Collegiate-Based Emergency Medical Services (EMS): A Survey of EMS Systems on College Campuses

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Abbreviations:
AED = automated external defibrillator
ALS = advanced life support
BLS = basic life support
CI = confidence interval
CBEMS = collegiate-based emergency medical services
EMS = emergency medical services
EMT = emergency medical technician
NCEMSF = National Collegiate Emergency Medical Services Foundation

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Abstract

Introduction: Collegiate-based emergency medical systems (CBEMS) are a unique model for the delivery of prehospital care. The National Collegiate Emergency Medical Services Foundation (NCEMSF) was founded to serve as a resource for CBEMS groups. The purpose of this investigation is to describe the current state of CBEMS organizations.

Methods: The NCEMSF maintains a Web-based, data collection system to gather data on CBEMS organizations. Collegiate-based emergency medical services are defined as emergency medical services in a university or college campus setting. The abstracted data from the NCEMSF registry were analyzed using descriptive statistics.

Results: The NCEMSF registry contained data on 175 groups, and 145 groups were identified as providing CBEMS. The levels of service provided by the groups were: (1) first responder, 8.3%; (2) basic life support (BLS) 66.2%; (3) intermediate life support (ILS) 4.8%; (4) advanced life support (ALS), 9.7%; and (5) combination BLS/ALS, 8.3%. Transport capabilities were provided by 31.7% of the CBEMS. The average response time was estimated at 2.6 minutes (95% confidence interval (CI), 2.35–2.91 minutes). Early defibrillation using a automated external defibrillator (AED) or ALS was available by 75.9% (95% CI, 68.8–83.0) of CBEMS. Service to the community beyond the campus was provided by 21.3% of CBEMS groups. Forty-eight percent of the services operate 24 hours/day, seven days/week. The average call volume per year was 568 responses (95% CI, 315–820), and the groups averaged 29 (95% CI, 25–34) members. During the past five years, an average of 4.3 new CBEMS groups were formed per year. Eleven of the CBEMS are based at international schools.

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Introduction

At colleges and universities, large populations of individuals are congregated in a relatively small geographical area. As a result, there is a need for the provision of prehospital emergency services to patients. The physical layout of these campuses is complex, often making access difficult.

Collegiate-based emergency medical services (CBEMS) serve as a unique model for the delivery of prehospital care. Collegiate-based emergency medical services are located on colleges and in universities. Generally, they are organized from within the campus by the school's administration and/or by the students. Being located on the campus allows a CBEMS to respond to emergency situations rapidly and meet the special needs inherent in the campus environment. While no definitive history has been compiled, one organization traces its beginnings to 1948.[1] Several articles profiling individual groups have been written.[2,3] In 1996, King *et al* reported the results of a survey of college and university administrators regarding emergency medical services (EMS) systems. They reported that 25.5% of campuses provided EMS.[4]

Demographic descriptor		Number (%) n = 145
Geographic Region	Northeast (CT, DC, DE, MA, ME, NH, NJ, NY, OH, PA, RI, VT)	87 (60)
	Southeast (AL, FL, GA, MD, NC, SC, TN, VA, WV)	21 (15)
	Central (AK, CO, IA, IL, IN, KS, KY, LA, MN, ND, NE, OK, SD, TX, WI)	18 (12)
	Northwest (MO, OR, WA, WY)	3 (2)
	Southwest (AZ, CA, NM, NV, UT)	5 (3)
	Canada	1 (8)
Type	Public	68 (47)
	Private	77 (53)
Location	Rural	34 (23)
	Suburban	58 (40)
	Urban	53 (37)
Size	<1,000 students	2 (1)
	1,000-9,999 students	71 (49)
	>10,000 students	69 (48)
	Unknown	3 (2)

Table 1—Demographics of the schools where collegiate-based emergency medical services groups operate

The National Collegiate Emergency Medical Services Foundation (NCEMSF) was founded in 1993 to serve as a resource for CBEMS groups. It supports, promotes, and advocates EMS on college and university campuses. Prior to its formation, most CBEMS groups functioned in isolation, without much contact with other organizations. Students and university officials interested in creating their own group often had to do so without guidance from older, more established organizations. The purpose of this investigation is to describe the current state of CBEMS groups, their capabilities, and to identify areas for future research.

Methods

The NCEMSF maintains a Web-based registry of information about member organizations. Collegiate-based emergency medical services groups can self-report information about their organization. Each group has a designated administrative liaison to the NCEMSF, and is encouraged to keep the information on the Web server as current as possible. Areas of information reported to the database include:

1. *Demographics*: organizational name, school location, leadership, and contact information;
2. *Population served*: estimated number of persons covered and coverage area (campus only, campus and surrounding community, off-campus only);
3. *Staffing*: hours of coverage and level of service provided (first responder, BLS, ILS, ALS);
4. *Type of response*: non-emergency and/or emergency, and transport capacity;
5. *Budget*: source of funding and estimated amount of annual budget;
6. *Medical direction*: campus health center physician, local emergency department physician, or other; and
7. *Organizational supervision*: campus health center, student government, or department of public safety

A cross-sectional study of the NCEMSF database was conducted to describe the current state of CBEMS organizations. The study received exemption from the IRB. Information from the NCEMSF registry was accessed in July 2002. Each group had a unique identifier and a contact person identified to verify data as necessary. Collegiate-based emergency medical services were defined as providing EMS in a university or college campus setting. All statistical processing was performed using Excel XP and SPSS 10.0 for Windows (Microsoft, Inc., Redmond, Washington; SPSS Inc., Chicago, Illinois).

Results

The NCEMSF registry contained information on 175 groups, and 145 groups were identified as providing CBEMS. The remaining 30 groups do not provide CBEMS (i.e., systems are educational only, alumni organizations, defunct, or are in the formation process).

Many college and university campuses have CBEMS organizations that provide rapid response and prehospital emergency care, including defibrillation. Collegiate-based emergency medical services are an underutilized resources, and could be integrated into existing community systems. Additional EMS resources could be provided by CBEMS disasters.

Response capacity descriptor		Number (%) n = 145
Staffing level	First Responder	12 (8)
	Basic Life Support (BLS)	96 (66)
	Intermediate Life Support	7 (5)
	Advanced Life Support (ALS)	14 (10)
	BLS/ALS combination	12 (8)
	Unknown	4 (3)
Response level	Non-emergent	18 (12)
	Quick response vehicle	55 (38)
	Ambulance	46 (32)
	Special events only	9 (6)
	Other	5 (3)
	Unknown	12 (8)
Response vehicle	Yes	99 (68)
	No	46 (32)
AED	Yes	101 (70)
	No	44 (30)
Early defibrillation	Yes	110 (76)
	No	135 (14)

Table 2—Response capacity of collegiate-based emergency medical services groups (AED = automated external defibrillator

Coverage descriptor		Number (%) n = 145
Coverage area	Campus only	113 (78)
	Off-campus only	5 (3)
	Both	16 (18)
	Unknown	1 (1)
Population served	0-999	3 (2)
	1,000-9,999	65 (45)
	10,000-49,000	59 (41)
	50,000+	11 (8)
	Unknown	7 (5)
Coverage hours	24/7; entire year	70 (48)
	24/7; during school only	22 (15)
	<12 hours/day; entire year	1 (1)
	<15 hours/day; during school only	5 (3)
	≥12 hours/day; entire year	9 (6)
	≥12 hours/day; during school only	5 (3)
	Events coverage only	9 (6)
	Other	21 (5)
	Unknown	3 (2)

Table 3—Coverage of collegiate-based emergency medical services groups in the United States

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Organizational descriptor		Number (%) n = 145
Organizational oversight	Campus health center	42 (29)
	Public safety department	50 (35)
	Student government	20 (14)
	Municipal agency	10 (7)
	Other	17 (12)
	Unknown	6 (4)
Budget source	University department	29 (20)
	Student government	29 (20)
	Combination	11 (8)
	Self-supported	3 (2)
	Unknown	73 (50)
Members	1-10	15 (10)
	11-25	36 (25)
	26-50	45 (31)
	51+	20 (14)
	Unknown	29 (20)
Staff compensation	All volunteer	106 (73)
	All paid	25 (17)
	Volunteer/Paid mix	13 (9)
	Unknown	1 (1)

Table 4—Organization of collegiate-based emergency medical services groups

The demographics of the colleges and universities in which CBEMS groups operate are listed in Table 1. Sixty percent of the CBEMS groups are located in the northeastern US. They are equally constant to private and public institutions. Three-quarters of the groups are located in rural or suburban settings. They are located equally between smaller and larger schools. The majority of CBEMS groups provide service at the BLS level (66%), have a response vehicle (68%), and possess early defibrillation capabilities (76%; 95% confidence interval (CI) = 67–83%) (Table 2).

The average of the response times per call was 2.6 minutes (95% CI = 2.35–2.91 minutes), the average of the number of calls per year was 569 (95% CI = 315–820). The mean of the number of members per group was 29 (95% CI = 24.7–34.1) with the largest services having 150 members. A total of 4,268 students were involved in providing CBEMS.

The details surrounding the coverage area and staffing of CBEMS groups are listed in Table 3. Seventy-eight percent of CBEMS groups provide coverage only on their respective campuses. A total of 85.5% of CBEMS serve populations between 1,000 and 50,000, with a total of 2,716,456 people covered.

A variety of different organizational structures and administrative oversight arrangements exist within the continuum of CBEMS (Tables 4 and 5). The majority consist entirely of volunteers (73%) and are dispatched via campus security departments (60%.)

Discussion

Emergency medical services, as with other public service agencies such as fire and law enforcement, exist in a broad range of size, staffing levels, and capabilities. This also is true for CBEMS organizations. Some consist of a small group of individuals who respond (on foot) to render BLS care before municipal agencies arrive to provide transport, while other CBEMS groups provide ALS transport capabilities to their campus and surrounding municipalities. What seems to make CBEMS organizations unique is their relative proximity to their call locations. With an average response time of <3 minutes from dispatch to arrival on scene, they provide care promptly. Given that the majority of organizations are capable of providing early defibrillation (either using an automated external defibrillator (AED) or by providing ALS-level care), their short response time makes the goal of early defibrillation more attainable, as early defibrilation is the key to survival for many emergency medical services. But, setting the goal of early defibrillation is unattainable due to long response times.

Although the implementation of AED programs is accepted widely, only 76% of CBEMS are capable of providing this type of care, which is lower than expected. There are several possible explanations as to why 24% of systems do not provide early defibrillation. First, only 68% of CBEMS have response vehicles, which limits the amount of equipment that a responder can carry. Secondly,

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Logistical descriptor		Number (%) n = 145
Dispatch agency	Campus security	87 (60)
	Municipal 9-1-1	17 (12)
	Both	1 (1)
	Other	5 (3)
	Unknown	35 (24)
Average response time interval	0-2 minutes	70 (48)
	3-4 minutes	63 (43)
	5-9 minutes	10 (7)
	≥10 minutes	2 (1)

Table 5—Logistics of collegiate-based emergency medical services groups

many CBEMS run on small budgets that limit resources. The purchase of an AED may be out of the reach of groups with limited funding. As the cost of AEDs continue to fall and the CBEMS programs grow, AEDs should become an integral part of most CBEMS programs.

Most CBEMS organizations are not incorporated into surrounding EMS systems. The majority of CBEMS groups can provide advanced care and early defibrillation with relatively short response times, and could bring additional resources to local communities. Ways to integrate CBEMS with surrounding resources should be explored to maximize the benefit of CBEMS to the community.

Since 11 September 2001, mass-casualty incidents and disaster management has received substantial attention.[5] Given the large number of CBEMS groups (145) and providers (4,268), these organizations might be able to provide a supplemental level of prehospital emergency care in times of crisis. As many communities focus on disaster management planing, involving CBEMS in these discussions and planning efforts may prove helpful.

Nine groups reported that their only area of operation was providing medical coverage at special events and mass gatherings (e.g., concerts, athletic events, commencements). With many universities possessing stadiums and arenas capable of housing 10,000–100,000 people in one location, there are numerous opportunities for CBEMS groups to provide coverage at large events. Collegiate-based emergency medical services may duplicate existing municipal EMS capabilities, but the vast majority of these municipal services have limited experience and resources to provide this type of medical coverage. A football game with 100,000 people in attendance in a small college town may tax the local EMS resources without the aid of CBEMS.

In addition to the medical coverage and support provided by CBEMS, it has been reported that many CBEMS organizations provide members with leadership training and experiences not available to the typical college student.[6] While detailed information regarding this aspect of CBEMS was not obtained, reports from CBEMS organizations indicate that many of these members go into careers in EMS or medicine at all levels, including emergency physicians.

Eleven of the CBEMS organizations were from Canada, and the remaining 134 were from the United States. Canada has a different healthcare delivery system than the US, but many similarities exist at the prehospital level.[7] After examination of the data and the environments of the Canadian CBEMS groups, it was determined that these organizations are very similar to their American counterparts. For these reasons, the data from 11 Canadian groups were added to the American CBEMS groups.

In 1996, King *et al* identified 234 college campuses in the United States with EMS systems. This study only identified 145 CBEMS groups, 11 of which were international. Several factors could account for this difference. This is likely due to the selection bias encountered by using the self-reporting NCEMSF database. It is unlikely that 100 groups have disbanded since King's study in 1996. In fact, both the NCEMSF and the King data indicated that CBEMS groups are growing in number. While King's study noted that only 19.7% of EMS systems were staffed at the emergency medical technician (EMT) level or higher, the current study found that 91.7% of CBEMS were staffed at the EMT level or higher. These numbers likely reflect two different groups of EMS providers. King asked college administrators if they had an EMS system on their campus; NCEMSF asked the CBEMS systems to respond themselves. In King's study, college administrators may have considered campus security and police that provide first responder services as campus EMS providers. While these groups provide an important first responder capability to their community, their primary focus is not EMS. These public safety groups function as first responders in one of their many roles in the college community, but generally they do not have the same training and equipment as CBEMS groups do. Given their limited EMS roles, they probably would not be registered with NCEMSF. It is most likely that this more inclusive definition of what constituted a CBEMS group was used by both the authors and

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the respondents of King's study and is responsible for the different numbers of CBEMS groups reported.[4]

The data available provided no information on the acuity of patients or the specific nature of calls encountered. King's data had limited information on patient complaints, with 40.6% reported as medical and 36.3% reported as trauma/surgical. While many organizations collect such information on an internal quality assurance/quality improvement basis, these data should be compiled and analyzed on a larger scale. Future research could be directed towards filling this void by better illuminating the specific types of conditions treated by CBEMS providers. Existing literature has explored the impact of alcohol consumption on college campuses.[8] Future research could examine the connection between college drinking and its subsequent impact on CBEMS.

Several limitations exist in this review of CBEMS groups. While the NCEMSF has made substantial efforts to gather as much information as possible, not every CBEMS group entered information into the database. Therefore, the study is influenced by a selection bias. Over its 10 years of existence, NCEMSF has made significant efforts to reach out to every CBEMS group within the US and beyond, which now is a reasonable representation of CBEMS groups. All of the data were self-reported and are subject to a certain amount of bias, the amount of which is impossible to determine.

Conclusion

Many colleges and universities are covered by CBEMS organizations that can provide rapid response and prehospital emergency care, including early defibrillation. Collegiate-based emergency medical services is an underutilized resource that could be integrated into existing community systems. Additional EMS resources could be provided by CBEMS during times of disaster.

Addendum

The Tulane Emergency Medical Services (TEMS), staffed by Tulane University undergraduates who are certified as EMTs, and normally provide service to the campus and surrounding neighborhoods, stepped up to provide care for those displaced by Hurricane Katrina. Initially, 20 members of TEMS worked as a disaster-response team, caring for fellow students evacuated to Jackson, Mississippi. After the storm passed, the group packed two ambulances and a trailer, and headed for the Louisianna Emergency Operation Center in Baton Rouge. There, they helped triage patients and were later sent to New Orleans, where they assisted in search and rescue, and delivered drugs and medical supplies. This team contributed greatly during this crisis, and their efforts are applauded.

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