

Role of Student Nurse in the Prehospital Medical Teams Responding to the Scene of A Terrorist Attack in France

Carla De Stefano, MS^{a,b,c,*}, Hayatte Akodad, MD^a, Helene Gauducheau, RN^d, Paul-Georges Reuter, MD^{a,b}, Jean-Damien Ricard, MD, PhD^{e,f}, Tomislav Petrovic, MD^a, Frédéric Adnet, MD, PhD^{a,b}, Jennifer Truchot, MD^{f,g}, Frédéric Lapostolle, MD, PhD^{a,b}

^aAP-HP, SAMU93 – UF Research Teaching Quality, Avicenne Hospital, Paris 13 University, Bobigny, France

^bParis 13 University, Sorbonne Cité, Bobigny, France

^cAP-HP, Department of Child and Adolescent Psychiatry and General Psychiatry, Avicenne Hospital, Paris 13 Sorbonne University, Paris Cité, Laboratoire UTRPP, France

^dIADE School Nurse-Anesthetists Theodore Simon, Paris 13 University, Sorbonne Cité, Neuilly sur Marne, France

^eAP-HP, Intensive Care Unit, Louis Mourier Hospital, Colombes, France

^fParis Diderot University, Paris, France

^gAP-HP, Emergency Department, Lariboisière Hospital, Paris, France

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ABSTRACT

Background: The terrorist attacks in Paris and in Saint-Denis in November 2015 were unprecedented events involving various human and material resources. These events question the role of nurse students in prehospital teams.

Purpose: To investigate nursing students' preference about whether they wished to participate in the prehospital care during a terrorist attack.

Methods: This cross-sectional study was conducted with student nurses, from two nursing schools in the Greater Paris area. They completed an anonymous survey assessing the desire to be called to help the mobile intensive care units (MICU) or another ward; whether their presence should be mandatory, and the feelings associated with their experience. The responses were collected with a visual analogue scale and could range from 1 (yes, very much) to 10 (no, not at all). A Chi-square test was performed for qualitative variables and a Mann–Whitney test for quantitative variables.

Findings: Among 225 students, 205 (91%) responded, 133 (65%) were women. When on duty, 169 (82%) would have preferred to accompany the MICU team, compared with 31 (15%) who would have preferred not to go. Overall, 146 students (71%) considered that this presence should be optional. Only gender was significantly associated with the choice to accompany the MICU team ($W = 87\%$ vs. $M = 13\%$; $p = .002$). Students expressed a moderate feeling of frustration and fear.

Discussion: Students would prefer to assist the MICU team responding to the scene of a terrorist attack but feel this choice should be optional. A discussion in nursing schools and universities should be considered for the implementation of a

* Corresponding author: Carla De Stefano, SAMU93-UF Research Teaching Quality, Avicenne Hospital, 125 Rue de Stalingrad, 93000 Bobigny, France.

E-mail address: carla.destefano85@gmail.com (C. De Stefano).

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“systematic” procedure to ensure the student’s willingness to participate in such interventions.

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Introduction

During the terrorist attacks in Saint-Denis and Paris on November 13, 2015, health care professionals were confronted about the need to deliver complex care in a hostile context (Haug, 2015; Vandentorren, Paty, Baffert, Chansard, & Caserio-Schönemann, 2016).

These events, and the raid seeking to arrest the terrorists in Saint-Denis five days later, required the deployment of numerous medical teams (Hirsh et al., 2015). The victims, many in critical condition, were transported to 16 university hospitals.

Besides the direct damage they cause, such attacks expose the witnesses, the victims, their families and friends, but also the medical teams to the risk of post-traumatic stress disorder (PTSD) (Liu, Tarigan, Bromet, & Kim, 2014). Other psychological consequences include anxiety and depressive symptoms, high levels of stress, and flashbacks. (Misra, Greenberg, Hutchinson, Brain, & Glozier, 2009; Ron & Shamai, 2014). Indeed, the impact of traumatic events on medical teams has been described in previous longitudinal studies, and showed long-term consequences on mental health (De Stefano et al., 2018; Lung, Lu, Chang, & Shu, 2009; Webber et al., 2011).

In France, emergency medical service (EMS) manages the prehospital care for the victims and the medical organization in these specific situations (Adnet & Lapostolle, 2004). Twelve teams of mobile intensive care units (MICU) in the Great Paris area (Paris metropolitan region) responded to the scene of the attacks at the Stadium of France, and more than 40 teams to other different sites in Paris.

Ten more intervened during the raid of the terrorists’ hideout several days later.

Background

MICU teams include an emergency physician, a specialized nurse on intensive care, and a trained ambulance attendant (Adnet & Lapostolle, 2004). Especially when affiliated university hospitals, as they frequently are in the Greater Paris area, these teams also welcome and train students: medical students, residents in training to become emergency physicians, student midwives, and student ambulance attendants. Nursing students, during their specialization training in emergency care, have a specific rotation in the MICU. Not all of these trainees will practice emergency medicine after their studies. For the nursing students, this training period in emergency

care is mandatory during their curriculum, regardless of their future career plans. In France, two distinct nursing curricula exist: (1) a first level (first cycle of three years) giving the right to work as a qualified generalist nurse and (2) a second level (second cycle of two years) specializing in emergency and pre hospital intensive care. When training for the second cycle, nurses are required to train one month with the MICU teams.

Students are even more exposed, than the regular staff, to the risk of post-traumatic stress when facing extreme events (Anderson et al., 2016; Broussard, Myers, & Meaux, 2008; Carter et al., 2016; Lowery & Stokes, 2005). Few studies explored the risk of developing a PTSD among nurse students after a catastrophic event (e.g., terrorist attacks, earthquakes, Tsunami) during their professional training (Cusack, Arbon, & Ranse, 2010). Some authors also hypothesized that PTSD and the type of traumatic experience may interfere with work-related activities and perceptions (Barstow, 2000; Mealer, Burnham, Goode, Rothbaum, & Moss, 2009). Regarding student perceptions, only 35% of 1,053 students were aware of the possible adverse psychological effects following a catastrophic event in a study conducted in Turkey and Japan (Öztekin, Larson, Yüksel, & Altun Uğraş, 2015). Gaps in knowledge on the role of nurses during disasters, and the possible psychological repercussions for health care providers, as for the victims, was reported in an American population of nursing students (Jennings-Sanders, Frisch, & Wing, 2005). Additionally, experiencing a traumatic event is already a known stress factor that may negatively influence the quality of the students’ performance (Barstow, 2000; Shearer & Davidhizar, 1998; Wilkinson et al., 2016).

To date we don’t know the participation of students in the MICU teams in such circumstances. Specific procedures to handle the presence of students should be described. We have not found any studies in the literature relevant to the consideration of these questions.

To aid our analysis, we decided to collect the opinions of students from our departments who might face such a situation. We decided to investigate their preference on whether they wished to participate in the prehospital care with the MICU team.

Methods

Design

Setting

The EMS handles all emergency medical calls in France with a unique nationwide phone number: 15. There is

an EMS in each administrative district, that is 100 throughout France. An emergency physician is responsible for managing the calls and organizing an appropriate response to each call 24/7. Depending on the situation, the physician can give medical advice, an ambulance, a general practitioner, fire-brigades, and/or police. When the situation requires it, the physician can send a fully equipped medical team (MICU) to manage the patient on site. This includes point of care laboratory testing, ultrasound, thrombolysis, intubation, and ventilation. Students, student nurses among them, train during their MICU rotation with the team.

In Île-de-France, there are 8 administrative districts including 41 MICUs. During the Paris and Saint-Denis terrorist attacks, emergency teams from these eight administrative districts were called to intervene on site.

Participants

We recruited nursing students during the second cycle of their curriculum, with no professional experience in emergency and prehospital care.

The specific training was intended to enable them to work in operating rooms (ORs), intensive care units (ICUs), or MICU teams. Approximately 500 nurses complete this training program in France each year.

We questioned students from two nursing schools, located in two Great Paris area districts where the November 2015 attacks took place: one in Seine-Saint-Denis, at University of Paris 13 (Bobigny) and the other in Paris, affiliated to the University of Paris 7 (Paris Diderot).

Inclusion

Students from both nursing schools were asked by e-mail to complete an online author-constructed anonymous questionnaire. The questions were created to allow the analysis of student's perspectives as well as to target the aims of the research.

The questionnaire was posted on line November 25, 12 days after the attacks and 7 days after the police raid in Seine-Saint-Denis. The objective was to obtain a response rate greater than 90% within two weeks. Accordingly, we sent regular email reminders. The questionnaire was closed on December 12, 2015.

Indicators Studied

We collected demographic data (sex and age), school and year in the program, as well as information on previous professional experience as a nurse, in an emergency department (ED), ICU, recovery room or other postintervention care unit, and any placement or rotation as a nurse trainee for MICU, an ICU, or an OR.

The question was: "if they would have wanted, had they been on duty, to go with the team to the scene" and in that specific case whether their participation should be mandatory or optional. The possible answers were yes or no.

They were then asked if they would have wanted to work the day of the attack, with the MICU, or in an ICU, an OR, recovery room or postinterventional care unit, and would they have liked to be called in to help out in any of those departments. These responses were collected with a visual analogue scale (VAS) and could range from 1 (yes, very much) to 10 (no, not at all).

Finally, students were questioned about their feelings: did they find it frustrating that they had not been present? Or was it frightening to think that they might have been there? Might they have found being on site traumatic? Would they have been afraid of being useless? To answer these questions, the same visual analogue scale (from 0 to 10) was used.

Analysis

Statistical analyses are reported in [Table 1](#). We considered VAS responses 1 & 2 as positive and 9 & 10 as negative. We compared the characteristics of the subgroup population regarding our main outcome.

The descriptive responses categorized were compared with a Chi-square test, or Fisher's exact test, when appropriate, and the quantitative variables with the Mann-Whitney test. Our results are expressed as numbers and percentages, or as medians and their interquartile intervals.

The study was approved by the French Data Protection Authority (CNIL: 19105522 v 0). This was a cross-sectional design survey of students of nursing.

Findings

Characteristics of Subjects

Among the 225 nurse students who were asked to participate, 205 (91%) finally responded. The response rate was different between the two nursing schools (20% vs. 80%). There were 133 (65%) women and 70 (35%) men (missing data: 2) with a median age of 31 [29–35] years old (missing data: 2).

Overall, 151 (74%) reported previous professional experience in an ICU, 94 (46%) in a recovery room or postintervention care unit, 63 (31%) in an emergency department, and 22 (11%) within a MICU.

Main Results

Had they been on duty that day, 169 (82%) would have wanted to accompany the MICU team, compared with 31 (15%) who would have preferred not to. Most of the students felt that the decision to accompany should be optional ($N = 142$, 71%).

Only gender was significantly associated with the choice to accompany the MICU team. Detailed results are in the [Table 1](#).

The overwhelming majority ($N = 193$, 94%) reported a rotation as a student nurse in the OR, but only 10% ($N = 20$) with a MICU and 2% ($N = 5$) in an ICU.

When asked whether they would have wanted to be on duty, 54% answered wanting to be assigned to the operating room and 51% to the recovery room or post-intervention care unit (Table 2, Figures 1 and 2). Among students who would have wanted to be called the day of the attacks, 58% wanted to be assigned to the operating room and 56% to the recovery room or postintervention care unit (Table 2, Figures 1 and 2). The students expressed a moderate feeling of frustration and fear, and to some, traumatized. Results are detailed in the Table 3.

Discussion

The nurses studying in our geographic area, near the scene of terrorist attacks, would mostly (82%) have wanted to accompany the MICU team on the field. They expressed that this presence should be optional. The exceptionally high (>90%) response rate underlines the importance of this question. These students expressed the will to work or to be called back, more specifically in the departments they were training in. Less than 25% of participants gave negative answers to questions about fear, trauma, and fear of being useless.

The attacks in Saint-Denis and Paris and the police operations that followed in November 2015 resulted in exceptionally high demands for the medical teams in our region (Hirsh et al., 2015). Health care professionals are particularly exposed to post-traumatic stress in this context, although their risk appears to be lower than in the civilian population (Liu et al., 2014). Nonetheless, directly witnessing horror has been associated with a higher risk (Bryant & Guthrie, 2005; Liu et al., 2014). Nontraditional responders are also at increased risk of post-traumatic stress (Galea et al., 2002; Liu et al., 2014). Our results suggest that students can both provide

some level of support but also learn through participating in the prehospital care during disaster events. However, the direct confrontation to such events without the required professional skills imposes the consideration of the risks and consequences for students and patients. A higher risk for developing mental disorders must be taken into account, and could also expose patients to a higher risk of medical errors (Asensi-Vicente, Jiménez-Ruiz, & Vizcaya-Moreno, 2018; Fahrenkopf et al., 2008; Freeburn & Sinclair, 2009).

The students questioned here, however, were in a particular situation. They had all completed nursing school and worked as a nurse for at least two years. Moreover, they were learning to manage critical situations in their on-going curriculum. This certainly explains why so few of them feared not being helpful if they accompanied the MICU team. A feeling of uselessness is, itself, associated with an increased risk of post-traumatic stress (Jonsson, 1997; Liu et al., 2014; Yonge, Rosychuk, Bailey, Lake, & Marrie, 2010).

Additionally, the high response rate, in line with other studies conducted among medical students, can be explained by different factors. These factors include the motivation to answer the survey, the proximity between the location of the school and the events, and the number of solicitations to answer the questionnaire. The factors could also explain the difference in the response rate between the two study sites. Therefore, generalization of our findings should be cautious and considered selection bias (Anderson et al., 2016; Carter et al., 2016). Indeed, a previous study found that ambulance paramedics reported feelings of shame and worthlessness, as well as sleep disorders and flashbacks, because they failed to properly manage the patient during an emergency situation (Jonsson & Segesten, 2004). However, those feelings have not been found in a sample of medical students, who predominantly reported the feeling that they "should have been able to do more" predominated among those involved in handling the Hillsborough disaster (95 deaths and 159 injuries during a football match in Sheffield, Great Britain, in 1989) (Kent, 1991).

Table 1 – Student Preferences About Accompanying the MICU Team

	Would Have Preferred to Go $N = 169$ $N (%)^*$	Would Have Preferred Not to Go $N = 31$ $N (%)$	p^{**}
Site			0.2
Paris school	137 (81%)	22 (71%)	
Seine-Saint-Denis school	32 (19%)	9 (27%)	
Gender			0.002
Women	103 (61%)	27 (87%)	
Men	66 (39%)	4 (13%)	
Course level			0.9
First year	85 (50%)	16 (52%)	
Second year	84 (49%)	15 (48%)	
Age (years) (mean) [IQR]***	31 [29–35]	31 [29–35]	0.9

* Student preferences expressed in frequencies (N) and percentages (%).

** p value significantive $< .005$.

*** IQR interquartile range

Table 2 – Student Preferences About Being on Duty or Called in

	Positive Response (1 & 2) N (%)*	Intermediate Response (3 to 8) N (%)*	Negative Response (9 & 10) N (%)*
The day of the attacks, would you have wanted to be on duty			
At MICU?	78 (38%)	98 (48%)	29 (14%)
In the Intensive care unit?	79 (38%)	96 (47%)	30 (15%)
In the operating room?	110 (54%)	78 (38%)	17 (8%)
In a recovery room or postintervention care unit?	104 (51%)	83 (41%)	16 (8%)
The day of the attack, would you have wanted to be called to come in to work			
At MICU?	96 (48%)	81 (40%)	24 (12%)
In the emergency department?	100 (50%)	79 (39%)	23 (11%)
In the intensive care unit?	97 (48%)	82 (40%)	24 (12%)
In the operating room?	117 (58%)	72 (35%)	14 (7%)
In a recovery room or postintervention care unit?	114 (56%)	73 (36%)	18 (8%)

* Student preferences about being on duty or called in expressed in frequencies (N) and percentages (%).

The same high response rate was found in studies among nursing students having faced the earthquake in New Zealand in 2010 (Richardson et al., 2015; Trip et al., 2018). An increase in mental health problems (anxiety and depressive disorders, PTSD) was self-reported (Trip et al., 2018), with the identification of factors attenuating the negative impact of the curriculum, such as the promotion of personal, professional, and institutional resilience (Richardson et al., 2015).

Gender was the only factor associated with the will to accompany the MICU team: women seemed somewhat less ready to accept the idea of this exposure.

Such exposure to potentially traumatic events could increase the risk of psychiatric comorbidities

(anxio-depressive disorders, PTSD, etc.) and emotional disorders (De Stefano et al., 2018). In the field of mental disorders, different studies agree that the female gender is associated with more symptoms of PTSD (Bowler et al., 2010; Carmassi et al., 2014; De Stefano et al., 2018; Murphy, Elklit, Chen, Ghazali, & Shevlin, 2018). Positive association between female gender and psychological disorders is explained by a difference in the stress response between women and men, confirmed by neuroscientific research (Bangasser & Wicks, 2017; Bangasser & Wiersielis, 2018). In accordance with this evidence, we hypothesize that the willingness in women to participate less voluntarily in events could be related to this

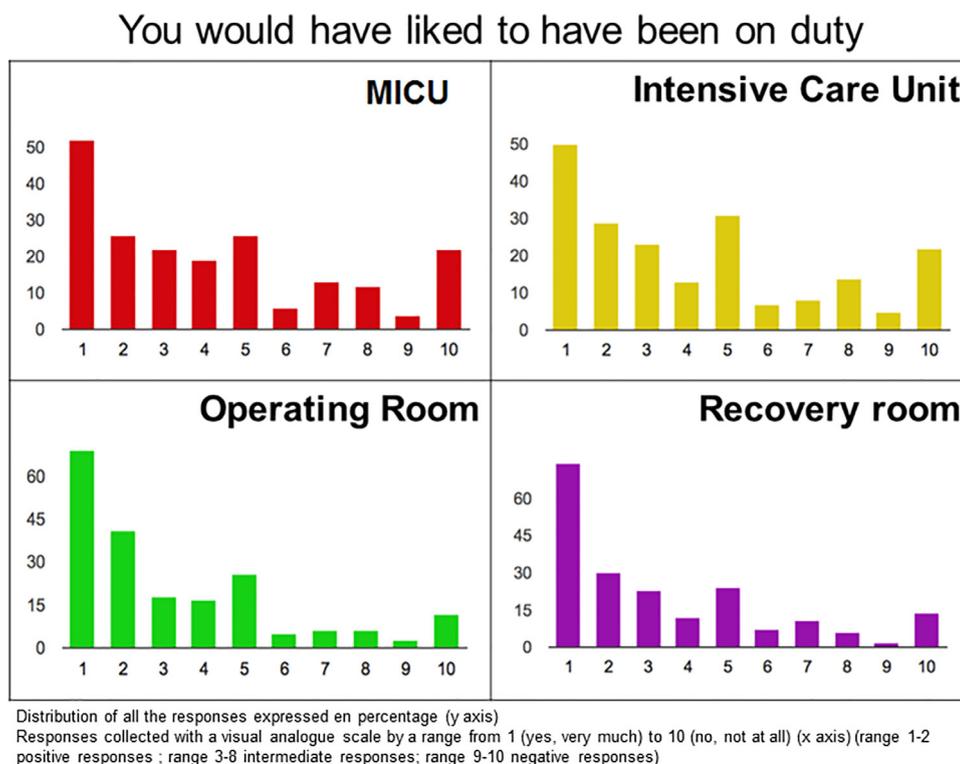
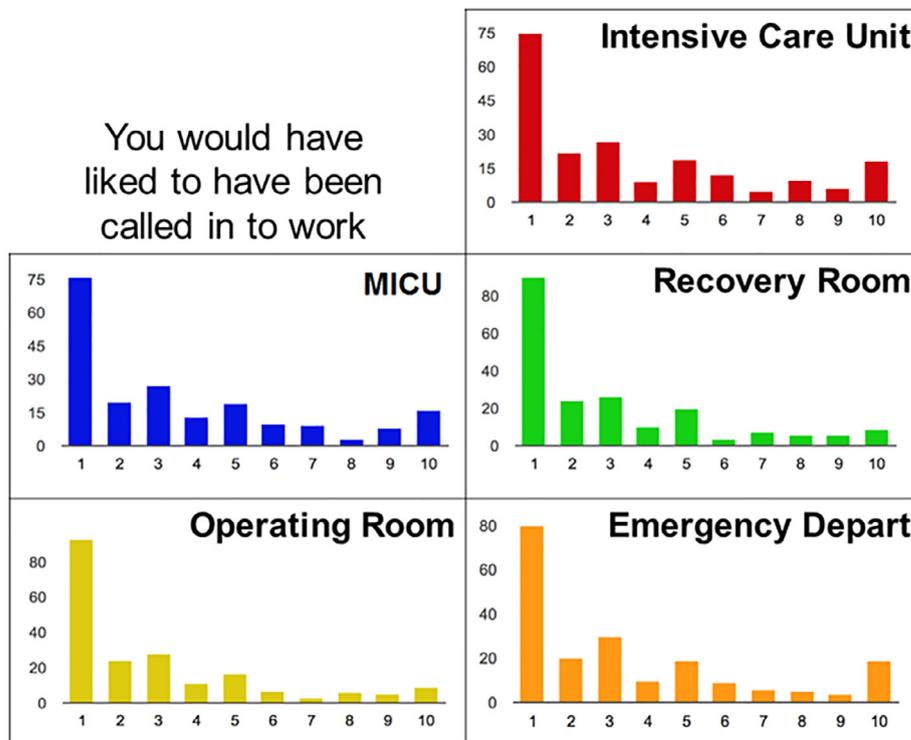


Figure 1 – Distribution of all the responses to the questions about whether the students would have wanted to be on duty.



Distribution of all the responses expressed in percentage (y axis)
 Responses collected with a visual analogue scale by a range from 1 (yes, very much) to 10 (no, not at all) (x axis) (range 1-2 positive responses ; range 3-8 intermediate responses; range 9-10 negative responses)

Figure 2 – Distribution of all the responses to the question whether student would have liked to have been called in to work.

gender difference in stress response. Women may have a less combative attitude than men when facing stress. The increased risk of PTSD and its comorbidities for women could be linked to the hypothesis of a higher expression of emotions, correlated to cognition and consequently with an awareness of the severity of the situation (Kring & Gordon, 1998). A meta-analysis on the risk of post-traumatic stress in the context of a large-scale terrorist attack (the World Trade Center disaster) did identify gender as a risk factor. On the other hand, being on the site at an early point or for a prolonged period was a risk factor (Berninger et al., 2010). This risk is applicable to MICU medical teams. Risk has been reported to decrease with age (Norris et al., 2002). However, the youth and homogeneity of our sample of students prevents us from reaching a conclusion on this criterion.

The potential role of student nurses in disasters has recently been discussed (Culley, 2010; Cusack et al., 2010). The psychological impact differs according to the type of disaster—natural (earthquakes, epidemics), accidental (building collapse, fires), or terrorist (Santiago et al., 2013). The literature explores only the first two situations and tends to support their involvement in such exceptional situations. First, students, men or women, must be alerted to this risk (Kent, 1991). The students’ fields of practice, their educational level, their supervision, and the regulatory framework should be taken into consideration, in specific guidelines (Cusack et al., 2010). Dedicated training is encouraged (Broussard et al., 2008; Carter & Gaskins, 2010) as it appears to be a protective factor (Liu et al., 2014). Indeed, in the United States after the events of 9/11, 2001, the establishment of a mass casualty simulation was developed and implemented for senior-level

Table 3 – Feelings of Student Nurse

	Positive Response (1 & 2) N (%)*	Intermediate Response (3–8) N (%)*	Negative response (9 & 10) N (%)*
It’s frustrating to say we could have been there	87 (43%)	103 (51%)	12 (6%)
It’s frightening to say we could have been there	37 (18%)	128 (63%)	38 (19%)
I might have been traumatized later on if I’d been there	35 (17%)	150 (74%)	17 (9%)
I would have been scared of being useless	29 (14%)	126 (62%)	48 (24%)

* Feeling of students expressed in frequencies (N) and percentages (%).

nursing students in a large-scale program (Fletcher, Justice, & Rohrig, 2015). This program introduced students to rapid triage in an interactive and immersive experience, allowing them to be prepared in case of mass casualty incidents (Decker, Galvan, & Sridaromont, 2005; Fletcher et al., 2015). Additionally, both students and universities positively evaluated the program, highlighting that it represented an opportunity for nurse students to fill the gap between theoretical knowledge and practical knowledge, as well as to develop their critical judgment (Decker et al., 2005; Ireland, Ea, Kontzamanis, & Michel, 2006).

Group work may also play a more important protective role in this case (Corneil, Beaton, Murphy, Johnson, & Pike, 1999). In France, only local initiatives are organized for students by military health professionals (Pelaccia, 2008). However, more systematic collaboration between university health service and the nursing schools seems necessary. Consequently, exposing students to these situations and, therefore, to a risk of post-traumatic stress requires procedures to ensure proper identification and efficient management of PTSD. Indeed, the students' supervisors could systematically evaluate the willingness of students to participate in the care during a catastrophic event and assess their critical ability to judge themselves capable of such participation.

Limitations

The main limitation of our work is that our results cannot be extrapolated to different settings. The geographic setting here is important. Students from other schools might feel less directly involved and respond differently. The two schools questioned were in the two districts (Seine-Saint-Denis and Paris) directly affected by the attacks. These students' risk of being directly confronted with such a situation during one of their next rotations or during their future professional life is real. This fact certainly also explains the unusual response rate (>90%). Our results do not necessarily apply to other students. In our study, the students' responses illustrated that both previous experience and the ongoing curriculum were undoubtedly a reassuring factor. Thus, medical students, who most often do not plan a career involving emergencies, might respond differently.

In addition, in accordance with French research regulations prohibiting the question of religious preferences and the cultural background, we were unable to assess the impact of all these aspects. These issues would preclude generalizability.

Conclusion

The student nurses in our study would have chosen to accompany the MICU team providing prehospital care to victims at the scene. Only a few reported fear of being either useless or traumatized. Our results

suggest that specific procedures should be established to handle the presence of students at risk of being exposed to situations that bear a high risk to post-traumatic stress disorder.

None of the authors have any competing interests.

Supplementary materials

Supplementary material associated with this article can be found in the online version at [doi:10.1016/j.outlook.2019.02.004](https://doi.org/10.1016/j.outlook.2019.02.004).

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