

# Background to the Problem of Fatigue in EMS

Daniel Patterson, PhD, NRP

February 2, 2016

# Disclosures

- Funding
  - NHTSA DTNH2215R00022
  - The MedEvac Foundation
  - Carolinas Foundation / HealthCare System
- Employee of Carolinas HealthCare, Union County EMS, Parkview VFD

# Practicing Paramedic



# Background: EMS

Placeholder for 1 minute video that highlights the significance of EMS: annual volume, size of workforce, etc

# Fatigue

- Fatigue refers to... *“unpleasant symptom incorporating feelings of tiredness to exhaustion creating mental and physical conditions that interfere with ability to function in a normal capacity.”* (Ream & Richardson, 1996)
- Reported fatigue across occupations
  - 1/3<sup>rd</sup> of adult workers
  - 36% hospital-based nurses
  - 40% truck drivers
  - 75% small-airline commercial pilots

Ricci et al, 2007;  
Geiger-Brown et al, 2012;  
Arnold et al, 1997;  
Jackson & Earl, 2006

# Fatigue is a visible Issue

## Head on crash between ambulance and van on U.S. 101 sends six to hospital - Oregon

An ambulance was headed south with a paramedic tending a patient in the back around 3:15 a.m. when an oncoming van crossed the centerline.



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



0 1

Share Tweet

Thursday, August 3  
regional health auth

## Patient dead, three crew injured after ambulance crash - Roswell, New Mexico

One man died and three medical workers were injured Wednesday after their ambulance crashed.

State police said the accident happened on U.S. Highway 285 north of Roswell as the ambulance was traveling from Albuquerque to Big Spring, Texas.

The ambulance drifted into the median and the driver lost control after overcorrecting, police said. The ambulance rolled several times.

nt six to the hospital,

nd 3:15 a.m. when an  
aid that the ambulance  
ght, but the vehicles

Jandra Palacios, 17, both  
left rear seat and had

ot injured. They were  
n-life threatening injuries

# South Dakota Ambulance Flips After Driver Falls Asleep

EMSWORLD.COM NEWS

CREATED: MARCH 6, 2013

*The EMT in the rear compartment treating the patient was ejected when the unit rolled.*

driver fatigue may have been a factor in the crash.

## 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."

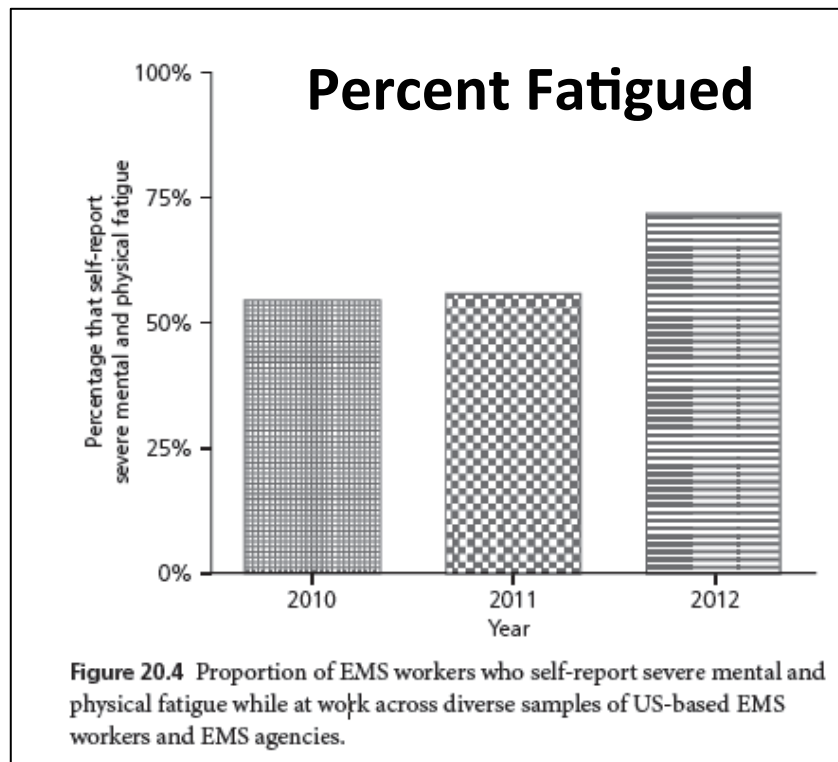


Newsday

Anne Lamberson went through an intersection in  
hed into this car driven by Angela Igwe. Three of Igwe's  
Morak, 2, Olusegun Morak, 5, and Damilola Morak, 7,

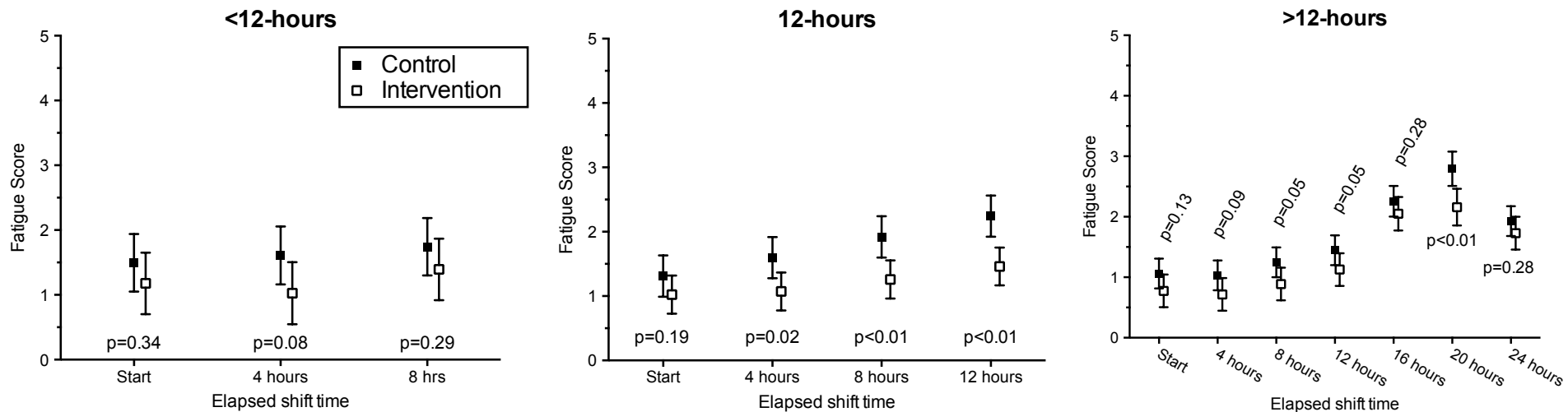
# Fatigue in EMS: Point Prevalence

- Van Der Ploeg & Kleber, 2003
  - N=221 EMS workers in Netherlands (10% fatigued)
- Patterson et al, 2010
  - N=119 US EMS workers (44.5% fatigued)
- Patterson et al, 2012
  - N=511 US EMS workers (55% fatigued)
- Patterson et al, 2014
  - N=355 US EMS workers (64% fatigued)
- Patterson et al, 2015
  - N=100 US EMS workers (85% fatigued)



Patterson et al, 2014; Patterson et al, 2012; Patterson et al, 2010; Patterson et al., 2015; Van Der Ploeg et al, 2003; Brown et al, 2002; Frakes & Kelly, 2007; Bauder, 2012; Patterson PD, Weaver MD, Hostler D. EMS Provider Wellness. In: Cone DC, Brice JH, Delbridge TR, Myers JB, editors. Emergency Medical Services: Clinical Practice and Systems Oversight. Second Edition. Chichester, West Sussex; Hoboken: John Wiley & Sons Inc., 2015 pp. 211-216.

# Change in Fatigue During Shiftwork



The SleepTrackTXT Pilot Trial (Clinicaltrials.gov NCT02063737)  
Patterson et al, 2015 (AJIM)

## Real-Time Fatigue Reduction in Emergency Care Clinicians: The SleepTrackTXT Randomized Trial

P. Daniel Patterson, PhD,<sup>1\*</sup> Daniel J. Buysse, MD,<sup>2</sup> Matthew D. Weaver, PhD,<sup>3</sup>  
Jack M. Doman, MS,<sup>2</sup> Charity G. Moore, PhD,<sup>4</sup> Brian P. Suffoletto, MD,<sup>5</sup> Kyle L. McManigle,<sup>5</sup>  
Clifton W. Callaway, MD, PhD,<sup>5</sup> and Donald M. Yealy, MD<sup>5</sup>



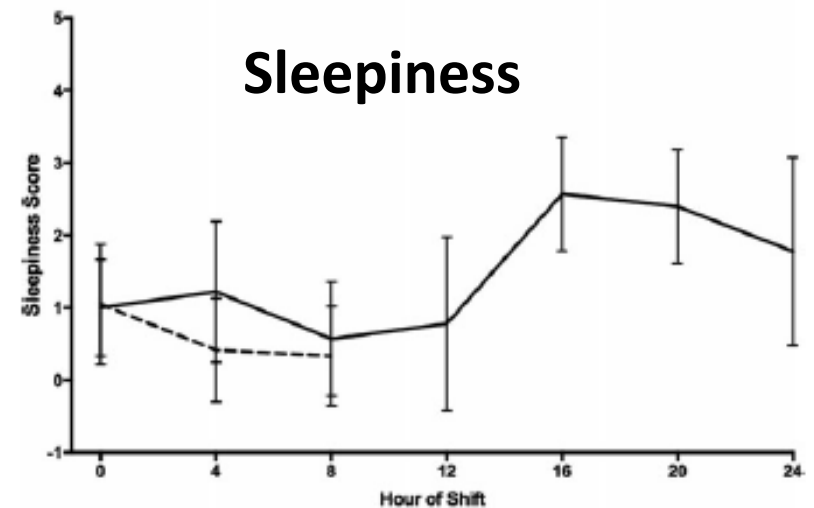
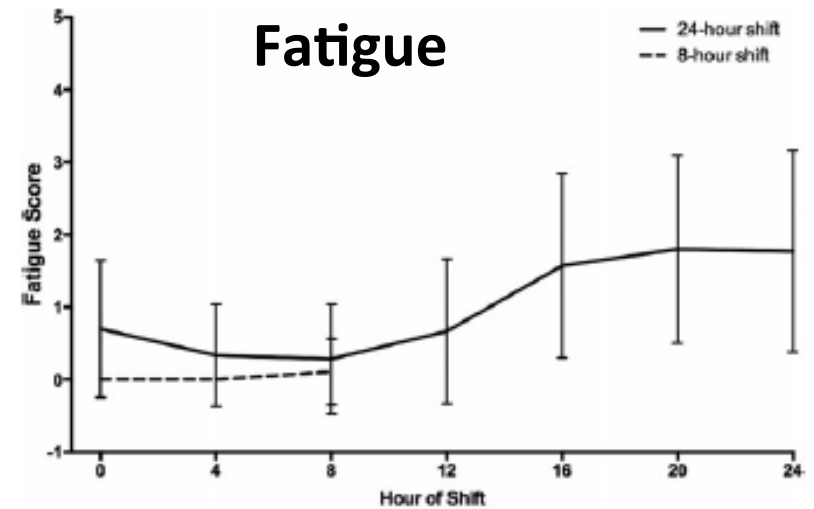
# Change in Fatigue During Shiftwork

## Case report of one paramedic

### DIFFERENCES IN PARAMEDIC FATIGUE BEFORE AND AFTER CHANGING FROM A 24-HOUR TO AN 8-HOUR SHIFT SCHEDULE: A CASE REPORT

P. Daniel Patterson, PhD, NRP, Sharon E. Klapec, NRP, Matthew D. Weaver, PhD, EMT-P, Francis X. Guyette, MD, MS, Thomas E. Platt, EdD, NRP, Daniel J. Buysse, MD

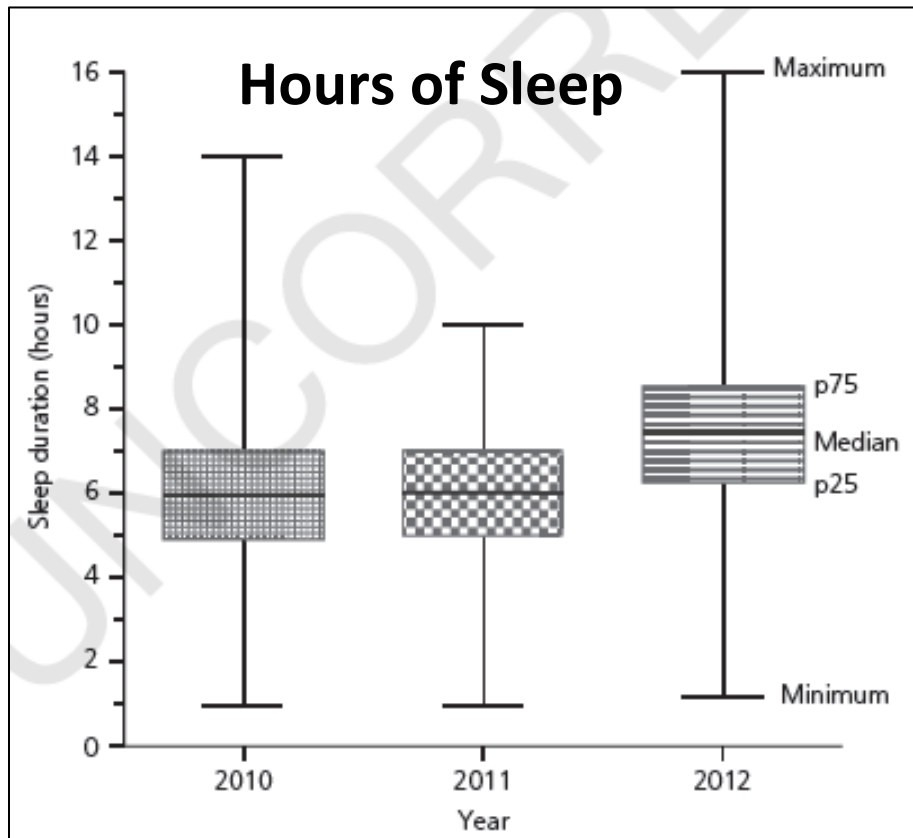
Patterson et al, Prehosp Emerg Care, 2016



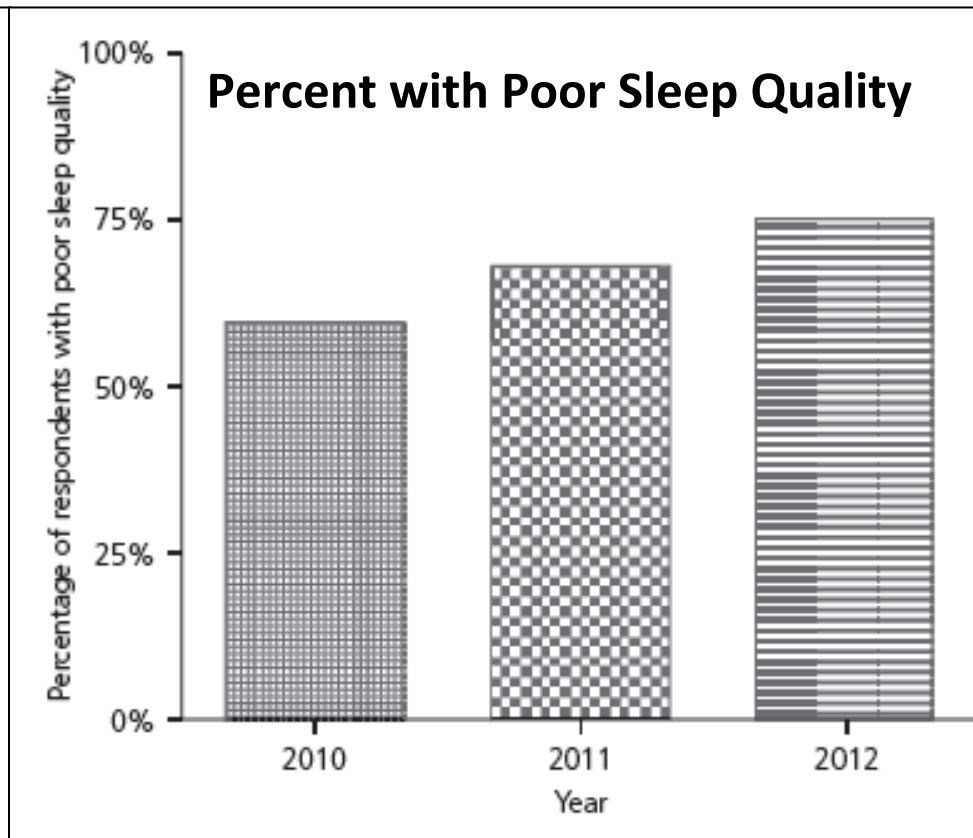
# Factors Associated With Fatigue

- Greater years of experience in EMS
- Full-time employment
- More shifts per month
- Fair/poor health status
- Perceived poor recovery between shifts

# Factors Associated with Fatigue: Sleep and Sleep Quality



**Figure 20.2** EMS worker self-reported median hours of sleep per sleep period across multiple years and diverse samples of EMS workers.



**Figure 20.3** Percentage of EMS workers with poor sleep quality across years and diverse samples of US-based EMS workers and EMS agencies.

# Factors Associated with Fatigue: Recovery

## RECOVERY BETWEEN WORK SHIFTS AMONG EMERGENCY MEDICAL SERVICES CLINICIANS

P. Daniel Patterson, PhD, NRP, Daniel J. Buysse, MD, Matthew D. Weaver, PhD, EMT-P,  
Clifton W. Callaway, MD, PhD, Donald M. Yealy, MD

TABLE 3. Variation in Intershift recovery by demographic/work-related variables

	Mean (SD) Intershift Recovery Score (n = 450)	Percent low recovery (0–40)	Percent low/moderate recovery (41–50)	Percent moderate/high recovery (51–66.6)	Percent high recovery (66.7–100)
Overall Intershift Recovery Score	54.0 (20.1)	25.3	24.9	22.0	27.8

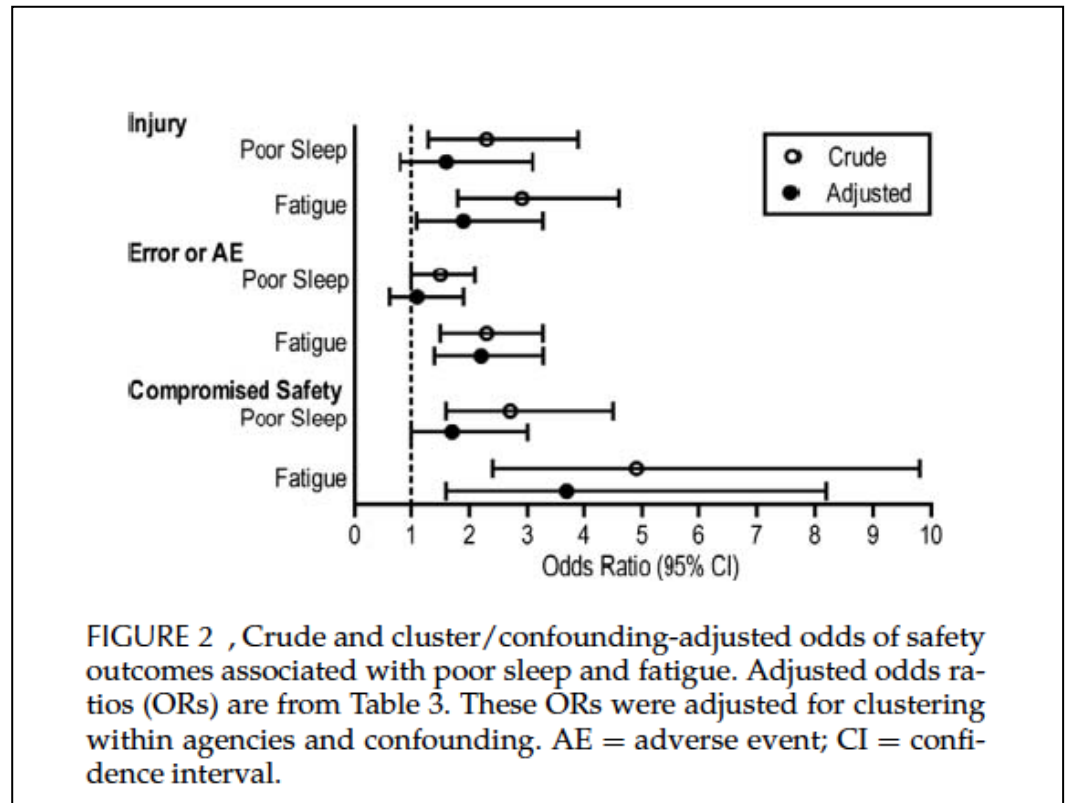
**Half (50.2%) report  
LOW to MODERATE Recovery Between Shifts**

# Factors Associated with Fatigue: Shiftwork

- More than half of EMS clinicians work long hours (>45hours/week)
- Most work extended shifts (12-hours or 24-hours)
- In some locations, >80% work at multiple jobs
- Some work excessive overtime hours

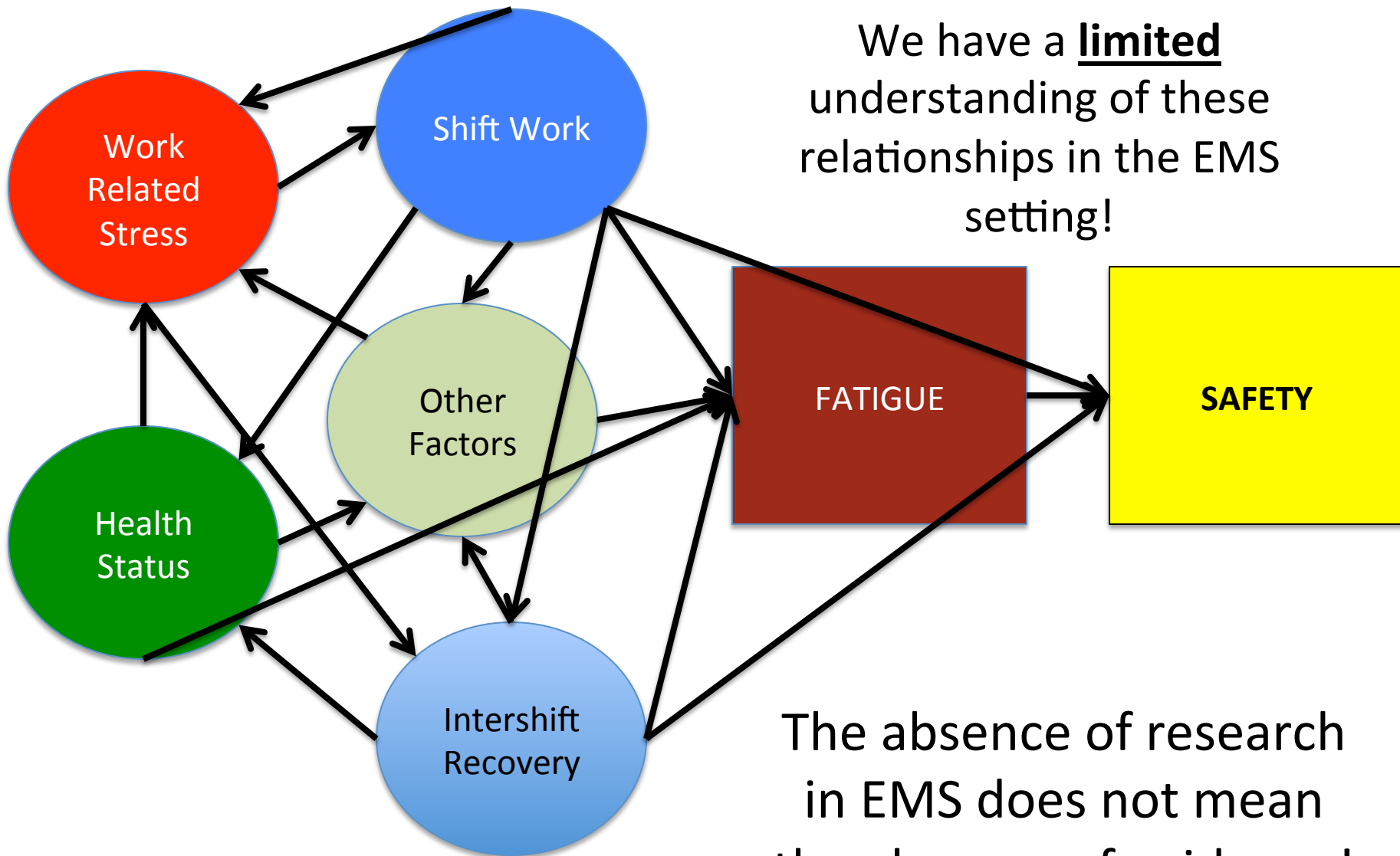
# Fatigue and Safety

- Fatigue linked to safety in EMS (Patterson et al, 2012)
  - 1.9 greater odds of injury
  - 2.2 greater odds of medical error or adverse event
  - 3.6 greater odds of safety compromising behavior



Patterson et al, 2012; PMID 22023164

# Causes & Consequences



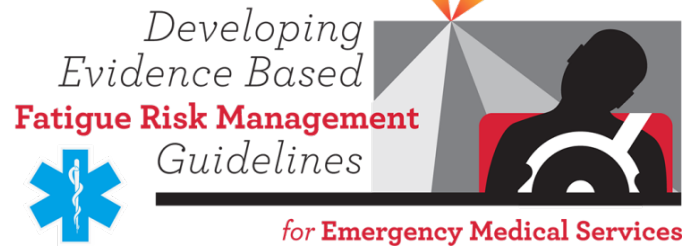
We have a **limited** understanding of these relationships in the EMS setting!

The absence of research in EMS does not mean the absence of evidence!

# Significance of Fatigue in EMS

- Placeholder for video on fatigue in ems.





- Fatigue affects a large number of EMS clinicians
- Consequences include injury and error
- No clear standard or best practice for fatigue risks management in the EMS environment