



# Improving Sleep Health Knowledge in Firefighters Through Education

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# Special Thanks To

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# Sleep Deprivation

Short term health effects:

- Increased risk-taking behavior and impulsivity
- Reduced attention time, reaction time, learning ability, memory formation, and emotional processing

Chronically disordered sleep has been associated with:

- Heart disease, hypertension, and diabetes
- Reduced immune system function, certain cancers
- Increased stress, anxiety, and depression
- Alzheimer disease

# What is the Problem?

Firefighters have a unique risk profile predisposing them to sleep deprivation and its adverse health effects.

# Contributing Factors

## Work Environment

- 24hr work shifts
- Increasing call volume
- Frequent awakenings
- Station design, sleeping quarters, tap-out system
- State of hyperarousal
- Altered sleep patterns

## Individual Health

- Sleep disorders
- Mental health conditions
- Caffeine
- Alcohol

## Home Environment

- Choosing family and social obligations instead of sleep when off-duty

## Modern Society

- Increasing dependence on technology
- Artificial lights

# Literature Review

Sleep health education for firefighters:

- Improvement in surrogate markers of sleep health
- In-person sessions most effective
- Difficulty taking firefighters out of service for training
- Difficulty with lengthy sleep health curriculums.

# Specific Aims

Increase firefighter knowledge levels from a self assessed baseline level by at least 25% in the following knowledge domains:

- Short term adverse health effects of sleep deprivation
- Health effects of chronically disordered sleep
- Adjustable lifestyle factors that can improve sleep

# Project Context & Setting

## A Fire & Rescue Company in Washington County

- Provides emergency medical aid and fire protection services to over 500,000 residents of Washington County and employs over 500 career firefighters
- Fire station crews range from 2-9 firefighters, composed of paramedics and EMTs
- Typical work shifts last 24 hours with the possibility of an additional 24 hours in overtime
- No prior sleep health education outreach



# Project Methods & Intervention

## Project Inception

Pitch Project  
Concept to Site

Contracting

Identify Project  
Champion

## Development

Sleep Health  
Handout

Presentation

Survey

## Deployment

Fire Station  
Selection

Education  
Sessions

## Analysis

Analysis

Report Out

# Project Methods & Intervention

Strategies for Improving Sleep		
<b>Quick Tips</b>		
<p><b>Ideal amount of sleep:</b> 7-9 hours every day  <b>Ideal bedroom air temperature:</b> ~66F. Avoid temps &lt;62F or &gt;77F  <b>Noisy environment?</b> Consider ear plugs and/or a white noise machine  <b>Need a nap?</b> Try to keep it &lt;30 minutes and earlier in the day. Longer naps can lead to grogginess and disorientation upon waking.  <b>Stress:</b> Psychological stress can impair sleep. Exercise, meditation, massage, acupuncture, and sensory deprivation are all potential strategies to help relax. Find what works well for you.</p>		
<b>Adjustable Lifestyle Factors</b>		
<u>How Sleep is Impacted</u>	<u>Recommendations</u>	
<b>Alcohol*</b>	<p>Disrupts sleep by changing body temperature regulation, increasing awakenings, increasing urine production, and disrupting restorative phases of sleep.</p> <ol style="list-style-type: none"> <li>1. Consider reducing the amount consumed.</li> <li>2. Avoid drinking alcohol within 6 hours of bedtime.</li> </ol>	
<b>Caffeine*</b>	<p>Promotes wakefulness by blocking chemical receptors in your brain that would help you feel tired. Also increases urine production.</p> <ol style="list-style-type: none"> <li>1. Avoid drinking caffeine within 9 hrs of bedtime.</li> <li>2. Try to stay consistent with the amount consumed (avoid large increases).</li> </ol>	
<b>Nicotine*</b>	<p>Promotes wakefulness by stimulating chemical receptors in your brain. Also increases awakenings and disrupts restorative phases of sleep.</p> <ol style="list-style-type: none"> <li>1. Consider minimizing the amount used. The body can become tolerant to nicotine, but not its effects on sleep.</li> </ol>	
<b>Food</b>	<p>Eating certain foods or large meals close to bedtime can cause disrupted sleep by altering body temperature, reducing release of melatonin (a chemical that makes you feel sleepy), and by disrupting restorative phases of sleep.</p> <ol style="list-style-type: none"> <li>1. Avoid eating within 4 hours of bedtime, particularly foods that are high in sugar and other refined carbohydrates, as well as saturated fats.</li> <li>2. If you do eat close to when you sleep, consider reducing the portion size. Also consider including foods high in fiber.</li> </ol>	
<b>Light Exposure</b>	<p>Sends signals to the brain promoting wakefulness and reduces the release of melatonin.</p> <ol style="list-style-type: none"> <li>1. Reduce light exposure in your bedroom close to bedtime (avoid screens and other light-emitting electronics, consider light blocking curtains or a sleep mask).</li> </ol>	
<b>Exercise</b>	<p>Moderate to intense exercise has a positive effect on sleep. Exercise in the evening raises body temperature and prevents the release of melatonin.</p> <ol style="list-style-type: none"> <li>1. Exercise daily.</li> <li>2. Avoid exercising in the evening.</li> </ol>	
<p>* With long term use, consider slowly reducing the amount consumed to avoid withdrawal effects, which can temporarily worsen sleep.</p>		
<b>Common Treatable Health Conditions that can Impact Sleep</b>		
Obstructive sleep apnea (OSA) Restless leg syndrome (RLS)	Acid reflux (GERD) PTSD	Anxiety Depression
<small>(Baranwal et al., 2023; Gardiner et al., 2023; He et al., 2019; Irish et al., 2014; Sejbuk et al, 2022)</small>		



# Project Methods & Intervention

**Sleep Health Education Survey**

For the following 3 questions, fill in the bubble corresponding to your knowledge level **prior** to today's education and the bubble corresponding to your knowledge level **after** today's education.

1= Not knowledgeable at all      4 = Very knowledgeable  
 2= Slightly knowledgeable      5 = Extremely knowledgeable  
 3= Moderately knowledgeable

	Prior to today's education					After today's education				
	1	2	3	4	5	1	2	3	4	5
1. How do you rate your knowledge of the ways poor sleep can affect health in the short term (days)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. How do you rate your knowledge of the ways poor sleep can affect health in the long term (over many years)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. How do you rate your knowledge of lifestyle strategies to help improve sleep health?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. What about today's education worked well for you?										
5. What about today's education could be improved?										



# Evolution of Project

## Challenges & Changes

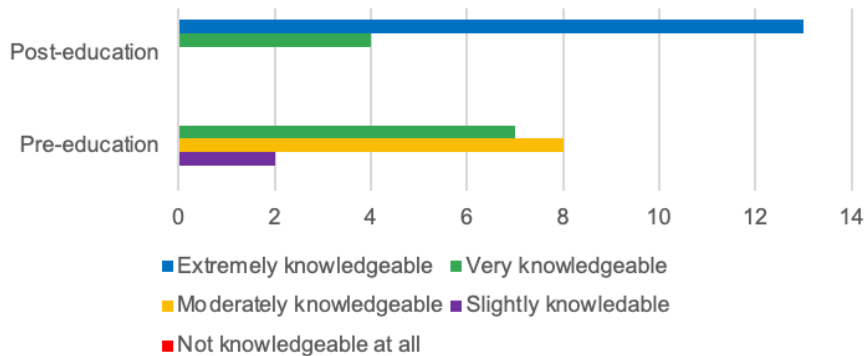
- Distillation of research and creation of materials
- Determining location and approach for education

## Approach & Results

- Presentations at fire stations for in-service firefighters
- 3 presentations
- 17 participants
- 100% participation and survey response rate

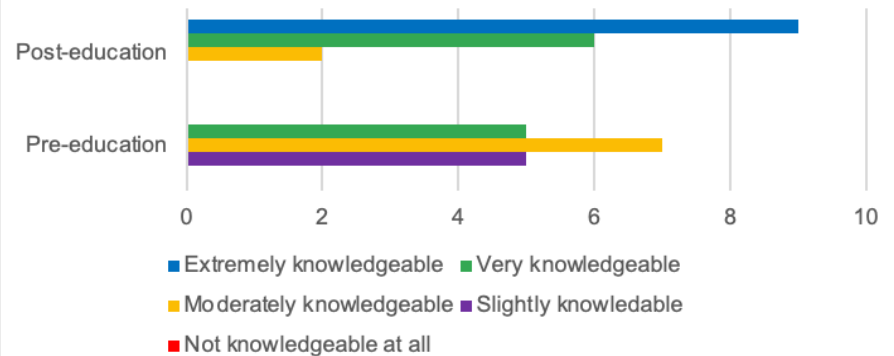
# Survey Results

Q1: How do you rate your knowledge of the ways poor sleep can affect health in the short term (days)?



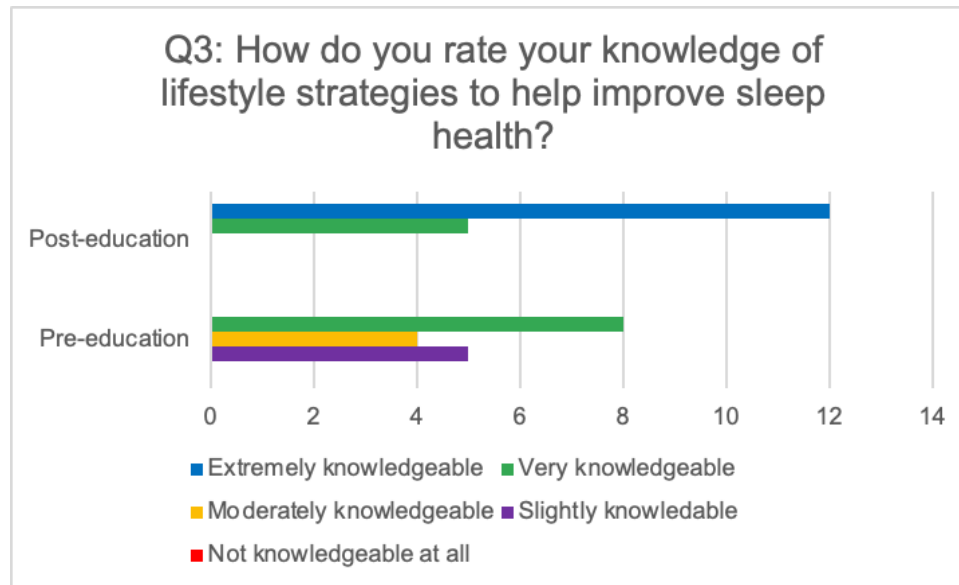
88% Reported improved knowledge  
29.41% Average Increase

Q2: How do you rate your knowledge of the ways poor sleep can affect health in the long term (over many years)?



94% Reported improved knowledge  
28.24% Average increase

# Survey Results



100% Reported improved knowledge  
30.59% Average increase

# Survey Results

Q4: What about today's education worked well for you?

Themes:

- Satisfaction with delivery approach of a short presentation and handout
- Appreciation for straightforward information with actionable recommendations

Q5: What about today's education could be improved?

Theme:

- Desire for additional information about the effects of chronically disordered sleep

# Interpretation of Findings

- Increased knowledge of sleep health concepts
- Qualitative feedback highlights positive participant engagement with the material and approach
- Sleep health education can be integrated into the dynamic and unpredictable work environment of fire stations
- Results are promising as to the potential viability of sleep health education at a larger scale within the organization.



# Next Steps for Project

## **Potential opportunities within the organization:**

- Including sleep health education in organizational wellness initiatives, recruit academy training, including sleep health as a topic in annual firefighter physicals

## **Future work could include:**

- Examining outcomes downstream of knowledge uptake such as:
  - Long-term knowledge retention
  - Behavior change
  - Impact on surrogate markers of sleep health



# Next Steps Professionally

- Rural health rotation
- Obtain national certification
- Find a job!



# Practicum

## Primary Care

- OHSU Primary Care Clinic, Richmond
- Adventist Columbia Gorge Family Medicine – The Dalles

## Internal Medicine

- OHSU Internal Medicine, Marquam Hill
- Grand Ronde Regional Medical Center Internal Medicine - La Grande

## Immediate Care

- OHSU Immediate Care, Portland & Scappoose

## Specialty Placements

- OHSU ED Observation Unit
- OHSU Preoperative Medicine
- OHSU Women's Health

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Thank You