En Route Critical Care Transfer From a Role 2 to a Role 3 Medical Treatment Facility in Afghanistan

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BACKGROUND En route care is the transfer of patients requiring combat casualty care within the US military evacuation system. No reports have been published about en route care of patients during transfer from a forward surgical facility (role 2) to a combat support hospital (role 3) for comprehensive care.
OBJECTIVE To describe patients transferred from a role 2 to a role 3 US military treatment facility in Afghanistan.
METHODS A retrospective review of data from the Joint Trauma System Role 2 Database was conducted. Patient characteristics were described by en route care medical attendants.
RESULTS More than one-fourth of patients were intubated at transfer (26.9%), although at transfer fewer than 10% of patients had a base deficit of more than 5 (3.5%), a pH of less than 7.3 (5.2%), an international normalized ratio of more than 2 (0.8%), or temporary abdominal or chest closure (7.4%). The en route care medical attendant was most often a nurse (35.5%), followed by technicians (14.1%) and physicians (10.0%). Most patients (75.3%) were transported by medical evacuation (on rotary-wing aircraft).
CONCLUSION This is the first comprehensive review of patients transported from a forward surgical facility to a more robust combat support hospital in Afghanistan. Understanding the epidemiology of these patients will inform provider training and the appropriate skill mix for the transfer of postsurgical patients within a combat setting. (*Critical Care Nurse*. 2018;38[2]:e7-e15)

Since the early 19th century, war fighters have recognized the benefit of early stabilization and rapid transport of people injured on the battlefield. However, the extensive use of forward surgical teams and support hospitals in the theater of war has evolved only recently during the conflicts in Iraq and Afghanistan.[1,2] Combat casualty care occurs across a continuum within the US military evacuation system, from point of injury to initial resuscitation and surgery, in and between military medical treatment facilities (MTFs), and ultimately to US-based facilities for definitive care and rehabilitation. The continuum of care consists of roles of care that are typically defined by capability: Role 1 is on-scene

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care and includes basic and advanced first aid (eg, tourniquet application, fracture stabilization, and application of sterile dressings); role 1 may also include a battalion aid station, where a physician assistant or physician may initiate resuscitation, airway management, or other nonsurgical lifesaving interventions before transfer; role 2 MTFs may be fixed or mobile facilities used for immediate resuscitation and surgical stabilization; role 3 combat support hospitals have multiple surgical specialties and intensive care; role 4 MTFs provide the full spectrum of trauma care at fixed facilities outside of the United States, and include definitive care hospitals in the United States.[3,4] Prehospital care of the injured also continues during transport from point to point on the continuum of care; ideally the care during transport will maintain the same level of care as the sending facility when moving to higher levels of care.

Of patients transported from role 2 to role 3, most patients were attended by a nurse.

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Transport platforms in the US combat theater in Afghanistan included ground and air evacuation. The 2 primary US rotary-wing (helicopter) medical evacuation platforms included the Army air ambulance and the Air Force pararescue squadron. The fixed-wing (airplane) platform was used by US Air Force Critical Care Air Transport Teams (CCATTs) and medical evacuation teams, who transported patients within the theater of war from role 2 to role 3 MTFs, as well as out of the theater to role 4 facilities. In the CCATT, physicians and nurses are assigned to this evacuation platform, whereas traditional Army rotary-wing medical evacuation does not have assigned physicians or nurses. However, in 2010, critical care nurses were assigned routinely to the US Army's medical evacuation companies to provide transport of critically ill and postoperative patients. Air Force medical evacuation (fixed-wing) teams include registered nurses; from 2010 through 2012, dedicated critical care transport was available through Air Force medical evacuation (fixed-wing) teams that included critical care flight paramedics. From 2011 through 2013, the Air Force rotary-wing tactical combat en route transportation teams were also deployed with critical care capabilities to support transfer patients from role 2 to role 3 MTFs. The level of provider varied depending on the platform and personnel availability, from basic emergency medical technician (EMT) to critical care flight paramedic to a team with physicians and critical care nurses.[5]

Rapid evacuation is essential in a combat environment after damage control resuscitation and damage control surgery in an austere role 2 surgical facility.[3] The goal of damage control efforts is to control hemorrhage and prevent or correct hypothermia, acidosis, and coagulopathy. Treatments may include advanced hemorrhage control, decompression of pneumothorax, advanced airway management, and surgery. The goal is to transport these patients to a role 3 or higher level of care as soon as they are clinically stable, ideally within 4 to 8 hours, but patients may be held at the role 2 facility as long as 72 hours. Patients may or may not be stable and may require en route critical care, presenting a unique challenge to the en route care provider.[3] The benefits of tactical combat casualty care focusing on treatment at the point of injury and during tactical evacuation have been well described.[6-10] A similar emphasis on improvements

in en route care after initial care at a role 2 MTF also may promote survival.

Research has been conducted on many aspects of combat casualty care, but information is limited about the role 2 patient population and the transport of patients from a role 2 to a role 3 facility. No reports have been published about en route care of patients from a role 2 to a role 3 MTF. The purpose of this study was to describe patients transferred from a role 2 MTF to a US role 3 MTF in Afghanistan, as a first step in understanding this patient population and the skill level of medical attendants, with the goal of gaining data about best practices for en route care.

Methods

Approval for this exempt research study was received from the US Army Institute of Surgical Research Regulatory Department. This study consisted of a retrospective review of data from the Joint Trauma System Role 2 Database. The database included prehospital data, arrival and discharge status, diagnoses, interventions, blood administration, and complications data.[11] In the Role 2 Database, 15310 patient records were available. Of those records, 4534 patients were eligible (ie, these patients had transportation data available from a role 2 to a role 3 facility) for the study.

Study Inclusion Criteria

To be included in the study, patients had to have (1) been injured in Afghanistan; (2) been at least 18 years of age; (3) sustained trauma (ie, battle or nonbattle injury); (4) been injured between February 2008 and September 2014; and (5) received treatment at a role 2 MTF and been transferred to a US role 3 MTF.

Definitions

In this study, the term *en route medical attendant* was defined as the medical attendant (ie, physician, registered nurse, medical technician) with the highest clinical capability. *Medical technician* refers to an EMT or a paramedic. Patient affiliation was classified as (1) military, US (US Army, US Air Force, US Marine Corps, and US Navy); (2) military, non-US (Afghanistan police, Afghanistan military, NATO (North Atlantic Treaty Organization) coalition, combatants, and non-NATO coalition); and (3) civilian or unknown (Afghanistan civilian, contractor, non-US civilian, US civilian, and other). Mode of transfer out of a role 2 to a role 3 included medical evacuation by fixed wing, rotary wing, and ground transportation; and nonmedical evacuation by rotary-wing and ground transportation.

Injury and Intervention Categories

Using the methods of a previous study by Ingalls and colleagues,[12] patient diagnoses were categorized as orthopedic injuries, soft tissue trauma, penetrating extremity injuries, brain injuries, penetrating injuries, gastrointestinal/abdominal injuries, ears/nose/mouth/teeth/throat injuries, pulmonary/thoracic injuries, vascular injuries, genitourinary/renal injuries, burns, or other injuries. In addition, orthopedic injuries were divided into more specific categories: fracture, amputation, and other injuries. Penetrating injuries were classified according to body region: extremity or other. *Battle injury* included patients who were injured during hostile actions or battle-related activities, whereas *nonbattle injury* included nonbattle-related activities or hostile action and unintentional or self-inflicted injuries.

Blood transfusion at a role 2 MTF was defined as receiving any blood product (ie, whole blood, packed red blood cells, platelets, cryoprecipitate, or plasma/fresh frozen plasma), whereas massive transfusion at a role 2 MTF was defined as receiving more than 10 U of packed red blood cells within 24 hours. Surgery at a role 2 facility was identified by categorizing procedure descriptions into surgical (eg, bowel surgery, amputation) or nonsurgical procedures (eg, computed tomography scan, radiograph). Shock index (ie, heart rate divided by systolic blood pressure) was used to demonstrate trauma injury severity among study patients; a shock index of ≥0.9 indicated a patient with severe to critical injuries.[13] Injury types were categorized by all burn injuries, penetrating injury, blunt injury, or penetrating and blunt injury. Mechanism of injury was categorized by all explosions, gunshot wound, motor vehicle crash, fall, and other. Patient characteristics and interventions (eg, intubation, vasopressor use, shock index) were described by the en route care medical attendant.

Deployment of much smaller teams into more austere settings results in limited resources for definitive care, longer holding times, and extended evacuation times.

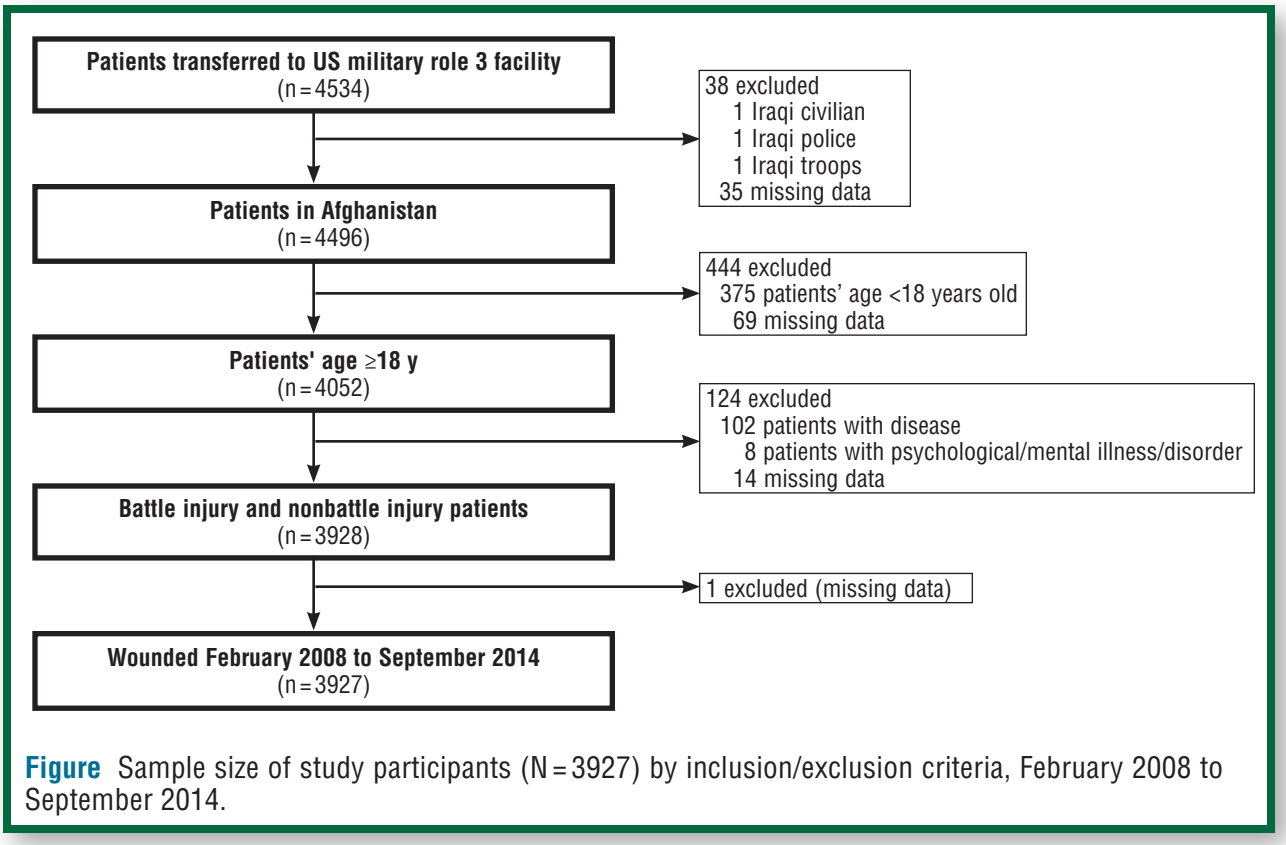

Figure Sample size of study participants (N = 3927) by inclusion/exclusion criteria, February 2008 to September 2014.

Statistical Analysis

Fisher's exact test, χ^2, or analysis of variance tests were used to determine significant differences in patient characteristics where appropriate. For the en route care medical attendant analysis, only physicians, nurses, and technicians were compared, because the unknown category was not mutually exclusive for nurses, physicians, and technicians. Analyses were performed using SAS, version 9.4 (SAS Institute, Inc).

Results

Based on the inclusion criteria, 3927 patients transferred to a US role 3 MTF were included in the study (see Figure). Study patients had a median (interquartile range) age of 25 (22-30) years; about half of the study population was US military (49.6%; n = 1949) (Table 1). Most patients were male (96.5%; n = 3791), had a battle injury (81.8%; n = 3214), were injured by an explosion (51.5%; n = 2023), had a penetrating injury (52.5%; n = 2060), or had a shock index less than 0.9 (75.8%; n = 2978). Among the study patients, 37.9% (n = 1489) had surgery at a role 2 MTF, and 24.5% (n = 963) received a blood transfusion and 4.7% (n = 183) received a massive transfusion at a role 2 MTF.

Injury diagnoses are described in Table 2 according to highest level of transport medical attendant. Orthopedic injuries made up the largest number of diagnoses (38.6%; n = 1517) for trauma-eligible adult patients treated and transferred from role 2 MTFs, followed by soft tissue trauma (23.9%; n = 938), penetrating extremity injuries (13.8%; n = 543), and brain injuries (13.3%; n = 521). After stratifying by medical attendant, the top 2 injury diagnoses remained the same (orthopedic injuries and soft tissue trauma) among all attendants, and penetrating injury and brain injuries remained in the top 5 diagnoses.

Many records (40.4%; n = 1588) did not have a defined en route care provider; about one-third of patients transferred from a role 2 to a role 3 facility had en route care provided by a nurse (35.5%; n = 1394), followed by technicians (14.1%; n = 554) and physicians (10.0%; n = 391; Table 3). More than one-fourth of patients were intubated at transfer (26.9%; n = 1056) and more of these patients were transported by physicians (38.9%; 152 of 391) or nurses (39.7%; 553 of 1394) than by technicians (7.2%; 40 of 554; $P < .001$). Patients transported with vasopressors differed significantly by en route medical attendant capability (physicians, 3.8% [15 of 391];

Table 1 Study characteristics of eligible adult trauma patients (N = 3927)[a] treated and transferred from role 2 medical treatment facilities during Afghanistan conflict from February 2008 to September 2014

Characteristics	No. (%)
Male sex	3791 (96.5)
Battle injury	3214 (81.8)
Mechanism of injury	
Explosion	2023 (51.5)
Gunshot wound	941 (24.0)
Other	324 (8.3)
Motor vehicle crash	303 (7.7)
Fall	151 (3.8)
Type of injury	
Penetrating	2060 (52.5)
Blunt	1232 (31.4)
Penetrating and blunt	341 (8.7)
Burn	78 (2.0)
Shock index upon arrival at role 2 facility	
< 0.9	2978 (75.8)
≥ 0.9	781 (19.9)
Patient affiliation	
US military	1949 (49.6)
Non-US military	1139 (29.0)
Civilian or unknown	839 (21.4)
Surgery at role 2 facility	
Yes	1489 (37.9)
No	838 (21.3)
Blood transfusion at role 2 facility	
Yes	963 (24.5)
No	1140 (29.0)
Massive transfusion at role 2 facility	
Yes	183 (4.7)
No	1874 (47.7)

[a] Median (interquartile range) age was 25 (22-30) years old.

nurses, 2.3% [32 of 1394]; technicians, 0.4% [2 of 554]; $P = .001$). Compared with patients transported by technicians, more patients attended by a physician or nurse had a base deficit of more than 5 at transfer (physicians, 5.1% [20 of 391]; nurses, 5.0% [70 of 1394]; technicians, 1.4% [8 of 554]; $P = .04$), pH less than 7.3 at transfer (physicians, 7.2% [28 of 391]; nurses, 7.2% [101 of 1394]; technicians, 2.7% [15 of 554]; $P = .05$), and an international normalized ratio of more than 2 at transfer (physicians, 2.3% [9 of 391]; nurses, 1.1% [16 of 1394]; technicians, 0%; $P = .03$). Fewer patients transported by technicians (3.1% [17 of 554]) had temporary abdominal or chest closure at transfer compared with physicians (8.7% [34 of 391]) or nurses (11.1% [155 of 1394]; $P < .001$). The distribution of patient mode of transportation differed by medical attendant ($P < .001$), although most patients, regardless of type of en route medical attendant, were transported by rotary-wing medical evacuation. More patients transported by physicians (4.9% [19 of 391]) or nurses (6.7% [94 of 1394]) had a massive transfusion at a role 2 facility, compared with patients transported by technicians (1.3% [7 of 554]). Technicians transported patients with lower mean (SD) pulse at departure (84.0 [16.3]) compared with physicians (92.9 [20.7]) and nurses (92.0 [21.7]; $P < .001$).

Discussion

This study represents the first detailed description of the en route care of trauma-eligible adult patients transferred from a role 2 to a role 3 MTF in Afghanistan. In this study, we compared trauma-eligible adult patients transferred from role 2 MTFs to US role 3 MTFs by en route care medical attendant capability. Of patients with a documented en route care provider, most patients were attended by a nurse. Among study patients, the top 4 diagnoses were orthopedic injury, soft tissue trauma, brain injury, and penetrating extremity injury. In this study, the physiological status of patients differed by medical attendant. Proportionally, patients attended by physicians or nurses were in worse physiological condition at transfer (ie, intubated and receving vasopressors, base deficit >5, pH <7.3, international normalized ratio >2, temporary abdominal or chest closure, or massive transfusion at role 2) than patients transported by technicians. Specifically, more than 25% of patients transferred from a role 2 were intubated, and the highest level of medical attendant at transfer was a technician for 40 of these intubated patients. A traditional EMT is not trained to care for an intubated patient. In addition, nearly 40% of study patients were postoperative patients. Although a combat-trained medic can retrieve a battle casualty from point of injury, a postoperative patient tends to require specialized care that may be outside the scope of an EMT or paramedic, necessitating a higher and specialized provider skill level.

Previous studies have identified outcomes for trauma casualties transported from point of injury to surgical capability and cared for by nonphysician providers with varying levels of training. In the study by Mabry et al,[14] among patients transported from point of injury to first MTF, mortality was lower in patients cared for by critical

Table 2 Diagnoses for eligible adult trauma patients (N = 3927) treated and transferred from role 2 medical treatment facilities during Afghanistan conflict by highest level of en route medical attendant[a] from February 2008 to September 2014

	Total (N = 3927)	Physician (n = 391)	Nurse (n = 1394)	Technician (n = 554)	Unknown (n = 1588)
Diagnosis	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Orthopedic injury, total	1517 (38.6)	174 (44.5)	778 (55.8)	182 (32.9)	383 (24.1)
Fracture	1069 (27.2)	144 (36.8)	536 (38.5)	119 (21.5)	270 (17.0)
Amputation	157 (4.0)	14 (3.6)	91 (6.5)	14 (2.5)	38 (2.4)
Other injury	291 (7.4)	16 (4.1)	151 (10.8)	49 (8.8)	75 (4.7)
Soft tissue trauma	938 (23.9)	77 (19.7)	469 (33.6)	129 (23.3)	263 (16.6)
Penetrating injury, extremity	543 (13.8)	36 (9.2)	287 (20.6)	69 (12.5)	151 (9.5)
Brain injury	521 (13.3)	47 (12.0)	196 (14.1)	83 (15.0)	195 (12.3)
Other injury	275 (7.0)	44 (11.3)	135 (9.7)	24 (4.3)	72 (4.5)
Penetrating injury, other regions	221 (5.6)	21 (5.4)	116 (8.3)	23 (4.2)	61 (3.8)
Gastrointestinal/abdominal injury	193 (4.9)	24 (6.1)	109 (7.8)	12 (2.2)	48 (3.0)
Ears/nose/mouth/teeth/throat injury	138 (3.5)	14 (3.6)	77 (5.5)	12 (2.2)	35 (2.2)
Pulmonary/thoracic injury	138 (3.5)	15 (3.8)	81 (5.8)	13 (2.3)	29 (1.8)
Vascular injury	104 (2.6)	10 (2.6)	65 (4.7)	6 (1.1)	23 (1.4)
Genitourinary/renal injury	91 (2.3)	13 (3.3)	50 (3.6)	5 (0.9)	23 (1.4)
Burn injury	45 (1.1)	3 (0.8)	26 (1.9)	4 (0.7)	12 (0.8)

[a] En route medical attendant was defined as the medical attendant with the highest capability.

care flight paramedics than in patients treated by EMTs, who have a lower level of training (mortality, 8% vs 15%, respectively; $P = .011$). Dissimilarly, in a comparison of patient outcomes among EMTs, paramedics, and advanced-level providers from point of injury to first MTF (which includes physicians, physician assistants, and nurses), Maddry and colleagues[5] did not report a difference. These null findings may be due to (1) restrictions of care because of the confined space of the transport platform or (2) a minimization of the need for lifesaving en route interventions due to reduced transport times because of the golden hour policy (ie, the mandate that medical evacuation platforms must deliver causalities from point of injury to surgical capability within 1 hour of request[2]). However, transport of a relatively stable postoperative patient using a regulated system differs from the transport of a patient from the point of injury or role 1 to initial surgical care at the role 2.

Multiple studies have been conducted evaluating the en route care of patients during transport from point of injury to first MTF (role 2 and/or 3)[5,12,14-22] and out of theater to the role 4 medical center in Landstuhl, Germany.[12,19-28] A few published reports have described patients treated by individual forward surgical teams (role 2) during specific deployments, but these studies do not include information related to patient transport. These reports described cases and procedures performed by the surgical teams from data sets collected prospectively by the surgical team. The data elements compiled varied from report to report, limiting the ability to combine data.[29-38] The Joint Trauma System established its Role 2 Database in 2008; however, only 1 preliminary report using this database has described the profiles of patients treated in all role 2 facilities.[11] Ultimately, our study is the first comprehensive description of the types of trauma patients evacuated from a role 2 surgical facility to a higher level of care in a combat setting.

Limitations

Several limitations of our study must be considered along with the interpretation of study results. The data used in this study have not been validated using quality control methods, such as cross-checking the data against the patient's medical records. Another limitation is that we are unable to differentiate critical care flight paramedics, who have a higher level of training, from traditional combat flight medics, as these attendants are grouped

Table 3 Study characteristics by en route medical attendant[a] of trauma-eligible adult patients (N = 3927) treated and transferred from role 2 medical treatment facilities during Afghanistan conflict from February 2008 to September 2014

Characteristics	Total No. (%)	Physicians No. (%)	Nurses No. (%)	Technicians No. (%)	Unknown No. (%)	P[b]
Patients	3927 (100.0)	391 (10.0)	1394 (35.5)	554 (14.1)	1588 (40.4)	
Intubated at transfer						<.001
Yes	1056 (26.9)	152 (38.9)	553 (39.7)	40 (7.2)	311 (19.6)	
No	2521 (64.2)	235 (60.1)	799 (57.3)	491 (88.6)	996 (62.7)	
Receiving vasopressors at transfer						.001
Yes	64 (1.6)	15 (3.8)	32 (2.3)	2 (0.4)	15 (0.9)	
No	3426 (87.2)	369 (94.4)	1291 (92.6)	523 (94.4)	1243 (78.3)	
Base deficit >5 at transfer						.049
Yes	138 (3.5)	20 (5.1)	70 (5.0)	8 (1.4)	40 (2.5)	
No	2467 (62.8)	299 (76.5)	1043 (74.8)	297 (53.6)	828 (52.1)	
pH <7.3 at transfer						.05
Yes	203 (5.2)	28 (7.2)	101 (7.2)	15 (2.7)	59 (3.7)	
No	2414 (61.5)	292 (74.7)	1015 (72.8)	298 (53.8)	809 (50.9)	
INR >2 at transfer						.03
Yes	32 (0.8)	9 (2.3)	16 (1.1)	0 (0.0)	7 (0.4)	
No	2011 (51.2)	261 (66.8)	818 (58.7)	209 (37.7)	723 (45.5)	
Temporary abdominal or chest closure at transfer						<.001
Yes	292 (7.4)	34 (8.7)	155 (11.1)	17 (3.1)	86 (5.4)	
No	2745 (69.9)	319 (81.6)	1055 (75.7)	413 (74.5)	958 (60.3)	
Mode of transfer						<.001
Medical evacuation (fixed wing)	183 (4.7)	60 (15.3)	46 (3.3)	8 (1.4)	69 (4.3)	
Critical care air transport team	80 (2.0)	39 (10.0)	15 (1.1)	1 (0.2)	25 (1.6)	
Medical evacuation (rotary wing)	2956 (75.3)	259 (66.2)	1197 (85.9)	495 (89.4)	1005 (63.3)	
Medical evacuation (ground)	34 (0.9)	1 (0.3)	5 (0.4)	11 (2.0)	17 (1.1)	
Nonmedical evacuation (air)	74 (1.9)	2 (0.5)	32 (2.3)	16 (2.9)	24 (1.5)	
Nonmedical evacuation (ground)	15 (0.4)	1 (0.3)	3 (0.2)	1 (0.2)	10 (0.6)	
Other	165 (4.2)	29 (7.4)	84 (6.0)	19 (3.4)	33 (2.1)	
Massive transfusion						<.001
Yes	183 (4.7)	19 (4.9)	94 (6.7)	7 (1.3)	63 (4)	
No	1874 (47.7)	196 (50.1)	753 (54.0)	242 (43.7)	683 (43)	
	Total Mean (SD)	**Physicians Mean (SD)**	**Nurses Mean (SD)**	**Technicians Mean (SD)**	**Unknown Mean (SD)**	**P[b]**
Pulse at departure, beats/min	89.1 (20.4)	92.9 (20.7)	92.0 (21.7)	84.0 (16.3)	86.9 (19.6)	<.001
Respiratory rate at departure, breaths/min	16.9 (4.1)	16.5 (3.9)	16.9 (4.3)	17.3 (4.0)	16.8 (3.9)	.17
Systolic blood pressure at departure, mm Hg	125.3 (17.9)	123.9 (19.4)	124.2 (19.0)	124.2 (15.4)	127.5 (17.0)	.98
Oxygen saturation at departure, %	98.1 (4.0)	97.5 (7.9)	98.4 (4.1)	97.8 (3.3)	98.0 (3.2)	.06

Abbreviation: INR, international normalized ratio.
[a] En route medical attendant was defined as the medical attendant with the highest capability.
[b] *P* value is a comparison between physician, nurse, and technician.

together. In addition, given that data are recorded voluntarily by health care professionals with limited training on data entry, we are unsure of the proportion of role 2 workload that has been captured. Therefore, selection bias is a possibility in this study. Finally, because of the high proportion of missing data (eg, en route care interventions, physiological status, patient outcomes), this analysis serves as only an initial evaluation of patients evacuated from role 2 to higher level of care.

Implications for Future Practice

The model of role 2 MTFs has been successful in recent conflicts in demonstrating outcomes comparable to a combat support hospital and in establishing the use of fresh whole blood in an austere setting.[39-41] However, we are reaching limits of effectiveness in terms of how much farther "forward" we can place teams or units with surgical capability.[42] Deployment of much smaller teams into more austere settings results in limited resources for definitive care, longer holding times, and extended evacuation times. This limit is important, because delays in the application or performance of definitive lifesaving interventions lead to more critically ill patients with worse outcomes.[43] Moreover, even if resources are available for placing teams and units farther forward, the geography of the combat theater may be a limiting factor, as was the case in Afghanistan compared with Iraq.[44] Consequently, in the future, improved outcomes are not only going to come from physicians, but from other health care providers who also have significant training and experience (ie, flight paramedics, critical care nurses).[42] Given our study results, we must specifically train medical attendants to care for postoperative patients, train flight paramedics in critical care, and individually assign critical care nurses to transport patients to ensure standardization of an appropriate skill level for critical care transport; these teams could be augmented by a physician assistant or physician as needed.

In addition, the traditional role 2 facility is located in an austere setting, often without an airfield capable of accommodating a fixed-wing aircraft, which may make the routine use of medical evacuation (fixed wing) or CCATTs impractical for future combat scenarios. Therefore, in future conflicts, the advantage of more highly trained providers may become more apparent if shorter patient transport times are not possible.[5]

The time frame for this study was from 2008 through 2014, and multiple changes in capabilities and resource allocation occurred during that time. Future studies may be more meaningful if they focus on a later, shorter time period when practices are more consistent. In addition, future studies need to examine the actual care provided during transport from role 2 to role 3 MTFs and include an analysis of short- and long-term outcomes based on provider skill level. The results of these studies can provide valuable information about en route care training requirements, clinical practice guidelines, and the use of resources. In addition, understanding the care needs of patients closest to the battlefield in recent conflicts may help shed light on prolonged field care scenarios.

Finally, approximately half of the study population was a non-US military member or civilian or unknown. Documentation of care provided at the role 2 and during transportation of these patients within the austere environment of the US military evacuation system is challenging but critical, because providers need to know what interventions occurred before arrival at the next level of care. Innovations in the transfer of medical information and records to host-nation treatment facilities are needed.

Conclusion

This study is the first comprehensive review of patients transported from a forward surgical facility to a more robust combat support hospital in Afghanistan. Understanding the epidemiology of these patients will inform provider training and appropriate skill mix for the transfer of postsurgical patients within a combat setting. CCN

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