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# Patient Safety Tip of the Week

# May 9, 2023

# Can Light Reduce Fatigue-Related Errors?

Fatigue is a major contributor to errors and accidents in all industries, not just healthcare. Our many prior columns on fatigue in healthcare have focused on the long work hours that are a major cause of fatigue. So, the focus has largely been on preventing fatigue by managing those work hours. But what about acute interventions to minimize fatigue and the errors that often occur because of fatigue. Well-timed breaks and even "power naps" may have a beneficial effect (see our November 2012 What's New in the Patient Safety World column "The Mid-Day Nap" and our September 6, 2016 Patient Safety Tip of the Week "Napping Debate Rekindled").

But how about light? Light, of course, is the major driver of circadian rhythms. After a couple preliminary trials (Olson 2019, Cyr 2022) to see if light could reduce fatigue and prevent errors, Cyr and colleagues (Cyr 2023) conducted a randomized controlled trial of an evening light intervention on night shifts. The study recruited 57 nurses at the McGill University Health Centre who worked schedules that rotated between day and night shifts within the same week.

Participating nurses completed the study over 3 non-consecutive 10-day periods during which they worked similar shift schedules. The first period served as the baseline; participants then learned about their randomly assigned intervention and followed it during the second and third periods.

During the initial 10-day observation period, nurses in the experimental group made a total of 21 errors, ranging from giving the wrong medication dose to accidental needle pricks. However, when given 40 minutes of bright light exposure from a portable light box before their night shifts, the number of errors by nurses reduced to an average of only 7 errors — a reduction of 67%. In contrast, nurses in the control group reported 19 errors during the baseline and an average of 18 during each intervention period, for a 5% reduction.

More experimental participants mentioned improvements in fatigue or alertness at work on the post-study questionnaire (73%) than those in the control group (41%).

This trial confirmed the results of the previous feasibility study (Olson 2019) where the researchers saw a similar 62% reduction in the number of errors at work.

The authors also speculate whether sunlight might replace the light box in similar interventions, at least in the summer. Getting sunlight before sunset and then avoiding light the following morning could potentially improve circadian alignment without the need for additional equipment. They suggest future research could test this hypothesis.

These study results are quite provocative. Very few patient safety interventions produce a 67% reduction in errors. We'd like to see replication of these results in other settings and, more importantly, studies showing sustainability of the results.

**Some of our other columns on the role of fatigue in Patient Safety**:

November 9, 2010 "12-Hour Nursing Shifts and Patient Safety"
April 26, 2011 "Sleeping Air Traffic Controllers: What About Healthcare?"
February 2011 "Update on 12-hour Nursing Shifts"
September 2011 "Shiftwork and Patient Safety
November 2011 "Restricted Housestaff Work Hours and Patient Handoffs"
January 2012 "Joint Commission Sentinel Event Alert: Healthcare Worker Fatigue and Patient Safety
January 3, 2012 "Unintended Consequences of Restricted Housestaff Hours"
June 2012 "June 2012 Surgeon Fatigue"
November 2012 "The Mid-Day Nap"
November 13, 2012 "The 12-Hour Nursing Shift: More Downsides"
July 29, 2014 "The 12-Hour Nursing Shift: Debate Continues"
October 2014 "Another Rap on the 12-Hour Nursing Shift"
December 2, 2014 "ANA Position Statement on Nurse Fatigue"
August 2015 "Surgical Resident Duty Reform and Postoperative Outcomes"
September 2015 "Surgery Previous Night Does Not Impact Attending Surgeon Next Day"
September 29, 2015 "More on the 12-Hour Nursing Shift"
September 6, 2016 "Napping Debate Rekindled"
April 18, 2017 "Alarm Response and Nurse Shift Duration"
July 11, 2017 "The 12-Hour Shift Takes More Hits"
February 13, 2018 "Interruptions in the ED"
April 2018 "Radiologists Get Fatigued, Too"
August 2018 "Burnout and Medical Errors"
September 4, 2018 "The 12-Hour Nursing Shift: Another Nail in the Coffin"
August 2020 "New Twist on Resident Work Hours and Patient Safety"
August 25, 2020 "The Off-Hours Effect in Radiology"
September 2020 "Daylight Savings Time Impacts Patient Safety?"

January 19, 2021 "Technology to Identify Fatigue?"
October 12, 2021 "FDA Approval of Concussion Tool – Why Not a Fatigue Detection Tool?"
February 2022 "Does Time of Day Matter?"
May 2, 2023 "ACGME Work Hour Guidelines Not Good Enough"

**References**:


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Olson JA, Artenie DZ, Cyr M, Raz A, Lee V. Developing a light-based intervention to reduce fatigue and improve sleep in rapidly rotating shift workers. Chronobiol Int 2019; 37(4): 573-591
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Cyr M, Artenie DZ, Bikaii AA, Borsook D, Olson JA. The effect of evening light on circadian-related outcomes: a systematic review. Sleep Med Rev 2022; 64: 101660
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