



# Nurse Fatigue: The Human Factor

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**W**hile not definitive, the newest research on fatigue and staff nurse error rates should send up a red flag for every practicing nurse. In the study by Ann E. Rogers, Wei-Ting Hwang, Linda Scott, Linda Aiken, and David Dinges, the completed field logs of 362 hospital staff nurses kept for 28 days revealed that error rates increase to a level of significance when nurses work shifts of 12 hours or more. The authors of the study admit that there definitely needs to be further research to replicate the current findings and to gain further distinctions on work hours and error rates, such as the impact of work intensity, and recovery time between shifts.

In spite of the need for further study, the research predictably found that there is probably an important link between the

number of hours a nurse works and the potential for commission of errors. If there is any controversy surrounding the study's findings, it surely lies within the culture of nursing and within a health care delivery system that in spite of all scientific evidence to the contrary, encourages persons to work beyond known and acceptable human capacity for safe and productive performance. Nurses are, after all, only human!

## **COSTS OF FATIGUE**

So just how are humans affected by fatigue? According to the National Sleep Foundation (NSF), individual quantity and quality of sleep has an enormous impact on how we feel and perform, and on our quality of life. NSF further documents that a deficit of sleep is associated with decreased alertness, problems with task

completion, problems with concentration, irritability, unsafe actions, and unsafe decision making. These findings are consistent across studies.

Furthermore, fatigue is associated with 100,000 motor vehicle accidents per year and 1,500 deaths in the U.S. It is estimated that in the U.S., fatigue costs around \$18 billion annually in employer productivity loss, and \$12.5 billion per year in personal and property loss. If every human nurse is subject to the effects of fatigue, then how important to the safety of patients is our guarding against fatigue?

David Gaba M.D., director of the Patient Safety Center of Inquiry at the Veterans Administration in Palo Alto, CA, asserts that it is counter intuitive for health care workers to believe that they are different from other human beings

and that extremely long hours of shift work do not have a detrimental effect on patient safety, even if all the evidence needed to support linkage of the two is not yet available. Dr. Gaba points out, as does the Institute of Medicine (IOM), that in most high hazard industries there is an assumption that fatigue associated with long work hours results in poor performance. Yet in the health care industry, concerns over discontinuity of care drive the resistance to change.

Dr. Gaba also points out that fear of discontinuity continues in spite of the fact that we now have technologies that could improve continuity concerns. Gaba D. & Howard S. (2002) found that 41% of medical residents reported a fatigue-related error. They also found that being awake for 24 hours was equivalent to having a blood alcohol level of 0.10 percent. Hey, we know that residents are only human too!

Jha, A. K., Bradford, Duncan, B.W., & Bates D.W. (2004) reviewed studies related to fatigue, sleepiness and medical errors. They observed that adults require 6 to 10 hours of sleep in a 24-hour period and that when adults get less than 5 hours of sleep over a 24-hour period, peak mental abilities decline. After two nights of missed sleep, cognitive performance can fall to nearly 40% of baseline. Sleep debt is associated with slower response times, altered mood and motivation, and reduced morale and initiative. Sleep deprivation, they go on to state, is "common among medical personnel" (their study review included nurse studies). Their review of nurse studies predictably found that self-reported alertness, performance and satisfaction wane with longer

shifts. Moreover, they report that regardless of any recommended or regulated number of hours imposed for residents' work, unannounced monitoring of resident work hours resulted in findings that there was virtually no compliance with regulations or recommendations. Boy, are we medical folks resistant to the idea that working while fatigued is not a good idea or what?

### PHYSIOLOGY OF FATIGUE

Probably the most definitive work on fatigue and the effects of shift work/circadian rhythms has been conducted by the National Aeronautics and Space Administration (NASA). Reporting before the U.S. Congress in 1999, NASA cited the Federal Aviation Administration's (FAA) Human Factors Research Program. The program collects systematic data on fatigue, sleep, performance in flight operations, and circadian rhythms. FAA reported that fatigue is not "a mental state that can be willed away or overcome through motivation or discipline, fatigue is rooted in physiological mechanisms related to sleep, sleep loss, and circadian rhythms."

Voluntary reporting of flight crews to NASA's Aviation Safety Reporting System showed that 21% of reported incidents included fatigue as a factor. For the crew of the horrendous DC8 Crash of 1993 at Guantanamo Bay, Cuba, three factors were evident: cumulative sleep loss, continuous hours of wakefulness, and circadian/time. The accident occurred in the afternoon. Circadian rhythm has two times of maximum sleepiness: between the hours of 3 and 5 a.m., and 3 and 5 p.m. Since that accident, NASA recommended a combination of training, and flexible scheduling (with the inclusion of naps), as well as continued research in order to understand how fatigue-related human error can be decreased in aviation.

The National Transportation Safety Board (NTSB) study of flight crew incidents between 1978 and 1990 found that 50% of airline captains for which data existed had been awake for more the 12 hours prior to their accidents. This led to the conclusion that fatigue is the probable cause of a large portion of air accidents due to impaired judgment and decision



making, and flight handling abilities.

So if a pilot who's been awake for the prior 12 hours (and perhaps, not even piloting the plane) can't necessarily land the aircraft successfully even with the benefit of an instrument panel of data, and a crew, albeit fatigued, telling him he's missed the correct instrument readings, why would nurses who are fatigued think they could continue to provide safe patient care? In many cases, we nurses have to make critical, split-second judgments in patient care without the benefit of instrument panels and supportive crew members.

The NTSB recommended that scheduling policies be amended to not only limit scheduled flight times but also provide time for "adequate restorative rest." Restorative rest varies but NTSB recommends that it include at least 8 hours of continuous sleep before reassignment to flight. The NTSB says that age should be taken into consideration because as persons age, they are more susceptible to sleep disturbance and this should be considered in the calculating of recovery time. OK, you nurses with an average age of 46 years, are you getting adequate restorative rest with your 12-plus hour shifts?

## PREDICTABILITY OF FATIGUE

Now, let's get more specific. What are the laboratory findings regarding sleep deficiency with a loss of as little as 2 hours of sleep in a night?

- decrease in alertness
- worsened mood
- decreased performance including:
  - ◆ degraded judgment,
  - ◆ degraded situation awareness,

- ◆ degraded decision making,
- ◆ decrease in memory,
- ◆ slowed reaction time,
- ◆ lack of concentration,
- ◆ fixation

Of interest to nurses, conditions that contribute to the above problems include how long one has been awake and how long one has been at a particular task. The symptoms of fatigue according to the laboratory studies begin with errors of omission, progress to errors of commission, and finally result in micro sleep (periods of sleep lasting for seconds or minutes).

Let's recap. Our nurse studies and medical studies are not yet definitive on the subject of fatigue and errors. But, every study we have to date implies that we nurses are not different from any other humans who are subject to the effects of fatigue. Those effects are predictable. We even advise our patients to get adequate rest for maximum performance.

So, what are we waiting for? We knew for a decade that studies would prove that nurses were essential at the patient bedside and contributed to the quality of patient care. We now have definitive studies that prove we were right. We should predict, based upon current data, that repeated studies that include larger numbers of nurses and doctors will give us results on error-related fatigue that is similar to results we already have in other safety related industries. We just haven't studied it yet.

What could we do in the meantime? Nurses could be proactive in developing scheduling that improves the safety and quality of care. Within the profession, we could facilitate

schedules that include adequate restorative rest for our colleagues. We could (and we probably should), based upon aviation data, consider the inclusion of naps to counteract micro sleep, especially on night shifts. We could stop encouraging shift durations that exceed reason and admit to each other that we are not super humans - that we are, after all, only human. 🇺🇸

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