A CASE STUDY ON SIGNIFICANCE OF MEDICAL SIMULATION FOR SOFT SKILLS TRAINING IN EMERGENCY MEDICAL CRISIS MANAGEMENT
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ABSTRACT

Background: The simulation help improve patient safety, individual and team performance, and the quality of care. We distinguish between technical skills and non-technical skills that include communication proficiency, decision-making, and teamwork. Methods: The aim of this study was to evaluate and assess the effect of simulation in improving non-technical skills in emergency medical crisis management of medical students. The study was conducted at the simulation center of University Hospital Center affiliated with the Faculty of Medicine and Pharmacy of Fez, Sidi Mohamed Ben Abdellah University. The participants were the medical students of the fifth, sixth and seventh-year. The simulation session was organized with groups of three participants. Each team participated in three different scenarios. The debrief was structured into four phases (reactions, facts, analysis and summary). During the debriefing and in the most relaxed atmosphere possible, the soft skills were assessed by an instructor using the Team Emergency Assessment Measure (TEAM). Results: Eighteen students participated in this study. For each item of non-technical skills in TEAM there was significant improvement in the mean scores of subjects between their first and second session and their first and third session (p <0.05). Conclusions: Our study shows that simulation sessions improve non-technical skills in all medical students. Consequently, given their crucial importance in ensuring better patient care, they must be integrated early in the training curriculum of medical and nursing students.

Keywords: Crisis management; Medical students; Non-technical skills; Simulation.

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INTRODUCTION
Simulation is a technique to replace or amplify real-patient experiences with guided experiences, artificially contrived, that evokes or replicates substantial aspects of the real world in a fully interactive manner [1]. Simulation improves patient safety and the technical and non-technical skills of teams (communication proficiency, decision-making, and teamwork) [2, 3]. The aim of this study was to evaluate and assess the effect of simulation in improving non-technical skills of medical students in emergency medical crisis management.

MATERIAL AND METHODS
The study was conducted at the simulation center of University Hospital Center affiliated with the Faculty of Medicine and Pharmacy of Fez, Sidi Mohamed Ben Abdellah University. The participants were the medical students of the fifth, sixth and seventh-year. The scenarios chosen by the
pedagogical team were cardiac arrest in adults, consciousness disorders, beta-blocker poisoning, polytrauma, severe traumatic brain injury, agitation in the intensive care unit, febrile jaundice, breaking bad news to families of hospitalized patients, acute severe asthma, management of decompensated diabetes, severe acute pancreatitis and pheochromocytoma. These illnesses are frequent in real-life. To ensure maximum immersion, we used the high-fidelity adult manikin and standardized patient that corresponds to a healthy individual trained to portray a clinical problem or situation for the purpose of testing or teaching specific skills in the field of health care professionals (Figure 1).

The simulation session was organized in four parts with groups of 3 participants. Each team participated in three different scenarios (Table I). The average session duration, from the briefing to the debriefing was 50 minutes. The session began with a briefing, during which the medical teachers exposed the material, the environment, the clinical context with a presentation of the clinical case. The scenario lasts 15 minutes. The debriefing was structured into four phases (reactions, facts, analysis and summary). During the debriefing, and in the most relaxed atmosphere possible, we assessed the overall feeling of participants, analyzed the technical skills (method of interrogation, diagnostic process and treatment), respect of hygiene rules and soft skills.

Table I: distribution of participants by scenarios

<table>
<thead>
<tr>
<th>Team N°</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>N°1</td>
<td>Cardiac arrest in adults</td>
<td>Consciousness disorders</td>
<td>Severe traumatic brain injury</td>
</tr>
<tr>
<td>N°2</td>
<td>Polytrauma</td>
<td>Agitation in the intensive care unit</td>
<td>Febrile jaundice</td>
</tr>
<tr>
<td>N°3</td>
<td>Acute severe asthma</td>
<td>Decompensated diabetes</td>
<td>Cardiac arrest in adults</td>
</tr>
<tr>
<td>N°4</td>
<td>Severe acute pancreatitis</td>
<td>Breaking bad news</td>
<td>Cardiac arrest in adults</td>
</tr>
<tr>
<td>N°5</td>
<td>Cardiac arrest in adults</td>
<td>Breaking bad news</td>
<td>Consciousness disorders</td>
</tr>
<tr>
<td>N°6</td>
<td>Pheochromocytoma</td>
<td>Breaking bad news</td>
<td>Beta-blocker poisoning</td>
</tr>
</tbody>
</table>

The soft skills were assessed by an instructor using the Team Emergency Assessment Measure. To achieve this objective, we have chosen the Teamwork Emergency Assessment Measure (TEAM), an observational scale designed for measuring team processes and performance, which has been developed and validated in accordance with the psychometric theory [4-7]. It comprises eleven
items rated on a four-point Likert response scale and covering three dimensions namely leadership, teamwork, and task management—and one overall team performance rating item (TEAM) (Figure 2) [8].

Figure 2: Team Emergency Assessment Measure (TEAM)
RESULTS:

Eighteen students participated in this study. Each group of students participates in three simulation sessions. Each session ends with a debriefing where, in addition to technical skills, emphasis is placed on non-technical performance by following the items of the TEAM assessment score. Category Scores The TEAM results from the first sessions are most representative of pre-intervention control scores, as preexisting skill levels in the medical students before additional training was assessed. The scores from the second session correspond to the additional skills acquired from the previous session’s training. The scores from the third session should correspond to the additional skills obtained from the second session’s training (Table II).

<table>
<thead>
<tr>
<th>Group</th>
<th>Scenario 1 (Score/56)</th>
<th>Scenario 2 (Score/56)</th>
<th>Scenario 3 (Score/56)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>7</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td>Group 2</td>
<td>12</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>Group 3</td>
<td>15</td>
<td>29</td>
<td>34</td>
</tr>
<tr>
<td>Group 4</td>
<td>14</td>
<td>26</td>
<td>32</td>
</tr>
<tr>
<td>Group 5</td>
<td>15</td>
<td>28</td>
<td>41</td>
</tr>
<tr>
<td>Group 6</td>
<td>33</td>
<td>36</td>
<td>38</td>
</tr>
</tbody>
</table>

Before the simulation training, the participants often forgot to appoint a leader, and when the leader identifies himself, he was unable to work and organize the team, distribute tasks, give clear and precise orders and redistribute the roles. About the teamwork, there is a poor communication, lack of feedback and of coordination and the participants were unable to work as a team. After simulation and debriefing, all of these failures improved over the course sessions. So, for each item of non-technical skills in TEAM, there was a significant improvement in the mean scores of subjects between their first and second session and their first and third session. Statistical analysis (test t) showed a significant difference between the mean scores of the different groups when comparing the different scenarios (p<0.05) (Table III).

<table>
<thead>
<tr>
<th>Scenarios</th>
<th>Mean (standard deviation)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>16 (8.85)</td>
<td>0.001</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>26,33 (6.65)</td>
<td></td>
</tr>
<tr>
<td>Scenario 3</td>
<td>32,33 (6.83)</td>
<td></td>
</tr>
<tr>
<td>Scenario 1</td>
<td>16 (8.85)</td>
<td>0.002</td>
</tr>
<tr>
<td>Scenario 3</td>
<td>32,33 (6.83)</td>
<td></td>
</tr>
</tbody>
</table>

These results represent the effect of the intervention of a simulation session with debriefing. Three very strong points emerge from this analysis. The first point is that there is a significant difference in non-technical performance between the novice groups who have never benefited from this training (1st to 5th group) and the 6th group who have already benefited from this training (Figure 3).
The second point, we recorded an improvement in these skills during the sessions, with a clear difference between the first and the third session (Figure 4). The third point is that the performances were maintained for the sixth group over time.

**DISCUSSION:**

Medical teaching has placed significant emphasis on knowledge acquisition and the mastering of technical skills [9]. However, critical incident reporting and observational studies, both in the clinical setting and on patient simulators, have identified nontechnical skills to be major determinants of successful crisis management [10, 11]. The term non-technical skills (NTS) or soft skills was derived primarily from the aircraft industry, such skills include leadership, teamwork, decision making and situation awareness [12]. The Leadership is the ability of an individual or a group...
of individuals to influence and guide followers or other members of an organization [13]. The teamwork include clarity of goals, effective and efficient communication, defined roles and horizontal leadership [14]. Situation awareness is described as the perception of the elements in the environment within a volume of space and time, the comprehension of their meaning and the projection of their status in the near future [15]. Unfortunately, these skills are not necessarily acquired by medical students through routine clinical experience and may need to be specifically taught. These skills are all the more necessary in the management of crisis situations, whether in anesthesia or in emergency medicine. In this stressful context, where the medical staff (doctors, nurses) must be vigilant, fast and extremely precise, the concept of crew resource management (CRM), which is a tool that was initially developed by the aviation industry and which has largely contributed to reducing the incidence of aircraft accidents over the past 4 decades is perfectly suited [16]. CRM training has been shown to improve team performance and decrease error during medical and surgical crises in the operating room [17, 18]. The CRM were adapted for anaesthesia by Gaba and colleagues (anaesthesia crisis resource management) [10]; they comprise fifteen points in anesthesia crisis resource management (ACRM) : Know the environment, anticipate and plan, call for help early, exercise leadership and followership, distribute the workload, mobilize all available resources, communicate effectively, use all available information, prevent and manage fixation errors, cross (double) check, use cognitive aids, re-evaluate repeatedly, use good teamwork, allocate attention wisely and set priorities dynamically. Most of the studies in the area of crisis resource management training for emergency medicine focused on emergency medicine residents or interdisciplinary trauma teams. The aim of this study is to evaluate and assess the effect of simulation in improving non-technical skills in emergency medical crisis management of medical student. Cooper Simon in a literature review showed that various non-technical measures of skills are available; only a few have been used in emergency care and there is a need to increase the targeted assessment of teamwork skills for a better understanding of team performance to improve patient safety in emergency medical care [19]. Teodora shows that even one day training on CRM principles using a combination of didactic and simulation sessions may significantly improve nontechnical skills in all the categories involved in an inter- professional emergency team [20]. Vera Hagemann shows that the effectiveness of a single brief seminar on non-technical skills to improve student’s non-technical skills [20]. Our study shows that CRM teaching with simulation sessions improves non-technical skills in all medical students learning curve. Consequently, given their crucial importance to ensuring better patient care, they must be integrated early in the training curriculum of medical and nursing students.

CONCLUSION

Clinical medicine is becoming focused more on patient safety and quality. Our study shows that the medical simulation is a good technique of teaching the technical and soft skills for graduate medical education, undergraduate medical education, and continuing medical education, so it must be integrated into the educational curriculum even before the start of clinical placements.

ACKNOWLEDGMENTS

The authors appreciate all the medical students who helped in conducting this research, the simulation center of the department of anesthesiology, critical care and emergency of Hassan II Teaching Hospital, Fez and the ARMU laboratory, Faculty of Medicine and Pharmacy of Fez, Sidi Mohamed Ben Abdellah University, Morocco.

CONFLICT OF INTEREST

The authors did not declare any conflict of interest.

FUNDING

No funding to declare.

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