ATHLETIC TRAINING EDUCATION JOURNAL

www.natajournals.org
ISSN: 1947-380X
DOI: 10.4085/1204208

ORIGINAL RESEARCH

A Teaching Simulation is Effective in Improving Athletic Training Students' Football Helmet Facemask Removal Clinical Skills and Confidence

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Context: Patient encounters related to acute care skills rarely occur in clinical education, leaving a potential gap in students' skills and confidence.

Objective: Investigate the effects of an acute care simulation requiring football helmet facemask removal on clinical skill application and confidence in athletic training students.

Design: Cross-sectional.

Patients or Other Participants: Forty-four students (16 male, 28 female; age = 20.9 ± 1.12 years) enrolled in 2 accredited professional athletic training programs.

Intervention(s): Participants completed a confidence assessment survey and were pretested on football helmet facemask removal skills. Pairs of participants engaged in a simulation where they evaluated and managed a football player who required facemask removal, followed by a debriefing session. Participants repeated the confidence assessment survey and were posttested to evaluate skills.

Main Outcome Measure(s): Dependent variables were clinical skills scores and confidence, as measured by a confidence assessment survey. Simulation served as the independent variable. Paired samples *t* test determined changes in clinical skills scores. Wilcoxson Signed-Rank Test determined changes in confidence.

Results: Paired samples *t* test revealed a significant increase in performance on the posttest, including: primary survey ($t_{43} = 4.13$, $P < .001$), facemask removal ($t_{43} = 4.00$, $P < .001$), vital signs assessment ($t_{43} = 5.57$, $P < .001$), and secondary survey ($t_{43} = 8.85$, $P < .001$). Wilcoxon Signed-Rank Test revealed increased confidence in participants' recognition of ($Z = 4.96$, $n = 44$, $P < .001$), knowledge of ($Z = 5.03$, $n = 44$, $P < .001$), and skills ($Z = 4.78$, $n = 43$, $P < .001$) needed for football helmet facemask removal.

Conclusions: With the inability to ensure students have authentic, real-time evaluation of acute care skills during clinical experiences, a simulation can assist in acquisition of skills, while also improving confidence in managing acute care conditions.

Key Words: Athletic training education, emergency management skills

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Full Citation:
Popp JK, Walker SE. A teaching simulation is effective in improving athletic training students' football helmet facemask removal clinical skills and confidence. *Athl Train Educ J.* 2017;12(4):208–215.

A Teaching Simulation is Effective in Improving Athletic Training Students' Football Helmet Facemask Removal Clinical Skills and Confidence

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INTRODUCTION

Athletic training educators are challenged to provide meaningful and effective learning opportunities that will not only develop knowledge and clinical skills, but confidence as well. American football is a widely played sport with a high frequency of catastrophic head and cervical spine injuries that require emergency spinal precautions.[1] Participants wear helmets with facemasks and shoulder pads which must be removed quickly to provide possible lifesaving procedures. In the 2013–2014 academic year, there were 1 094 949 football players at the high school level[2] and 71 291 at the college level.[3] With approximately 47% of all athletic trainers employed in either the secondary school (23.24%) or college setting (23.83%),[4] it is imperative that these health care providers are prepared to manage acute care situations involving helmet facemask removal and airway access. A widely accepted mechanism to access the airway in an equipment-laden sport athlete is by removing the facemask, which results in less cervical motion than helmet removal.[5,6] While students may learn and practice facemask removal techniques in the laboratory setting, acute care situations where they can provide real-time emergency care rarely occur during clinical education encounters.[7,8] Due to this limited exposure, students may lack the skill and confidence to properly remove a facemask. One way to provide additional experience is through simulation. A simulation can provide realistic acute care situations where students can practice their clinical skills and receive immediate and constructive feedback.[9]

McGaghie et al[10] defines simulation as learners engaging in a lifelike experience with varying levels of fidelity or authenticity to mimic a real patient encounter. Simulation fidelity ranges from low- (eg, mannequins, partial models), to mid- (eg, computer simulations, standardized patients), and high-fidelity (eg, instructor-controlled computerized mannequins), depending on the degree that they match reality.[11,12] A meta-analysis revealed that simulation-based education is superior to traditional (lecture and lab) education methods in enhancing students' knowledge, clinical skills performance, confidence, and critical thinking.[13] While the use of simulations as a teaching method is widely accepted in nursing[14] and medical education,[15] little research exists on its use in athletic training education. Tivener and Gloe[16] found that athletic training students' knowledge and self-confidence improved following a cardiopulmonary resuscitation (CPR) simulation. The researchers concluded that athletic training students' strong emotional reactions to the emergency simulation and their positive experiences contributed to the overall simulation effectiveness.[16] Another study in athletic training education found that students' confidence and skills in cardiac screening improved significantly following a simulation-based intervention.[17] Presently, there are no studies evaluating the effectiveness of a simulation on the clinical skills or confidence associated with football helmet facemask removal in athletic training. Simulation experiences require learners to actively engage and think critically, which will help them build confidence through real-life practical problems without any detrimental effects to the student or patient.[9] In addition, students perceive simulations as a nonthreatening learning experience which builds confidence.[9,18,19] Debriefing following a simulation provides feedback to the learners and is one of the most important features of a simulation experience to promote effective learning and bridge the theory-practice gap.[9,15] It is unlikely that a student will be directly involved with football helmet facemask removal during their clinical experience, yet they are expected to be as proficient as a professional if facemask removal is necessary. As a result, simulations may produce confident and skilled health care professionals who are prepared for a wide variety of situations upon graduation. Therefore, the purpose of this study was to investigate the effects of an acute care simulation requiring football helmet facemask removal on clinical skill application and confidence in athletic training students.

METHODS

Participants

After reading and signing informed consent forms, 44 athletic training students (16 male, 28 female; age = 20.9 ± 1.12 years) participated in the study. Participants were enrolled in the professional phase of 2 separate undergraduate programs in the Midwest during the 2012–2013 and 2013–2014 academic years. Participants represented all levels of the athletic training programs (15 sophomores, 17 juniors, 12 seniors). Inclusion criteria consisted of passing (with an earned grade of B-minus or better) an emergency responder course, which is a required component of the preprofessional curricula for both programs, and current certification in CPR and automated external defibrillator for the professional rescuer (or comparable). Additionally, all participants had received formal instruction and laboratory experiences in football helmet facemask removal, which is also included in courses within the preprofessional curricula at both institutions.

Procedures

This study was approved by the institutional review boards at both institutions where data were collected. The study consisted of 3 phases: a pretest, a simulation 1 week later, and a posttest 1 week after the simulation. After obtaining informed consent, participants were evaluated on their ability to remove a football helmet facemask during the pretest. During the next week, participants engaged in a simulation with debriefing which was designed as a teaching strategy. The learning objectives of the simulation were to identify an acute care situation that required the removal of a football helmet facemask, perform appropriate patient care, including the assessment and management of an acute care situation, and develop confidence when handling acute care situations. One week following the simulation, participants were posttested on their facemask removal skills.

Table 1. Assessment of Football Facemask Removal Skills Checklist

Section	Item	Completed	
Primary survey	Scene safety	Yes	No
	General impression of athlete's condition	Yes	No
	Level of consciousness: alert, voice, pain, unresponsive	Yes	No
	Activate emergency medical system	Yes	No
	Cervical spine stabilization required	Yes	No
	Airway: establish and maintain airway	Yes	No
	Use jaw thrust due to suspected cervical spine injury	Yes	No
	Breathing: look, listen, and feel	Yes	No
	Circulation: check pulse (carotid)	Yes	No
Facemask removal	Use power screwdriver/another cutting device to remove	Yes	No
	Facemask removed quickly (30 s)	Yes	No
	Facemask removed with minimal cervical spine motion	Yes	No
Vital signs assessment	Blood pressure	Yes	No
	Respiration rate	Yes	No
	Note quality of respirations	Yes	No
	Pulse	Yes	No
	Note quality of pulse	Yes	No
Secondary survey	Pupils equal and reactive to light	Yes	No
	Blood/cerebral spinal fluid from nose or ears?	Yes	No
	Assess facial area (eg, eyes, ears, nose, mouth)	Yes	No
	Inspect the anterior neck	Yes	No
	Palpate the cervical spine	Yes	No
	Inspect and palpate chest	Yes	No
	Perform rib compression	Yes	No
	Palpate 4 abdominal quadrants	Yes	No
	Inspect and palpate pelvis	Yes	No
	Perform pelvic compression	Yes	No
	Inspect and palpate upper extremity	Yes	No
	Inspect and palpate lower extremity	Yes	No
	Check capillary refill of upper extremity	Yes	No

Pretest and Posttest. All pretesting and posttesting occurred in the athletic training laboratory. First, participants completed the Presimulation Experience Confidence Assessment Survey. Next, participants were instructed that they were engaging in a practical examination designed to assess their ability to remove a football helmet facemask during an emergency. Participants performed all skills on a testing model that simulated an unresponsive college-aged male. The live testing model wore a football helmet, shoulder pads, jersey, shorts/pants, and athletic shoes and was positioned supine. The Football Helmet Facemask Removal Skills Checklist (Table 1) was used by the primary investigator to score performance using a yes or no. The checklist was divided into 4 sections (primary survey, facemask removal, vital signs assessment, and secondary assessment), and instructions were read to the participants prior to the start of each section. No feedback regarding performance was provided. Posttesting occurred 1 week after the simulation, with participants first completing the Postsimulation Experience Confidence Assessment Survey and then being posttested in the same manner described above using the aforementioned checklist (Table 1).

Simulation and Debriefing. For the simulation, participants were randomly paired into groups of 2, consisting of students at any level within the same program. To delineate roles during the simulation, 1 person was randomly chosen as the team leader and the other as the team member. The simulation learning objectives were to identify an acute care situation that required the removal of a football helmet facemask, perform appropriate patient care, apply acute care knowledge and skills, and develop confidence when handling acute care situations. To increase fidelity, all simulations occurred outside on an isolated grassy/turf area or inside in a field house or facility with a turf field. The simulated patient was a college-aged male who was wearing a properly fitted football helmet, shoulder pads, jersey, athletic shorts, and shoes. The simulated patient presented in an identical fashion to the testing model used in the pretest and posttest and was given instructions prior to the start of the simulation to remain on his back and unresponsive for the duration of the simulation. To properly establish the simulation scenario, presimulation instructions were provided. The participants were instructed that they were providing health care to a college football team when they were summoned to a specific location where tackling drills were taking place to manage the simulated patient's care. The patient was described as an unconscious 20-year-old running back involved in a tackling drill. Participants were provided and instructed to explore a medical kit that included various equipment/instruments needed to evaluate and treat the patient (eg, pen light, stethoscope, screwdriver, blood pressure cuff).

The presimulation instructions also included timeout/time-in procedures. If the participants felt unsure of what to do during the simulation, or if the primary investigator felt they were doing something that could potentially hurt the patient, a timeout[19] was called by either participants or the primary investigator. The timeout would pause the simulation in order

to discuss the concern. Once the concerns/questions were addressed, a time-in would restart the simulation at the point where the participants left off. Participants were instructed to conclude the simulation when they felt the appropriate care had been given. Once all instructions were communicated and participants' questions addressed, the simulation began. The primary investigator evaluated their performance using the same checklist (Table 1) as during the pretest and posttest. Notes on performance were also written down to provide feedback and foster discussion during the debriefing.

At the conclusion of the simulation, the participants and the primary investigator returned to the athletic training laboratory to conduct a debriefing. The debriefing was guided by a standard list of 6 questions used to prompt discussion regarding performance:

1. "Summarize the events that occurred during the simulation."
2. "What things were done well?"
3. "What aspects need improvement?"
4. "How did you feel while performing the simulation?"
5. "How can this simulation be applied to athletic training?"
6. "Can you relate this simulation to a real-time patient encounter that you've had during a clinical experience?"

These questions prompted participants to review their actions in the simulation, gather information about their emotions (eg, nervousness, anxiety) during the experience, and to form associations between the simulated experience and clinical practice. During debriefing, the primary investigator also provided feedback based on each individual participant's performance using the checklist items and notes taken during the simulation. Examples of discussion during the debriefing consisted of clinical skills that were performed correctly, incorrectly, or not performed during the simulation.

Instrumentation

Football Facemask Removal Confidence Assessment Survey. Two surveys were developed to assess the participants' confidence. The *Presimulation Experience Football Facemask Removal Confidence Assessment Survey* consisted of a demographic and confidence assessment section (Table 2). Demographic data (eg, age, sex) were collected, and participants asked the number of times that acute care skills had been practiced, observed, or used on patients with a preceptor during clinical education. Confidence was assessed through 21 Likert-scale item statements (1 = *not at all confident*, 4 = *very confident*) broken down into 3 sections: confidence to recognize, confidence in knowledge, and confidence in acute care clinical skills associated with football helmet facemask removal. Once developed, 3 individuals with expertise related to acute care but not affiliated with this research determined its content validity. It was then pilot tested with 2 separate groups of athletic training students who had recently graduated and were not part of the study. The *Postsimulation Experience Football Facemask Removal Confidence Assessment Survey* contained 2 sections. While the first section included the same 21 Likert-type items as in the pretest survey, the second section contained 2 open-ended questions designed to assess the benefits and challenges of engaging in acute care simulations.

Football Helmet Facemask Removal Skills Checklist. Pretest and posttest football helmet facemask removal performance was evaluated via a checklist (Table 1) developed from an article related to emergency assessment[21] and content validated by 3 certified athletic trainers with expertise related to acute care assessment. It objectively measured the participants' abilities to properly assess the patient and remove a football helmet facemask across 4 care categories: primary survey (9 items), facemask removal (3 items), vital signs assessment (5 items), and secondary survey (13 items). All 30 items were scored using a yes or no metric.

Data Analysis

Descriptive statistics were used to calculate demographic data. Data analyses were conducted with an α level of $P \leq .05$ using IBM SPSS Statistics for Windows (version 21; IBM Corp, Armonk, NY). A paired sample t test was used to compare the pretest and posttest checklist category means (primary survey, facemask removal, vital signs assessment, and secondary survey) to identify the simulation's impact on participants' clinical skill application. A Wilcoxson Signed-Rank Test was used to determine a change in confidence from pretest to posttest for each section of the survey, including confidence in recognition of, knowledge, and clinical skills associated with football helmet facemask removal. Participants' responses to open-ended questions were compiled and categorized. All responses were individually read through and coded for concepts on the benefits and challenges of engaging in acute care simulations to create themes. Once identified, responses were counted in the respective theme.

RESULTS

While the majority of students (52.3%, n = 23) reported practicing acute care skills with a preceptor in the clinical education setting more than 3 times, 22.7% (n = 10) reported practicing only 1 or 2 times, and 25% (n = 11) reported never having any practice opportunities at all. Over half of students (56.8%, n = 25) never observed an acute care situation during clinical experiences, while roughly 20.5% (n = 9) have observed 1 incident, and 22.7% (n = 10) have observed 2 or more incidents. A large number of participants (70.5%, n = 31) have never assisted with an acute care situation during clinical education experiences. Conversely, 20.5% (n = 9) have assisted with 1 acute care situation, and 9.1% (n = 4) have assisted with 2 situations.

Participants performed significantly more skills correctly during the posttest than the pretest on all sections of the *Football Helmet Facemask Removal Skills Checklist*: primary survey ($t_{43} = 4.13$, $P < .001$), facemask removal ($t_{43} = 4.00$, $P < .001$), vital signs assessment ($t_{43} = 5.57$, $P < .001$), and secondary survey ($t_{43} = 8.85$, $P < .001$). Means and SDs for correct response percentages are found in Table 3. The *Football Helmet Facemask Removal Skills Checklist* demonstrated internal consistency with an α coefficient of .717 on the

Table 2. Football Facemask Removal Confidence Assessment Survey

	Not at All Confident	Somewhat Not Confident	Moderately Confident	Very Confident
How confident are you that you can recognize:				
1. Signs and symptoms related to an emergency situation?	1	2	3	4
2. The need to assess level of consciousness?	1	2	3	4
3. The need to perform a primary survey?	1	2	3	4
4. The need for spinal motion restriction of the cervical spine?	1	2	3	4
5. The need to perform facemask removal?	1	2	3	4
6. The need to evaluate vital signs?	1	2	3	4
7. The need to perform a secondary survey (head-to-toe exam)?	1	2	3	4
How confident are you that you have the knowledge to:				
1. Manage the patient in an emergency situation?	1	2	3	4
2. Assess level of consciousness?	1	2	3	4
3. Perform a primary survey?	1	2	3	4
4. Perform spinal motion restriction of the cervical spine?	1	2	3	4
5. Perform facemask removal?	1	2	3	4
6. Perform an evaluation of vital signs?	1	2	3	4
7. Perform a secondary survey (head-to-toe exam)?	1	2	3	4
How confident are you that you have the skills to:				
1. Manage a patient in an emergency situation	1	2	3	4
2. Assess level of consciousness?	1	2	3	4
3. Perform a primary survey?	1	2	3	4
4. Perform spinal motion restriction of the cervical spine?	1	2	3	4
5. Perform facemask removal?	1	2	3	4
6. Perform an evaluation of vital signs?	1	2	3	4
7. Perform a secondary survey (head-to-toe exam)?	1	2	3	4

pretest and .724 on the posttest. Confidence also improved significantly from pretest to posttest in the recognition of ($Z = 4.96$, $n = 44$, $P < .001$), knowledge of ($Z = 5.03$, $n = 44$, $P < .001$), and skills ($Z = 4.78$, $n = 43$, $P < .001$) associated with acute care facemask removal. The *Simulation Experience Football Facemask Removal Confidence Assessment Survey* demonstrated internal consistency in each of its 3 sections: confidence to recognize ($\alpha = .846$), confidence in knowledge ($\alpha = .844$), and confidence in acute care clinical skills ($\alpha = .837$) associated with football helmet facemask removal.

The comments from the open-ended section of the *Post-simulation Experience Football Facemask Removal Confidence Assessment Survey* supported the statistical findings related to benefits of a simulation. Participants indicated they received a real hands-on experience ($n = 15$), and that simulations will help them to become more confident ($n = 10$) in a real-life emergency. Participants felt as though simulations gave them another opportunity to practice their acute care skills ($n = 18$), and discover their weaknesses ($n = 7$), which in turn increase their knowledge and skill in preparation for a real emergency.

Table 3. Pretest and Posttest Scores by Section[a]

	Mean ± SD	
Section	Pretest	Posttest
Primary survey	43.7 ± 17.3	56.3 ± 16.0
Facemask removal	47.7 ± 18.2	63.6 ± 24.7
Vital signs	21.0 ± 23.2	44.1 ± 22.7
Secondary survey	22.4 ± 20.3	47.2 ± 20.8

[a] Mean scores represent the percentage of correct responses.

Participants also commented on the challenges associated with engaging in an acute care simulation. These included the fact that a simulation is not real ($n = 17$) so that they may not always be taken seriously and/or their emotions may not be quite as high as a result. Additionally, participants felt that it is difficult to create an accurate emergency situation in a healthy person ($n = 7$). This was most derived from the fact that our study included the use of a healthy testing model as the patient during the simulation, and even though the model was unresponsive, the participants felt as though it was not quite as accurate as a real-life emergency would be.

DISCUSSION

Studies[5,6] have found that football facemask removal created less cervical spine motion than helmet removal when accessing the airway. While recommendations for prehospital care of a fully equipped football player have recently changed,[22] it is still necessary for members of the medical team to be skilled in facemask removal to access the airway. When performed proficiently, the facemask should be removed to allow airway access in a clinically acceptable time of 30 seconds or less.[5] While we know that these skills are taught in professional programs, students may not be practicing this skill regularly and may not be exposed to its use during clinical education. For example, some participants in this study indicated that they had never practiced acute care skills with a preceptor during clinical experiences, and well over half indicated that they had never assisted with a real-time acute care situation during clinical education experiences. Simulation is an educational strategy that can be used to fill this gap. The results of this study indicate that athletic training students'

clinical skills and confidence increased significantly following a football helmet facemask removal simulation.

Effects of a Simulation Experience on Clinical Skill Performance

Our results indicate that a single simulation session with debriefing effectively improves students' football helmet facemask removal clinical skills. Participants in this study performed more skills correctly on the posttest in each of the 4 checklist categories (primary survey, facemask removal, vital signs assessment, secondary survey). Related research in athletic training education also concluded that knowledge and skill related to CPR[16] and cardiovascular screening[17] improved significantly following a simulation.[16] Likewise, research in medical[10] and nursing education[12] has found significant clinical skill improvements after students participated in a simulation. Similarly, a variety of simulation strategies (human patient simulators, partial-task trainers, low-fidelity manikin) have shown improvement in a variety of medical (eg, advanced cardiac life support, laparoscopic skills, suturing, auscultation) and nursing skills (eg, emergency obstetrics, acute cardiac care, acute respiratory distress).[10,12] Lastly, a systematic review of high-fidelity simulation modes showed that students' clinical skills improved in the majority of studies examined when compared to other training methods, such as standardized patients, traditional skills laboratory, computer-based programs, and lectures.[14] On the contrary to this review, our study used a medium-fidelity simulation, which both resulted in improved clinical skills and demonstrated that expensive equipment is not always necessary to create effective simulations. Furthermore, while students may benefit from multiple simulation experiences, our study and others[23,24] have shown that a single simulation experience can lead to significant outcome improvements. However, in our study, it is important to note that participants' percentages of correct responses on the clinical skills assessment were below 70% in each section on both the pretest and posttest, indicating a need for a thorough review of these acute care skills for all students.

This study provides evidence that incorporating multiple students into 1 simulation does not negatively affect clinical skill acquisition. Alinier et al[24] concluded that nursing students, who worked in pairs and engaged in an intensive care simulation, performed better on an objective structured clinical examination than students who did not engage in a simulation. Previous research indicates that working in partners[9,24] or small groups during a simulation in a collaborative learning environment benefits learners, since they must share ideas and experiences.[9] Like Tivener and Gloe,[16] who reported significant learning improvements after participants experienced simulations 3 times, once as the responder and twice more as an observer, our simulation randomly assigned participants into pairs, with some not serving as the team leader. Furthermore, instead of using a costly high-fidelity simulator for this experience, we used a simulated patient volunteer. A similar study, compared the use of a role-play volunteer to a high-fidelity manikin, also found no cognitive or skill assessment differences between the 2 groups.[25] Therefore, our findings indicate that athletic training educators may not need to spend a great deal of time preparing an elaborate simulation or resources obtaining an expensive technology-based simulator to provide an effective learning experience.

The role of debriefing following a simulation has been well documented.[9,15,26,27] Debriefing is imperative because it provides learners an opportunity to evaluate their own knowledge and skills and to reflect on the effectiveness of the simulation as a teaching-learning strategy.[9] In this study, the primary investigator led the debriefing; this was supported by a meta-analysis favoring instructor-led over self-led sessions to develop process skills.[26] Despite being led by the investigator, debriefing focuses on participants' interactions and reflections[26] to improve clinical performance, rather than invoke academic judgment (ie, letter grade or pass/fail).[15] A benefit of debriefing is that, while the instructor and student participants are engaged in the process, other students who observed the simulation can also participate in the debriefing procedures, making the simulation an active learning environment for all. Therefore, it is feasible for instructors to engage an entire class simultaneously. In addition to providing the learner feedback, debriefing following a simulation also develops critical thinking skills by giving participants an opportunity to reflect upon and appraise their own actions.[9,15] Similarly, Savoldelli et al[27] concluded that exposure to a simulation offers little benefit to learners without a debriefing, and that learners' self-reflections and instructor feedback are required even when simulating nontechnical skills (eg, team work, task management, situational awareness).[27] Therefore, it is likely that the significant clinical skill improvements found between the pretest and posttest in our study resulted from the simulation debriefing sessions.

Effects of a Simulation Experience on Confidence

Our study found that student confidence for recognizing, evaluating, and treating a patient who required facemask removal improved significantly after a single simulation. Likewise, studies have reported that athletic training students' self-confidence significantly increased following a high-fidelity simulation related to CPR skills,[16] and that nursing student confidence improved in 45% of nursing education studies evaluated in a meta-analysis.[12] Doherty-Restrepo et al[17] noted a significant improvement in self-reported confidence of athletic training students in cardiovascular screening skills following simulation-based educational intervention. Furthermore, additional research indicates that nursing students who engaged in both simulations and clinical experiences displayed more confidence than peers who only participated in clinical experiences,[19] and that recent nursing graduates who completed simulation education as a part of on-the-job training demonstrated greater confidence for handling critical work environment situations than others.[9] While this evidence suggests that simulations improve student confidence, research has yet to reveal if that confidence will translate into improved patient care outcomes in the clinical setting.

Participants' Perceptions of the Simulation

Participants' qualitative feedback regarding their perceptions of the simulation is noteworthy. Fifteen participants reported that they received an authentic hands-on experience through the simulation, which is consistent with previous research.[9] Having an authentic experience can bridge the theory-practice

gap[8,12] and prepare the learner for clinical practice upon graduation. Simulations are nonthreatening learning encounters,[8,14,15] which may explain the pretest to posttest confidence assessment survey changes and why 10 participants reported the experience as confidence building in this study. Unfortunately, 17 participants reported that, despite the simulation being helpful and somewhat realistic, it was still not real. This may be due to the model patient remaining unconscious throughout the simulation and the absence of other bystanders (eg, coaches, players), which prevented realistic clinician-patient-coach interactions. The use of a timeout to pause the simulation for questions and clarifications may also have contributed to feelings that the simulation was not real.

LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

The simulation only assessed clinical skills associated with football helmet facemask removal in an unresponsive patient and was limited to the primary survey, facemask removal, assessment of vital signs, and secondary survey. Including other content areas for clinical skills training and a larger sample size could strengthen the confidence in this study's conclusions. Even though program personnel indicated that formal training in football helmet facemask removal skills was included in the preprofessional curricula, participants were not asked if they had received prior training; therefore, it is possible that pretest confidence scores included both previously trained and untrained individuals. Since this study also did not use a control group, it is possible that clinical skills increased simply due to repeated exposure. Next, while our study found improved confidence after the simulation, this relationship needs more investigation to resolve conflicting evidence. For example, the effects of simulation on cognitive knowledge or nontechnical skills, such as critical thinking, teamwork, and communication skills should be explored in relation to skill acquisition and improvement. Finally, it would be valuable to reassess participants over time to measure potential skill decay like that found with other teaching-learning methods.

CONCLUSIONS

This study provides evidence to support the use of simulations in athletic training education to improve students' clinical skills and increase their confidence. In this study, we role-played a football helmet facemask removal patient case as the simulation, reinforcing previous studies which found expensive equipment not necessary. Simulations should be deliberately integrated into athletic training programs to enhance student clinical skills and confidence, especially skills that are not frequently used in the clinical education setting.

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