sessions cyclically, using role-playing in which participants are asked to act as they would in an emergency to care for the patient and also protect themselves. On such occasions, it could be useful to discuss practical examples and possible consequences of biological injuries. ICU nurses should be encouraged to participate in such training to maintain a high level of competencies. Nurses who participated in at least one specific training course that addressed SPs showed better compliance than those who never participated in such training (Donati et al., 2019).

Participants also described having become more compliant with SPs after an experience of accidental exposure to biological materials during an emergency. Health managers, who are directly responsible for nurses' safety, should ensure that ICU nurses improve their compliance with SPs without having to pass through such dangerous experiences. For this reason, it is also essential that training courses are specifically targeted to ICU nurses' needs.

Another finding was the need to work in a context that facilitates compliance with SPs during an emergency. Participants described overcrowding, distance to PPE, and lack of a safety climate among the factors that did not help them to be fully compliant with SPs during an emergency. If the ICU nurse coordinators observe these barriers in their own context, they should be responsible for suggesting an appropriate intervention strategy.

In the event of overcrowding, which the participants described as frequently occurring during an emergency, healthcare professionals should be trained in maintaining safe teamwork (Matthaeus-Kraemer et al., 2015). Also, healthcare professionals should know that a positive organizational climate can decrease the rates of occupational injuries and accidental exposures to blood and body fluids (Stone & Gershon, 2009).

Participants reported that the distance to PPE could negatively affect the use of PPE during an emergency. The proximity of such equipment appears to be relevant because participants described their difficulty in the critical moment when leaving the patient to find PPE. For this reason, PPE should be adequately available and immediately accessible (Verbeek et al., 2016).

The presence of a safety climate could help nurses maintain a favorable context for the use of SPs in an emergency. A systematic literature review confirmed that maintaining a safety climate may support higher compliance with infection control guidelines and healthcare worker safety (Hessels & Larson, 2016). Participants reported how their colleagues' low compliance could negatively influence compliance with SPs during an emergency: for example, the management of sharp and waste disposals or the provision of PPE. It is important to make ICU nurses aware that they can take responsibility not only for their own safety but also for the safety of their colleagues. Management policies should be oriented to promote team collaboration and to maintain a safety climate among staff.

5. Limitations

The first limitation of this study was that participants were recruited from a single ICU in a university hospital where many courses about SPs were offered to staff, PPE was largely available, and organizational support was provided. Therefore, even if some participants have reported experiences from the ICU of other hospitals, they may not be a good representation of the largest nursing population. A second limitation was the interactive and collective nature of FGs, which could have limited the discussion of sensitive or controversial issues. Since the topic of this study is internationally relevant, we recommend an increased level of evidence and a larger multi-professional sample size from different centers is recommended.

6. Conclusion

To the extent of our knowledge, this study is the first to provide an in-depth and thorough understanding of the factors that can influence intensive care nurses' compliance with SPs during an emergency. HAIs in the ICU can have significant consequences for both patients' outcomes and nurses' occupational safety. However, it is important to remember that HAIs are preventable, even during an emergency. For this reason, ICU nurses should be aware of preventable risks to themselves and their patients. Stringent compliance with SP guidelines is recommended as an effective strategy to reduce the risks of biohazard exposure and the prevention of HAI. To support intensive care nurses' compliance with SPs during emergencies, conflict, competencies, and context should be audited regularly in clinical practice. The findings of this study could inform infection control programs and training that targets intensive care nurses.

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