Dated 10-15-2018

Village: Johnson
Kettner
Werner

Town: Topczewski, Chair
Boucher
Wrasman

Village of Mukwonago
Town of Mukwonago

PROTECTIVE SERVICES COMMITTEE MEETING
FIRE AND AMBULANCE DEPARTMENT

Notice of Meeting and Agenda

Monday, October 15, 2018

Time: **6:30 p.m.**
Place: **Mukwonago Village Hall, 440 River Crest Ct**

1. Call to Order

2. Comments from the Public

3. New Business
   Discussion and Possible Action on the Following Items

   A. Countywide Mutual Aid Agreement – Action Needed Town Only
   B. Deputy Chief-POC Promotion (Captain Unti)
   C. Report on 3488 Damage
   D. Referendum Committee
   E. Expenditures and Revenues Year to Date
   F. Fire and Ambulance Reports for September 2018
      (This item is a report from Staff to Committee members. No discussion or action shall take place by Committee members unless otherwise listed below.)

4. Adjournment

It is possible that members of, and possibly a quorum of, members of other governmental bodies of the municipality may be in attendance at the above stated meeting to gather information. No action will be taken by any governmental body at the above stated meeting other than the governmental body specifically referred to above in this notice. Please note that, upon reasonable notice, efforts will be made to accommodate the needs of individuals with disabilities through appropriate aids and services. For additional information or to request this service, contact the Village Clerk's Office, 440 River Crest Court, (262) 363-6420, Option 4 or the Town Clerk's Office, W320S8315 Beulah Road, (262) 363-4555.

Village of Mukwonago

AGENDA ITEM REQUEST FORM

Committee/Board:	Village and Town Boards
Topic:	Waukesha County Municipal Mutual Aid Agreement
From:	Jeff Stien, Fire Chief
Department:	Fire Department
Presenter:	Jeff Stien
Date of Committee Action (if required):	08-13-18
Date of Village Board Action (if required):	08-15-18

Information

Subject:
Waukesha County Municipal Mutual Aid Agreement
Background Information/Rationale:
Village signed agreement 09-20-2010 and Town has no agreement in place
Key Issues for Consideration:
This compact shall not supersede existing mutual aid agreements such as the law enforcement Suburban Mutual Assistance Response Team (SMART), the fire service Mutual Aid Box Alarm System (MABAS) agreements, or other inter-governmental mutual aid agreements. Assistance may be refused, and assistance which is being provided may be terminated at any time, within the sole discretion of the party receiving the request. This agreement is specifically for municipal assistance for equipment and personnel.
Fiscal Impact (If any):
A. Labor force. Charges for labor force shall be in accordance with the assisting municipality's standard practices.
B. Equipment. Charges for equipment supplied by an assisting municipality shall be at the reasonable and customary rates for such equipment in Waukesha County.
C. Transportation. The assisting municipality shall transport needed personnel and equipment by reasonable and customary means and shall charge reasonable and customary rates for such transportation.
D. Meals, lodging, and other related expenses. Charges for meals, lodging, and other expenses related to the provision of aid pursuant to this Agreement shall be the reasonable and actual costs incurred by the assisting municipality.

Regardless of the foregoing, there shall be no inter-municipal charges for the first 48 hours of assistance provided to a Participating Municipality requesting assistance under this compact on a per incident basis unless other agreements supersede this compact. It is the responsibility of the requesting municipality to specifically invoke this agreement when the request is made. Charges shall be assessed for any assistance provided beyond 48 hours per incident.
Requested Action by Committee/Board:
Recommend the Village and Town Board approve the recommendation to sign the Waukesha County Municipal Mutual Aid Agreement

Attachments

- Waukesha County Municipal Mutual Aid Agreement
- Municipal Mutual Aid Agreement Cover 2013

Village of Mukwonago

AGENDA ITEM REQUEST FORM

Daniel P. Vrakas
County Executive

William F. Stolte
Emergency Management
Coordinator

Waukesha COUNTY

OFFICE OF EMERGENCY MANAGEMENT

To: Municipal Partners
From: William F. Stolte, Coordinator
Waukesha County Emergency Management
Date: August 6, 2013
RE: Municipal Mutual Aid Agreement Follow-up

During major emergencies and disasters, local resources may be rapidly exhausted or simply not available. Yet local municipalities must continue to respond to and recover from such critical events. As you will recall, back in 2007 collaborative efforts began bringing many Waukesha County communities together under a mutual aid agreement. Currently 21 of the 37 municipal entities in Waukesha County signed the mutual aid agreement, agreeing to share critical resources amongst each other during and immediately following a disaster in order to help stricken communities protect lives, safety, property and to recover more quickly.

A copy of the County-wide Mutual Aid Agreement for Waukesha County municipalities (hereinafter referred to as the Agreement) is attached for your review. This effort began as a part of our County-wide National Incident Management System (NIMS) compliance activities. NIMS strongly recommends the use of pre-arranged mutual aid agreements to guide sharing of available resources to facilitate major emergency and disaster response and recovery efforts. This agreement, developed with the assistance of local municipal attorneys (especially the City of Waukesha) and the County Corporation Counsel provides that crucial link between communities to ensure a rapid and effective response to disaster situations. Our thanks go out the municipal attorneys who took the time to carefully review and comment on the various draft versions of this document. The wording in the document incorporated many of their ideas.

The Agreement is not designed to replace existing contracts for normal activities, nor to interfere with implementation of other existing mutual aid agreements such as the Mutual Aid Box Alarms System (MABAS) for fire service or Suburban Mutual Aid Response Team (SMART) agreement for law enforcement. The agreement does, however, provide a basis to mobilize other resources such as public works staff and equipment, building inspectors, engineering staff, or even clerical staff to help with disaster damage assessment, documentation, and debris removal. Communities adopting the agreement are not required to send a requested resource, retaining the right to decline or recall a previously dispatched resource should the need arise.

Waukesha County Emergency Management
1621 Woodburn Road
Waukesha, WI 53188
(262) 548-7580 FAX (262) 548-7313

In most rapidly occurring disasters, the first 48 hour period following event onset represents a critical time period for life safety, incident stabilization and property preservation. The final agreement language establishes a 48 hour no direct charge feature between communities. Costs incurred beyond the initial 48 hours must be the assisting community's reasonable and customary rates and reflect actual costs. Following events involving identification of a responsible party, the municipality incurring initial response costs could submit those costs for reimbursement from the responsible party. The agreement provides a mechanism for rapid deployment of available resources to the affected areas, while addressing critical issues such as worker's compensation and liability issues in advance of an incident. In compliance with NIMS, however, no resources are deployed without a specific request from an affected jurisdiction to a partner jurisdiction.

Since your community did not sign the Agreement, we urge you to reconsider this important resource. Please review the attached document again and request your local Head of Emergency Management Services, Chief Elected Official, and municipal Clerk to sign the last page. Please provide a copy of the signed agreement to the Waukesha County Office of Emergency Management, as we will maintain records of which communities are participating in the agreement. While participation is optional, national disaster history analysis clearly demonstrates that those communities with existing mutual aid agreements respond to and recover from disasters much more rapidly than those who do not.

Thank you for your time and consideration of participating with the agreement. Hopefully, the terms of the agreement will never need to be implemented in Waukesha County, but should the need arise, having the agreement in place will make Waukesha County and its municipalities better, safer, more responsive communities in which to live, work, and enjoy! Should you have any questions, please feel free to contact my office.

Sincerely,

William F. Stolte, Coordinator

FATIGUE IN EMS

Developing Evidence Based Fatigue Risk Management Guidelines for Emergency Medical Services

WHAT IS FATIGUE?

Fatigue is...

> *a subjective, unpleasant symptom, which incorporates total body feelings ranging from tiredness to exhaustion creating an unrelenting overall condition which interferes with an individual's ability to function to their normal capacity.*[1]

1: Ream E, Richardson A. Fatigue: a concept analysis. Int J Nurs Stud. 1996;33(5):519-29.

THE FATIGUE IN EMS PROJECT

The overall goal of this project was to develop, test, and disseminate evidence-based guidelines for fatigue risk management tailored to the EMS setting. The project was comprised of three phases.

PHASE 1 aimed to evaluate the quality of evidence germane to use of caffeine, napping during shift work, shorter shift duration, and other strategies to mitigate fatigue. The primary outcome of PHASE 1 was a set of recommendations based on a review of the best available evidence and collated into a guideline for fatigue mitigation. Evidence-based guidelines are

> *systematically developed statements designed to help administrators, practitioners, and patients make decisions about appropriate health care for specific circumstances.*[2]

PHASE 2 aims to test one or more recommendations, and PHASE 3 aims to develop a freely available biomathematical model for EMS administrators to use while creating shift schedules.

2: Institute of Medicine. Clinical Practice Guidelines We Can Trust. March 23, 2011. The National Academies of Sciences, Engineering, Medicine.

Learn more about Fatigue in EMS: *www.emsfatigue.org*

RECOMMENDATIONS FOR MITIGATING FATIGUE

1. Reliable and/or valid fatigue and sleepiness survey instruments should be used to measure and monitor fatigue in EMS personnel. [1]
2. EMS personnel should work shifts shorter than 24 hours in duration.
3. EMS workers should have access to caffeine as a fatigue countermeasure. [3]
4. EMS personnel should have the opportunity to nap while on duty to mitigate fatigue. [4]
5. EMS personnel should receive education and training to mitigate fatigue and fatigue-related risks. [5]

ABOUT THESE RECOMMENDATIONS

These recommendations were developed following a rigorous process known as the GRADE Methodology (Grading of Recommendations, Assessment, Development, and Evaluation).

Evidence from more than 38,000 pieces of literature was reviewed by more than two-dozen investigators. A summary of the evidence connected to seven research questions and six fatigue mitigation strategies was evaluated by a panel comprised of experts in sleep medicine, fatigue science, emergency medicine, prehospital emergency care, risk administration, and public safety.

Prior to formulating recommendations, the panel deliberated: 1) the quality of evidence; 2) the balance between benefits and harms for different strategies; 3) the values and preferences of EMS constituents; and 4) costs associated with different fatigue mitigation strategies.

The panel reached consensus on five recommendations. These recommendations are supported by a review and synthesis of the best available evidence. EMS administrators that choose to create a fatigue risk management program of their own should consider one or more of these recommendations to guide decision making regarding specific fatigue mitigation strategies.

Contact the National Association of State EMS Officials
201 Park Washington Court, Falls Church, VA 22046
www.nasemso.org | info@nasemso.org
(703) 538-1799

Learn more about Fatigue in EMS: www.emsfatigue.org

Read the supplement in Prehospital Emergency Care:
http://tandfonline.com/action/showAxaArticles?journalCode=ipec20

PERFORMANCE MEASURES

Developing Evidence Based Fatigue Risk Management Guidelines for Emergency Medical Services

ABOUT THESE MEASURES

This handout includes an overview of the performance measures created by the panel of experts for EMS administrators. The intent of these performance measures is to aid EMS administrators with **evaluation of impact** and **monitoring of progress** following the adoption of one or more of the recommendations.

Performance measures 1-4 should each be measured over a one-year period.

1. Demonstrated use of reliable/valid fatigue and/or sleepiness survey instruments to measure and monitor fatigue in EMS personnel on at least a quarterly basis.

GOAL
Assess fatigue/sleepiness of EMS personnel with reliable/valid survey instrument(s) quarterly (4 out of 4 quarters annually).

NUMERATOR
Number of quarters in previous year when reliable/valid fatigue/sleepiness survey instruments were used to assess fatigue/sleepiness.

DENOMINATOR
Four quarters over same time period selected for numerator.

NOTES
- Assessing fatigue/sleepiness for a random sample of scheduled shifts (rather than all shifts) may reduce respondent burden and improve the rate of participation by EMS personnel.
- Targeted assessments are recommended. Specifically, the assessment of fatigue/sleepiness is recommended with reliable/valid survey instruments for any shift schedule (pattern/structure) suspected of elevating the risk of fatigue, such as extended duration shifts (e.g., ≥12 hours).

2. Percent of all shifts that are less than 24 hours in duration.

GOAL
100% of shifts are less than 24 hours in duration.

NUMERATOR
Number of shifts that are less than 24 hours in duration.

DENOMINATOR
Number of all shifts.

NOTES
- Shifts performed contiguously should be counted as a single shift period with a total duration (e.g. two 12-hour shifts performed contiguously by a single provider should be counted as a 24-hour shift).

3. Percent of all shifts where EMS personnel have access to caffeine.

GOAL
100% of shifts with access to caffeine.

NUMERATOR
Number of shifts with access to caffeine.

DENOMINATOR
Number of all shifts.

NOTES
- Example of access to caffeine includes availability of caffeinated beverages for free or for purchase while on duty within reasonable access to on-duty EMS personnel.

4. Percent of all shifts where EMS personnel are provided with access to and permission to take a nap while on duty.

GOAL
EMS personnel are provided with access to and permission to take a nap while on duty in 100% of extended shifts (e.g., ≥12 hours) and shifts taking place overnight.

NUMERATOR
Number of extended shifts (e.g., ≥12 hours) or shifts taking place overnight where EMS personnel are provided with access to and permission to take a nap while on duty.

DENOMINATOR
Number of all shifts ≥12 hours in duration or taking place overnight.

NOTES
- We define a nap as a short period of sleep (duration is not specified).
- The EMS agency that permit EMS personnel the opportunity to nap on duty is best demonstrated with a written policy.
- To ensure reasonable access to take a nap while on duty, there should be a scheduled time to take a nap or an unrestricted opportunity to take a nap throughout the shift, and an appropriate place to take an uninterrupted nap.
- Agencies may wish to consider the napping strategy regardless of shift duration and include shifts <12 hours as part of the performance measure if personnel work contiguous shifts and/or consecutive shifts with limited recovery between shifts (including combinations of shifts involving different agencies).

5. Percent of EMS personnel who have: (1) received education and training to mitigate fatigue and fatigue-related risks during new employee orientation/training; and (2) received education and training to mitigate fatigue and fatigue-related risks within the previous two years.

GOAL
(1) 100% of EMS personnel have received fatigue education and training as part of new employee orientation/training; and (2) 100% of EMS personnel have received fatigue education and training within the previous two years.

NUMERATOR
Number of EMS personnel who have received fatigue education and training 1) during new employee orientation/training, or 2) within the previous two years.

DENOMINATOR
All EMS personnel.

NOTES
- Functional memory, knowledge, and skill can decay rapidly after initial education and training. Education and training every two years is recommended to address decay in memory, knowledge, and skills in dealing with fatigue in the workplace.

Contact the National Association of State EMS Officials
201 Park Washington Court, Falls Church, VA 22046
www.nasemso.org | info@nasemso.org
(703) 538-1799

Learn more about Fatigue in EMS: www.emsfatigue.org

Read the supplement in Prehospital Emergency Care:
http://tandfonline.com/action/showAxaArticles?journalCode=ipec20

Developing
Evidence Based
Fatigue Risk Management
Guidelines

for **Emergency Medical Services**

Project Overview
January 11, 2018

Project web site: www.emsfatigue.org

An Amazing Partnership to Improve Safety in EMS!

- National Highway Traffic Safety Administration (NHTSA)
  - Office of Behavioral Safety Research
  - Office of Emergency Medical Services
- National Association of State EMS Officials (NASEMSO)
- University of Pittsburgh (Pitt)
  - P. Daniel Patterson, PhD, NRP, Principal Investigator
- Institutes for Behavior Resources, Inc. (IBR)

Contract Number DTNH2215C00029

Developing Evidence Based Fatigue Risk Management Guidelines for Emergency Medical Services

Population of Interest

EMS personnel or similar worker groups, defined as shift workers whose job activity requires multiple episodes of intense concentration and attention to detail per shift, with serious adverse consequences potentially resulting from a lapse in concentration.

November 2015 – November 2017

The Fatigue in EMS Project

PHASE 1	PHASE 2	PHASE 3
Develop Evidence-Based Guideline (EBG) for fatigue risk management in EMS	Test the impact of one or more evidence-based recommendations in an experimental study	Develop a biomathematical model tailored to EMS shift scheduling and make freely available

Developing Evidence Based Fatigue Risk Management Guidelines for Emergency Medical Services

EMS is setting the bar: *There is no equivalent effort from any other high risk industry/occupation to improve worker fatigue.*

Phase 1 Methodology Paper Published Spring 2017

Evidence-Based Guidelines for Fatigue Risk Management in EMS: Formulating Research Questions and Selecting Outcomes

P. Daniel Patterson, PhD, NRP, J. Stephen Higgins, PhD, Eddy S. Lang, MDCM, CCFP, Michael S. Runyon, MD, MPH, Laura K. Barger, PhD, Jonathan R. Studnek, PhD, NRP, Charity G. Moore, PhD, Kathy Robinson, RN, EMT-P, Dia Gainor, MPA, Allison Infinger, MSPH, Patricia M. Weiss, MLIS, Denisse J. Sequeira, BS, Christian Martin-Gill, MD

Patterson et al., 2017 PMID-27858581

Developing Evidence Based Fatigue Risk Management Guidelines for Emergency Medical Services

Question #	Research Questions That Guided Systematic Reviews
1	Are there reliable and valid instruments for measuring fatigue among EMS personnel?
2	In EMS personnel, do shift-scheduling interventions mitigate fatigue, mitigate fatigue-related risks, and/or improve sleep?
3	In EMS personnel, does the worker's use of fatigue countermeasures mitigate fatigue, mitigate fatigue-related risks, and/or improve sleep?
4	In EMS personnel, does the use of sleep or rest strategies and/or interventions mitigate fatigue, mitigate fatigue-related risks, and/or improve sleep?
5	In EMS personnel, does fatigue training and education mitigate fatigue, mitigate fatigue-related risks, and/or improve sleep?
6	In EMS personnel, does implementation of model-based fatigue risk management mitigate fatigue, mitigate fatigue-related risks, and/or improve sleep?
7	In EMS personnel, do task load interventions mitigate fatigue, mitigate fatigue-related risks, and/or improve sleep?

Phase 1 Methods

Research Question	Literature Screened / Reviewed
1	1,257
2	21,670
3	1,401
4	4,656
5	3,817
6	2,777
7	3,394
TOTAL	38,972

Results of Phase 1

Five recommendations

1. Recommend use of reliable/valid instruments
2. Recommend shifts <24-hours in duration
3. Recommend access to caffeine
4. Recommend allowing naps during shifts
5. Recommend education/training in sleep/fatigue

15 total peer-reviewed papers

Evidence Based Guidelines for Fatigue Risk Management in Emergency Medical Services:

http://tandfonline.com/doi/full/10.1080/10903127.2017.1376137

www.emsfatigue.org

Developing Evidence Based Fatigue Risk Management Guidelines for Emergency Medical Services

ALL Fatigue Study Related Materials– AVAILABLE NOW!!

http://tandfonline.com/action/showAxaArticles?journalCode=ipec20

www.emsfatigue.org

Developing Evidence Based Fatigue Risk Management Guidelines for Emergency Medical Services

Adoption & Evaluation

1. Recommend use of reliable/valid instruments

Goal: Assess fatigue/sleepiness of EMS personnel with reliable/valid survey instrument(s) quarterly (4 out of 4 quarters annually).

Performance Measure: Demonstrated use of reliable/valid fatigue and/or sleepiness survey instruments to measure and monitor fatigue in EMS personnel on at least a quarterly basis.

See Patterson et al. at
http://tandfonline.com/doi/full/10.1080/10903127.2017.1376134

Adoption & Evaluation

2. Recommend shifts <24-hours in duration

Goal: 100% of shifts are less than 24 hrs in duration.

Performance Measure: Percent of all shifts that are less than 24 hrs in duration.

See Patterson et al. at
http://www.tandfonline.com/doi/full/10.1080/10903127.2017.1376135

Adoption & Evaluation

3. Recommend access to caffeine

Goal: 100% of shifts with access to caffeine.

Performance Measure: Percent of all shifts where EMS personnel have access to caffeine.

See Temple et al. at
http://tandfonline.com/doi/full/10.1080/10903127.2017.1382624

Adoption & Evaluation

4. Recommend allowing naps during shifts

Goal: EMS personnel are provided with access to, and permission to take a nap while on duty in 100% of extended shifts (i.e., ≥12 hours) and shifts taking place overnight.

Performance Measure: Percent of all shifts where EMS personnel are provided with access to and permission to take a nap on duty.

See Martin-Gill et al. at
http://tandfonline.com/doi/full/10.1080/10903127.2017.1376136

Developing Evidence Based Fatigue Risk Management Guidelines for Emergency Medical Services

Adoption & Evaluation

5. Recommend education/training in sleep/fatigue

Goal: 1) 100% of EMS personnel have received fatigue education and training as part of new employee orientation/ training; and 2) 100% of EMS personnel have received fatigue education and training within the previous two years.

Performance Measure: Percent of EMS personnel who have: 1) received education and training to mitigate fatigue and fatigue-related risks during new employee orientation/training; and 2) received education and training to mitigate fatigue and fatigue-related risks within the previous two years.

See Barger et al.at
http://tandfonline.com/doi/full/10.1080/10903127.2017.1362087

Summary

- Five recommendations based on the best available evidence

- Tremendous flexibility with implementing recommendations

November 2017 – December 2018*

The Fatigue in EMS Project

PHASE 1	PHASE 2	PHASE 3
Develop Evidence-Based Guideline (EBG) for fatigue risk management in EMS	Test the impact of one or more evidence-based recommendations in an experimental study	Develop a biomathematical model tailored to EMS shift scheduling and make freely available

www.emsfatigue.org

Developing Evidence Based Fatigue Risk Management Guidelines for Emergency Medical Services

Contract Timeline for Aim 1 and 2

- November ‘17 to May ‘18 develop and pilot test the intervention and recruit EMS agencies
- May ‘18 enroll EMS agencies and start data collection
- Nov/Dec ’18 complete data collection*

*Possible Impact Phase 2 Deadline

- To avoid overburdening the public with federally sponsored data collections, the Paperwork Reduction Act (PRA) of 1995 requires that U.S. federal government agencies obtain Office of Management and Budget (**OMB**) **approval** before requesting or collecting most types of information from the public.
- Study *likely to be* delayed beyond 2018.

Study Population

- Recruit & enroll diverse EMS operations
  - All ground-based operations
  - Include fire-based EMS operations
  - Moderate sized (minimum of 50-300 employees)
  - Nationwide recruitment
  - Representation in all major Census regions
  - Goal enrollment n=30 total EMS operations

Phase 2-The Proposed Intervention

- "***Take 10 for Sleep Health***"
- 10 modules
- Online delivery method
- Each module no longer than 10-minutes
- Topics covered: Circadian rhythms, Sleep Health, Sleep Timing and Sleep Hygiene, Dangers of Fatigue, Strategic use of naps, Strategic use of caffeine, Strategic use of exercise, Negative effects of sleep deprivation, and more.

Our **desired** Longer Term Outcomes

Goals for the EBG Project overall:

- Fewer EMS personnel that report fatigue while at work.
- Fewer EMS personnel classified with poor sleep quality.
- Fewer fatigue-related negative safety and performance outcomes (e.g., ambulance crashes).
- Increased number of EMS organizations that have formal fatigue risk management programs with strategies that are informed by the evidence.

Phase 3 – Fatigue Modeling Tool for EMS - 2019

Similar Models Used Everyday in Aviation, Rail, Maritime, Trucking….

Source: Aviation: http://www.cos-mag.com/ohs-laws-regulations/34098-transport-canada-proposes-new-rules-on-flight-crew-fatigue/.
Rail: http://calgaryherald.com/business/local-business/cp-rail-union-at-odds-over-worker-fatigue.
Trucking: https://www.wsj.com/articles/independent-truckers-tell-court-e-logs-violate-constitutional-rights-1459444146

Developing Evidence Based Fatigue Risk Management Guidelines for Emergency Medical Services

Expert Panel

Expert Panel Name	Area of Expertise	Institution
Hans Van Dongen, PhD	Sleep Medicine / Fatigue	Washington State University
John Violanti, PhD	Fatigue Expert	University of Buffalo
Daniel Buysse, MD	Sleep Medicine Physician	University of Pittsburgh
Douglas Kupas, MD	Emergency Medicine / EMS	Geisinger Health System
Frank Guyette, MD	Emergency Medicine / EMS / Air-Medical	University of Pittsburgh
Joe Penner	EMS Administration	Mecklenburg County EMS
Ron Thackery, JD	EMS / Risk Administration	AMR
David Becker, MA, EMT-P	Fire / EMS	Columbia Southern University / IAFC
Bradley Dean, MA, NRP	Field Provider / Clinician	Rowan County EMS
George Lindbeck, MD	State EMS Medical Director	Virginia State Office of EMS / Univ. of Virginia
Dennis Eisnach	Consumer Representative	None / Retired

***The guideline development group should be multi-disciplinary and balanced, comprising a variety of methodological experts and clinicians, and populations expected to be affected by the guidelines*. (IOM, 2011)**

Developing Evidence Based Fatigue Risk Management Guidelines for Emergency Medical Services

Research / Project Team	
Name	**Institution**
Daniel Patterson, PhD, NRP	University of Pittsburgh, Department of Emergency Medicine
J. Steve Higgins, PhD	NHTSA
Anthony Fabio, PhD	University of Pittsburgh, Graduate School of Public Health
Eddy Lang, MDCM	University of Calgary, Emergency Medicine
Patricia Weiss, MLIS	University of Pittsburgh, Health Sciences Library
Laura Barger, PhD	Harvard Medical School, Division of Sleep Medicine
Matthew D. Weaver, PhD	Harvard Medical School, Division of Sleep Medicine
Christian Martin-Gill, MD	University of Pittsburgh, Department of Emergency Medicine
Michael Runyon, MD	Carolinas HealthCare System, Department of Emergency Medicine
Jon Studnek, PhD, NRP	Mecklenburg EMS
Allison Infinger, MSPH	Mecklenburg EMS
Charity Moore, PhD	University of Pittsburgh
Denisse Sequeira, BS	University of Pittsburgh, Department of Emergency Medicine
David Hostler, PhD, NRP	University of Buffalo, Department of Exercise & Nutrition Sciences
Jennifer Templin, PhD	University of Buffalo, Department of Exercise & Nutrition Sciences
Kathy Robinson, RN	NASEMSO

Summary

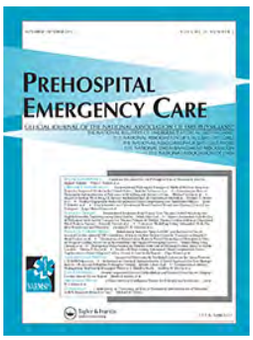
- **Evidence Based Guidelines for Fatigue Risk Management in Emergency Medical Services:** http://tandfonline.com/doi/full/10.1080/10903127.2017.1376137

- **All Published Materials (Supplement):** http://tandfonline.com/action/showAxaArticles?journalCode=ipec20

- **Project Website: www.emsfatigue.org**

Contact: NASEMSO Project Manager
Kathy Robinson, RN, EMT-P
Ph. 703-538-1799, Ext. 1894
E: Robinson@nasemso.org

Developing Evidence Based Fatigue Risk Management Guidelines for Emergency Medical Services



Prehospital Emergency Care

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Fatigue Risk Management in High-Risk Environments: A Call to Action

Deborah A. P. Hersman & Emily A. Whitcomb

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To link to this article: https://doi.org/10.1080/10903127.2017.1380097

Published online: 11 Jan 2018.

Fatigue Risk Management in High-Risk Environments: A Call to Action

Deborah A. P. Hersman, MS, Emily A. Whitcomb, MPH

PREHOSPITAL EMERGENCY CARE 2018; Early Online:1–2

Our society depends on 24/7 operations for everything from transporting passengers and goods, manufacturing products, to providing emergency services. Around-the-clock operations require millions of individuals to work non-traditional schedules that shorten sleep opportunities and disrupt natural sleep patterns (1). These shift workers are susceptible to work-related fatigue and fatigue-related risks such as injury, error, and poor performance (2). Unfortunately, many employers of shift workers, including Emergency Medical Services (EMS), lack guidance on evidence-based strategies for managing fatigue in the workplace (3). Recommendations and solutions for fatigue management based on systematic reviews and synthesis of the evidence are long overdue.

Fatigue and shift work are crosscutting safety risks that are not unique to any one industry or occupation (4–7). As a physiological issue, fatigue — *the overwhelming feeling of tiredness and exhaustion*—affects all types of workers (8). The outcomes of fatigue-related events are much greater in safety critical jobs where lives are on the line. Safety critical jobs can include transporting passengers, operating heavy machinery, providing medical care, or doing a task that place the worker's life or the lives of others at risk.

Fatigue-related events are common (9). The National Transportation Safety Board (NTSB) has investigated thousands of accidents and identified fatigue as a contributing factor in aviation, highway, marine, pipeline, and rail operations. The NTSB has issued over 200 recommendations focused on mitigating fatigue in high-risk industries with worker education, use of medical screenings for sleep disorders, scheduling practices, and other solutions (10). In 2011, the Federal Aviation Administration promulgated new flight and rest requirements for commercial pilots that take into consideration factors such as the time of day for their first flight, the number of time zones they cross, and the number of flight legs in a given day. In the last decade, the Federal Motor Carrier Safety Administration issued guidance to clinicians that perform employee medical exams and directed them to screen commercial vehicle drivers for sleep apnea and also identified how drivers may return to work with effective treatment (11). In addition, both the aviation and trucking industries have addressed risks by going beyond regulations through fatigue risk management programs tailored to operational demands. Not all industries have these regulations but all organizations, especially those with safety critical jobs, should address fatigue as a component of a comprehensive safety management system.

The need for fatigue risk management in the EMS setting is compelling. Any industry with 24/7 operations involving safety critical tasks will have contributing factors that are numerous, complex, and undeniably difficult to address. Previous research suggests that large numbers of EMS personnel suffer from work-related fatigue, sleep deprivation, inadequate recovery between scheduled shifts, and fatigue-related risks such as injury and error (12–14). Adoption of recommendations to manage fatigue, supported by the evidence, and tailored to the EMS setting may lead to significant improvements in safety and enhance the health status of EMS personnel.

All employers should learn about fatigue in the workplace, its costs, its causes and how fatigue can lead to a higher rate of safety-related incidents. While shiftwork and fatigue will never be eliminated in the workplace, it can be managed (15). Science-based fatigue risk management systems (FRMS) include policies, programs, and procedures to manage fatigue risk in the workplace with the goal of a safer and healthier workforce and community in which they live (16). An effective FRMS will identify fatigue risk and include effective countermeasures, such as a well-designed shift schedule that can improve the wellbeing, productivity, health, and safety of workers (16). As part of a FRMS, employers should be encouraged to provide sleep health education and sleep disorder assessment and treatment to improve employee well-being and reduce operational risks. Fatigue can impact every aspect of life including job and safety performance,

Received July 31, 2017 from National Safety Council, Itasca, Illinois (DAPH, EAW). Revision received September 7, 2017; accepted for publication September 11, 2017.

Address correspondence to Emily A. Whitcomb. E-mail: Emily.Whitcomb@nsc.org

doi: 10.1080/10903127.2017.1380097

family relationships and health (17). Incorporating fatigue risk management into existing safety management systems is vital for preventing injuries and fatalities and improving the well-being of employees or workers.

References

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FATIGUE IN EMS RISK MANAGEMENT GUIDELINES GO LIVE!!

January 11, 2018 (Falls Church, VA) Workplace fatigue is a common complaint among shift workers. Emergency Medical Services (EMS) personnel work shifts and deliver emergent health care to the acutely ill and injured on the roadside, in patients' homes, and other environments. They must deliver this care while under significant time pressure and stress. Fatigue is a threat that is often overlooked by EMS leadership and personnel as "just part of the job."

The number of fatigue-related safety incidences involving EMS personnel and their patients is on the rise. Recent research shows that more than half of emergency medical services (EMS) personnel report severe mental and physical fatigue while at work, poor sleep quality, and poor recovery between shifts. Half of EMS personnel obtain less than 6 hours of sleep per day. The industry has a fatigue problem, yet few have developed solutions informed by the evidence or best practice.

The National Association of State EMS Officials (NASEMSO) has partnered with a team led by University of Pittsburgh School of Medicine scientists to develop new fatigue guidelines published early online in the journal Prehospital Emergency Care. The aim of the guidelines is to mitigate the effects of fatigue with recommendations based on a comprehensive evaluation of the best available evidence related to numerous fatigue mitigation strategies such as using caffeine and napping during shifts.

"Evidence Based Guidelines for Fatigue Risk Management in Emergency Medical Services" are now available at http://tandfonline.com/doi/full/10.1080/10903127.2017.1376137 and all companion materials, including background information, systematic reviews, evidence tables, and expert commentaries can be freely accessed at http://tandfonline.com/action/showAxaArticles?journalCode=ipec20.

"Fatigue is widespread in EMS and is not isolated to one type of EMS operation or category of EMS clinician. The administrators of EMS organizations are tasked with creating shift schedules and mitigating threats to safety. Unfortunately, these administrators are not equipped to address fatigue in the workplace, in part because they have no guidance on how to manage fatigue in the workplace," said Daniel Patterson, Ph.D., lead author, assistant professor of emergency medicine at the Pitt School of Medicine, and active paramedic clinician. "Operating an ambulance is dangerous and fatigue can threaten safe operation of the vehicle," said Patterson. "Aside from driving, most of the work EMS clinicians do is patient care, and fatigue can have negative consequences for decision-making abilities and overall performance. The outcomes of fatigue can be devastating for EMS personnel and their patients."

Patterson and his team of two-dozen co-investigators and staff reviewed more than 38,000 pieces of literature, completed seven systematic literature reviews, including three meta-analyses. Investigators synthesized the quality of the evidence for a panel of experts, who used this information to create evidence-based guidelines for fatigue risk management.

The guidelines consist of five recommendations:

- Use of fatigue/sleepiness surveys to measure and monitor EMS personnel fatigue.
- Limit EMS shifts to less than 24 hours in duration.
- Provide EMS personnel access to caffeine to help stave off fatigue.
- Allow EMS personnel the opportunity to nap while on duty.
- Provide education and training in fatigue risk management to EMS personnel.

Patterson and his team expect the guidelines to have a wide impact on improving practice and policies to alleviate EMS personnel fatigue, whether when driving an ambulance or caring for patients.

Additional contributors to the study included: From the University of Pittsburgh, Christian Martin-Gill, MD, MPH, Anthony Fabio, PhD, MPH, Francis X. Guyette, MD MPH, Charity Moore, PhD, Daniel Buysse, MD, and Denisse Sequeira. From Harvard University, Laura Barger, PhD and Matthew Weaver, PhD. From the State University of New York at Buffalo, David Hostler, PhD, Jennifer Temple, PhD, and John Violanti, PhD. From Mecklenburg County EMS Agency, Jon Studnek, PhD, Allison Infinger, MSPH, and Josef Penner, MBA. From the University of Calgary Eddy Lang, MD. From Carolinas HealthCare System, Mike Runyon, MD. From the Institute for Behavior Resources, Inc., Francine James, PhD and Lauren Waggoner, PhD. From Washington State University, Hans Van Dongen, PhD. From Columbia Southern University, David Becker, MA. From Rowan County EMS Agency, NC, Bradley Dean, MA. From the National Highway Traffic Safety Administration, Stephen Higgins, PhD. From Geisinger Health System, Douglas Kupas, MD. From the University of Virginia, George Lindbeck, MD. From American Medical Response, Mr. Ron Thackery. From the National Association of State EMS Officials, Kathy Robinson and Dia Gainor.

Work performed on this project was supported with funding from the U.S. Department of Transportation, National Highway Traffic Safety Administration to the National Association of State EMS Officials (NASEMSO): contract/grant number: DTNH2215C00029. The views contained in these materials are those of the authors and not necessarily those of the National Highway Traffic Safety Administration.

###

The National Association of State EMS Officials is a leading national organization for EMS, a respected voice for national EMS policy with comprehensive concern and commitment for the development of effective, integrated, and community-based EMS programs. Its members are the leaders of their state and territory EMS systems.

City of Franklin

Dear Franklin Residents:

One of the top priorities of the Mayor and Common Council is to ensure your safety, and that starts with maintaining high-quality emergency response, fire and police services. This is increasingly challenging given that the funding sources currently available are not able to keep pace with the needs of our growing community.

The Common Council works very hard to be good stewards of taxpayers' funds, as evidenced by the fact that from 2013 - 2017 **total municipal property taxes stayed the same.** However, we are at a crossroads, and we need to determine if we should maintain our existing level of staffing or work to secure funding to meet the growing demands of our community as well as better align our fire/EMS and police staffing levels with national standards.

To help develop the options explored in this survey, the Common Council commissioned an *Assessment of Public Safety Funding Options Report*, which can be found at www.franklinwi.gov.

Our goal is to finalize a public safety plan that reflects the opinions of our residents and their willingness to financially support these services. Therefore, we need your input through this community survey.

Please take 5-10 minutes to respond to this survey!

TAKE THE SURVEY IN ONE OF TWO EASY WAYS

Online:

1) Simply go to the survey website: **www.survey2000.com**
2) Enter your Survey Access Number:
3) Take the survey!

By Paper:

If you do not have internet access, please mail the completed survey in the enclosed envelope or return it to the City Clerk's Office at City Hall, 9229 W. Loomis Road, Franklin.

The Survey Access Number can be used only once. To obtain a second survey for another adult in your household, please call 414-425-7500.

Please complete the survey by July 30, 2018.

To collect this feedback, we are working with Community Perceptions, an independent firm with expertise in conducting community surveys. All survey data is returned to Community Perceptions, and your feedback will remain anonymous.

Final survey results will be reported at a Common Council meeting this summer and will also be available on the City's website at www.franklinwi.gov.

Thank you for taking the time to complete this survey.

Sincerely,

Stephen R. Olson
Mayor, City of Franklin

Mark A. Dandrea
President, City of Franklin Common Council

Fire Department/Emergency Medical Services Background Information

The City of Franklin's emergency medical services (EMS), fire suppression and fire prevention services are currently provided by the Franklin Fire Department (FFD) and include:

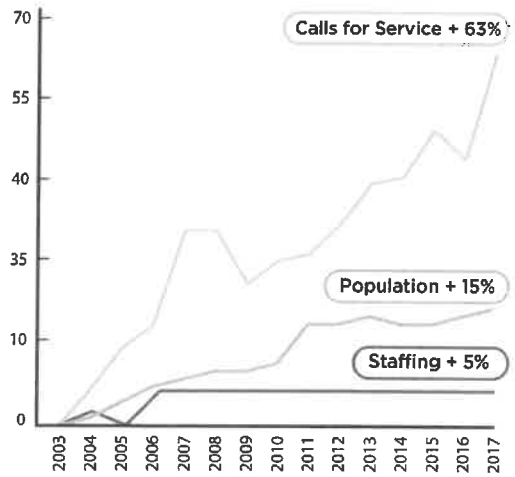
- **Basic Life Support (BLS):** Bleeding control, CPR, treatment of shock and poisoning, stabilization of traumatic injuries and first aid.
- **Paramedic/Advanced Life Support (ALS):** Pre-hospital emergency care using invasive life-saving procedures, such as intravenous fluids, administration of medications and advanced airway procedures.
- **Fire/Service Responses:** Emergency fire calls, automatic fire alarms, investigations (carbon monoxide alarms, natural gas leaks, smell of smoke, electrical issues), open burning complaints, motor vehicle crashes, elevator emergencies and water emergencies.
- **Non-emergency Inspection and Prevention Services:** State-mandated fire inspections, public education events, smoke detector installations, training as well as equipment, vehicle and facility maintenance.

Over the last 15 years, the City of Franklin has experienced a population growth of nearly 15%. During that same time, the Fire Department's Calls for Service (CFS) have increased by 63%. In fact, in just the past six years, the number of calls for fire and emergency medical services (EMS) has grown from 3,381 calls in 2012 to 4,099 calls for service in 2017, an increase of 21%. This increase is largely due to a demographic shift in the City, including an increase of more than 5,000 Franklin residents over the age of 65 since 2000. This trend is expected to continue in the years ahead, which also means CFS will continue to rise.

FFD assigns 11 firefighters to each 24-hour shift distributed among the City's three fire stations.

- Station #1: 5 personnel
- Station #2: 2 personnel
- Station #3: 4 personnel

FRANKLIN POPULATION GROWTH & FIRE DEPARTMENT TRENDS
2003 - 2017



Station #2 is the only station in Milwaukee County routinely staffed with less than three personnel, creating additional challenges in responding to calls for service and depleting resources from other stations. In addition, the area serviced by Station #2 is poised for significant residential development in the coming years.

Despite the population growth and increased demand for service, staffing levels have remained the same since 2007.

How important is it to you that the City of Franklin provides high-quality and responsive emergency services?	❒ Extremely important ❒ Somewhat important ❒ Not important ❒ Not sure

Comments/suggestions:

Fire Department/Emergency Medical Services Funding

To date, the City has been able to fund fire and emergency medical services (EMS) through a combination of:

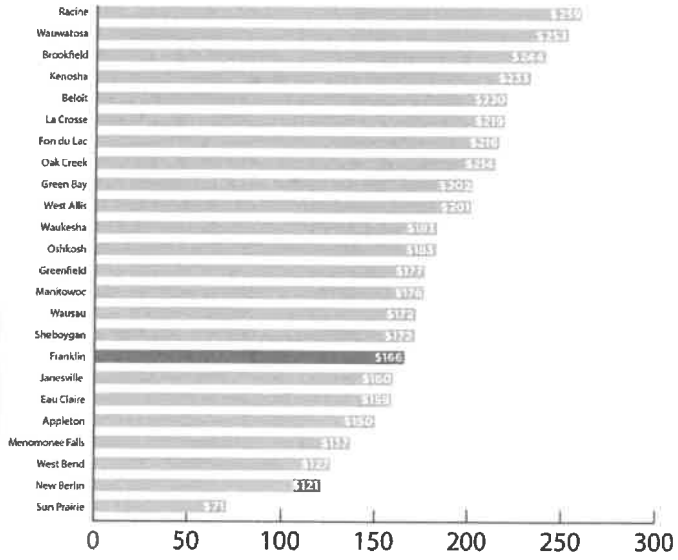
- ✓ **Local Property Taxes**
- ✓ **Milwaukee County Funding**
- ✓ **Fees for Services** (Ex. ambulance transport)
- ✓ **Grants and Donations**

Over the last three years, funding from these sources hasn't kept pace with the demands of the department.

Additionally, the City's overall budget has been limited by state levy limits and state legislation that restricts utilizing other revenue sources. **To date, the City has been addressing the budget shortfall through reductions in other areas of the city budget.** These budget limitations have resulted in staffing shortages, requiring the use of overtime to meet base staffing levels. As a result, **Franklin is in the bottom third of similar-sized Wisconsin cities in fire/EMS spending per capita.**

A study in May 2012 found there are considerable opportunities to partner with neighboring municipalities in the areas of training, fire inspections and vehicle repair/maintenance to save money. However, the financial savings associated with those opportunities and potential shared staffing are limited.

NET FIRE SPENDING PER CAPITA
WISCONSIN MUNICIPALITIES (POPULATION 30,000-150,000)



In order to meet the growing needs of the community, the City will need to hire 9 additional firefighters to meet national safety and response time standards.

What advice would you give to the City?	❒ Explore funding options to increase fire/emergency medical services (EMS) staffing levels that meet the national standard ❒ Maintain the current fire/emergency medical services (EMS) staffing level ❒ Not sure ❒ Other:

Comments/suggestions:

The following three options to address fire and emergency medical services (EMS) have been developed for community feedback:

OPTION 1: Maintain the Current Staffing for Fire/Emergency Medical Services

The City could maintain the current staffing for fire and emergency medical services (EMS). This will continue to further challenge the department as the population continues to grow and age. Additionally, this will require Franklin to increasingly rely on surrounding municipalities to respond to calls when the City does not have the personnel, thus increasing response times.

Would you support OPTION 1 as described above to maintain the current staffing of fire/emergency medical services (EMS)? *Representing no significant increase in local municipal property taxes.*	❒ Yes ❒ No ❒ Undecided

Comments/suggestions:

OPTION 2: Add Fire/Emergency Medical Services Staff to Ensure High-Quality and Timely Responses by Making Other Budget Cuts and Service Reductions

The City could make cuts to other budget items, requiring layoffs of city employees and/or the reduction of city services to free up funding to add fire and emergency medical services (EMS) staff to meet the national standard. The City would need to initially cut $1 million in expenses from other department budgets or through personnel reductions. This could include:

- Reduction in snow removal services
- Reduction in staffing and hours for various non-statutory departments such as library and health
- Reduction in road right-of-way and park maintenance, improvement and services

Would you support OPTION 2 as described above to add fire/emergency medical services (EMS) staff to ensure high-quality and timely responses by making other budget cuts and service reductions? *Representing no significant increase in local municipal property taxes.*	❒ Yes ❒ No ❒ Undecided

Comments/suggestions:

OPTION 3: Add Fire/Emergency Medical Services Staff to Ensure High-Quality and Timely Responses by Increasing Local Municipal Property Taxes

If Franklin residents want to increase fire and emergency medical services (EMS) staffing, without impacting other existing city services, additional revenue will be needed. Voters would need to approve a referendum to exceed the state-imposed property tax limit in order to add 9 full-time fire fighters. This would represent a municipal property tax increase of $45 for each $100,000 of property value.

Would you support OPTION 3 as described above to add fire/emergency medical services (EMS) staff to ensure high-quality and timely responses by increasing local municipal property taxes? *Representing an estimated annual municipal property tax increase of $45 for each $100,000 of property value.*	❒ Yes ❒ No ❒ Undecided

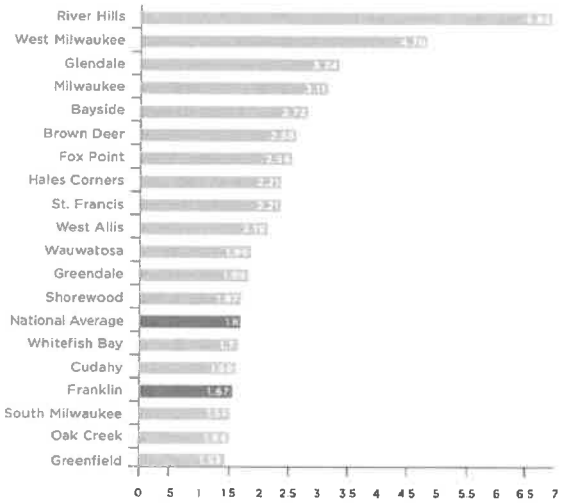
Comments/suggestions:

Police Services Background Information

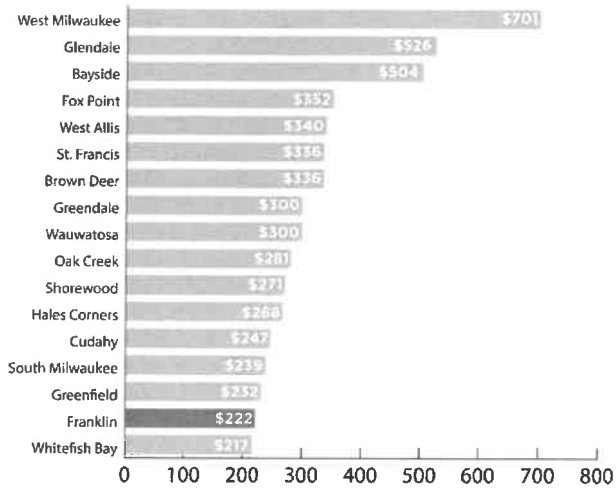
Despite the City of Franklin's significant population growth and greater demand for officer time due to increases in crime and drug-related incidents, the Police Department has only added one police officer in the past 15 years. In fact, **Franklin has fewer officers per person than nearly every other municipality in Milwaukee County.** In addition, Franklin is among the lowest in per capita expenses for law enforcement.

The department responded to an increase of nearly 3,000 service calls in 2017, compared to 2008. The complexities of these calls, which often involve assisting citizens with mental health and alcohol/drug issues, require officers to spend more time on the scene, preventing them from fulfilling other duties. Additionally, there is a need for greater support to ensure safety in all our schools.

NUMBER OF OFFICERS PER 1,000 POPULATION



NET POLICE SPENDING PER CAPITA IN MILWAUKEE COUNTY



After a comprehensive review of Franklin's public safety service needs, the City has identified a need to **hire 3 additional officers** to address the needs of the growing population relative to the department's response and preventative responsibilities.

What advice would you give to the City?	❒ Explore funding options to add 3 additional police officers ❒ Maintain the current level of police staffing ❒ Not sure ❒ Other:

Comments/suggestions:

Police Services Funding

Two options to fund the positions have been developed for community feedback:

OPTION 1: Add Police Officers by Making Other Budget Cuts and Service Reductions

The City could make cuts to other budget items, requiring layoffs of city employees and/or the reduction of city services to free up funding to add police officers. The City would need to initially cut $390,000 in expenses from other department budgets or through personnel reductions. This could include:

- Reduction in snow removal services
- Reduction in staffing and hours for various non-statutory departments such as library and health
- Reduction in road right-of-way and park maintenance, improvement and services

Would you support OPTION 1 as described above to add police officers by making other budget cuts and service reductions? *Representing no significant increase in local municipal property taxes.*	❒ Yes ❒ No ❒ Undecided

Comments/suggestions:

OPTION 2: Add Police Officers by Increasing Local Municipal Property Taxes

If Franklin residents want to add police officers without impacting other existing city services, additional revenue will be needed. Voters would need to approve a referendum to exceed the state-imposed property tax limit in order to add 3 police officers. This would represent a municipal property tax increase of $15 for each $100,000 of property value.

Would you support OPTION 2 as described above to add police officers by increasing local municipal property taxes? *Representing an estimated annual municipal property tax increase of $15 for each $100,000 of property value.*	❒ Yes ❒ No ❒ Undecided

Comments/suggestions:

Respondent Information

This data helps us to ensure respondents are consistent with the demographic make-up of the city. All survey data is returned to Community Perceptions, and your feedback will remain anonymous.

What is your age?

☐ 18-25 ☐ 26-35 ☐ 36-45 ☐ 46-55 ☐ 56-64 ☐ 65 and older

How long have you lived in the City of Franklin?

☐ Less than one year ☐ 1-5 years ☐ 6-10 years
☐ 11-20 years ☐ More than 20 years
☐ I do not live in the City of Franklin

Which best describes your housing status?

☐ Own ☐ Rent ☐ Other

Thank you for your participation. We sincerely value your time and feedback!

City of Franklin
9229 W. Loomis Road
Franklin, WI 53132

LOCAL
POSTAL CUSTOMER

Please complete the enclosed survey by July 30, 2018.

This publication was produced for the residents of the City of Franklin. Due to the overlap of postal routes, residents from neighboring communities may receive this publication. Given the limitations of bulk mailing, this overlap was difficult to eliminate without significant cost. Thank you for your understanding.

Current and Future Staffing Needs of Mukwonago FD and Opportunities/Challenges to Fund, Recruit and Retain.

2016 and 2017

- Staffed three POP positions during the day
- Out of 13,140 POP hours available an average of 12,028.38 were filled= 91%

2018

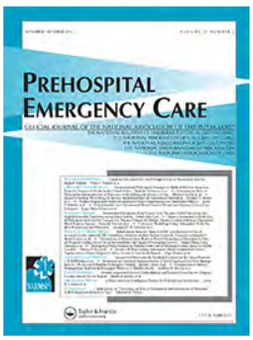
- The third POP shift was frozen due to the negotiations with PHC
- 03-03-18 Able to add third POP shift to weekends utilizing 2-0800-1800hrs and 1- 0600-1800hrs
- 01-01-18 to 09-04-18 total POP hours available 6,312 and covered 3,521.50hrs= 56%
- Recruits 2012-2017=91 15/year ave. 2018=7
- Staff lost 2012-2017=86 14/year ave. 2018=14
    - FT FF position (4)
    - Terminated due to policy and attitude issues (3)
    - FT Job change/relocation (3)
    - Moved out of the area (1)
    - Lacking participation/time commitment (2)
    - Pregnancy and family (1)

Opportunities:

- Completing of station 1 expansion start Intern Program
- Getting interest in the Cadet Program
- Get more face to face at local business or recruiting materials displayed
- Staffing Referendum

Challenges:

- POP pay rate
    - Currently- $11.50, 12.50, 15.50 and 16.50 CC
    - POC average staffing at nighttime
        - 01-01-2018 7.23 personnel
        - 09-01-2018 4.92 personnel
    - City of Lake Geneva- $18.48 for FFI/ Paramedic, 1200 calls a year
    - Elkhorn FD FFI/AEMT- $14.98
        - Chief Rod Smith looking to do increase to $18.00/hr starting 2019 looking to do Paramedic
        - Asking to do a staffing referendum in 2020
        - Lost 7 out of 7 of POP staffing so far this year
    - New Berlin FD FFI/Paramedic $15.40 and FFII/Paramedic $16.22
        - 2019 will combine 6 POP positions to hire 3 FT staff due to unavailable POP pool and retention so they don't leave to another FT position
- 2 in 2 out rule



Prehospital Emergency Care

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Evidence-Based Guidelines for Fatigue Risk Management in Emergency Medical Services

P. Daniel Patterson, J. Stephen Higgins, Hans P. A. Van Dongen, Daniel J. Buysse, Ronald W. Thackery, Douglas F. Kupas, David S. Becker, Bradley E. Dean, George H. Lindbeck, Francis X. Guyette, Josef H. Penner, John M. Violanti, Eddy S. Lang & Christian Martin-Gill

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Evidence-Based Guidelines for Fatigue Risk Management in Emergency Medical Services

P. Daniel Patterson, PhD, NRP, J. Stephen Higgins, PhD, Hans P. A. Van Dongen, PhD, Daniel J. Buysse, MD, Ronald W. Thackery, JD, Douglas F. Kupas, MD, David S. Becker, MA, EMT-P, Bradley E. Dean, MA, NRP, George H. Lindbeck, MD, Francis X. Guyette, MD, MPH, Josef H. Penner, MBA, John M. Violanti, PhD, Eddy S. Lang, MDCM, CCFP (EM), Christian Martin-Gill, MD, MPH

Abstract

Background: Administrators of Emergency Medical Services (EMS) operations lack guidance on how to mitigate workplace fatigue, which affects greater than half of all EMS personnel. The primary objective of the Fatigue in EMS Project was to create an evidence-based guideline for fatigue risk management tailored to EMS operations. **Methods**: Systematic searches were conducted from 1980 to September 2016 and guided by seven research questions framed in the Population, Intervention, Comparison, Outcome (PICO) framework. Teams of investigators applied inclusion criteria, which included limiting the retained literature to EMS personnel or similar shift worker groups. The expert panel reviewed summaries of the evidence based on the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) methodology. The panel evaluated the quality of evidence for each PICO question separately, considered the balance between benefits and harms, considered the values and preferences of the targeted population, and evaluated the resource requirements/needs. The GRADE Evidence-to-Decision (EtD) Framework was used to prepare draft recommendations based on the evidence, and the Content Validity Index (CVI) was used to quantify the panel's agreement on the relevance and clarity of each recommendation. CVI scores for relevance and clarity were measured separately on a 1–4 scale to indicate consensus/agreement among panel members and conclusion of recommendation development. **Results**: The EtD framework was applied to all 7 PICO questions, and the panel created 5 recommendations. PICO1: The panel recommends using fatigue/sleepiness survey instruments to measure and monitor fatigue in EMS personnel. PICO2: The panel recommends that EMS personnel work shifts shorter than 24 hours in duration. PICO3: The panel recommends that EMS personnel have access to caffeine as a fatigue countermeasure. PICO4: The panel recommends that, EMS personnel have the opportunity to nap while on duty to mitigate fatigue. PICO5: The panel recommends that EMS personnel receive education and training to mitigate fatigue and fatigue-related risks. The panel referenced insufficient evidence as the reason for making no recommendation linked to 2 PICO questions. **Conclusions**: Based on a review of the evidence, the panel developed a guideline with 5 recommendations for fatigue risk management in EMS operations.
Key words: recommendations; PICO framework; GRADE methodology

PREHOSPITAL EMERGENCY CARE 2018; Early Online:1–13

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All authors contributed to the conception of the design of this work. All authors contributed to acquisition of study data. PDP led the analysis, and all authors contributed to the interpretation of findings, drafting of the manuscript, and providing critically important intellectual content. All authors reviewed and approved the final version and agree to be accountable for all aspects of the work.

Supplemental data for this article can be accessed on the publisher's website.

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BACKGROUND

Mental and physical fatigue in the Emergency Medical Services (EMS) workplace affect large numbers of EMS personnel (1) and have been linked to EMS personnel injury, patient care error, and adverse events (2). EMS personnel work in shifts, which has been shown in other shift worker groups to disrupt normal patterns of sleep and circadian rhythms, and contribute to fatigue (3). The problem of fatigued EMS personnel is widespread and not isolated to one type of EMS operation or category of EMS clinician (2, 4, 5). Administrators of EMS organizations are not sufficiently equipped to address fatigue in the workplace, in part because of the absence of guidelines for fatigue risk management in the EMS setting.

Fatigue risk management can be seen as one critical component of safety management systems and is defined as "a scientifically based, data-driven addition or alternative to prescriptive work hour limitations, which manages employee fatigue in a flexible manner appropriate to the level of risk exposure and nature of the operation" (6). Aviation, rail, nuclear power and other high-risk industries have aimed to directly address the dangers of fatigue by developing and applying advanced processes for fatigue detection and mitigation (7). Despite this progress, none of these industries has developed guidelines for fatigue risk management based on a systematic review of the best available evidence.

Evidence Based Guidelines (EBGs) help to normalize practice and policies, and to aid decision-making based on a review of the best available evidence. EBGs are widely supported by national EMS and other medical organizations (8, 9). Guideline development is a multi-step process that requires careful review of the evidence and consideration of factors that can affect adoption and implementation of recommendations. The National Model Process was created to aid EBG developers with developing, implementing, and evaluating Prehospital EBGs (10). This Model Process encourages the use of a rigorous methodology such as the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) framework to form recommendations based on a careful review of the evidence and other factors that may impact acceptance of an intervention by the target population (11).

This paper describes guideline development for the Fatigue in EMS project and reports the results of the panel's review of the evidence and recommendations. This project was supported by the National Highway Traffic Safety Administration (NHTSA) to address gaps in guidance for fatigue risk management through the Model Process and to aid the EMS industry with recommendations tailored to EMS operations and personnel. The primary targeted audience for this work includes individuals in positions of leadership, administration, and/or management of EMS personnel.

TABLE 1. Members of expert panel

Name	Area of Expertise	Institution
Hans P. A. Van Dongen, PhD	Sleep and Fatigue Science	Washington State University
John M. Violanti, PhD	Fatigue in Public Safety	University at Buffalo
Daniel J. Buysse, MD	Sleep Medicine	University of Pittsburgh
Douglas F. Kupas, MD	Emergency Medicine & EMS	Geisinger Health System
Frank X. Guyette, MD, MPH	Emergency Medicine & EMS	University of Pittsburgh
Josef H. Penner, MBA	EMS Administration	Mecklenburg County NC EMS
Ronald W. Thackery, JD	EMS Risk Administration	American Medical Response
David S. Becker, MA, EMT-P	Fire / EMS	Columbia Southern University
Bradley E. Dean, MA, NRP	Field Personnel / Clinician	Rowan County NC EMS
George H. Lindbeck, MD	State EMS Medical Direction	Virginia State Office of EMS
Dennis Eisnach*	Consumer Representative	None / Retired

*Mr. Eisnach discontinued participation on the panel February 2017 due to illness.

These recommendations should also guide the decision making of individuals in the position of educating, training, and influencing policies that impact the work environment, health, and safety of EMS personnel. Fatigue risk management is a shared responsibility between the employer and employee (6, 12). Therefore, these recommendations are also meant to inform EMS personnel, and to guide their decision-making toward actions that can mitigate fatigue in the workplace.

METHODS

Overview

The development of these guidelines followed recommendations of the 8-step Model Process for the creation of prehospital EBGs. The primary aim was to create EBGs for fatigue risk management that are tailored to the EMS workplace (10). External Input (Step 1) was solicited through public comment periods during project-related meetings in April 2016, and with an online solicitation for public comments on a designated project website. Guideline Initiation and Evidence Review (Step 2) was accomplished by forming a panel of experts with knowledge of and experience in sleep medicine, fatigue science, emergency medicine, EMS, risk management, administration, and consumerism (Table 1). The panel's configuration satisfied the Institute of Medicine's (IOM) recommendation of diversity in experience, expertise, and content knowledge (8). Panel member disclosures appear in Online Supplement Appendix A (13).

The panel produced seven research questions framed in the Population, Intervention, Comparison, and Outcomes (PICO) format. The development of each

research question is described elsewhere (13). Each question informed the research team's Evidence Appraisal (Step 3), which included seven systematic reviews and where possible, meta-analyses (14–20). All systematic reviews were registered with PROSPERO (21), the international database of prospectively registered systematic reviews (2016 registration numbers: CRD42016040097; CRD42016040099; CRD42016040101; CRD42016040107; CRD42016040110; CRD42016040112; CRD42016040114). Evidence profile tables were created as prescribed by the GRADE system (11). Guideline Development (Step 4) focused on evaluation of the evidence, panel discussions of the balance between benefits and harms, appraisal of the values and preferences of the target population, and deliberation regarding the resources needed to implement each intervention contained within the PICOs.

Steps 5–8 comprise translating recommendations into model protocols or policies, dissemination, implementation, and evaluation/testing (10). This paper does not address Steps 5–8. This paper provides a summary of recommendations and their development, so they may be disseminated, incorporated into policy, and field-tested. The panel supplemented recommendation statements with the panel's collective expert opinion on interpretation of recommendations.

Protocol

The Institutional Review Board of the University of Pittsburgh approved the protocol. In March and April of 2017, the panel gathered for a face-to-face meeting and a conference call/webinar to review the evidence profiles for each PICO. The principal investigator (PDP) and GRADE methodologist (ESL) led panel members through an orderly review of GRADE evidence profile tables for each research question. The panel evaluated the quality of evidence, reflected on the balance between benefits and harms of a particular intervention, considered the values and preferences of the targeted population, and evaluated the resource requirements/needs associated with a particular intervention. The discussions were documented with the GRADE Evidence-to-Decision (EtD) Framework (22). The EtD framework is a form developed by the GRADE working group that guides panel members through the process of evidence evaluation and consideration of important information and questions (e.g., values and preferences of targeted populations), and ensures transparency in decision-making toward development of recommendations (22).

Measures and Statistical Analyses

Following the evidence review, the Principal Investigator and GRADE methodologist offered the panel a draft recommendation for consideration and editing. The panel was directed to debate the draft statement and then rate the relevance and clarity separately of draft recommendation statements. The question of relevance was presented to panel members as follows: "*Is the statement connected/germane to* [a] *the findings of the systematic reviews;* [b] *the balance between benefits and harms;* [c] *the values and preferences of the EMS community of shift worker clinicians and administrators;* [d] *any concerns for resource use (costs); and* [e] *suitable in its current form for purposes of guiding the EMS community with regards to fatigue risk management?"* The question of clarity was presented as follows: "*Is the statement clear, intelligible, appropriately worded, sharp, and easy to understand by a diverse audience?"* Panel members scored relevance and clarity on a 4-point ordinal scale: [1] = the statement is not relevant/clear; [2] = the statement needs major revisions to be relevant/clear; [3] = the statement needs minor revisions to be relevant/clear; and [4] = the statement is relevant/clear. The panel calculated a total score for relevance and clarity separately by following procedures for the Content Validity Index (CVI) measure (23). The CVI is the proportion of scores of 3 or 4 divided by the total number of individual scorers (23). The draft recommendations were revised and scoring procedure repeated until the total score for relevance and total score for clarity were greater than or equal to 0.78, a common benchmark for CVI measurement (23). The panel prohibited modifications or edits to the text or wording of recommendation statements once the panel's score exceeded the CVI benchmark.

Results

Evidence-based recommendations are listed in the following sections. The CVI score for each of the seven recommendation statements was 1.0 (See Table 2). The panel required only a single round of scoring on relevance and clarity for each draft recommendation statement before reaching the maximum possible CVI score of 1.0. The completed EtD frameworks for each PICO are available in the Online Supplement Appendices B–H.

Recommendations by Expert Panel

Question 1: Are there reliable and valid instruments for measuring fatigue among EMS personnel?

Recommendation 1: Recommend using fatigue/sleepiness survey instruments to measure and monitor fatigue in EMS personnel.

Strength of Recommendation: Strong

Quality of the Evidence: Low

Panel Remarks and Opinion: In total, the panel considered evidence from 34 experimental and observational studies, which was interpreted as supportive of 14 different fatigue and sleepiness survey instruments (14). The greatest limitation of current survey instruments is that none has undergone comprehensive

TABLE 2. Evidence-based recommendations for fatigue risk management in EMS

PICO	Recommendation statement	Relevance CVI Clarity CVI	Total Rounds of Voting
1	Recommend using fatigue/sleepiness survey instruments to measure and monitor fatigue in EMS personnel.	1.0	1
	(strong recommendation, very low certainty in evidence)	1.0	
2	Recommend that EMS personnel work shifts shorter than 24 hours in duration.	1.0	1
	(weak recommendation in favor, very low certainty in effect)	1.0	
3	Recommend that EMS personnel have access to caffeine as a fatigue countermeasure.	1.0	1
	(weak recommendation in favor, low certainty in effect)	1.0	
4	Recommend that EMS personnel have the opportunity to nap while on duty to mitigate fatigue.	1.0	1
	(weak recommendation in favor, very low certainty in effect)	1.0	
5	Recommend that EMS personnel receive education and training to mitigate fatigue and fatigue-related risks.	1.0	1
	(weak recommendation in favor, low certainty in evidence)	1.0	
6	No recommendation: The confidence in effect estimates is insufficient to make a recommendation at this time. (Reference to GRADE Handbook 6.1.4)	—	1
7	No recommendation: The confidence in effect estimates is insufficient to make a recommendation at this time. (Reference to GRADE Handbook 6.1.4)	—	1

testing of reliability and validity (common indicators of an instrument's utility) with EMS personnel and other shift worker groups (14). Positive reliability and validity findings instill confidence, which is important when choosing an instrument for diagnostic/assessment purposes. Most studies reported internal consistency reliability, which refers to the internal correlations between items that are used to operationalize or define a construct of interest (24). Other tests of reliability, such as test–retest reliability, were not widely reported (14). Validity testing (i.e., criterion-related validity, sensitivity, and specificity) (25) are often more challenging to assess than reliability. The absence of a gold standard and consensus objective technique for assessment of occupational fatigue accounts for the lack of validity testing (26–29). A gold standard is needed to facilitate tests of sensitivity and specificity, which are two important outcomes for this evidence review (13).

The evidence profile of the 34 included studies reveals that the overall quality of evidence is low. The panel considered research design, risk of bias, and consistency of reported findings across studies; indirectness of the populations studied; imprecision; the potential for publication bias; and other considerations that may impact the certainty of findings (i.e., the evidence) (30). Many panel members raised concerns about the accuracy of fatigue and sleepiness survey instruments when used in EMS settings. The consequences of fatigue instrument implementation are difficult to predict. Inaccurate assessments could lead personnel to report high levels of fatigue in order to leverage fatigue mitigation policies that limit or eliminate work and invoke mandatory rest. Conversely, personnel may report low levels of fatigue to avoid lost opportunities for work or overtime.

Despite these concerns, the panel believes the benefits of using fatigue and sleepiness survey instruments outweigh both their limitations and the liabilities of not using such instruments at all. The survey instruments identified are easy to use, are supported by considerable evidence of reliability in shift worker populations, and show at least some evidence of validity (e.g., construct, content, and criterion-related with indirect outcome measures) (14). Furthermore, reliability and validity for many of the instruments reviewed have been demonstrated in studies of non-shift worker populations (26, 31).

Despite a judgment of low quality of evidence, the panel concluded that these instruments consistently measure fatigue in workers similar to EMS personnel and could feasibly be implemented with limited effort within the EMS environment. These survey instruments are potentially useful tools to EMS administrators for assessing the fatigue and sleepiness status of EMS personnel. Their use in a fatigue risk management program will do more good than harm. The panel issues a strong recommendation for their use for the specific purpose of assessing and monitoring fatigue and sleepiness in the EMS setting.

While the panel recommends their use, the panel suggests careful review and consideration of each instrument. They vary in length, number of scales (domains) measured, and time periods that are assessed or referenced. Six of the reviewed survey instruments solicit feelings of fatigue "in general," during the past month, or over the past 7 days (14). Others solicit perceptions of sustained fatigue over an unspecified timeframe. Four instruments assess fatigue either at the time of administration, in the past 24 hours, or at the end of a shift (14). In operational settings, the terms "fatigue" and "sleepiness" are often used interchangeably (32). Three survey instruments assess situational sleepiness (e.g., in real-time), while one instrument (the Epworth Sleepiness Scale [ESS]) measures sleepiness from a trait-level perspective.

Some instruments may require payment, licensing, or special permissions issued by the developer prior to use (33–35).

The panel considered the feasibility of distributing survey instruments and the potential burden placed on EMS personnel tasked with repeatedly reporting fatigue status. A random or targeted sample of shifts (rather than all shifts) may provide the optimal balance of utility and feasibility. Random sampling rather than complete sampling is less burdensome on respondents and may lead to improved rates of participation. Higher participation will contribute to a more representative picture of fatigue in the workforce. The panel also recommends targeted assessments of specific shifts such as extended duration shifts (e.g., ≥12 hours), shifts that occur overnight, or shifts that occur in close proximity (i.e., rapid returns), including shifts worked across different agencies. A detailed description of performance measurement linked to this recommendation is published separately (36).

Further development and testing of fatigue and sleepiness survey instruments should be a priority for future research. The panel recommends investigators fully test the utility of fatigue and sleepiness survey instruments with EMS personnel in the EMS operational environment. Investigators who seek to tailor instruments to fit the EMS environment should adhere to the common standards for development and testing of survey instruments as outlined by Norbeck (37): [1] clearly defining each construct measured; [2] reference to the literature linked to the construct of interest; [3] clear and transparent description of item-scale development; [4] analysis of content validity with established content validity measurement techniques (23, 38, 39); [5] tests of reliability (24); [6] tests of construct validity; [7] clear description of target population for the instrument's intended use; [8] description of sampled respondents; and [9] reporting of common statistics (e.g., measures of central tendency and dispersion) for each item and construct measured (37). Measurement development should also include use of qualitative techniques such as focus groups and in-depth interviews involving the targeted population in order to solicit input on the constructs being measured and face validity of draft items. Whether using one of the 14 instruments identified in this evidence review or developing new instruments, it is essential that common indicators of reliability and validity be reported. These data will guide and help to improve the future of fatigue/sleepiness assessment of EMS personnel. See Online Supplement Appendix B for a summary of our deliberations germane to this recommendation.

Question 2: In EMS personnel, do shift-scheduling interventions mitigate fatigue, mitigate fatigue-related risks, and/or improve sleep?

Recommendation 2: Recommend that EMS personnel work shifts shorter than 24 hours in duration.

Strength of Recommendation: Weak

Quality of the Evidence: Very low

Panel Remarks and Opinion: The panel examined the quality of evidence from 100 studies that compared critical and important outcomes for different durations of shift work (15). The panel documented their discussion and decision-making in the EtD framework appearing in Online Supplement Appendix C. In total, the panel grouped 24 different shift duration comparisons across 100 studies into three main comparisons: 1) shifts < 24 hours versus ≥ 24 hours, 2) 8-hour versus 12-hour shifts, and 3) a composite of other comparisons that present greater than two shift durations (multiple comparisons) (15). Given the large number of studies, the panel aggregated studies with favorable findings on critical or important outcomes and compared them to studies with unfavorable or mixed/inconclusive findings.

Regarding the 15 studies that compared shifts <24 hours to ≥24 hours in duration, the ratio of favorable findings on critical or important outcomes to unfavorable findings strongly favored shifts <24 hours in duration (15). Findings from nine studies were judged favorable toward shifts <24 hours for at least one outcome. Findings from one study were judged as unfavorable toward the shorter duration shift for the outcome of personnel performance. None of the studies reported unfavorable findings for shorter duration shifts (<24 hours) on critical outcomes of patient and personnel safety.

While the findings strongly favored shifts <24 hours vs. ≥24 hours in duration, shorter shifts were not similarly supported when comparing 8-hour versus 12-hour shifts or a composite of other combinations of shorter versus longer shifts (15). The panel determined that the existing evidence is mixed with respect to the 8-hour versus 12-hour shift comparison. Similarly, the panel identified no convincing pattern of evidence for or against shifts of other durations.

The panel acknowledges an ongoing debate regarding the safety and impact of longer versus shorter shifts in the EMS workplace (40). The desirable anticipated effects of EMS personnel working shifts shorter than 24 hours include reduced fatigue, improved alertness, better sleep and sleep quality, better health and wellbeing of personnel, and improved safety for patients and personnel (41). Undesirable anticipated effects might include potentially higher cost to the system (42, 43), reduced access to care for patients, and increased risks to personnel.

Numerous factors may impact the costs associated with shorter versus longer shift durations, and these costs will vary system-to-system (e.g., size of workforce, deployment model). Costs may be greater with shorter versus longer shift durations (e.g.,

predominantly 8-hour versus predominantly 12-hour shift schedules) (42–44). These data mostly come from studies of police departments, where shift schedules and rotations are fairly consistent (e.g., 8-hour shifts, 3 shifts per 24-hour period, with set days of rotation) and may be meaningful to a subset of EMS operations with similar shift schedules. Longer shifts lead to less frequent transitions of medical crews, which are particularly important in EMS settings where medical equipment needs to be signed out and/or checked at the beginning of each shift, creating lead time before being able to respond to medical incidents.

The panel recognized that many EMS personnel favor longer duration shifts. Recovery between shifts is potentially greater with longer duration of shifts (45). Longer duration shifts may allow for additional employment due to less time spent to travel and transition to and from work. This may be especially important for EMS agencies with bases located in remote locations (e.g., air medical providers or rural EMS agencies), and longer shifts may influence the ability to recruit individuals to work at these locations. Many EMS personnel (>80% in some locations) report multiple jobs (45, 46), and modifications in shift scheduling may impact the feasibility of employment with multiple organizations or recovery between shifts. To some stakeholders, a reduction in the number of personnel with multiple jobs would be viewed as a potentially positive step for safety, health, and wellbeing. Others may react differently. The panel accepts the validity of such concerns, and the challenge of finding viable solutions. However, such concerns and challenges should be addressed within the context of consistent findings from numerous empirical studies.

Some remote and low-volume EMS operations rely on extended duration shifts due to limited resources and personnel to staff ambulances. It may not be practical, or cost-effective, and potentially not safe to eliminate extended duration shifts in some EMS operations. The decision to implement specific shift durations should not be based solely on the evidence, which the panel believes favors a recommendation of shifts <24 hours in duration (refer to Online Supplement Appendix C). However, the panel encourages organizations to consider the evidence, the benefits versus potential dangers of shifts ≥24-hours in their systems and community, the values and preferences of their EMS personnel, and the costs unique to their EMS operation. If shifts ≥24 hours must be utilized to ensure adequate staffing, other fatigue risk mitigation strategies outlined in these guidelines should be implemented to optimally balance safety, performance, and retention of EMS personnel.

Future research should investigate: [1] if critical and important outcomes (e.g., patient safety) differ in EMS systems that operate longer versus shorter duration shifts; [2] if the costs and resource requirements of longer versus shorter duration shift schedules differ by size of the EMS operation (e.g., small, medium, large organizations); and [3] if it is cost-effective for EMS operations to move from longer to shorter shifts.

Question 3: In EMS personnel, does the worker's use of fatigue countermeasures mitigate fatigue, mitigate fatigue-related risks, and/or improve sleep?

Recommendation 3: Recommend that EMS personnel have access to caffeine as a fatigue countermeasure.

Strength of Recommendation: Weak

Quality of the Evidence: Low

Panel Remarks and Opinion: The evidence review shows the positive effects of caffeine on psychomotor vigilance, which is important for performance, and on acute fatigue and sleepiness (16). However, the health and safety risks associated with excess caffeine consumption should also be addressed (47, 48). Excess caffeine may contribute to onset of, or difficulty managing, conditions such as anxiety and cardiac dysrhythmias (47, 48). The safety profile of longer-term caffeine consumption for mitigation of workplace fatigue is not well known (49). Individuals will often self-regulate consumption and caffeine is generally safe at low to moderate doses (e.g., 250 mg/day) (49). Sleep may be affected by caffeine and additional guidance on use in the workplace is needed (50, 51).

Caffeine is readily available in many EMS settings, but may not be considered proactively by EMS systems as a tool to mitigate fatigue, particularly for shifts of prolonged duration or taking place during overnight periods. There is a minimal amount of information to inform EMS administrators regarding the total costs (e.g., annual) of providing access to caffeine in the EMS setting. The costs of providing caffeinated beverages might exceed thousands of dollars annually for moderate to large EMS operations. Costs may differ depending on the type of EMS deployment model. For instance, EMS personnel deployed from fixed base sites may have easier access to caffeine than personnel deployed dynamically in the ambulance. Personnel deployed in ambulances for the duration of their shift may find access to caffeine challenging for a number of reasons (e.g., proximity to businesses that sell caffeinated beverages). The panel recommends EMS administrators provide access to caffeine regardless of system deployment and whether it is provided directly or not.

Consumption of caffeine for the purposes of mitigating work-related fatigue in the EMS environment should be guided by education and training in a robust fatigue risk management program that recognizes caffeine use as only one component of a comprehensive fatigue management strategy. A formal program is recommended for monitoring utilization, safety, and the impact of caffeine on EMS personnel performance. The panel also calls for future research to explore the route, dosing, and timing of caffeine for diverse EMS shift schedules and operations (Online Supplement Appendix D).

Question 4: In EMS personnel, does the use of sleep or rest strategies and/or interventions mitigate fatigue, fatigue-related risks, and/or improve sleep?

Recommendation 4: Recommend that EMS personnel have the opportunity to nap while on duty to mitigate fatigue.

Strength of Recommendation: Weak

Quality of the Evidence: Very low

Panel Remarks and Opinion: The panel reviewed the evidence for shift workers napping while on duty (17). The panel determined that current evidence supports the use of naps while on duty as an effective strategy to positively impact fatigue-related outcomes. Naps improve alertness, reduce sleepiness, and improve personnel performance (e.g., reaction time).

While the available evidence supports napping, several potential undesirable effects may occur. The most important of these is sleep inertia, a period of reduced alertness or impaired cognition immediately after waking (52, 53). Sleep inertia may inhibit EMS personnel response times, especially from the time of notification to the time when personnel are in the ambulance (apparatus) and en route. Standards followed by many EMS operations, such as the National Fire Protection Association's (NFPA) Standard 1710 of one-minute turnout time, may be impacted by personnel who engage in napping.

The review of the evidence did not address the optimal duration of the nap or the impact that nap duration has on sleep inertia (17). Naps ranging from 15 to 120 minutes during shift work have been associated with better performance and reduced levels of acute fatigue/sleepiness (17). Some evidence indicates that shorter duration naps (e.g., 10 minutes) lessen the risk of sleep inertia, while providing some rest and/or recovery (53). The use of naps as a fatigue countermeasure will likely take different forms in different EMS organizations. Some may decide to implement short duration naps, whereas other organizations may choose to utilize longer duration naps, or some combination of naps with deployment of additional personnel and resources as a possible temporary replacement for personnel engaged in napping. The panel believed that EMS organizations can develop innovative policies and protocols for napping, while at the same time accounting for the possibility of sleep inertia. The benefits of napping, as shown in the evidence review (17), outweigh the risks.

The general public may perceive EMS personnel napping on duty as unacceptable. The panel concluded that the benefits of improved alertness on duty, and ultimately improved patient and personnel safety, are a commonsense justification to this anticipated undesirable effect. Additionally, it is common knowledge that many EMS personnel and other first responders work long duration shifts requiring nighttime sleep when not on a response. Policies and protocols that clearly describe the appropriate use, structure, and benefits of naps on duty may be useful toward educating the public and reducing potential negative opinion.

Many EMS organizations have existing facilities that enable napping. Some organizations may incur costs to modify or construct facilities that allow an individual to lie down and limit exposure to light and noise, which are important characteristics of workplace napping facilities (54, 55). The true costs associated with an intra-shift napping policy or program are unclear. Operations that use dynamic deployment will face unique challenges adopting and implementing a policy of napping. A nap in the front cab of the ambulance (apparatus) is likely better than no nap. Administrators may consider a requirement that personnel nap only when in the passenger seat (securely belted) or patient compartment (securely belted) to avoid the possible negative effects of sleep inertia on operating the ambulance immediately upon waking and while not fully alert.

None of the reviewed studies demonstrated an impact on the critical outcome for this evidence review (personnel safety). However, the expert panel concluded that napping during shifts can be an effective strategy to mitigate fatigue and fatigue-related risks, especially in extended duration shifts (e.g., $\geq$12 hours) and shifts during overnight periods. Napping during shifts may be beneficial for EMS personnel who work contiguous shifts (without breaks in between) or consecutive shifts with short rest periods (rapid returns), within or between agencies. Napping may be a useful tool to mitigate the effects of fatigue even in shifts $<$12 hours in duration or on shifts occurring during daylight hours. Permitting naps does not absolve EMS personnel of the responsibility to present to work well rested. The panel recommends that EMS agencies have a broad policy that allows napping at all hours, and that they work toward providing adequate nap facilities whenever possible.

The panel recommends a formal program of monitoring be established to determine utilization and impact of intra-shift naps on important and critical outcomes (Online Supplement Appendix E). Future research should involve EMS personnel to determine the optimal duration of an intra-shift nap, the optimal timing of naps during shifts, what constitutes an adequate location for a nap, and assesses the time interval immediately post nap.

Question 5: In EMS personnel, does fatigue training and education mitigate fatigue, fatigue-related risks, and/or improve sleep?

Recommendation 5: Recommend that EMS personnel receive education and training to mitigate fatigue and fatigue-related risks.

Strength of Recommendation: Weak

Quality of the Evidence: Low

Panel Remarks and Opinion: The panel discovered a variety of programs to deliver fatigue/sleep education and training of shift workers, which use multiple formats (e.g., lectures and workshops), durations (e.g., one hour presentations and eight-week courses), instructors (e.g., fatigue experts, teammates and peers), and delivery methods (e.g., in person, online, or via email) (18). Our evidence review of 18 studies showed a favorable relationship between education and training in fatigue (and sleep health) and important outcomes of patient and personnel safety (18). A meta-analysis of five studies showed improvements in shift worker sleep quality four to eight weeks after fatigue education and training (18).

Education and training in fatigue and sleep health may have the anticipated and desirable effect of identifying undiagnosed sleep disorders such as obstructive sleep apnea (OSA) (56). Large numbers of EMS personnel are at risk of OSA and other sleep disorders that contribute to fatigue and poor sleep quality (1, 57). Being overweight or obese (a risk factor for OSA) affects three-quarters of EMS personnel and 75% of EMS personnel fail to meet recommendations for physical activity (1, 58). The panel believes that increased awareness of sleep disorders through education and training will contribute to increased awareness and subsequent diagnosis, ultimately reducing fatigue in the EMS workplace.

Costs of workplace health and wellness programs that address fatigue and sleep health are a concern. Costs will likely vary, and the total cost burden for the average EMS organization is unknown. Costs of general worksite health, wellness, and fitness programs range from 130 to 150 U.S. dollars per employee per year (59, 60). Adding fatigue or sleep health modules to an existing program may be cost-neutral or minimal in real dollars for some EMS organizations. The panel does not provide recommendations or suggestions for the depth, breadth, or source of content for fatigue or sleep health education. Multiple methods, and sources of content, may be needed to educate and train EMS personnel on these topics (61). Findings from the meta-analysis of five diverse programs were favorable for personnel sleep quality, regardless of which program was analyzed in the pooled analysis (18). The panel believes EMS organizations may choose to use a variety of sources for their content, develop education and training tailored to their organization's needs, and be able to introduce fatigue and sleep health education and training for minimal cost.

EMS personnel should receive fatigue education and training during new employee orientation/training, as well as every 2 years, in order to prevent decay in knowledge (62–67), skills (62–67), and proficiency in techniques that can help mitigate fatigue and fatigue-related risks. Recommended retraining at least every two years is consistent with existing recommendations for other required educational programs for EMS providers, including cardiopulmonary resuscitation and advanced cardiac life support. Education and training in fatigue and sleep health should be a key component of a comprehensive strategy to mitigate the effects of fatigue related to EMS shift work. Research priorities include investigating: [1] the content that has a meaningful impact on outcomes; [2] the effectiveness of diverse methods of educating and training personnel; [3] the costs of education and training; and [4] the impact of education and training on the behavior(s) of EMS personnel. See Online Supplement Appendix F for a summary of our deliberations germane to this recommendation.

Question 6: In EMS personnel, does implementation of model-based fatigue risk management mitigate fatigue, mitigate fatigue-related risks, and/or improve sleep?

Recommendation 6: No recommendation: The confidence in effect estimates is insufficient to make a recommendation at this time (Reference to GRADE Handbook 6.1.4).

Strength of Recommendation: Not applicable

Quality of the Evidence: Very low

Panel Remarks and Opinion: The evidence review produced only one study that met criteria for inclusion (19). Findings from this one study were favorable for two important outcomes of interest. However, the panel determined that the body of evidence evaluated for this research question was insufficient for purposes of making a recommendation. The panel recognizes that biomathematical modeling is a novel approach for determining the role of sleep and circadian rhythms in relation to fatigue (68). A preponderance of the existing research reports on development and modification of models to improve fatigue estimation (69–74). The systematic review did not intend to examine this information; instead the review sought to identify the evidence that implementation of a biomathematical model impacts outcomes like safety. The panel discovered a minimal amount of evidence, yet the panel believes these models will one day be an instrumental component of fatigue risk mitigation for EMS organizations. Their widespread use in aviation, rail, and other high-risk industries suggests utility and promise for EMS fatigue risk management (68).

While biomathematical fatigue models may reduce fatigue and improve safety, undesirable effects may include improper reliance on such models to estimate individual "fitness for duty." Licensing biomathematical models from suppliers or service providers entails recognized, unpublished costs.

Priorities for future research in this area include determining the unique sleep and circadian patterns of EMS personnel, given that these data are key inputs for biomathematical models. Next, use of models calibrated with EMS inputs should be evaluated for

impact on critical and important outcomes such as patient and personnel safety. The panel documented discussions and conclusions about this evidence review in the EtD framework (see Online Supplement Appendix G).

Question 7: In EMS personnel, do task load interventions mitigate fatigue, mitigate fatigue-related risks, and/or improve sleep?

Recommendation 7: No recommendation: The confidence in effect estimates is insufficient to make a recommendation at this time (Reference to GRADE Handbook 6.1.4).

Strength of Recommendation: Not applicable

Quality of the Evidence: Very low

Panel Remarks and Opinion: The search produced five prospective observational studies (20), with wide variation in the description and definitions of task load and workload. One study investigated the relationships between workload, fatigue, and personnel performance. None of the evidence reviewed investigated the relationship between task load (or workload), fatigue, and personnel safety, patient safety, and cost to the system. The panel concluded that evidence quality was very low and determined that this body of evidence was insufficient for purposes of making a recommendation.

Task load and workload are of interest to many administrators of shift workers. While modifying task load or workload (e.g., reducing workload) may help to reduce fatigue and fatigue-related risks (75), potentially undesirable effects may also occur. A reduction in patient volume (one possible measure of EMS task load or workload) could contribute to loss of skill and proficiency with caring for acutely ill and injured patients (76). This may contribute to error, especially when dealing with patients that need time-sensitive intervention (76). Reducing workload without appropriate accommodations in staffing may increase response times or decrease patient access to care. It may also add cost to the system through decreased unit-hour utilization, a common metric used in the EMS industry to track workload.

Task load or workload interventions may take on many different forms. Possibilities include [a] deployment of additional personnel and ambulances to cover for others who may reach a threshold of workload; and [b] limiting the number of transports or patient encounters per crew per shift. Interventions of this type would increase costs for the system. While the panel believes these interventions are possible, it is unclear how different stakeholders view these and other similar options for modifying EMS crew task load or workload.

If an EMS organization chooses to modify task load or workload, the panel recommends a formal program to monitor and evaluate the intervention. The panel advocates the following research priorities: [1] identify common tasks in EMS that contribute to fatigue and/or fatigue-related risks; [2] determine which tasks contribute the least or most to fatigue; [3] investigate the impact of a task load or workload intervention on fatigue, safety, and other important/critical outcomes; and [4] test the reliability and validity of measures designed to quantify task load/workload specifically for the EMS setting. The panel's discussions and conclusions relevant to this evidence review are recorded in the GRADE EtD framework (see Online Supplement Appendix H).

Discussion

Fatigue risk management is a shared responsibility between EMS organizations and personnel (6, 77). All EMS personnel have a responsibility to report for duty well-rested, and EMS employers have a responsibility to proactively identify fatigue (6), determine when fatigue is a threat, and mitigate fatigue with strategies informed by evidence-based recommendations. Successful implementation will require a comprehensive strategy tailored to local needs, given the diversity of EMS organizations and personnel. Regardless of organization type or classification of personnel, EMS administrators should strive to fully integrate fatigue risk management into daily operations and make fatigue mitigation a core component of the organization's safety culture.

Implementing an effective fatigue risk management program requires multiple strategies (multiple layers of defense) (78). For example, one of the panel's recommendations endorses shift durations <24 hours in duration. Hours-of-service restrictions should be a fundamental part of a comprehensive fatigue risk management program, but they should not be the program's sole focus or feature. Limiting the hours-of-service for shift workers was a common twentieth century tactic for fatigue management in numerous high-risk industries (79, 80). Modern approaches combine hours-of-service policies with fatigue mitigation strategies (77–79). The panel believes that EMS administrators jeopardize the success of fatigue risk management if the sole focus is on hours-of-service. Limiting work hours to <24 hours may be harmful to some EMS personnel and their patients in rural, frontier, or otherwise remote locations. In these locations, personnel may need to travel great distances for many hours to and from work. The opportunity to rest and recover may be extensive given limited workload and low patient volume. In such settings, shorter shift durations may elevate risk rather than reduce it, and fatigue risk management programs focused primarily on hours-of-service may be counterproductive. Thus, the panel advised EMS administrators to implement a program that incorporates multiple strategies supported by evidence.

Administrators should communicate with personnel to understand the potential impact of recommendations on daily operations, personnel health, and work-life balance. Such communication may reveal informal strategies that are tightly aligned with recommendations in these guidelines and that might easily be transformed into formal strategies (81). A change in shift duration, for example, might impact staffing and frequency of crew substitutions and rotations. Personnel may reveal an informal process of shift swaps or substitutions between personnel that could inform a formal plan if shift duration becomes a focus for fatigue risk management. Implementing a nap period during shifts could similarly impact operations. In some locations, EMS administrators may consider staggering naps between partners so that at least one crewmember is alert to initiate driving toward a response. Personnel may reveal an alternative approach that is equally attentive to safety, yet more feasible. While implementation of other recommendations (e.g., providing access to caffeine) potentially has less impact on daily EMS operations, administrators should consider the impact prior to implementation and engage personnel in the development and tailoring of program components.

Administrators will face challenges and potential barriers to implementation of recommendations that can be overcome with awareness and planning. Altruism, the belief in one's own invulnerability to fatigue, and poor organizational safety culture are some of the many potential barriers or threats to successful fatigue risk management in the EMS setting. Persons entering the EMS occupation report sensation seeking, altruism, and commitment to community (82, 83). Many of these individuals may be willing to work extended work periods, and administrators may be willing to approve large amounts of overtime or extended work periods when faced with deficits in personnel and coverage. Some EMS personnel, as reason for choosing the EMS occupation, may judge themselves as invulnerable to fatigue and discount or reject common signs of fatigue as nothing more than part of the job, a sign of weakness, or not in keeping with the occupational identity of an EMS professional (84). Other personnel may lack a personal commitment to fatigue mitigation based on a poor perception of their organization's safety culture and commitment to personnel safety (85). Many may be unaware of the dangers associated with fatigue, sleep deprivation, and shift work. Mistrust between administrators and EMS personnel is a barrier to successful implementation of fatigue risk management and a safety culture (80). Faced with these and other barriers or threats, EMS administrators should clearly communicate their support for the evidence-based recommendations adopted. Increasing the awareness of fatigue as a threat should be a top priority, as limited awareness of the problem and solutions supported by evidence are commonly cited barriers to successful implementation of evidence-based guidelines (86).

Sample protocols and policies are a means of improving the feasibility and timeliness of implementing guidelines. The approaches to fatigue risk management will differ across EMS organizations. The panel recommends administrators use a checklist to facilitate the implementation of a successful and comprehensive fatigue risk management program. An example checklist appears as Table 2 in a separate publication (36). Administrators should use this checklist in concert with the performance measures and instructions for incorporating performance measurement and evaluation described in a separate publication (36).

LIMITATIONS

The panel, which was formed based on the IOM's recommendations for panel composition (8), included representatives from a variety of disciplines (i.e., sleep medicine, fatigue science, emergency medicine). A different panel with a different set of PICO questions may have created recommendations unlike those produced in this study.

The GRADE framework is an emerging standard for development of EBGs that inform clinical practice and occupational health (11, 87). The panel utilized the Model Process for EBG development germane to the prehospital environment, and adhered to the GRADE framework for evaluating the certainty in evidence and formulating recommendations (10, 11). Other methodological processes for guideline development exist and could yield different evaluations of the evidence and recommendations.

Similar efforts to produce EBGs report using a "majority vote" to determine agreement on recommendation statements (88). The panel felt it important to objectively measure agreement of the panel on the wording of recommendations. The panel used the CVI and established CVI benchmarks to quantify relevance and clarity, which the panel feels improved the objectivity of the protocol and findings (23).

CONCLUSIONS

Fatigue is an important issue that impacts all EMS personnel. The panel completed a rigorous process for the creation of evidence-based guidelines for fatigue risk management in the EMS setting. The panel recommends using fatigue and sleepiness survey instruments for assessing and monitoring fatigue. The panel recommends scheduling shifts <24 hours whenever possible, providing access to caffeine throughout shifts, incorporating on-duty naps, and providing education and training in fatigue risk management. The evidence on which the panel based these recommendations is substantial, although generally of low quality. Implementation of these evidence-based recommendations has the potential to improve multiple fatigue-related

outcomes including patient and personnel safety, and advancing the field of Emergency Medical Services.

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CITY OF SOUTH MILWAUKEE

2017 Public Safety Referendum

VOTE TUESDAY, NOVEMBER 7, 2017

Voters will be asked whether to approve an increase in the tax levy to maintain current paramedic services and hire two additional police officers to fulfill all of the department's response and preventative responsibilities.

WHY DO WE NEED A REFERENDUM NOW?

South Milwaukee must act now if is to **maintain its critical fire, paramedic and police services** that are at risk from a growing budget gap.

The challenge is that while the need and **program costs continue to rise, current funding sources are stagnant or decreasing.**

Because of state-imposed levy limits, South Milwaukee must **ask approval from taxpayers through a referendum to increase the tax levy** to fund these services.

As part of a community-wide survey in the Spring of 2017, **South Milwaukee residents voiced support for seeking additional funding to maintain these critical public safety services**, with the majority supporting a referendum to raise the property tax levy.

WHAT WILL IT MEAN IF A MAJORITY OF VOTERS VOTE "YES"?

If the referendum is approved, the City of South Milwaukee will be able to **maintain paramedic services and add two police officers**. The annual property tax would increase by $52 per year ($35 going toward paramedics and $17 going toward police) for every $100,000 of property value, starting with the bills issued in December 2017.

Public Safety Referendum
$616,641 Per Year
(Increase of $52 per $100,000 of property value)

Property Value	Estimated Tax Increase	
	Per Year	Per Month
$100,000 of property value	$52.00	$4.33
$150,000 of property value	$78.00	$6.50
$200,000 of property value	$104.00	$8.66

WHAT DOES IT MEAN IF A MAJORITY VOTE "NO" AND THE REFERENDUM FAILS?

An already extremely challenging city budget will be made worse, as the City is faced with difficult decisions to address the growing budget gap and will likely have to make additional cuts to current services—potentially including public safety:

A reduction in paramedic staff could **double or even quadruple emergency response times**, which is directly related to patient outcomes.

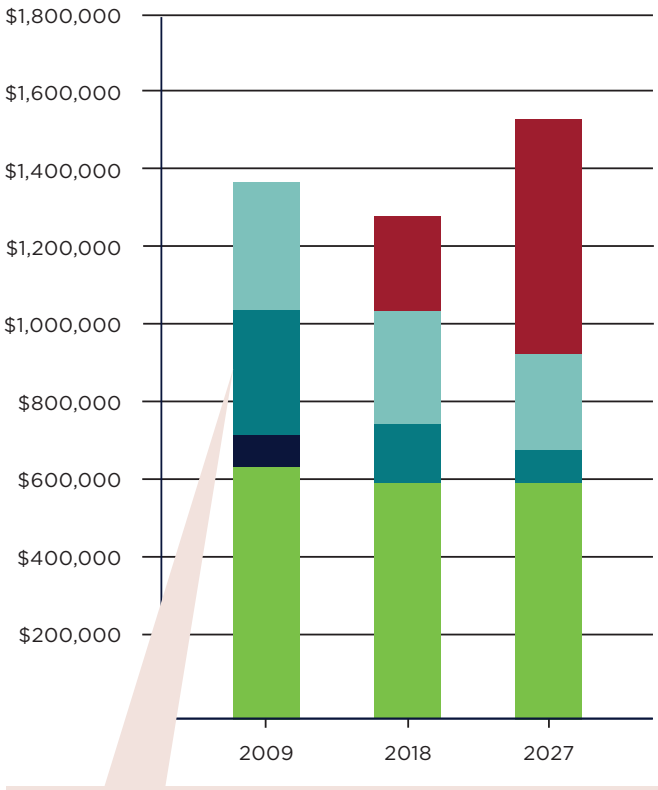
The City would be **unable to hire additional police officers** to meet the growing community need.

www.smwi.org/2017-referendum referendum@smwi.org 414.768.8051

PARAMEDIC FUNDING CHALLENGE

The City's paramedic service, which is provided by the fire department, has been a major asset for the community, enabling rapid-response for residents facing emergencies and medical issues. The City must take action this year to secure alternative funding that will preserve high-quality paramedic service.

SOUTH MILWAUKEE PARAMEDIC/ALS REVENUE SOURCES



While **city funding** has stayed relatively consistent, **county funding has declined** and will continue to decrease, leading to a **growing budget shortfall** starting in 2018 that will double by 2027.

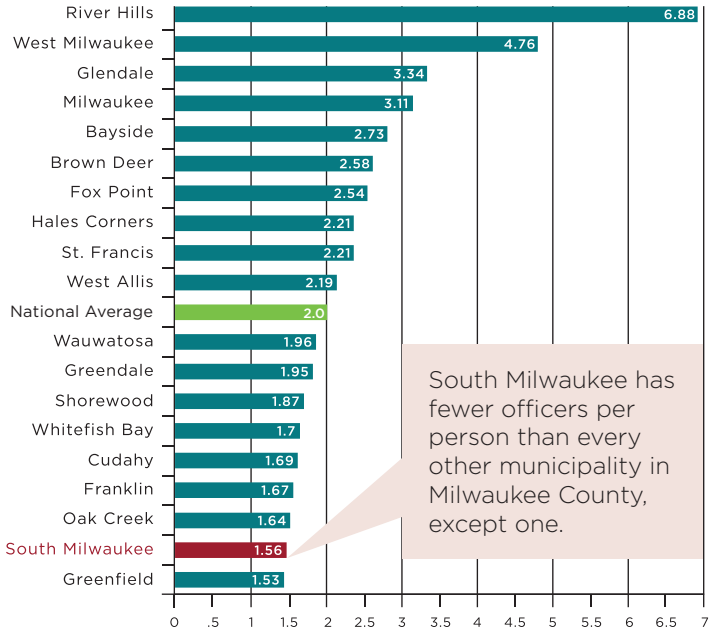
- **Local Property Taxes**
- **Milwaukee County Funding**
- **Fees for Services** (ex: ambulance transport)
- **Fund Balance**
- **Budget Shortfall**

POLICE SERVICES CHALLENGE

Over the past 20 years, the South Milwaukee Police Department's **staffing level has decreased, despite a greater demand** for officer time due to increases in crime and drug-related incidents including burglaries, thefts and heroin overdoses.

South Milwaukee is well **below the local and national average** for the number of officers based on population.

NUMBER OF OFFICERS PER 1,000 POPULATION



South Milwaukee has fewer officers per person than every other municipality in Milwaukee County, except one.

MAKE AN INFORMED DECISION AND LEARN MORE

REFERENDUM INFORMATION OPEN HOUSE
Thursday, October 12 (5–7 p.m. at City Hall)
Monday, October 30 (5–7 p.m. at City Hall)

VOTE

VOTE NOVEMBER 7

ABSENTEE VOTING: October 23–November 3
(in person at City Hall)
Monday–Thursday 7:30 a.m.–4:00 p.m.
Friday 7:30 a.m.–5:00 p.m.

Deadline to request an absentee ballot by mail: November 2, 4:00 p.m.

VILLAGE OF MUKWONAGO

Expenditure Guideline - Fire Dept

Current Period: September 2018

Account Descr	2018 Adopted	2018 YTD Budget	2018 YTD Amt	YTD Balance	%YTD Budget	Fund
Fund 150 FIRE/AMBULANCE FUND						
Cat 5140 ADMINISTRATIVE & GENERAL						
E 150-5140-5110 Salaries & Wages	$18,044.00	$18,044.00	$12,494.24	$5,549.76	69.24%	150
E 150-5140-5112 Social Security	$1,383.00	$1,383.00	$969.89	$413.11	70.13%	150
E 150-5140-5152 Retirement	$1,681.00	$1,681.00	$1,166.36	$514.64	69.38%	150
E 150-5140-5154 Health	$3,970.00	$3,970.00	$3,241.94	$728.06	81.66%	150
E 150-5140-5159 Other Fringe Benefits	$248.00	$248.00	$78.13	$169.87	31.50%	150
E 150-5140-5399 Other	$0.00	$0.00	-$26.88	$26.88	0.00%	150
Cat 5140 ADMINISTRATIVE & GENERAL	$25,326.00	$25,326.00	$17,923.68	$7,402.32	70.77%	
Cat 5221 FIRE ADMINISTRATION						
E 150-5221-5110 Salaries & Wages	$432,534.00	$432,534.00	$304,961.44	$127,572.56	70.51%	150
E 150-5221-5111 Overtime	$52,695.00	$52,695.00	$23,471.63	$29,223.37	44.54%	150
E 150-5221-5112 Social Security	$36,462.00	$36,462.00	$24,219.19	$12,242.81	66.42%	150
E 150-5221-5152 Retirement	$52,611.00	$52,611.00	$36,789.25	$15,821.75	69.93%	150
E 150-5221-5154 Health	$123,079.00	$123,079.00	$70,702.14	$52,376.86	57.44%	150
E 150-5221-5159 Other Fringe Benefits	$4,000.00	$4,000.00	$318.76	$3,681.24	7.97%	150
E 150-5221-5219 Professional Services	$32,000.00	$32,000.00	$22,294.93	$9,705.07	69.67%	150
E 150-5221-5221 Water-Sewer	$2,200.00	$2,200.00	$1,514.70	$685.30	68.85%	150
E 150-5221-5222 Electric	$17,000.00	$17,000.00	$14,336.11	$2,663.89	84.33%	150
E 150-5221-5225 Telephone	$8,500.00	$8,500.00	$10,309.35	-$1,809.35	121.29%	150
E 150-5221-5226 Insurance Premiums	$44,000.00	$44,000.00	$35,896.85	$8,103.15	81.58%	150
E 150-5221-5311 Supplies	$6,000.00	$6,000.00	$3,130.88	$2,869.12	52.18%	150
E 150-5221-5313 Fire Prevention Materials	$2,750.00	$2,750.00	$1,483.41	$1,266.59	53.94%	150
E 150-5221-5324 Membership Dues	$2,000.00	$2,000.00	$551.00	$1,449.00	27.55%	150
E 150-5221-5335 Training & Travel	$7,000.00	$7,000.00	$632.85	$6,367.15	9.04%	150
E 150-5221-5346 Clothing Allowance	$3,500.00	$3,500.00	$1,309.01	$2,190.99	37.40%	150
E 150-5221-5395 Repairs & Maintenance	$500.00	$500.00	$3.58	$496.42	0.72%	150
E 150-5221-5399 Other	$0.00	$0.00	$483.21	-$483.21	0.00%	150
Cat 5221 FIRE ADMINISTRATION	$826,831.00	$826,831.00	$552,408.29	$274,422.71	66.81%	
Cat 5222 FIRE SUPPRESSION						
E 150-5222-5110 Salaries & Wages	$15,000.00	$15,000.00	$9,549.75	$5,450.25	63.67%	150
E 150-5222-5112 Social Security	$1,148.00	$1,148.00	$730.47	$417.53	63.63%	150
E 150-5222-5152 Retirement	$600.00	$600.00	$491.05	$108.95	81.84%	150
E 150-5222-5311 Supplies	$5,000.00	$5,000.00	$5,556.77	-$556.77	111.14%	150
E 150-5222-5346 Clothing Allowance	$3,000.00	$3,000.00	$100.00	$2,900.00	3.33%	150

VILLAGE OF MUKWONAGO

Expenditure Guideline - Fire Dept

Current Period: September 2018

Account Descr	2018 Adopted	2018 YTD Budget	2018 YTD Amt	YTD Balance	%YTD Budget	Fund
E 150-5222-5351 Motor Fuel & Oil	$6,000.00	$6,000.00	$9,700.42	-$3,700.42	161.67%	150
E 150-5222-5395 Repairs & Maintenance	$35,000.00	$35,000.00	$17,533.13	$17,466.87	50.09%	150
Cat 5222 FIRE SUPPRESSION	$65,748.00	$65,748.00	$43,661.59	$22,086.41	66.41%	
Cat 5223 FIRE TRAINING						
E 150-5223-5110 Salaries & Wages	$36,500.00	$36,500.00	$18,419.74	$18,080.26	50.47%	150
E 150-5223-5112 Social Security	$2,700.00	$2,700.00	$1,409.03	$1,290.97	52.19%	150
E 150-5223-5152 Retirement	$1,800.00	$1,800.00	$912.48	$887.52	50.69%	150
E 150-5223-5311 Supplies	$1,000.00	$1,000.00	$1,179.35	-$179.35	117.94%	150
E 150-5223-5335 Training & Travel	$2,000.00	$2,000.00	$418.56	$1,581.44	20.93%	150
Cat 5223 FIRE TRAINING	$44,000.00	$44,000.00	$22,339.16	$21,660.84	50.77%	
Cat 5231 AMBULANCE						
E 150-5231-5110 Salaries & Wages	$153,680.00	$153,680.00	$129,965.16	$23,714.84	84.57%	150
E 150-5231-5111 Overtime	$0.00	$0.00	$55.86	-$55.86	0.00%	150
E 150-5231-5112 Social Security	$17,000.00	$17,000.00	$9,943.50	$7,056.50	58.49%	150
E 150-5231-5152 Retirement	$8,000.00	$8,000.00	$3,954.27	$4,045.73	49.43%	150
E 150-5231-5154 Health	$1,000.00	$1,000.00	$466.68	$533.32	46.67%	150
E 150-5231-5159 Other Fringe Benefits	$0.00	$0.00	$22.14	-$22.14	0.00%	150
E 150-5231-5219 Professional Services	$67,500.00	$67,500.00	$53,692.32	$13,807.68	79.54%	150
E 150-5231-5311 Supplies	$45,000.00	$45,000.00	$36,409.87	$8,590.13	80.91%	150
E 150-5231-5315 Postage	$500.00	$500.00	$394.53	$105.47	78.91%	150
E 150-5231-5351 Motor Fuel & Oil	$12,000.00	$12,000.00	$6,742.91	$5,257.09	56.19%	150
E 150-5231-5395 Repairs & Maintenance	$15,000.00	$15,000.00	$8,472.09	$6,527.91	56.48%	150
Cat 5231 AMBULANCE	$319,680.00	$319,680.00	$250,119.33	$69,560.67	78.24%	
Cat 5232 AMBULANCE TRAINING						
E 150-5232-5110 Salaries & Wages	$17,000.00	$17,000.00	$7,589.67	$9,410.33	44.65%	150
E 150-5232-5112 Social Security	$1,301.00	$1,301.00	$580.79	$720.21	44.64%	150
E 150-5232-5152 Retirement	$708.00	$708.00	$312.59	$395.41	44.15%	150
E 150-5232-5311 Supplies	$1,000.00	$1,000.00	$35.43	$964.57	3.54%	150
E 150-5232-5324 Membership Dues	$500.00	$500.00	$0.00	$500.00	0.00%	150
E 150-5232-5335 Training & Travel	$2,000.00	$2,000.00	$1,078.00	$922.00	53.90%	150
Cat 5232 AMBULANCE TRAINING	$22,509.00	$22,509.00	$9,596.48	$12,912.52	42.63%	
Cat 5233 CRITICAL CARE TRANSPORTS						
E 150-5233-5335 Training & Travel	$0.00	$0.00	$239.80	-$239.80	0.00%	150
Cat 5233 CRITICAL CARE TRANSPORTS	$0.00	$0.00	$239.80	-$239.80	0.00%	

VILLAGE OF MUKWONAGO

Expenditure Guideline - Fire Dept

Current Period: September 2018

Account Descr	2018 Adopted	2018 YTD Budget	2018 YTD Amt	YTD Balance	%YTD Budget	Fund
Cat 5700 CAPITAL OUTLAY EXPENDITURES						
E 150-5700-5713 Fire Dept Capital Equip	$17,000.00	$17,000.00	$2,944.00	$14,056.00	17.32%	150
E 150-5700-5714 Ambulance Capital Equip	$17,000.00	$17,000.00	$3,008.38	$13,991.62	17.70%	150
E 150-5700-5721 Fire Administration	$1,000.00	$1,000.00	$1,360.00	-$360.00	136.00%	150
Cat 5700 CAPITAL OUTLAY EXPENDITURES	$35,000.00	$35,000.00	$7,312.38	$27,687.62	20.89%	
Cat 5880 USE OF GRANTS/DONATIONS						
E 150-5880-5805 Act 102 Expenses	$0.00	$0.00	$9,171.04	-$9,171.04	0.00%	150
Cat 5880 USE OF GRANTS/DONATIONS	$0.00	$0.00	$9,171.04	-$9,171.04	0.00%	
Cat 5900 OTHER FINANCING USES						
E 150-5900-5925 Transfer to Designated Funds	$30,000.00	$30,000.00	$0.00	$30,000.00	0.00%	150
Cat 5900 OTHER FINANCING USES	$30,000.00	$30,000.00	$0.00	$30,000.00	0.00%	
Fund 150 FIRE/AMBULANCE FUND	$1,369,094.00	$1,369,094.00	$912,771.75	$456,322.25	66.67%	

VILLAGE OF MUKWONAGO

Expenditure Guideline - Fire Dept

Current Period: September 2018

Account Descr	2018 Adopted	2018 YTD Budget	2018 YTD Amt	YTD Balance	%YTD Budget	Fund
	$1,369,094.00	$1,369,094.00	$912,771.75	$456,322.25	66.67%	

VILLAGE OF MUKWONAGO

Revenue Guideline - Fire Dept

September 2018

Act Status	Account Descr	2018 Adopted	2018 YTD Budget	2018 YTD Amt	YTD Balance	%YTD Budget	Fund
Fund 150 FIRE/AMBULANCE FUND							
Cat 4100 TAXES							
Active	R 150-4100-4111 General Property Tax	$214,200.00	$214,200.00	$160,650.00	$53,550.00	75.00%	150
Cat 4100 TAXES		$214,200.00	$214,200.00	$160,650.00	$53,550.00	75.00%	
Cat 4300 INTERGOV T REVENUES							
Active	R 150-4300-4344 EMS Act102 Grant	$6,000.00	$6,000.00	$5,910.40	$89.60	98.51%	150
Cat 4300 INTERGOV T REVENUES		$6,000.00	$6,000.00	$5,910.40	$89.60	98.51%	
Cat 4600 PUBLIC CHARGES FOR SERVICES							
Active	R 150-4600-4304 Treasurer s Fees	$13,000.00	$13,000.00	$5,031.57	$7,968.43	38.70%	150
Active	R 150-4600-4716 Paramedic Ride-Along Fee	$50.00	$50.00	$0.00	$50.00	0.00%	150
Cat 4600 PUBLIC CHARGES FOR SERVICES		$13,050.00	$13,050.00	$5,031.57	$8,018.43	38.56%	
Cat 4620 PUBLIC SAFETY							
Active	R 150-4620-4320 Fire Dept Charges for Services	$3,000.00	$3,000.00	$1,210.00	$1,790.00	40.33%	150
Active	R 150-4620-4325 Ambulance County Collections	$20,000.00	$20,000.00	$14,069.73	$5,930.27	70.35%	150
Active	R 150-4620-4730 Ebix Ambulance Revenue	$501,729.00	$501,729.00	$747,904.75	-$246,175.75	149.07%	150
Active	R 150-4620-4737 Ebix Fire Revenue	$10,500.00	$10,500.00	$0.00	$10,500.00	0.00%	150
Active	R 150-4620-4741 Ebix Interfacility ALS& BLS	$296,595.00	$296,595.00	$0.00	$296,595.00	0.00%	150
Active	R 150-4620-4742 Ebix InterfacilityCriticalCare	$88,620.00	$88,620.00	$0.00	$88,620.00	0.00%	150
Cat 4620 PUBLIC SAFETY		$920,444.00	$920,444.00	$763,184.48	$157,259.52	82.91%	
Cat 4700 INTERGOV T CHARGES FOR SERVICE							
Active	R 150-4700-4731 Fire/Ambulance Service to Town	$214,200.00	$214,200.00	$142,800.00	$71,400.00	66.67%	150
Cat 4700 INTERGOV T CHARGES FOR SERVICE		$214,200.00	$214,200.00	$142,800.00	$71,400.00	66.67%	
Cat 4800 MISC REVENUE							
Active	R 150-4800-4890 Donations Received	$0.00	$0.00	$5,850.00	-$5,850.00	0.00%	150
Active	R 150-4800-4899 Misc. Revenues	$0.00	$0.00	$22.00	-$22.00	0.00%	150
Cat 4800 MISC REVENUE		$0.00	$0.00	$5,872.00	-$5,872.00	0.00%	
Cat 4810 INTEREST REVENUE							
Active	R 150-4810-4871 Interest Revenue	$200.00	$200.00	$596.60	-$396.60	298.30%	150
Cat 4810 INTEREST REVENUE		$200.00	$200.00	$596.60	-$396.60	298.30%	
Cat 4820 COMMERCIAL REVENUE							
Active	R 150-4820-4880 Sale of Owned Property	$1,000.00	$1,000.00	$0.00	$1,000.00	0.00%	150
Cat 4820 COMMERCIAL REVENUE		$1,000.00	$1,000.00	$0.00	$1,000.00	0.00%	
Fund 150 FIRE/AMBULANCE FUND		$1,369,094.00	$1,369,094.00	$1,084,045.05	$285,048.95	79.18%	

VILLAGE OF MUKWONAGO

Revenue Guideline - Fire Dept

September 2018

Act Status	Account Descr	2018 Adopted	2018 YTD Budget	2018 YTD Amt	YTD Balance	%YTD Budget	Fund
		$1,369,094.00	$1,369,094.00	$1,084,045.05	$285,048.95	79.18%	

Runs by City

Scene Incident City Name (eScene.17)	Number of Runs	Percent of Total Runs
Village of Mukwonago	1,116	72.56%
East Troy	185	12.03%
Town of Mukwonago	149	9.69%
Eagle	35	2.28%
Village of North Prairie	20	1.30%
Big Bend	19	1.24%
Dousman	4	0.26%
Palmyra	4	0.26%
Vernon	3	0.20%
City of Oconomowoc	1	0.07%
Rochester	1	0.07%
Waterford	1	0.07%
	Total: 1,538	**Total: 100.00%**

Report Filters

Incident Date: is between '01/01/2018' and '09/30/2018'

Runs by Destination Name

Disposition Destination Name Delivered Transferred To (eDisposition.01)	Disposition Destination Code Delivered Transferred To (eDisposition.02)	Number of Runs	Percent of Total Runs
		203	13.20%
Aurora Lakeland Medical Center	132	15	0.98%
Aurora Medical Center - Summit	53066	24	1.56%
Aurora Medical Center - West Allis	149	2	0.13%
Aurora Mem Hosp of Burlington	14	8	0.52%
Children's Hospital of Wisconsin (CHOW)	135	21	1.37%
Clement J Zablocki VA Medical Center	53295	5	0.33%
Elmbrook Memorial Hospital	183	2	0.13%
Froedtert Memorial Lutheran Hospital	232	16	1.04%
Mercy Walworth Hospital And Medical Center	6023	2	0.13%
Mooreland Reserve Health Center	233	3	0.20%
Not Applicable		1	0.07%
Not Transported	6024	175	11.38%
Oconomowoc Memorial Hospital	113	2	0.13%
Rogers Memorial Hosp	190	1	0.07%
St Francis-Wheaton Franciscan-Milwaukee	75	1	0.07%
St. Lukes Medical Center	160	8	0.52%
Waukesha Memorial Hospital	41	902	58.65%
Waukesha Memorial Outpatient Center	42	147	9.56%
		Total: 1,538	**Total: 100.00%**

Report Filters

Incident Date: is between '01/01/2018' and '09/30/2018'

Runs by Primary Role of Unit

Response Primary Role Of Unit (eResponse.07)	Number of Runs	Percent of Total Runs
ALS Ground Transport	649	42.20%
Critical Care Ground Transport	387	25.16%
Non-Transport	273	17.75%
BLS Ground Transport	229	14.89%
	Total: 1,538	**Total: 100.00%**

Report Filters

Incident Date: is between '01/01/2018' and '09/30/2018'

Incident Type Report (Summary)

Basic Incident Type Code And Description (FD1.21)	Total Incidents	Total Incidents Percent of Incidents	Total Property Loss	Total Content Loss	Total Loss	Total Loss Percent of Total
Incident Type Category (FD1.21): 1 - Fire						
111 - Building fire	20	10.64%	631,000.00	250,000.00	881,000.00	99.42%
113 - Cooking fire, confined to container	3	1.60%				
114 - Chimney or flue fire, confined to chimney or flue	1	0.53%				
118 - Trash or rubbish fire, contained	2	1.06%	1,000.00	1,000.00	2,000.00	0.23%
138 - Off-road vehicle or heavy equipment fire	1	0.53%	600.00		600.00	0.07%
141 - Forest, woods or wildland fire	1	0.53%				
142 - Brush or brush-and-grass mixture fire	2	1.06%				
143 - Grass fire	2	1.06%				
154 - Dumpster or other outside trash receptacle fire	2	1.06%	2,000.00	0.00	2,000.00	0.23%
162 - Outside equipment fire	1	0.53%				
	Total: 35	**Total: 18.62%**	**Total: 634,600.00**	**Total: 251,000.00**	**Total: 885,600.00**	**Total: 99.94%**
Incident Type Category (FD1.21): 2 - Overpressure Rupture, Explosion, Overheat (No Fire)						
221 - Overpressure rupture of air or gas pipe/pipeline	1	0.53%				
	Total: 1	**Total: 0.53%**	**Total: 0.00**	**Total: 0.00**	**Total: 0.00**	**Total: 0.00%**
Incident Type Category (FD1.21): 3 - Rescue & Emergency Medical Service Incident						
311 - Medical assist, assist EMS crew	4	2.13%				
321 - EMS call, excluding vehicle accident with injury	1	0.53%				
322 - Motor vehicle accident with injuries	22	11.70%				
324 - Motor vehicle accident with no injuries.	16	8.51%				
341 - Search for person on land	2	1.06%				
342 - Search for person in water	1	0.53%				
353 - Removal of victim(s) from stalled elevator	1	0.53%				
360 - Water & ice-related rescue, other	1	0.53%				
361 - Swimming/recreational water areas rescue	1	0.53%				
362 - Ice rescue	1	0.53%				
	Total: 50	**Total: 26.60%**	**Total: 0.00**	**Total: 0.00**	**Total: 0.00**	**Total: 0.00%**
Incident Type Category (FD1.21): 4 - Hazardous Condition (No Fire)						
411 - Gasoline or other flammable liquid spill	5	2.66%				
412 - Gas leak (natural gas or LPG)	2	1.06%				
413 - Oil or other combustible liquid spill	5	2.66%				
424 - Carbon monoxide incident	2	1.06%				
440 - Electrical wiring/equipment problem, other	2	1.06%				
442 - Overheated motor	1	0.53%				
443 - Breakdown of light ballast	1	0.53%				
444 - Power line down	1	0.53%				
463 - Vehicle accident, general cleanup	2	1.06%				
481 - Attempt to burn	1	0.53%	0.00	0.00	0.00	0.00%
	Total: 22	**Total: 11.70%**	**Total: 0.00**	**Total: 0.00**	**Total: 0.00**	**Total: 0.00%**
Incident Type Category (FD1.21): 5 - Service Call						
500 - Service call, other	3	1.60%	500.00		500.00	0.06%
531 - Smoke or odor removal	2	1.06%				
542 - Animal rescue	1	0.53%				
551 - Assist police or other governmental agency	1	0.53%				

Year to Date Intercept Report
VILLAGE OF MUKWONAGO
Posting Dates: 01/01/2018 - 09/30/2018

Financial Class	Encounters	Procedures	Charges	Payments	Adjustments	Proc/Enc	Chg/Enc
BIG BEND VERNON FIRE DEPT	6	6	2,970.00	1,980.00	.00	1.00	495.00
EAGLE FIRE DEPT	13	13	6,435.00	8,390.00	.00	1.00	495.00
EAST TROY EMS	77	77	38,115.00	39,050.00	.00	1.00	495.00
LAUDERDALE-LAGRANGE FIRE DE	1	1	495.00	.00	.00	1.00	495.00
NORTH PRAIRIE	9	9	4,455.00	4,450.00	.00	1.00	495.00
PALMYRA FIRE DISTRICT	8	8	3,960.00	1,800.00	180.00	1.00	495.00
Report Total	114	114	56,430.00	55,670.00	180.00	1.00	495.00

VILLAGE OF MUKWONAGO
Interfacility Summary - Year to Date
Posting Dates: 01/01/2018 - 09/30/2018

			Procedures	Charges	Minutes	Payments	Adjustments
DNG	A0382	BASIC SUPPORT ROUTINE SUPPLIES	119	416.50	12,489	362.72	8.82
DNG	A0384	BLS DEFIBRILLATION SUPPLIES	10	630.00	1,039	656.30	12.56
DNG	A0390	ALS - ADVANCED LIFE SUPPORT MILEAG	13	228.60	0	224.03	4.57
DNG	A0392	ALS DEFIBRILLATION SUPPLIES	43	4,300.00	4,446	4,471.71	91.02
DNG	A0394	ALS IV DRUG THERAPY SUPPLIES	10	140.72	985	135.35	.72
DNG	A0398	ALS ROUTINE DISPOSBLE SUPPLIES	471	15,068.11	49,901	15,379.66	362.22
DNG	A0422	AMBULANCE 02 LIFE SUSTAINING	584	5,617.36	60,979	6,150.04	127.86
DNG	A0425	DNG MILEAGE	4,018	29,611.22	27,050	23,877.28	523.12
DNG	A0425	GROUND MILEAGE	5,320	38,997.47	36,151	46,701.37	3,070.54
DNG	A0427	ALS1-EMERGENCY DNG	269	112,376.28	29,143	119,356.58	2,423.74
DNG	A0427	ALS1-EMERGENCY INTERCEPT	1	495.00	90	198.27	169.95
DNG	A0427	ALS1-EMERGENCY RESIDENT	3	2,555.00	0	391.54	1,528.92
DNG	A0429	BLS-EMERGENCY DNG	127	44,795.08	13,486	48,620.41	957.99
DNG	A0432	PARAMEDIC INTERCEPT (PI), RURAL	0	.00	300	.00	.00
DNG	A0434	CRITICAL CARE DNG	185	132,347.17	20,440	134,872.24	2,728.42
DNG	J7030	NORMAL SALINE SOLUTION INFUS	5	27.20	604	33.47	.68
DNG	J7040	NORMAL SALINE SOLUTION INFUS	3	10.86	301	7.10	.14
DNG	82962	GLUCOSE BLOOD TEST	0	.00	0	.64-	.64
DNG	93005	ELECTROCARDIOGRAM, TRACING	14	1,176.00	1,278	1,011.97	27.11
DNG	94760	NONINVASIVE EAR OR PULSE OXIMETRY	26	176.22	2,882	212.88	4.30
DNG	TOTAL		11,221	388,968.79	261,564	402,662.28	12,043.32
Other	A0380	BLS - BASIC LIFE SUPPORT MILEAGE	72	1,301.40	0	1,600.54	754.55
Other	A0382	BASIC SUPPORT ROUTINE SUPPLIES	5	3.36	0	3.16	9.75
Other	A0384	BLS DEFIBRILLATION SUPPLIES	0	.00	0	60.00	60.00
Other	A0390	ALS - ADVANCED LIFE SUPPORT MILEAG	136	2,470.60	0	3,456.59	340.21
Other	A0392	ALS DEFIBRILLATION SUPPLIES	0	.00	0	90.00	.00
Other	A0398	ALS ROUTINE DISPOSBLE SUPPLIES	6	70.90	0	106.20	34.03
Other	A0422	AMBULANCE 02 LIFE SUSTAINING	52	224.18	0	84.08	19.32
Other	A0425	GROUND MILEAGE	142	2,969.00	0	1,578.00	1,966.40
Other	A0427	ALS-EMERGENCY INTERFACILITY	3	3,150.00	0	3,871.16	1,178.84
Other	A0427	ALS1-EMERGENCY INTERCEPT	1	495.00	0	187.72	76.39
Other	A0427	ALS1-EMERGENCY RESIDENT	1	815.00	0	165.68	.00
Other	A0429	BLS-EMERGENCY INTERFACILITY	3	2,850.00	0	5,539.83	1,530.10
Other	A0429	BLS-EMERGENCY NON RESIDENT	1	685.00	0	70.56	.00
Other	A0429	BLS-EMERGENCY RESIDENT	1	580.00	0	.00	.00
Other	A0434	INTERFACILITY CRITICAL CARE TRANSP	6	8,568.00	0	9,622.58	2,966.27
Other	93005	ELECTROCARDIOGRAM, TRACING	1	84.00	0	.00	.00
Other	94760	NONINVASIVE EAR OR PULSE OXIMETRY	1	35.00	0	.00	.00
Other	TOTAL		431	24,301.44	0	26,436.10	8,935.86
	TOTAL		11,652	413,270.23	261,564	429,098.38	20,979.18

VILLAGE OF MUKWONAGO
ERF Summary
Posting Dates: 09/01/2018 - 09/30/2018

Current Quantity	Current Charges	Current Payments	Current Adjustments	YTD Quantity	YTD Charges	YTD Payments	YTD Adjustments
5	3,125.00	.00	.00	17	10,625.00	3,825.00	1,075.00