The National EMS Advisory Council

Interim Advisory

Submitted on January 29, 2013

Committee: Safety
Title: Fatigue in Emergency Medical Services

Issue Synopsis

A: Problem Statement

There is reason to believe that a high proportion of Emergency Medical Services (EMS) workers suffer from fatigue, and as a result, poor safety outcomes.[1,2] Poor sleep, which is a precursor to short term or chronic fatigue, affects between 29% and 35% of U.S. adults.[3,4] Fatigue affects one in every four U.S. workers (38%; 95%CI 37.4, 38.5).[5] Poor sleep and fatigue can reduce attention, impair normal functions of the central nervous system, and have a negative impact on cognition, reaction time, and health.[6-9] Furthermore, research has identified a strong association between poor sleep, fatigue, and poor safety outcomes.[1,2,10-12]

There is limited research that examines fatigue and poor sleep among EMS providers.[1,2,13-16] However, there is widespread concern that EMS providers and patients are at an increased risk of poor safety outcomes related to fatigue.[15,16] Factors believed to increase this risk include the atypical work schedule (shift work),[16-18] providers holding multiple jobs,[2] unpredictable nature of EMS call volume which affects ability to rest,[19,20] increased need and demand for EMS responses tied to increased productivity requirements limiting opportunities for rest ,[21] a high prevalence of poor sleep and fatigue among EMS workers,[1,2] a high prevalence of occupational stress and burnout,[20,22-25] poor health status among EMS workers,[26,27] high risk of occupational injury and mortality,[28-33] and wide variation in workplace safety culture.[34,35]

EMS is a vital public health resource, providing care for more than 30 million ill and injured patients annually.[36] Poor sleep and fatigue among EMS workers represent potential threats to patient care, provider wellbeing, and the public's health and trust in EMS.[16]

The overarching goals of this advisory are to:

1: provide a brief summary of current research regarding fatigue and its impact on safety and to highlight gaps in the research, evidence and current efforts to address the observed problems of fatigue and safety; and

2: advise NHTSA to address a list of feasible recommendations for combatting the impact of fatigue on EMS patient and provider safety.

B: References

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C: Crosswalk with other standards or related documents

Our understanding of sleep, fatigue, and safety has been shaped by literature reviews, statistical analyses, government rules and regulations, and numerous scientific studies - some of which (but not all) are highlighted below.

In 2001, the Agency for Research on Healthcare (AHRQ) published an evidence-based report raising awareness of poor sleep, fatigue, and its impact on patient and provider safety (Chapter 46).[37] The Chapter (literature review) is comprehensive but lacks discussion of fatigue amongst EMS clinicians and its effect on patients.

In 2004, the National Institute for Occupational Safety and Health (NIOSH) supported a review of the literature that discovered a lack of research exploring the impact of shift work and long hours on worker health.[18] The report was a review of studies involving

nurses, police officers, electricians, white-collar workers, air-traffic controllers, taxi drivers and other shift worker populations. The report did not include research involving EMS clinicians or patients. Authors concluded that some types of shift work are linked to negative health effects and deficits in performance leading to injury and error. The authors also concluded that there is limited, and sometimes contradictory evidence, supporting or refuting a particular shift structure as harmful.

The International Association of Fire Chiefs (IAFC) funded a review of the literature on sleep and fatigue, that when published in 2007, shed light on numerous elements of sleep, fatigue, and negative impacts of both on shift workers.[15] The authors concluded that "*Fire fighters and EMS responders are at risk for the decrements in mental and physical performance that have been well documented among others working long hours and during the night...*" however, "*there is a paucity of available well done studies, and many investigations have been done in countries other than the U.S*." The report provided a series of recommendations germane to shift work for fire fighters and emergency responders.

Other informative reports include the 2008 Institute of Medicine (IOM) report "*Resident Duty Hours: Enhancing Sleep, Supervision, and Safety.*"[38] In this report, the common practice of new physicians working long hours was criticized as a contributing factor to poor safety and poor performance.

More recently, the Joint Commission issued a Sentinel Event Alert raising awareness of the growing body of evidence linking health care worker fatigue and adverse events.[39] The alert stressed the common practice of working long / extended shifts contributed to poor patient and provider outcomes.

In 2011, Secretary of Transportation, Ray LaHood, announced sweeping new rules that impact how commercial passenger airline pilots obtain rest.[40] The new rules emerged from action taken by Congress in 2010 mandating airlines develop Fatigue Risk Management Plans and Programs informed by guidelines adopted by the Federal Aviation Administration (FAA).

Finally, the research exploring the link between work hours, fatigue, and safety outcomes in healthcare continues to grow; yet the true nature of the linkages between these factors in the EMS setting remains unclear. For example, a recent systematic review showed that limiting maximum shift length to 16 hours did not impact clinician education and was associated with safety improvement.[41] Findings support a reduction in shift length among clinicians to improve safety. In contrast, a recent study of EMS clinicians found extended shifts were not associated with safety outcomes after controlling for fatigue and sleep quality.[1] Findings show a mediation relationship between shift length, fatigue, and safety outcomes that is not yet fully understood. This variation in findings across studies highlights the need to more fully investigate the relationships between shift structure, fatigue, and safety outcomes among EMS clinicians.

D: Analysis

There is an abundance of research and information that highlights the prevalence and dangers of poor sleep and fatigue. We believe that poor sleep and fatigue are conceivably common problems amongst EMS workers that threaten the health and safety of the workers and their patients.[1,2,18,42] Unfortunately, research involving EMS workers and patients is limited and our understanding of these issues in the context of EMS care delivery is unclear.[1,2,16,43]

Specifically:

- We believe that a lack of substantial data and research on poor sleep fatigue in EMS is problematic. Lack of data may foster attitudes among EMS workers and leaders that poor sleep and fatigue are non-EMS problems. Research is needed to quantify the magnitude and nature of these problems in the EMS setting.

- Second, there is considerable evidence that links shift characteristics to fatigue and poor safety outcomes.[11,17,44] We acknowledge that EMS clinicians work atypical shift schedules that vary in length, structure, and over time. Further, many EMS clinicians work multiple jobs and the structure of shifts across occupations may not be comparable.[1] Unfortunately, there is limited research that describes variation in EMS shift characteristics and how these characteristics are linked to sleep, fatigue, and safety outcomes.[1,2]

- Third, operating emergency vehicles and equipment are fundamental to day-to-day delivery of EMS care. In other industries that involve vehicle or equipment operations, concerns for fatigue and safety have resulted restrictions on duty time and rest requirements (**See Table 1 below**). We believe efforts to address fatigue and vehicle operations safety in EMS is affected by a lack of data describing the relationship between fatigue and emergency vehicle operations.

- Fourth, there is considerable evidence linking poor sleep and fatigue to deficits in motor and cognitive functioning, trust and decision making, and poor safety outcomes.[44,45] We recognize that EMS work requires paramedics and Emergency Medical Technicians (EMTs) to work long hours which may impact their fatigue and in ultimately their clinical judgment and approach to safety. However, EMS is unique in that decisions are made in a rapid fashion with limited information and in stressful conditions uncommon or unfamiliar to other commonly studied occupations.

- EMS administrators and individual EMS workers are in uniquely different but instrumental positions to address poor sleep and fatigue. Administrators may directly or indirectly dismiss fatigue over concerns for the economic viability and productivity of individual EMS workers. Individual EMS workers may directly or indirectly place personal economic and family well being ahead of poor sleep and fatigue and the threats that each present for personal and patient safety. Research and information

that explores these issues is needed to inform the development of fatigue management programs in EMS.

- Finally, while research involving EMS workers is limited, there is growing concern that extended shifts (e.g., ≥12 hours) may contribute to EMS worker fatigue and ultimately negative patient or provider safety outcomes.[16] Some in the EMS industry advocate for reducing shift length, while others may avoid shift limits due to economic concerns. Current thinking on reducing fatigue in shift workers caution against condemning shift characteristics as the source of fatigue and negative outcomes.[46] The diversity in opinions on these issues and variation in research findings may have leaders and providers of EMS care confused. We believe that shift structure may play a role in fatigue and safety, but the nature of that relationship is unclear. Lack of clarity may prevent efforts to address EMS patient or provider safety. Research is needed that clarifies the role of shift characteristics in fatigue and safety in the delivery of EMS care.

Recommended Actions or Strategies:

National Highway Traffic Safety Administration Office of EMS

Recommendation #1: The NHTSA Office of EMS (OEMS) should cross-validate findings from studies and reports of fatigue in other professions with that of fatigue in EMS. This effort should involve a convening of subject matter experts, individual providers of EMS services, and representatives from local, state, and federal organizations, national organizations (e.g., NAEMT, NAEMSP) that play a role in EMS oversight or care delivery. The effort should clarify the evidence linking EMS provider fatigue and safety outcomes of patients, providers, and the public.

Recommendation #2: The NHTSA Office of EMS (OEMS) should work through its federal and non-federal partners to address the lack of a standardized method for investigating the role of fatigue in ground and air-medical crashes. This effort may include developing a valid and reliable measurement tool and check list for investigators.

Recommendation #3: The NHTSA Office of EMS (OEMS) should disseminate (evidence-based) information to the EMS community to aid development of fatigue management programs / interventions to fit local needs.

Table 1: Federally Mandated Work Hour Limitations (adopted from table found in the IOM Report on Resident Duty Hours)[38]

Industry	Weekly Limitations	Limits of Single Shift Duration (h)	Minimum Rest Between Shifts	Minimum Rest Period Given Weekly	Regulatory Agency	Enforcement
Part 121 Scheduled Aiirlines Pilots	30h of flying time in any consecutive days	8 h flight time per 24 h	11 h of continuous rest in the 24 h prior to 9+ h of scheduled flight time	none	Federal Aviation Administration	FAA and certificate holder
Part 135 Pilots Unscheduled On-demand commuter.	500 hours actual flight time in a calendar quarter 1400 hours actual flight time in a calendar year	8 hours of flight time in a single 24 hour period 14 hours maximum duty shift	10 hours prior to being scheduled for shift.	Must be scheduled for at least 13 24 hour rest periods in a calendar quarter	Federal Aviation Administration Federal Aviation Regulations (FAR) Part 135. 267 and Part 135.271 (HEMES)	FAA and Certificate Holder
Shipboard Personnel on Tankers	84 h per week	15 h per every 24 h and 36 h per 72 h	none	none		
Railroad Conductors	none	12h	10 consecutive hours after a 12 h shift and 8 consecutive hours during the 24 h prior to any shift	none	Federal Railroad Administration (FRA)	Currently hours are recorded by hand; 4 major railroads have upgraded to electronic record keeping.
Long- haul truck drivers	60 or 70 h driving time per 7 or 8 day shift	14 h on duty with a maximum of 11 h spent driving	10 consecutive hours, drivers with sleeper berth must spend minimum of 8 consecutive hours in berth and 2 h in berth or off duty in any combination.	34 h continuous rest period prior to any 7- or 8- day working period	Federal Motor Carrier Safety Administration (FMCSA)	Drivers are required to record a log of hours for each 24 hour period, including a record of the prior 7 days. Record can be electronic or handwritten, depends on motor carrier

Medical Residents	80 h per week averaged over 4 weeks	24 h + 6 h transition time	10 consecutive hours (recommended but not required)	One continuous 24 h rest period per week	ACGME	ACGME
Flight crew for Air-Medical EMS	No maximum	Not to exceed 24 hours on schedule with requirements for rest periods	Must have 8 hours minimum rest between shifts	Cannot be scheduled for more than 16 hours actual clinical time in 24 hour period.	CAMTS Standards Version 8	CAMTS and Agency