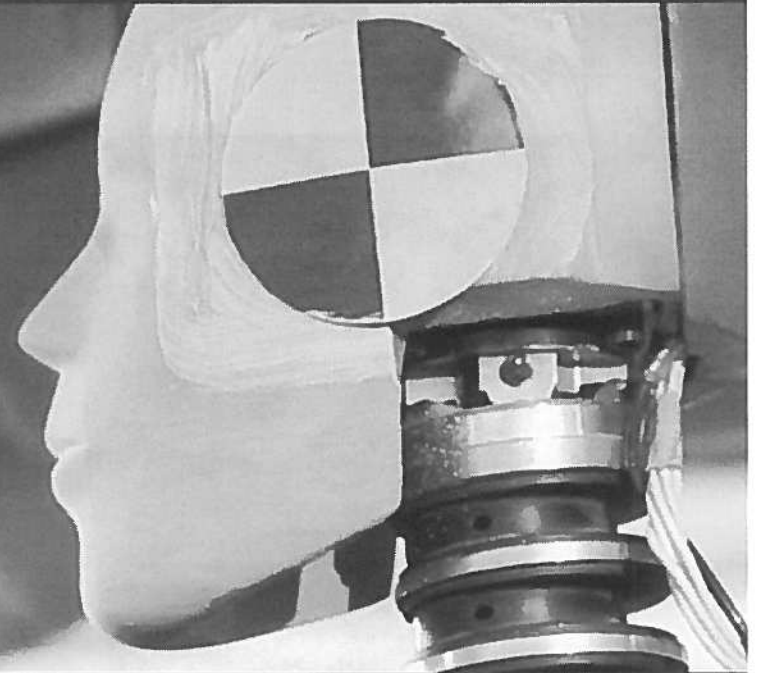


# National Highway Traffic Safety Administration

## Developing Guidelines for Fatigue Management in EMS NEMSAC – December 2<sup>nd</sup> 2015



J. Stephen Higgins, Ph.D.

Research and Program Development  
Office of Behavioral Safety Research



# Agenda

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- i. Background
- ii. Project Tasks
- iii. Optional Tasks
- iv. The Team
- v. Comments/Questions?





# Background

## Study Examines Effects of Sleep Deprivation on Shift Work

Medical professionals are beginning to call fatigue the number one problem in our field

### Study: Medics' fatigue linked to higher injury rates

In the survey sample, more than half of the respondents were classified as fatigued

#### Fatigue a factor in ambulance accident in Manitoba - Canada



0

1

Share Tweet

Thursday, August 30, 2012  
regional health authorities need to be made." - Lois W

Winnipeg (29 Aug. 2012) -  
Health Authority was invol

The ambulance slid off the  
Swan River after doing an  
several days and nights w

#### State Coroner: fatigue a factor in administering wrong drug

- In 2007 Coroner Peter White reported that while attempting to resuscitate a 78 year-old male cardiac patient a paramedic accidentally administered morphine instead of adrenaline.
- The Coroner said fatigue was a factor. "I am satisfied that both officers were affected by fatigue at the time of these incidents and that resulting error is always a possibility in such circumstances."
- A positive outcome was unlikely but "the possibility that resuscitation may have been more effective given appropriate treatment cannot be excluded."



AMBULANCE EMPLOYEES AUSTRALIA is the ambulance section of the major Hospitality & Miscellaneous Union



#### Admin & Leadership

#### Studies Prove 24-Hour Shifts Unsafe

Another ethical dilemma for EMS leaders

article

comments

Like 149 Send

Share 5

Print

Tweet 24

EMAIL PRINT

#### Ambulance driver fatigue a danger Distractions pose risks to patients, EMTs, traffic

By Lisa Zagaroli, and April Taylor / *Detroit News Washington Bureau*  
Monday, January 27, 2003

Emergency medical technician Anne Lamberson thought she was doing her job when she got a priority dispatch, stepped on the ambulance's accelerator and tried to make it to the scene as quickly as she could.



Newsday

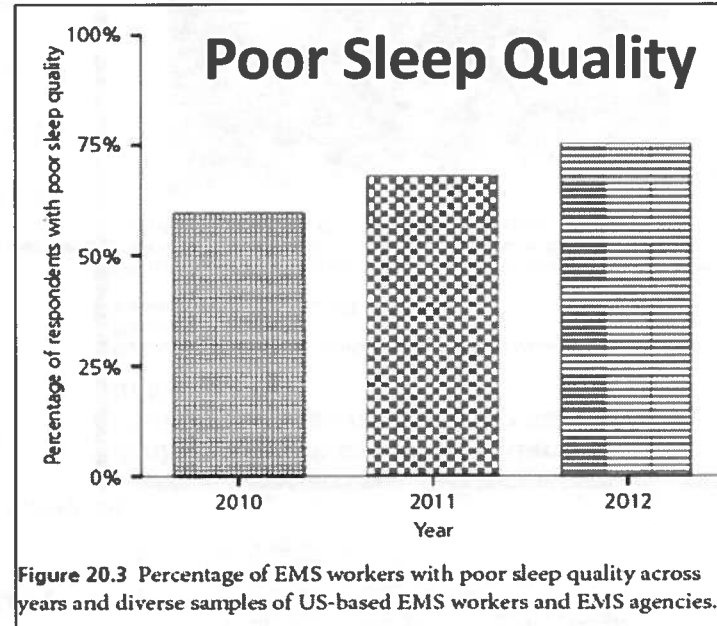
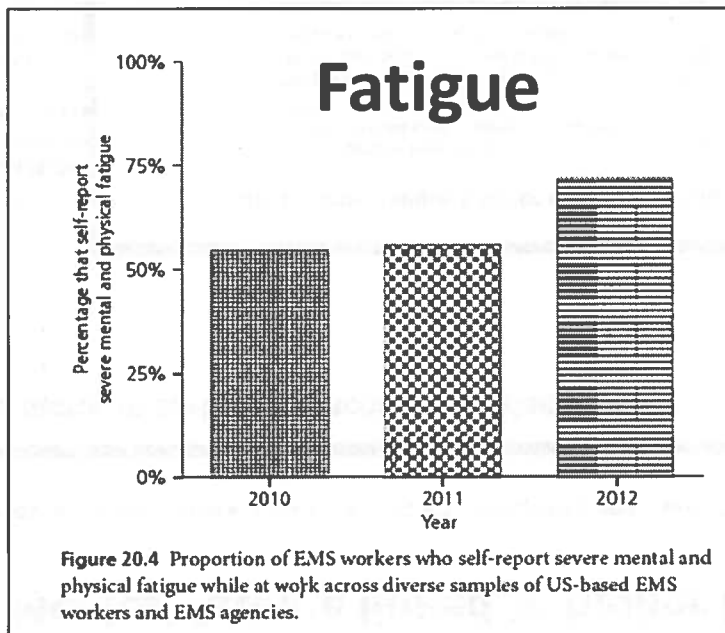
An ambulance driven by Anne Lamberson went through an intersection in Brooklyn, N.Y., and smashed into this car driven by Angela Igwe. Three of Igwe's four children, Akintunde Morak, 2, Olusegun Morak, 5, and Damilola Morak, 7, were killed.

Video

*Safer Drivers. Safer Cars. Safer Roads.*



# Fatigue and Sleep Health in EMS



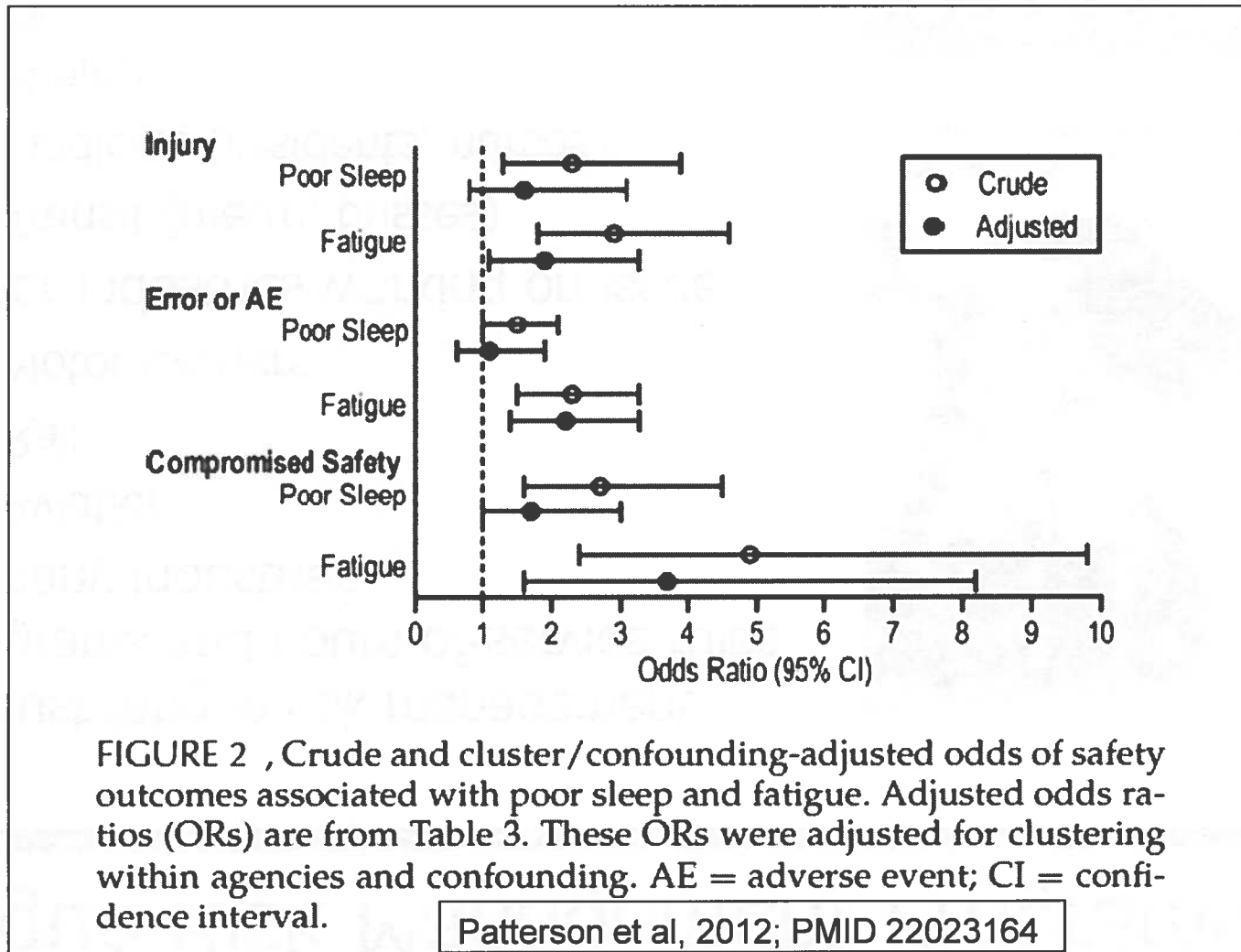
- Greater than half report fatigue at work
- Half get less than 6-hours sleep per day
- Greater than half report poor sleep quality
- Greater than 1/3<sup>rd</sup> report excessive daytime sleepiness
- Half report poor to moderate recovery between scheduled shifts

Patterson et al, 2015 (recovery); Patterson et al; 2015 (textbook); Pirrallo et al, 2012

*Safer Drivers. Safer Cars. Safer Roads.*



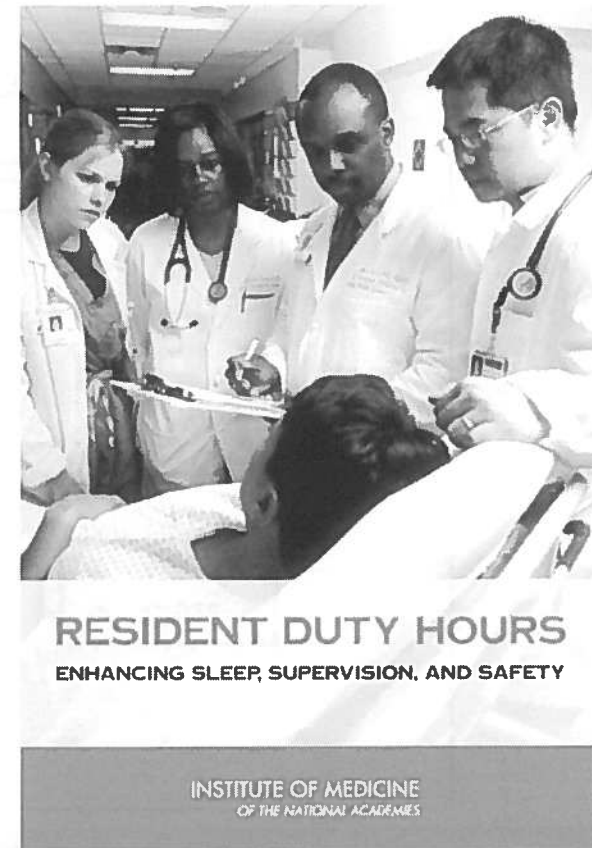
# Fatigue linked to safety in EMS





# Fatigue Risk Management Programs

- Robust fatigue risk management programs and hours-of-service rules in many industries
  - Aviation
  - Rail
  - Motor Carriers
- Other industries working on issue
  - Transit (metro, busses)
  - Medicine (residents, nurses)
  - Mining
  - Oil





# 2013 NEMSAC Advisory


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1. The NHTSA Office of EMS (OEMS) should cross-validate findings from studies and reports of fatigue in other professions with that of fatigue in EMS. This effort should involve a convening of subject matter experts, individual providers of EMS services, and representatives from local, state, and federal organizations, national organizations (e.g., NAEMT, NAEMSP, NASEMSO) that play a role in EMS oversight or care delivery. The effort should clarify the evidence linking EMS provider fatigue and safety and health outcomes of patients, providers, and the public. The effort should include an analysis of regulatory requirements of the employer and employee and legal framework with respect to the threat of fatigue on safety.
2. The NHTSA Office of EMS (OEMS) should work through its federal and non-federal partners to address the lack of a standardized method for investigating the role of fatigue in ground and air-medical crashes, clinical errors, and provider injuries. This effort may include developing a valid and reliable measurement tool and check list for investigators.
3. The NHTSA Office of EMS (OEMS) should disseminate (evidence-based) information to the EMS community to aid development of fatigue management programs / interventions to fit local needs.



# Tasks

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- Tasks:
    - Public stakeholder meeting – Feb. 2 2016 8am-noon.
    - Form EBG Panel & create research questions
    - Literature review & grade evidence
    - Develop Evidence Based Guidelines
    - Create performance measures
    - Dissemination
  - Optional Task 1
    - Additional dissemination
  - Optional Task 2
    - Evaluation Study
  - Optional Task 3
    - Develop and validate a biomathematical model of fatigue in EMS.
    - Create free scheduling tool for agencies to help assess work schedules at risk of fatigue
- 
- GRADE Methodology**



# Public Stakeholder Meeting

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- When: Tuesday, February 2<sup>nd</sup> 2016, 8am-noon
- Where: DOT Conference Center: Oklahoma City Room
- Who: NHTSA staff, guidelines team, invited stakeholders, other stakeholders who register (space limited)
- We will:
  - Have presentations on Workplace Fatigue and Drowsy Driving (tentatively by NHTSA Administrator, Mark Rosekind, Ph.D.), Fatigue in EMS, Project Structure and Methods, Dissemination
  - Accept comments from stakeholders about fatigue management in EMS (both at the meeting and through federal register notice)



# Why the GRADE methodology?

- Used previously for numerous EMS/emergency medicine topics
- Accepted, recognized, adopted by the EMS industry

## INTRODUCTION

**EVIDENCE-BASED GUIDELINES FOR PREHOSPITAL PRACTICE: A PROCESS WHOSE TIME HAS COME**

## ORIGINAL CONTRIBUTIONS

**THE DEVELOPMENT OF EVIDENCE-BASED PREHOSPITAL GUIDELINES: A GRADE-BASED METHODOLOGY**

Kathleen M. Brown, MD, Charles G. Macias, MD, MPH, Peter S. Dayan, MD, MSc, Manish I. Shah, MD, Tasneen S. Weik, DrPh, MPH, Joseph L. Wright, MD, MSc, Eddy S. Lang, MD, MSc, CCFP (EM)

## Resuscitation

Available online 9 October 2015  
In Press: Accepted Manuscript — Note to users

**Temperature Management After Cardiac Arrest: An Advisory Statement by the Advanced Life Support Task Force of the International Liaison Committee on Resuscitation and the American Heart Association Emergency Cardiovascular Care Committee and the Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation**

Michael W. Donnino<sup>1</sup>, Lars W. Andersen, Katherine M. Berg, Joshua C. Reynolds, Jerry P. Nolan, Peter T. Morley, Eddy Lang, Michael N. Cocchi, Theodoros Athos, Clifton W. Callaway<sup>1</sup>, Jasmeet Soar<sup>1</sup>, FRCA, FFICM, FRCPC, the ILCOR ALS Task Force

**THE IMPLEMENTATION AND EVALUATION OF AN EVIDENCE-BASED STATEWIDE PREHOSPITAL PAIN MANAGEMENT PROTOCOL DEVELOPED USING THE NATIONAL PREHOSPITAL EVIDENCE-BASED GUIDELINE MODEL PROCESS FOR EMERGENCY MEDICAL SERVICES**

Kathleen M. Brown, MD, Jon Mark Hirshon, MD, MPH, PhD, Richard Alcorta, MD, Tasneen S. Weik, DrPh, MPH, Eddy S. Lang, MD, MSc, CCFP (EM)

**Review**

**Analgesia in the emergency department: a GRADE-based evaluation of research evidence and recommendations for practice**

Chris Lipp<sup>a</sup>, Raj Dhalliwal and Eddy Lang

**Highly accessed**

<sup>a</sup> Corresponding author: Chris Lipp [clipp@ucalgary.ca](mailto:clipp@ucalgary.ca)

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University of Calgary, Faculty of Medicine, Alberta Health Services, Calgary, Canada

For all author emails, please [log on](#)

## Resuscitation

Volume 97, December 2015, Pages 38–47

**Review article**

**When should chest compressions be paused to analyze the cardiac rhythm? A systematic review and meta-analysis**<sup>☆</sup>

Joshua C. Reynolds<sup>a</sup>, Violetta Raffay<sup>b</sup>, Eddy Lang<sup>c</sup>, Peter T. Morley<sup>d</sup>, Kevin Nation<sup>e</sup>

**AN EVIDENCE-BASED GUIDELINE FOR PEDIATRIC PREHOSPITAL SEIZURE MANAGEMENT USING GRADE METHODOLOGY**

Manish I. Shah, MD, Charles G. Macias, MD, MPH, Peter S. Dayan, MD, MSc, Tasneen S. Weik, DrPh, MPH, Kathleen M. Brown, MD, Susan M. Fuchs, MD, Mary E. Fallat, MD, Joseph L. Wright, MD, MPH, Eddy S. Lang, MDCM, CCFP (EM)



# Why the GRADE methodology?

- The GRADE process uses a formalized, transparent, and reproducible system to assess level of evidence to specific questions.
- Results in clear, executable recommendations designated as either strong or weak.
- Makes clear separation between quality of evidence and strength of recommendations
  - (for example: quality of evidence may be weak, but benefits of a recommendation may far outweigh risk, thus an expert panel may offer a strong recommendation).

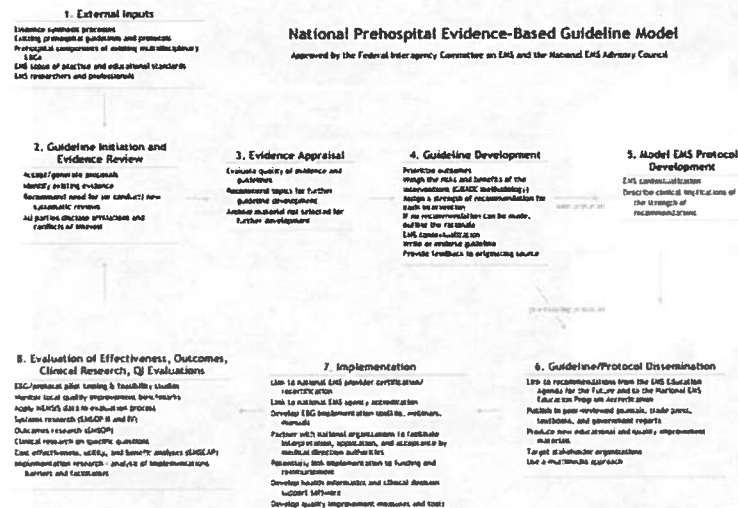


Figure 1. National prehospital EBG model. EBG = evidence-based guideline.

## Academia Emergency Medicine Official Journal of the Society for Academic Emergency Medicine SPECIAL CONTRIBUTION

### A National Model for Developing, Implementing, and Evaluating Evidence-based Guidelines for Prehospital Care

Eddy S. Lang, MD, CCFP(EM), Daniel W. Spaite, MD, Zoe J. Oliver, MD, Catherine S. Gotschall, ScD, Robert A. Swor, DO, Drew E. Dawson, and Richard C. Hunt, MD

Downloaded from emj.com on 25 April 2008

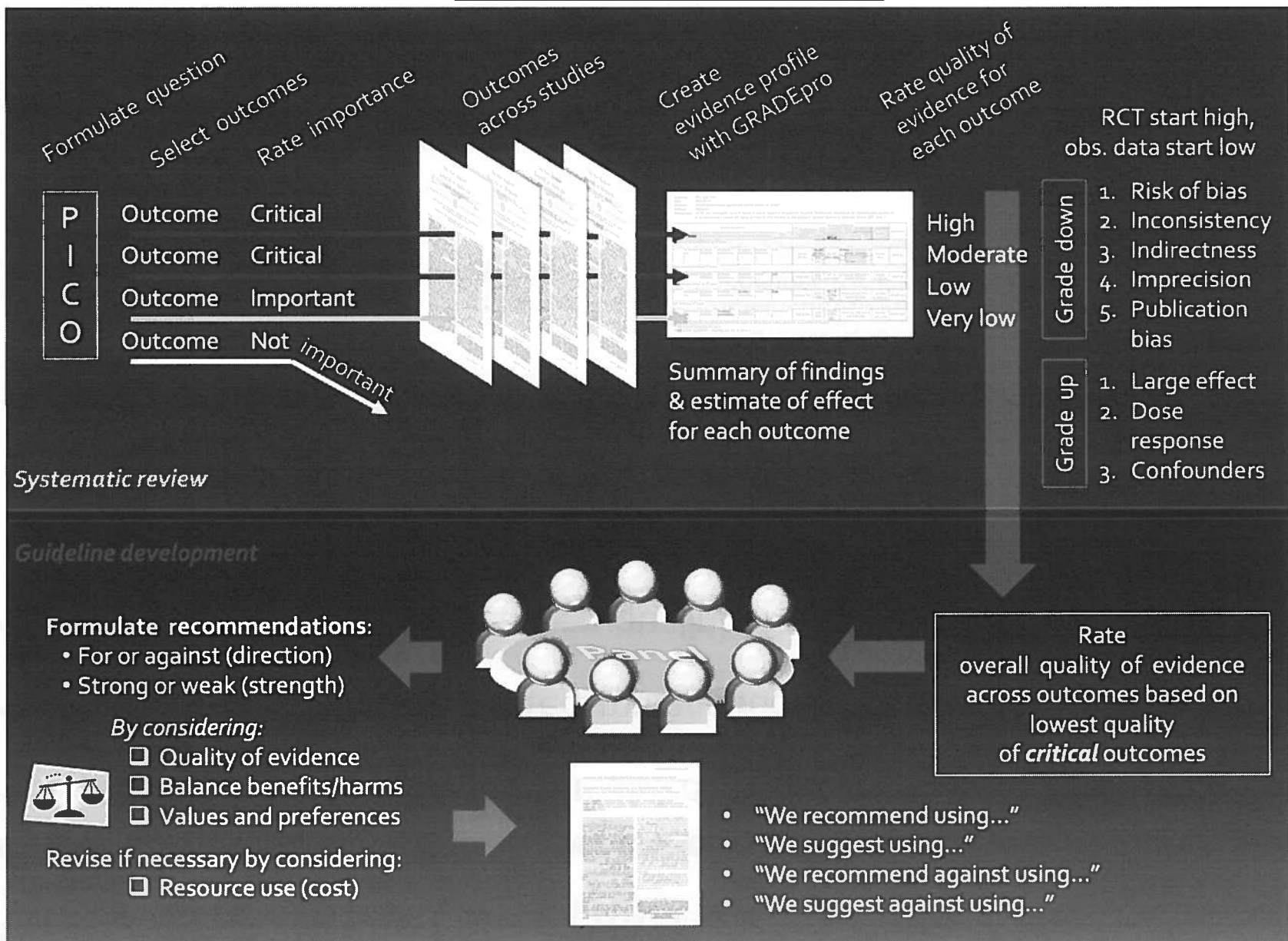
#### RATING QUALITY OF EVIDENCE AND STRENGTH OF RECOMMENDATIONS

### GRADE: an emerging consensus on rating quality of evidence and strength of recommendations

Guidelines are inconsistent in how they rate the quality of evidence and the strength of recommendations. This article explores the advantages of the GRADE system, which is increasingly being adopted by organisations worldwide



# The GRADE Methodology





# The Expert Panel

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- Expert panel will include (at a minimum): EMS researchers, clinicians, EMS administrators, government representative, patient advocate, fatigue and sleep scientists, and GRADE Methodologist (Dr. Lang)
- Panel charged with:
  1. Developing questions to guide the literature review
  2. Reviewing synthesis of literature provided by research team
  3. Reviewing draft recommendations offered by research team
  4. Rating relevancy and clarity of draft recommendations
  5. Rating relevancy, clarity, and feasibility of draft performance measures proposed by research team



# Literature Review & Evidence Table

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- Guided by questions from expert panel
- We will use established methods for reviewing and rating quality of literature (i.e., GRADE methodology)

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Downloaded from bmj.com on 25 April 2008

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## RATING QUALITY OF EVIDENCE AND STRENGTH OF RECOMMENDATIONS

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### **GRADE: an emerging consensus on rating quality of evidence and strength of recommendations**

Guidelines are inconsistent in how they rate the quality of evidence and the strength of recommendations. This article explores the advantages of the GRADE system, which is increasingly being adopted by organisations worldwide



# Performance measures

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- Research team with help from Expert Panel will develop measures
  - with consideration to what data may already be available / collected by EMS systems
  - creating standardization – thus opportunities for comparisons across systems
- What can we or others do with them
  - Evaluate effectiveness/impact of FRMPs



# Dissemination

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- Presentations at National Conferences
- Targeted press releases and webinars:
  - State EMS Offices
  - National EMS Organizations
  - EMS Stakeholders
  - EMS Agencies
  - Consumers
- Article(s) for trade publication
- Pamphlet for wide distribution
- Also additional Optional Task for more dissemination



# Optional Task 2: Evaluation Study

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- Experimental study of n=10 EMS agencies
- Proposed inclusion criteria:
  - ( $>$  or  $=$ ) to 100 EMS clinicians;
  - Use mix of shift durations/schedules (e.g.,  $<12$ -hour, 12-hour, 16-hour, 24-hour and other shift durations);
  - Variation in periods of inter-shift recovery.
- Measures of potential interest
  - Point prevalence of fatigue, sleep health/quality over time, inter-shift recovery, safety culture, work-related injury, other performance measures





# Optional Task 3: Biomathematical Model

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- Goals
  - Sample sleep patterns of EMS clinicians to customize sleep inputs to model-based analyses
  - Validate a biomathematical model for use in scheduled EMS operations
  - Develop a model-based tool to assist personnel managing fatigue risk associated with scheduled EMS operations



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# Project Schedule

Task	1-6 months	6-12 months	12-18 months	18-24 months
<b>C.3.2</b>	Revise Work Plan Meeting: EBG Panel			
<b>C.3.3</b>		Letter Report		
<b>C.3.4</b>		Literature Review Evidence Table		
<b>C.3.5</b>			Meeting: Guidelines Panel Letter Report	
<b>C.3.6</b>			Performance Measures	
<b>C.3.7</b>			Draft Report	
<b>C.3.8</b>				Final Report Briefing-DOT Dissemination



# Our contract team

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## National Association of State EMS Officials



- Dia Gainor and Kathy Robinson



## Carolinas HealthCare System

- Daniel Patterson - Department of Emergency Medicine

- Financial & Overall Project Management
- Meeting organization
- Dissemination

- EBG Creation Process Management
- Research Project Management
- Dissemination



## INSTITUTES FOR BEHAVIOR RESOURCES, INC. *shaping a better world*

- Steve Hursh, Francine James, Lauren Waggoner

- Optional Task:  
Biomathematical model  
of EMS fatigue &  
personnel scheduling  
tool



# Complete Project Team

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- Steve Higgins, PhD – NHTSA
- Dia Gainor – NASEMSO
- Kathy Robinson – NASEMSO
- Daniel Patterson, PhD – Carolinas Emerg.Med.
- Mike Runyon, MD – Carolinas Emerg.Med.
- Melanie Hogg – Carolinas Emerg.Med
- Charity Moore, PhD – Carolinas
- Caroline Axthelm – Carolinas
- Jon Studnek, PhD, NRP – Carolinas / MEDIC
- Allison Infinger, MSPH – Carolinas / MEDIC
- Laura Barger, PhD – Harvard
- Eddy Lang, MD – University of Calgary
- Steve Hursh, PhD – Institute for Behavior Resources, Inc.
- Francine James, PhD – Institute for Behavior Resources, Inc.
- Lauren Waggoner, PhD – Institute for Behavior Resources, Inc.



*Safer Drivers. Safer Cars. Safer Roads.*

Steve Higgins, Ph.D.

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