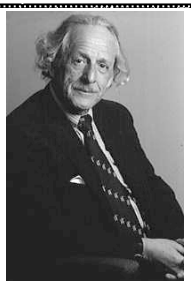
Essays of an Information Scientist: Science Literacy, Policy, Evaluation, and other Essays, Vol:11, p.138,1988
Current Contents, #19, p.3-7, May 9,1988



Current Comments®
EUGENE GARFIELD
INSTITUTE FOR SCIENTIFIC INFORMATION®
3501 MARKET ST, PHILADELPHIA, PA 19104

Sleep Deprivation in the Practice of Medicine: Is It Necessary?

Go to reprint "Sleep Deprivation in Physician Training"

Number 19 May 9, 1988

When you go to the hospital for treatment, you expect or hope for the best care that modern medicine can offer. The accelerating achievements of medical technology in the past several years contribute to that expectation. However, the realities of hospital and medical care are often far from the ideal.

One factor that may contribute to less than ideal treatment in or out of the hospital is sleep deprivation, especially among interns. However, it wasn't until the late 1960s that this topic was discussed openly in medical journals. Recently, there has been a burgeoning controversy among doctors about what contributes to physician and intern impairment. Indeed, in the past five years alone we found over 600 relevant published papers. Adherents of both sides of this topic have aired their views in the *New England Journal of Medicine*.[1-4]

ISI®'s data identified a 1987 research front—"Impairment and stress in interns, residents, and physicians" (#87-2661)—that includes papers on the issue of sleep deprivation. (The core articles for this front are listed in Table 1.) While small in terms of the usual size of research fronts we discuss—57 published (citing) and 9 core (cited) works in 1987—its very existence reflects the growing awareness of the problem if not actual systematic research. Of the nine core papers only the three by J.D. McCue, University of North Carolina School of Medicine, Chapel Hill; R.C. Friedman, Columbia University College of Physicians and Surgeons, New York; and R.J. Valko, Washington University School of Medicine, St. Louis, Missouri, are specifically concerned with sleep deprivation. The bibliography in Table 2 includes these 3 papers and 29 others.

A recent review paper by John B.R. Parker, Department of Anaesthesia, Saskatoon City Hospital, Saskatchewan, Canada, lists the results of studies on interns "acutely and chronically deprived of sleep": difficulty in thinking and learning, memory lapses, negative personality changes, sexual dysfunction, and even suicide. From this evidence Parker asserts that

> Clearly fatigue, and the work habits that produce it, reduce the quality of the physician's work, affect patient safety, and potentially lead to physician impairment with damage to personal mental and physical health.[5]

On the other hand, there is a body of papers that take the opposite viewpoint—that for the most part, the negative-impact results of such studies are inconclusive. A recent paper favoring this view appeared in the *British Medical Journal* and was authored by Ian J. Deary and Rosemary Tait, Department of Psychology, University of Edinburgh, UK. The authors conclude that

> [the] results suggest that there is a factor that accounts for more variation in cognitive performance levels than the effects of being on call—namely, the differences between individual doctors.... A starting point for this future research will be to discover the personality characteristics which make some doctors particularly vulnerable to desynchronization of circadian performance rhythm after disruption of sleep.[6]

Sleep deprivation and its effects have been of major interest to the Armed Forces for

four decades. The National Technical Information Service, which stores all unclassified defense studies, lists over 50 reports related to this topic. While the oldest study dates from 1943, most of the work has been conducted in the past five years.

The reprint that follows, originally appearing in the *New York State Journal of Medicine*,[7] reflects some of the recent exchange of ideas on an old topic.

The author, Emanuel E. Garcia, is presently a resident in psychiatry at the Institute of Pennsylvania Hospital in Philadelphia. I can say with pride that Manny has strong ties to ISI. From 1975 through 1982, he worked as an information scientist at ISI specializing in the arts and humanities.

This is also an appropriate time to mention that besides Garcia, two other colleagues and friends—Richard J. Torpie (a specialist in terminal cancer here in Philadelphia) and Boris Anzlowar (the technical director of Pharmaco-Medical Documentation of Madison, New Jersey)—also attended medical school after working as information scientists. All three have told me how their training as information scientists contributed to their success in dealing with the problems of coping with the information overload heaped on medical students.

Sleep deprivation is not unknown to nonphysicians—even most MD/PhD researchers go through this "rite of passage"—but it seems that the medical internship is one particular situation worthy of review for *Current Contents*® readers.

* * * * *

My thanks to Peter Pesavento for his help in the preparation of this essay.

Table 1: IMPAIRMENT AND STRESS IN INTERNS, RESIDENTS, AND PHYSICIANS. Core papers for the 1987 *SCI*®/*SSCI*® research front #87-2661.

Bissell L & Jones R W. The alcoholic physician: a survey. *Amer. J. Psychiat.* 133:1142-6, 1976.
Friedman R C, Kornfeld D S & Bigger J T. Psychological problems associated with sleep deprivation in interns. *J. Med. Educ.* 48:436-41, 1973.
McAuliffe W E, Wechsler H, Rohman M, Soboroff S H, Fishman P, Toth D & Friedman R. Psychoactive drug use by young and future physicians. *J. Health Soc. Behavior* 25:34-54, 1984.
McAuliffe W E, Rohman M, Santangelo S, Feldman B, Magnuson E, Sobol A & Weissman J. Psychoactive drug use among practicing physicians and medical students. *N. Engl. J. Med.* 315:805-10, 1986.
McCue J D. The effects of stress on physicians and their medical practice. *N. Engl. J. Med.* 306:458-63, 1982.
McCue J D. The distress of internship. Causes and prevention. *N. Engl. J. Med.* 312:449-52, 1985.
Morse R M, Martin M A, Swenson W M & Niven R G. Prognosis of physicians treated for alcoholism and drug dependence. *JAMA—J. Am. Med. Assn.* 251:743-6, 1984.
Vaillant G E, Sobowale N C & McArthur C. Some psychologic vulnerabilities of physicians. *N. Engl. J. Med.* 287:372-5, 1972.
Valko R J & Clayton P J. Depression in the internship. *Dis. Nerv. Syst.* 36:26-9, 1975.

Table 2: SELECTED BIBLIOGRAPHY ON SLEEP DEPRIVATION IN RESIDENTS AND INTERNS. A selected bibliography of papers focusing on various aspects of lack of sleep, stress, and performance by interns and residents. The list is by no means comprehensive; it is intended to give some flavor of research in the field.

Asken M J & Raham D C. Resident performance and sleep deprivation: a review. *J. Med. Educ.* 58:382-8, 1983.
Beatty J, Ahern S K & Katz R. Sleep deprivation and the vigilance of anesthesiologists during simulated surgery. (Mackie R R, ed.) *Vigilance: theory, operational performance, and physiological correlates.* New York: Plenum Press, 1977. p. 511-27.
Chamberlain A. Night-life: sleep deprivation in medical education. *New Physician* 30(5):28-30, May 1981.
Cousins N. Internship: preparation or hazing? *JAMA—J. Am. Med. Assn.* 245:377, 1981.
Davis R M. Sleep deprivation in graduate medical education. *Ill. Med. J.* 160:146-9, 1981.
Elwood J M & Barr R J. A new work schedule for interns aimed at reducing sleep deprivation. *Lancet* 2:371-2, 1973.

Engel W, Seime R, Powell V & D'Alessandri R. Clinical performance of interns after being on call. *Southern Med. J.* 80:761-3, 1987.
Ford C V & Wentz D K. Internship: what is stressful? *Southern Med. J.* 79:595-9, 1986.
Ford C V & Wentz D K. The internship year: a study of sleep, mood states, and psychophysiologic parameters. *Southern Med. J.* 77:1435-42, 1984.
Friedman R C, Bigger J T & Kornfeld D S. The intern and sleep loss. *N. Engl. J. Med.* 285:201-3, 1971.
Friedman R C, Kornfeld D S & Bigger J T. Psychological problems associated with sleep deprivation in interns. *J. Med. Educ.* 48:436-41, 1973.
Hawkins M R, Vichick D A, Silsby H D, Kruzich D J & Butler R. Sleep and nutritional deprivation and performance of house officers. *J. Med. Educ.* 60:530-5, 1985.
Hobson J A. Letter to editor. (Motivation of sleepy interns.) *N. Engl. J. Med.* 285:1381-2, 1971.
Hurwitz T A, Beiser M, Nichol H, Patrick L & Kozak J. Impaired interns and residents. *Can. J. Psychiatry* 32:165-9, 1987.
Klass P. ZZZZZZZZ(Wha'?)ZZZZZZZZZZZZ(Huh?)ZZZZZZZZZZZ. *Discover* 7(12):18, December 1986.
Kollar E J, Slater G R, Palmer J O, Docter R F & Mandell A J. Stress in subjects undergoing sleep deprivation. *Psychosom. Med.* 28:101-13, 1966.
Kranes A. Sleepy interns. *N. Engl. J. Med.* 285:231-2, 1971.
Landau C, Hall S, Wartman S A & Macko M B. Stresses and supports during residency training. *Proc. Annu. Conf. Res. Med. Educ.* 23:44-9, 1984.
Loes M W & Scheiber S C. The impaired resident. *Ariz. Med.* 38:777-9, 1981.
McCue J D. The distress of internship. Causes and prevention. *N. Engl. J. Med.* 312:449-52, 1985.
Mehler P S & Anderson R J. Mechanism of pressor response in medical house officers on call. *Ann. Intern. Med.* 106:560-1, 1987.
Noel G L, Cope D, Nadelson C & Reuben D. Symposium: stress in clinical training: causes, recognition and intervention. *Proc. Annu. Conf. Res. Med. Educ.* 23:399-406, 1984.
Parker J B R. The effects of fatigue on physician performance—an underestimated cause of physician impairment and increased patient risk. *Can. J. Anaesth.* 34:489-95, 1987.
Poulton E C, Hunt G M, Carpenter A & Edwards R S. The performance of junior hospital doctors following reduced sleep and long hours of work. *Ergonomics* 21:279-95, 1978.
Reidbord S P. Psychological perspectives on iatrogenic physician impairment. *Pharos* 46(3):2-8, Summer 1983.
Reuben D B. Psychologic effects of residency. *Southern Med. J.* 76:380-3, 1983.
Reznick R K & Folse J R. Effect of sleep deprivation on the performance of surgical residents. *Amer. J. Surg.* 154:520-5, 1987.
Schwartz A J, Black E R, Goldstein M G, Jozefowicz R F & Emmings F G. Levels and causes of stress among residents. *J. Med. Educ.* 62:744-53, 1987.
Small G W. House officer stress syndrome. *Psychosomatics* 22:860-9, 1981.
Smith P. The night resident schedule at Fremantle. *Med. J. Australia* 1:938-9, 1974.
Valko R J & Clayton P J. Depression in the internship. *Dis. Nerv. Syst.* 36:26-9, 1975.
Wilkinson R T, Tyler P D & Varey C A. Duty hours of young hospital doctors: effects on the quality of work. *J. Occup. Psychol.* 48:219-29, 1975.

REFERENCES

1. **Asch D A & Parker R M.** The Libby Zion case: one step forward or two steps backward? *N. Engl. J. Med.* 318(12):771-5, 24 March 1988.
2. **McCall T B.** The impact of long working hours on resident physicians. *N. Engl. J. Med.* 318(12):775-8, 24 March 1988.
3. **Levinsky N G.** Compounding the error. *N. Engl. J. Med.* 318(12):778-80, 24 March 1988.
4. **Glickman R M.** House-staff training—the need for careful reform. *N. Engl. J. Med.* 318(12):780-82, 24 March 1988.
5. **Parker J B R.** The effects of fatigue on physician performance—an underestimated cause of physician impairment and increased patient risk. *Can. J. Anaesth.* 34:489-95, 1987.
6. **Deary I J & Tait R.** Effects of sleep disruption on cognitive performance and mood in medical house officers. *Brit. Med. J.* 295(6612):1513-6, 12 December 1987.
7. **Garcia E E.** Sleep deprivation in physician training. *NY State J. Med.* 87(12):637-8, December 1987.

Reprinted with permission from the *New York State Journal of Medicine* 87(12):637-8, December 1987.

Sleep deprivation in physician training

Back to Introduction

> Sleep that knits up the ravell'd sleave of care,
> The death of each day's life, sore labour's bath,
> Balm of hurt minds, great nature's second course,
> Chief nourisher in life's feast
> —Shakespeare, *Macbeth*

Professional organizations and bureaucracies can have an uncanny way of undermining the very values that define the work of their members. Medicine, for example, has as its fundamental aim the relief of suffering and the lessening of human misery. As an organized profession, however, it sometimes indulges in certain practices that are harmful both to its members and to the patients it serves. As a physician I feel compelled to call attention to these practices because I believe their perpetuation constitutes no less an inhumanity than their original imposition. I refer, in short, to the nearly ubiquitous custom of requiring doctors-in-training, ie, hospital interns and residents, to work continuously every third or fourth day for 34 to 40-plus hours at a stretch without an assured period of sleep. During my internship I personally averaged approximately one and a half hours of sleep per 36-hour period. The consequences of such a system are, to my mind, far-reaching.

Let me begin with the medical housestaff, the interns and residents who staff most of our teaching hospitals around the clock. The routine pressures, stresses, and demands of caring for a sizable number of patients in today's hospital are not inconsiderable. A high degree of diligence, thoroughness, exquisite attention to detail, as well as a fair amount of intellectual and manual skill are the minimum requirements for competence, constantly demanded and daily employed. Patients admitted to hospitals nowadays are generally more ill than ever before, frequently on the brink of death; and technology makes possible a wider and ever-burgeoning array of therapeutic interventions. Lapses or oversights can sometimes prove fatal. Emergencies necessitating quick and abundant action occur rather frequently. The atmosphere is, to say the least, highly charged.

Immersed in this veritable cauldron of suffering, surrounded by death, compelled to energized vigilance and plain hard work, residents are regularly and systematically deprived of "sore labour's bath, balm of hurt minds"[1]—the much-needed refuge of sleep. It is interesting to note that a common form of torture employed in oppressive political regimes is routinely seen in the training of designated servants to humanity.

The physical effects of exhaustion—slow-wittedness, decreased strength, and impaired dexterity—during the period of sleep deprivation seem obvious. But there are other consequences as well. Curious things happen to a resident's psyche. The hurt, frustration, resentfulness, and intense anger that inevitably follow from what seems to be an endless, claustrophobic cycle of duties are ultimately directed against patients. This is irrational, unfortunate, but true. The patient comes to be regarded more as a "torture machine," ceaselessly bothering residents with demands for care, than as a suffering human being. The goal of treatment becomes disposal (getting the patient out of the hospital) instead of palliation, an attitude that has been well documented.[2] Sympathy and compassion, under the haze of heavy-lidded eyes, give way to hostility and disinterest.

Anyone falling within earshot of a group of residents at the luncheon table would be privy to the black humor directed towards patients. The patient has become the enemy, when the real enemy is the senseless system.[2]

By no means do I imply that we residents routinely indulge in cruelties. Our gallows humor is insurance against this. However, sympathy and tolerance for suffering certainly lessen. During the years that are critical for the cultivation of the appropriate relationship to patients, disease, and death, the poison of an adversarial attitude is introduced and allowed to flourish.

There are other consequences, perhaps more readily apparent. Demoralization, despair, and apathy beset residents. Breakdowns occur. Tempers shorten and outbursts of rage and rudeness flare, to the detriment of nurses and other hospital staff, including colleagues. I know of some residents who have retched, and others who have succumbed to tears during their sleepless stints. And I know of several cases where the muddied thinking and general dullness of mental faculties under conditions of sleep deprivation have resulted in suboptimal treatment. In one such instance, a fatality nearly occurred. In should be obvious that someone who has not slept for 24 or 30 or 34 or 40 hours may not be the person to be relied on for clear, rational decision making, especially where life and death may be at stake. Any sen-

sible individual would cringe at the idea of entrusting his life to a groggy airline pilot. Does one somehow feel more secure being admitted to the hospital under the care of a bone-weary intern who, with the mere slip of his pen, might jeopardize one's existence?

For those of us who survive the training process intact, scars remain. Even in the best of us there would seem to be an ingrained sense of superiority to patients. Furthermore, a sense of entitlement that often begins in medical school continues to develop.[3] After passage through such an onerous period we come to believe that we actually deserve to have the accoutrements of the good life. We become entrenched members of an elite, a breed of royalty, forming an exclusive fraternity. And it is this which explains in part the public's mounting dissatisfaction with physicians.

Sadly, the misery continues to be revisited upon others. Fresh medical school graduates are themselves subjected to the same senseless hazing. The victim has become the persecutor. "They should go through what we went through" is the attitude that prevails.

There is an attempt to justify the present on-call system by citing its value in building character, teaching residents to handle emergencies, and helping students master the details of medicine when a patient remains acutely ill over a long period of hours or days. This is hogwash. Enough emergencies occur both day and night to test our mettle. And education actually suffers greatly. I have learned little, if anything, while groggy. Worse yet, the desire to learn and study, to plumb the depths of medical knowledge during off-hours, is utterly extinguished by the fatigue, and the repulsion against all medical material which we come to feel. The detailed, comprehensive histories and physical exams which we strove so hard to master in medical school become embarrassingly skeletal. The system tends to turn generally compassionate people into cynical automata, at least temporarily; it inspires regression and decompensation rather than healthy growth.

At least one solution does exist, one that requires no additional expenditure of scarce financial resources (not that this should stand in the way), and one that a number of progressive institutions have begun to employ with considerable success. It is simply the use of a shift system, or, as we know it in medical circles, the "night-float." Essentially, it guarantees a period of sleep for each resident on or off call. For example, during my on-call day (the day when I am responsible for admitting patients), I would work until 11 PM, at which time I would be relieved by a fresh resident whose task for the month would be working nights. And at 7 or so the next morning I would return to resume my responsibilities and relieve the night worker, refreshed and possibly even enthusiastic.

I am convinced that this simple change would confer tremendous benefit on medical training. Residency would by no means be devoid of tribulations, but it would prove to be a much more tolerable and humane experience, as implementation has already demonstrated. The solace of assured sleep would make all the difference in the world.

I would like to emphasize yet another consequence of the current process. After we pass through an internship we tend to ignore or deny its damages, preferring instead to preserve only the moments that have given satisfaction, for example, the instances when our work has "paid off" in a "cure." Dismal memories recede, and with them our desire to effect change. In this way we contribute to perpetuating the system, a marked transgression of our own Hippocratic vows, thereby committing future physicians to needless torment and patients to poorer care. This may explain why the advantageous night float system has not yet been adopted on a wide scale across the country.

Recently, *The New York Times*, *Newsweek*, and *Sixty Minutes* touched on some of the points I raise. Even a few of my patients have uneasily asked whether I was one of those "36-hour" doctors. My impression, however, is that the public remains generally ignorant of the process and how it affects them. In no other profession would such reckless practices be tolerated. As a physician, I call on the public to exert its influence on the medical profession to bring about an end to the useless and harmful system I have described. The result would be better medical care and perhaps even the disappearance of the distasteful relics of residency—elitism and entitlement.

EMANUEL E. GARCIA, MD
2120 Race St
Logan Square
Philadelphia, PA 19103

(Dr Garcia has recently completed his internship in a Philadelphia hospital.)

1. Shakespeare W: *Macbeth*, II, ii, lines 38-41.
2. Mezrahi J: *Getting Rid of Patients. Contradictions in the Socialization of Physicians*. New Brunswick, NJ, Rutgers University Press, 1986.
3. Dubovsky JL: Coping with entitlement in medical education. *N Engl J Med* 1986; 315:1672-1674.