

Paramedic – Evidence Based Medicine (P-EBP) Program

Paramedic CAT (Critically Appraised Topic)

Title: Fatigue in EMS

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Clinical Scenario: Two medics are on shift together. One is on a reverse 24 hour shift and has already worked 60 hours this week. The other only works her allotted hours. They attend a call and the first medic is driving to the hospital when they skim the guardrail. No one was hurt and no time was lost but this could have been much worse. Is it possible that this near miss could have been avoided if the second medic had been driving?

PICO: In paramedics working in an EMS system, do high levels of fatigue compared to less fatigue (or efforts to control fatigue) lead to differences in errors and risk to safety?

Search Strategy: ((Sleep OR fatigue OR hours) AND (Failures OR error*) AND (Prehospital OR EMS OR residents OR interns))

Search Outcome: 165 titles

Relevant Papers: 4 were chosen as relevant for this CAT.

| Title | Design/LOE | Population | Intervention/ comparison | Outcomes Measured | Results |
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| Patterson 2012 | Survey using two standardized tools on sleep and fatigue LOE:3 | Paramedics in the U.S. | n/a | Level of fatigue, quality of sleep, EMS worker injury, errors and AEs, safety-compromising behaviors | 547 surveys returned: -55% found to be fatigued -Average score for sleep quality was 'poor' -1.9 greater odds of injury in fatigue vs. non-fatigued (95% Ci 1.1-3.3) |
| Arnedt 2005 | Comparison simulation study LOE: 2 | 34 pediatric residents on a U.S. hospital | 4 groups compared: -Post 44 hour week (light call) -Post 90 hour week (heavy call) -Post light call + alcohol (0.05% BAL) -Post heavy call + placebo | -Self-rated sleepiness -Attention test -Reaction time test -Simulated driving test -Post-test self assessment | Performance was worse for the following in the heavy call group, compared to the light call: -Attention errors (40% higher, $p < 0.001$). -Driving lane & speed variability (both $p < 0.001$). Performance was worse for the heavy call group compared to light call + alcohol: -Driving speed |

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| | | | | | <p>variability ($p < 0.01$).</p> <p>-Attention test ($p < 0.02$).</p> <p>Self assessed performance for reaction time after heavy call was not well correlated with actual performance.</p> |
| Lockely 2004 | Comparison study LOE:2 | 20 internal medicine residents in a U.S. hospital | Residents worked one of two schedules: traditional schedule which includes overnight on-call shifts and a workweek of 77-81 hours and the interventional schedule with no >16 hour shifts, and a workweek of 60-63 hours. | <p>-Hours of sleep</p> <p>-Attention failures</p> | <p>Residents slept less on the traditional schedule than the intervention schedule (45.9 hours/wk vs 51.7 hrs/wk, $p < 0.001$).</p> <p>Attentional failures occurred twice as often on night shifts on the traditional schedule compared to the new schedule ($p < 0.02$).</p> |

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| Landrigan 2004 | Randomized trial LOE:1 | Residents in MICU and CCU in a U.S. hospital | Residents who were randomized to work: -Traditional schedule: on-call every 3 rd night (29 hours) =77-81 hour week, or -Intervention schedule on call shifts divided in two (0700-2200 and 2100- 1300)=60-63 hours/week | Procedural, diagnostic and medication errors detected by the physician observation, chart reviews and computerized event detection monitors. | -The rate of serious medical errors/1000 patient days was higher in the traditional schedule compared to the intervention (136 vs. 100.1, p<0.001). -Of these serious errors, residents on the traditional schedule made more medication- related (99.7vs 82.5, p<0.03) and diagnostic errors (18.6 vs. 3.3, p<0.001) than residents on the intervention schedule. |
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Comments: Three of these studies may not be directly generalizable to the EMS setting. This must be considered when making conclusions.

Clinical Bottom Line: Health care workers are fatigued and are poor judges of their own level of alertness. The rate of injury, medical errors and driving impairment increase when the workers are more fatigued. Shortening call or shift length could mitigate some of these adverse events.

References:

- Arnedt JT, Owens J, Crouch M, Stahl J, Carskadon MA. Neurobehavioral performance of residents after heavy night call vs after alcohol ingestion. *JAMA*. 2005 Sep 7;294(9):1025-33.
- Lockley SW, Cronin JW, Evans EE, Cade BE, Lee CJ, Landrigan CP, et al. Effect of reducing interns' weekly work hours on sleep and attentional failures. *N Engl J Med*. 2004 Oct 28;351(18):1829-37.
- Landrigan CP, Rothschild JM, Cronin JW, Kaushal R, Burdick E, Katz JT, et al. Effect of reducing interns' work hours on serious medical errors in intensive care units. *N Engl J Med*. 2004 Oct 28;351(18):1838-48
- Patterson PD, et al. Association between poor sleep, fatigue, and safety outcomes in EMS providers. *Prehosp Emerg Care* 2012 (Early Online).