En-Route Care Capability From Point of Injury Impacts Mortality After Severe Wartime Injury

Jonathan J. Morrison, MRCS,† John Oh, MD,‡ Joseph J. DuBose, MD,§ David J. O'Reilly, MRCS,† Robert J. Russell, FCEM,¶ Lorne H. Blackbourne, MD,* Mark J. Midwinter, MD, FRCS,† and Todd E. Rasmussen, MD*||***

Objective: The objective of this study is to characterize modern point-of-injury (POI) en-route care platforms and to compare mortality among casualties evacuated with conventional military retrieval (CMR) methods to those evacuated with an advanced medical retrieval (AMR) capability.

Background: Following a decade of war in Afghanistan, the impact of en-route care capabilities from the POI on mortality is unknown.

Methods: Casualties evacuated from POI to one level III facility in Afghanistan (July 2008–March 2012) were identified from UK and US trauma registries. Groups comprised those evacuated by a medically qualified provider-led, AMR and those by a medic-led CMR capability. Outcomes were compared per incremental Injury Severity Score (ISS) bins.

Results: Most casualties (n = 1054; 61.2%) were in the low-ISS (1–15) bracket in which there was no difference in en-route care time or mortality between AMR and CMR. Casualties in the mid-ISS bracket (16–50) (n = 583; 33.4%) experienced the same median en-route care time (minutes) on AMR and CMR platforms [78 (58) vs 75 (93); $P = 0.542$] although those on AMR had shorter time to operation [110 (95) vs 117 (126); $P < 0.001$]. In this mid-ISS bracket, mortality was lower in the AMR than in the CMR group (12.2% vs 18.2%; $P = 0.035$). In the high-ISS category (51–75) (n = 75; 4.6%), time to operation was lower in the AMR than the CMR group (66 ± 77 vs 113 ± 122; $P = 0.013$) but there was no difference in mortality.

Conclusions: This study characterizes en-route care capabilities from POI in modern combat. Conventional platforms are effective in most casualties with low injury severity. However, a definable injury severity exists for which evacuation with an AMR capability is associated with improved survival.

Keywords: casualty evacuation, combat injury, medical evacuation, trauma, wartime injury

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The wars in Iraq and Afghanistan have prompted developments in the field of combat casualty care.[1,2] At the point of injury (POI), use of tourniquets and novel hemostatic agents has resulted in a reduction in deaths from extremity hemorrhage.[3,4] Further mortality reductions have been achieved in deployed surgical capability with the use of balanced blood component resuscitation and hemostatic adjuncts such as tranexamic acid.[5,6] The greatest proportion of combat deaths, however, continue to occur in the prehospital setting, with noncompressible torso hemorrhage and traumatic brain injury posing as the most lethal injury patterns.[7–9]

Out of hospital care occurs in 2 phases, the first of which is the brief but high impact phase of self-aid and buddy care now termed *tactical combat casualty care*.[10] The second and often longer phase is termed *en-route care* and includes care rendered as the casualty is moved from POI to surgical capability. As one considers the whole of pre-hospital care, landmark studies have been conducted to confirm the effectiveness of tactical combat casualty care methods in reducing mortality.[3,4,11] However, after a decade of war few studies have been performed on the longer aspect which is en-route care. The objective of this study is to characterize the types of en-route care platforms, moving casualties from POI in Afghanistan. An additional objective is to compare mortality among casualties moved using conventional military retrieval (CMR) platforms to those moved with an advanced medical retrieval (AMR) capability.

METHODS

Study Population

Approval for this study was obtained through the UK Joint Medical Command Research Pillar and the US Army Medical Research and Material Command. Three prospectively collected data sets were utilized over a 33 consecutive month period (July 2008–March 2011): the UK prehospital registry and the UK and US Joint Theatre Trauma Registries (JTTR). The study population was consecutive combat casualties admitted to a single surgical hospital in Regional Command-South Afghanistan (Camp Bastion). Personnel from North Atlantic Treaty Organization (NATO) military countries were designated as "NATO" and patients from Afghanistan were designated as "Local Nationals." Data retrieved included demographic, admission physiology, timeline data (where available), injury patterns, and mortality. Injury patterns were reported using Abbreviated Injury Scale (AIS) coding, version "Military 2005." *Severe injury* was defined as a body region AIS greater than or equal to 3. Both the US and UK JTTR were queried to obtain 30-day mortality for NATO military personnel, and day of discharge was the last day of follow-up for Local National patients.

The UK prehospital registry was queried for AMR interventions, which were divided into categories: (1) *Advanced Airway Intervention*: rapid sequence induction intubation or cricothyroidotomy; (2) *Chest decompression*: thoracotomy, tube or open or needle decompression; 3. *Intraosseous access*: sternal, humeral or tibial access sites; 4. *Intravenous access*: peripheral or central venous; and 5. *Prehospital Blood*: administration of red cell concentrate and plasma.

Retrieval Platform Descriptions and Case Identification

The AMR capability was the UK Medical Emergency Response Team (MERT). In this study, the majority of AMR patients

From the *United States Army Institute of Surgical Research, Fort Sam Houston, TX; †The Academic Department of Military Surgery and Trauma, Royal Centre for Defence Medicine, Birmingham, UK; ‡Landstuhl Regional Medical Centre, Landstuhl, Germany; §C-STARS Baltimore, R Adams Cowley Shock Trauma Center, Baltimore, MD; ¶The Academic Department of Military Emergency Medicine, Royal Centre for Defence Medicine, Birmingham, UK; ||59th Medical Deployment Wing, Science and Technology Section, Lackland Air Force Base, TX; and **The Norman M. Rich Department of Surgery, the Uniformed Services University of the Health Sciences, Bethesda, MD.

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Reprints: Todd E. Rasmussen, MD, US Army Institute of Surgical Research, Fort Sam Houston (San Antonio), TX 78234. E-mail: todd.rasmussen@amedd.army.mil.

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were transported by a CH-47 Chinook helicopter, which can carry up to 9 stretchered casualties at speeds up to 200 mph. En-route care is delivered by a paramedic in the standard MERT configuration or a physician capable of providing one of the previously mentioned interventions in the "enhanced" or MERT-E configuration. For the purposes of this study, 100% of missions were flown in the physician-led MERT-E configuration. The 2 CMR platforms were the US Air Force Expeditionary Rescue Squadron (ERS) and the US Army Medical Evacuation (MEDEVAC) Squadrons. ERS delivers care via a HH-60 Pave Hawk Helicopter, call sign "PEDRO," and is crewed by Pararescuemen (or PJs). These individuals are trained to paramedic standard in addition to other military specific skills. The MEDEVAC squadrons utilize a UH-60 helicopter, call sign "DUSTOFF," and are manned by basic-level emergency medical technicians (EMT-B). Both helicopters can travel up to 170 mph and can accommodate 2 stretchered patients.

Patients in the AMR group were identified from the UK prehospital registry, which was matched with the UK JTTR. Patients admitted by a CMR capability (DUSTOFF and PEDRO) were identified from both the US and UK JTTR and in unknown cases, case notes were retrieved to clarify.

Tasking, En-route, and "To Operation" Times

Casualty movement from POI commences once a request is made by military personnel for a medical retrieval mission. The request is made in a standard format containing a description of injuries and physiology and is processed by the Patient Evacuation Coordination Cell (PECC).[12,13] The PECC has both medical and nonmedical personnel that processed and assimilate current operational data as well as the medical needs of the patients before dispatching the appropriate retrieval asset. For purposes of the study, this time was designated as *Time of Tasking* (Table 1). All missions within this study were processed by the same PECC, and patients were flown to the same level III emergency department (ED). *Time from tasking to ED* included time required for AMR or CMR to travel from its ready location to POI and evacuate the casualty to the ED at the level III. *Time from ED to OR* was defined as the time from arrival at the level III until initiation of any necessary operation in the operating room (OR). This time included primary and secondary survey, diagnostic imagining such as plain x-rays or computed tomography as well as time waiting for an available operating table.

TABLE 1. Median Time in Minutes to ED and OR for Retrieval Platforms by ISS and Presence of Hypotension

Group	*Time Parameter	AMR	CMR	*P*
Overall	n (% available)	809 (74.0)	372 (59.2)	
	Tasking to ED	78 (58)	75 (93)	0.542
	n (% available)	737 (67.4)	300 (47.8)	
	ED to OR	110 (95)	117 (126)	<0.001
ISS: 1–15	n (% available)	484 (59.4)	243 (60.1)	
	Tasking to ED	74 (72)	79 (126)	0.150
	n (% available)	367 (56.5)	195 (48.3)	
	ED to OR	136 (125)	136 (167)	0.273
ISS: 16–50	n (% available)	281 (73.0)	11 (56.1)	
	Tasking to ED	59 (47)	71 (68)	0.132
	n (% available)	326 (84.7)	99 (50.0)	
	ED to OR	83 (67)	101 (82)	<0.001
ISS: 51–75	n (% available)	44 (75.9)	18 (69.2)	
	Tasking to ED	55 (47)	48 (47)	0.251
	n (% available)	44 (75.9)	18 (69.2)	
	ED to OR	15 (63)	56 (24)	0.038
SBP < 90 mm Hg	n (% available)	72 (74.6)	37 (32.7)	
	Tasking to ED	59 (33)	58 (70)	0.840
	n (% available)	84 (81.6)	34 (57.6)	
	ED to OR	66 (70)	83 (61)	0.009

*Based on incomplete data, percentage availability noted alongside n. Values expressed as median (interquartile range).

Statistical Analysis

The primary endpoint was in-hospital mortality for Local Nationals and 30-day mortality for NATO patients. The AMR and CMR cohorts were compared. Categorical variables were compared using χ^2 analysis, and continuous variables were compared using the Student *t* test or the Mann-Whitney rank-sum test. Significance was set at $P \leq 0.05$. Injury pattern and mortality analysis were performed after stratification into Injury Severity Score (ISS) bins: low, 1 to 15; middle, 16 to 50; and high, 51 to 75. To account for the frequency of what may have been nonsurvivable traumatic brain injury (TBI) in either cohort, a separate analysis of mortality was performed after excluding isolated severe TBIs defined as head AIS $\geq$ 3 in the absence of any other body region AIS $\geq$ 3. Risk ratio and 95% confidence intervals were generated for the AMR group relative to the CMR group for mortality.

RESULTS

Demographics, Admission Physiology and Injury Severity

A total of 2818 casualties during the study period were entered into the UK JTTR, 1721 of whom were retrieved with AMR (n = 1093) or CMR (n = 628) capabilities. The remaining 1097 patients were either admitted by nonmedical rotary wing assets (ie, utility helicopter) or land transport and were excluded. Both AMR and CMR groups had similar demographic characteristics (Table 2). There was a higher proportion of NATO patients in the AMR than in the CMR group (70.2% vs 58.1%; $P < 0.001$) and patients having sustained an explosive mechanism of injury were more common in the AMR than in the CMR group (70.4% vs 60.8%; $P < 0.001$). Patients in AMR had a higher mean Glasgow Coma Score than those in the CMR group (14 ± 3 vs 13 ± 4; $P = 0.005$), whereas the admission systolic blood pressure (BP) and ISS were the same in both groups (Table 2).

Analysis by Injury Severity Category

Both cohorts were divided into ISS bins: low, 1 to 15; medium, 16 to 49; and high, 50 to 75, and the proportion of severe (AIS $\geq$ 3) body region injuries compared (Table 3). AIS data was unavailable in 4 patients. The majority of patients were in the low (61.2%) and middle (33.9%) ISS bins, with a minority in the high category (4.6%).

TABLE 2. Demographic Characteristics and Admission Physiology of Patients Admitted by AMR and CMR Platforms

	AMR	CMR	*P*
Number, n	1093	628	
Age, mean ± SD, y	24.0 ± 7.7	24.3 ± 9.5	0.476
Male, n (%)	1059 (96.9)	598 (95.2)	0.053
NATO, n (%)	767 (70.2)	368 (58.1)	<0.001
Local nationals, n (%)	326 (29.8)	263 (41.9)	
Blast, n (%)	769 (70.4)	382 (60.8)	<0.001
Gunshot, n (%)	266 (24.3)	219 (34.9)	
Other, n (%)	58 (5.3)	27 (4.3)	
Systolic BP, mean ± SD	129 ± 36	130 ± 32	0.782
GCS, mean ± SD	14 ± 3	13 ± 4	0.005
ISS, mean ± SD	16 ± 17	15 ± 16	0.122

GCS indicates Glasgow Coma Score; ISS, injury severity score.

TABLE 3. Injury Pattern per Body Region Stratified by ISS Bins per Retrieval Platform

	ISS: 1–15			ISS: 16–50			ISS: 51–75		
Severe Injury	**AMR**	**CMR**	***P***	**AMR**	**CMR**	***P***	**AMR**	**CMR**	***P***
*Number, n	650	404		385	198		58	22	
Head, n (%)	0 (0.0)	0 (0.0)	NA	41 (10.6)	36 (18.2)	0.014	46 (79.3)	22 (84.6)	0.402
Face, n (%)	2 (0.3)	0 (0.0)	0.527	3 (0.8)	5 (2.5)	0.128	3 (5.2)	1 (3.8)	0.636
Neck, n (%)	0 (0.0)	1 (0.2)	0.383	9 (2.3)	4 (2.0)	0.532	5 (8.6)	4 (15.4)	0.284
Chest, n (%)	19 (2.9)	27 (6.7)	0.005	91 (23.6)	55 (27.8)	0.161	19 (32.8)	8 (30.8)	0.533
Abdomen, n (%)	17 (2.6)	9 (2.2)	0.839	86 (22.3)	33 (16.7)	0.129	14 (24.1)	4 (15.4)	0.274
Upper Extremity, n (%)	22 (3.4)	11 (2.7)	0.591	59 (15.3)	21 (10.6)	0.128	6 (10.3)	1 (3.8)	0.428
Lower Extremity, n (%)	94 (14.5)	63 (15.6)	0.657	250 (64.9)	110 (55.6)	0.017	21 (36.2)	5 (19.2)	0.135

NA indicates not applicable.
*Data on 4 patients body region data was unavailable.

The trend was for an increase in severe head and torso injuries in both groups as the ISS increased. The proportion of patients with severe extremity injury peaked in the AMR and CMR groups in the middle ISS 16 to 49 category (Table 3).

In the low-ISS bin, there was a greater proportion of severe chest injuries in the CMR than in the AMR group (6.7% vs 2.9%, respectively; $P = 0.005$), with no difference in other injury parameters (Table 3). In the middle-ISS category, there was a higher percentage of severe TBIs in the CMR than in the AMR group (18.2% vs 10.6%, respectively; $P = 0.014$), whereas the AMR group had a higher percentage of patients with severe lower extremity injuries (64.9% vs 55.6%, respectively; $P = 0.005$). There were no differences in the severity of injury patterns between en-route care platform groups in the high-ISS 51 to 75 bracket.

Duration of En-Route Care and Time to Operation

Data related to the duration of en-route care and initiation of surgical procedures was available from 809 (74%) of AMR and 301 (48%) of CMR missions. There was no difference in median (interquartile range) time (minutes) from tasking to arrival of the casualty in the ED between AMR and CMR capabilities [78 (58) vs 75 (93), respectively; $P = 0.542$] (Table 1). However, median time from arrival in the ED to initiation of operation (OR) was less in AMR than in CMR [110 (95) vs 117 (126), respectively; $P < 0.001$]. In the context of ISS categories, there was no difference in en-route care time or time to OR between AMR and CMR for patients in the low-ISS bin (Table 1). In contrast, time from the ED to OR was less in the AMR group for both the medium- (16–50) and high-ISS (51–75) categories (Table 1). Time to operation was 73% less in the AMR than in the CMR group in those with the highest ISS. Median time to operation in those with shock (systolic BP < 90 mm Hg) was also less in AMR than in CMR group [66 (70) vs 83 (61), respectively; $P = 0.009$] (Table 1).

Mortality

There was no difference in overall mortality between AMR and CMR groups (9.1% vs 9.2%, respectively; $P = 0.536$). When comparing mortality between cohorts per ISS bin, there was no difference between the AMR and CMR groups in the lowest category (2.8% vs 1.5%, respectively; $P = 0.124$) (Fig. 1). However, in the middle-ISS bin, a lower mortality was associated with the AMR group than that with the CMR group (12.2% vs 18.2%, respectively; $P = 0.035$). The risk ratio (95% confidence interval) of death in the AMR compared with the CMR platform was 0.63 (0.39–1.00). There was no difference in mortality between AMR and CMR groups in the high-ISS category (Fig. 1).

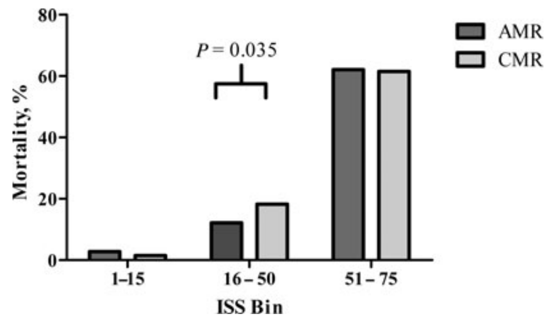

FIGURE 1. Mortality analysis of all patients retrieved by AMR or CMR platform, per ISS bins.

Because there was a greater proportion of severe TBIs in the CMR than those in the AMR group in the middle-ISS bin (18.2% vs 10.6%, respectively; $P = 0.014$), a separate analysis was performed after exclusion of isolated severe TBIs (head AIS $\geq$ 3 with an AIS $\leq$ 2 in any other body regions). After exclusion of severe TBIs, there remained a lower mortality in the AMR group than in the CMR group in the middle ISS bin (12.7% vs 20.8%, respectively; $P = 0.012$). The relative risk (95% confidence interval) of death in the AMR compared with the CMR capability after exclusion of isolated head injury was 0.55 (0.34–0.90).

Interventions Performed on AMR

Interventions performed on the CMR platforms were not available for analysis. A description of interventions per ISS category performed on the AMR platform is provided in Table 4. Nearly half of the patients in the medium- (40.5%) and high-ISS (51.7%) categories cohort required an airway intervention and nearly a third received chest decompression and transfusion of blood products. These percentages are in contrast to those in the low-ISS category where airway procedures, chest decompression, and the use of prehospital blood products were rarely used.

DISCUSSION

This report characterizes distinct POI en-route care capabilities in a combat setting. Findings show that times from tasking to arrival in the emergency department and to initiation of surgical procedures are the same or less with the AMR platform. In addition, a high percentage of the most severely injured patients evacuated with AMR have had an advanced intervention. Finally, this report finds no difference in mortality between capabilities in the low category of injury severity, which comprised two thirds of the cohort. However, casualties in the

TABLE 4. Interventions Performed on the AMR Platform

		ISS		
	Overall	**1–15**	**16–50**	**51–75**
Number, n	1093	650	385	58
Advanced airway intervention	222 (20.3%)	36 (5.5%)	156 (40.5%)	30 (51.7%)
Chest decompression	134 (12.3%)	19 (2.9%)	96 (24.9%)	19 (32.8%)
Intraosseous access	255 (23.3%)	39 (6.0%)	177 (46.0%)	39 (67.2%)
Intravenous access	662 (60.6%)	408 (62.8%)	229 (59.5%)	25 (43.1%)
Prehospital blood	162 (14.8%)	21 (3.2%)	124 (32.2%)	17 (29.3%)

Advanced airway intervention = Endotracheal intubation including rapid sequence intubation and cricothyroidotomy; Chest decompression = Tube thoracostomy, needle decompression; Intraosseous access = Sternal, humeral, tibial locations; Intravenous access = Peripheral and central access; Prehospital blood = up to 4 units of fresh frozen plasma and packed red blood cells.

middle-ISS category were associated with a lower mortality if they were retrieved by an AMR platform.

Evolution of POI En-Route Care

Rotary wing MEDEVAC was implemented during the Korean War and became a commonplace in Vietnam.[14] Despite the effectiveness of this mode of casualty movement, little has changed in the capability in 4 decades.[15] The US fields 2 CMR platforms, which operate to remove casualties from POI. Having pioneered MEDEVAC, Army "Dustoff" units manned mostly by EMT-B perform the majority of general POI missions. The US Air Force ERS, which is designed for search and rescue, has also been used for MEDEVAC in select scenarios. The Air Force Pave Hawk helicopters are manned by Pararescuemen trained at the flight paramedic level. Although fearless in mission, neither CMR capability fields a practiced advanced airway provider or physician and historically neither has been flexible with regard to the clinical capacity that it projects to a given POI. In select instances of complex casualties or delayed patient movement scenarios, the level of decision making and clinical capability provided by CMR may be exceeded. This evolution has led to the development of AMR platforms such as the newly developed US Air Force Tactical Critical Care Evacuation Team and the UK MERT.[16,17]

The premise behind AMR is a scalable capability able to be placed on a readied evacuation airframe for different en-route care scenarios. Scalable in this context means that the level of expertise placed on these platforms can be increased or decreased depending on mission requirements and that tasking is informed by medical and mission intelligence to deliver the bespoke configuration for the clinical need. AMR capability can comprise traditional levels of experience provided by an EMT-B or paramedic, or decision making and procedural capability can be increased by including a physician, nurse anesthetist, or other advanced airway provider. Results from the current study suggest that one-third patients in combat, those with an ISS of greater than 15 may benefit from such an advanced capability.

Context of Previous Reports

The results of the current study are corroborated by a recent report by Mabry et al[15] and an analysis from the US Joint Trauma System (JTS).[18] The report by Mabry et al demonstrated improved survival of casualties evacuated with experienced critical care flight paramedic (CCFP) capability. In that study, the authors compared mortality among those who were evacuated with the CCFP capability to those transported with the EMT-B MEDEVAC and found a 47% relative reduction in mortality with the advanced provider capability. Importantly, the study included casualties with an ISS of greater than 15, which corresponds to the ISS bin in the current study, where a mortality benefit was shown with AMR capability.

The US JTS whose mission is real-time, evidence-based process improvement of combat casualty care has also reported on this topic.[18] In an unpublished analysis of 670 casualties, the JTS compared mortality among those evacuated using the UK MERT platform to that observed in those evacuated by PEDRO. The JTS report found that in the higher ISS category (20–29) mortality was lower in MERT than in the PEDRO platform (7% vs 25%, respectively; $P = 0.02$).[18]

Both the Mabry and the JTS reports speculate that a factor leading to improved mortality was the higher level of training of providers on board the CCFP and MERT capabilities. The factors outlined in these reports as leading to improved survival were present on the AMR platform in the current study. Specifically, all AMR missions were MERT-E and led by physicians with experience in critical care, emergency medicine, and advanced airway techniques including rapid sequence intubation.[19] In aggregate, these reports confirm in a combat setting what has been proposed in the civilian setting that mortality from certain patterns and severity of trauma is decreased with the deployment of advanced, medically qualified providers as part of POI en-route care capability.[20–23]

Duration of En-Route Care

Unlike previous reports, the current study provides insight into the duration of en-route care with AMR and CMR capabilities (Table 1). En-route care times were similar between the evacuation platforms with a trend toward shorter times with AMR. Furthermore, times from the ED to operation (OR) were shorter in the AMR cohort in the middle- and high-ISS category as well as with those in shock (Table 1). The similarity in times from tasking to ED confirms what has been reported in the civilian literature: that although deployment of a physician-led team may increase "on scene time," when corrected for ISS, the use of this type of helicopter service does not increase total evacuation time.[24] Similar or shorter times in the AMR cohort may relate to airframe size and the ability to perform interventions en-route, which is an important distinction between military and civilian platforms. Most civilian helicopter-based evacuation is performed by small airframes necessitating that interventions be performed on the scene contributing to the "stay and play" observation. In contrast, the AMR capability in the current study is capacious, permitting interventions to be performed en-route. It would also be rational to assume that speed with the AMR platform reflects military retrieval in hostile environments where "on-scene" delays posed a risk to the patient, crew, and airframe. The observation that the ED to the OR times were less in the AMR group combined with the frequency of interventions in the same cohort may reflect that patients arrived better prepared for the operating room (eg, established airway, central venous access, and better resuscitation). It is also interesting to consider the decreasing transport times in both AMR and CMR groups as the ISS categories increase from low to high. This trend in both platforms suggests that although the absolute values of these times may be difficult to interpret, comparison between the cohorts is valid.

Additional Considerations

It is important to recognize that the MERT, PEDRO, and DUSTOFF rotary wing airframes evolved from very different operational requirements and have distinct nonclinical components. These components influence deployment of these helicopters for different missions and may render the platforms themselves poorly suited for direct comparison. As such, the results of this study should not be viewed as confirmation or indictment of any of the platforms themselves but instead a reappraisal of the *clinical capability* projected to the POI. This study reflects the recognized need among allies and branches of service to focus efforts on prehospital en-route care capabilities to optimize survival.

This report has limitations related to its construct as a registry-based study. As an example, data are not available for specific procedures performed on the CMR platforms and thus no comparison with the AMR capability was possible. The registry also does not capture prehospital physiology, so the dynamic change cannot be examined as a surrogate for the quality of resuscitation en-route.

In addition, complete data related to the time from dispatch to ED and ED to the OR was available in only 1110 (64.4%) patients. The time values themselves are also subject to variation and even estimates depending upon the individuals entering the information and the operational setting. A further important point to note is that resuscitative surgery may have commenced in the ED, especially in the higher ISS brackets, artificially increasing ED to OR times. As such, the absolute values of en-route and "to OR" times may have wide standard deviation and limited translation to other evacuation theaters. However, time data for 1100 patients is sizable, and the trends within the analysis are consistent between the AMR and CMR groups, making comparisons between the two credible.

Finally, this report has the potential to underemphasize the proficiency of the current DUSTOFF and PEDRO capabilities, which effectively evacuated the majority of casualties during this study. Unfortunately, this report is unable to provide specific information on how the PECC identified which platforms were sent to which POI because of operational reasons. However, this study does provide a broad distribution of platform assignments, which limits any specific bias. However, it does leave the study unable to define how, in the future, triage centers might distinguish between the majority of injury scenarios, which would be rightly served by CMR and the minority of critical casualties who would benefit from AMR capability. Ultimately, the platform requirements will need to be informed by both operational and clinical demands to deliver the optimum configuration to the wounded and maintaining military operational effect.

CONCLUSIONS

This report characterizes POI en-route care capabilities in a contemporary combat setting. In this study, two thirds of casualties were well served with the conventional medical retrieval platforms of DUSTOFF and PEDRO. However, patients with severe but survivable injuries were associated with a lower mortality when transported with an advanced physician-led retrieval capability. Efforts should focus on processes to allow triage centers to correlate POI data with expected injury severity.

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