

gies.¹⁶ Under this new system, variations in the base sequence of the DNA molecules themselves are examined. One single biologic specimen (DNA from the nuclei of leukocytes from about 40 ml of ordinary venous blood) has the potential to provide polymorphic gene markers that can map major genes on virtually any chromosome in the body. The leukocyte specimens can be frozen for future use, and the prepared DNA can be analyzed repeatedly for different markers. However, the real challenge of the future appears to be the behavioral and social issues of risk reduction. Understanding the cultural transmission of risk factors in the family may be one of our strongest allies in this realm.

Cultural transmission can be even stronger than genetic transmission. A dominant trait is expected to affect only half of all offspring, whereas some culturally transmitted characteristics, such as dietary fat intake or smoking habits, may be transmitted to most or even all offspring. Successful intervention affecting such culturally transmitted factors can be much more successful when directed to families rather than individuals.^{17,18} When family predisposition is due to cultural factors, as it seems to have been for cancer among the Danish adoptees in the article by Sørensen et al.,⁹ changing the behavior of the whole family could interrupt this cycle and substitute the cultural transmission of health rather than disease. Even for genetic predispositions, family traditions of compliance with screening procedures and targeted changes in life style may help protect the whole family against a disease to which its members are susceptible, just as vaccination protects highly susceptible infants from deaths due to whooping cough and diphtheria.

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SOUNDING BOARD

THE LIBBY ZION CASE

One Step Forward or Two Steps Backward?

THE unexpected death of a young woman at the New York Hospital in 1984 prompted a series of regional investigations that have resulted in recommendations of profound changes in graduate medical education. An initial proposal included the suggestion that work shifts be imposed to limit the long hours traditionally worked by house officers. Although this proposal was sparked by a single event, it did not occur in isolation; a variety of forces from inside and outside the profession gave it support. We examine the political and social pressures that urged the adoption of work shifts in the medical profession and interpret the implications of this trend.

THE LIBBY ZION CASE

In March 1984 an 18-year-old woman named Libby Zion died at the New York Hospital a few hours after she had been admitted through the emergency room. Zion's father, an attorney and a writer for *The New York Times*, claimed that his daughter had received inadequate care in the hands of overworked and undersupervised medical house officers. He persuaded New York County District Attorney Robert Morgenthau to begin a grand jury investigation into her death. What follows is a summary of the circumstances in the case, derived from a lengthy report issued in late December 1986 by the grand jury.¹

In January 1984 Libby Zion began psychiatric treatment for stress. Her therapy included phenelzine, which she took until the day before her arrival at the hospital. In late February she had a tooth extracted, and her dentist prescribed Percodan (aspirin-oxycodone hydrochloride) for pain. A few days later she had a fever and otalgia, and her personal physician prescribed erythromycin and chlorpheniramine. (During the preceding two months she had also been given

imipramine, flurazepam, diazepam, tetracycline, and doxycycline, though the circumstances surrounding the prescription of these drugs are not detailed in the grand jury's report.)

Over the next few days, Ms. Zion's fever persisted and she had chills, myalgias, and arthralgias. On March 4 her temperature reached 41°C. That day her father contacted his doctor, an attending physician at the New York Hospital, who suggested that Mr. Zion take his daughter to the emergency room there.

She arrived at the emergency room at 11:30 p.m. The junior medical resident obtained the history noted above, although he was not aware of the previous prescriptions for imipramine, flurazepam, diazepam, tetracycline, and doxycycline. The patient stated that she had not taken erythromycin or phenelzine that day because she had felt too ill. She admitted to frequent use of marijuana but reported no use of cocaine or any other drugs.

The patient was writhing during her physical examination; the resident believed this to be volitional. She had a temperature of 39.7°C and mild orthostatic blood pressure changes. Her right tympanic membrane was hyperemic; she had a soft murmur, a clear chest, and petechiae on her right thigh. The leukocyte count was 18,000 per cubic millimeter, and a chest film was normal. The patient was given intravenous fluids, and one set of blood cultures was obtained.

After a telephone discussion between the resident and the referring physician, the patient was admitted to the medical service at 2:00 a.m. and given acetaminophen. She was examined by both the intern and junior resident, who obtained separate histories. Both their admission notes described her agitation. The junior resident made a tentative diagnosis of "viral syndrome with hysterical symptoms." He recommended that blood, urine, and stool cultures be obtained, antibiotics be withheld, phenelzine be discontinued, therapy be administered for fever, and 25 mg of meperidine be given for agitation and shivering. The intern's tentative diagnosis was "viral syndrome." The admitting orders specified "routine" vital signs.

At 3:30 a.m. the patient was given the meperidine intramuscularly. Shortly thereafter, the house officers left the floor to care for other patients. Between 4:00 and 4:30 a.m., the patient became more restless and confused and began thrashing about in bed. The intern was notified of the patient's status twice during this period and, over the telephone, first ordered the use of physical restraints and later ordered 1 mg of haloperidol. Between 4:30 and 6:00 a.m., the patient was noted to be resting and the restraints were removed. She was calmer and able to take acetaminophen by mouth. Shortly thereafter she again became agitated and was found to have an axillary temperature of 42°C. The intern was called, and cold compresses and a cooling blanket were ordered. At 6:30

a.m. the patient went into respiratory arrest and could not be resuscitated.

The medical examiner's report of March 6, 1984, listed the preliminary cause of death as bilateral bronchopneumonia. The report stated that the patient had "hyperpyrexia and sudden collapse shortly following injection of meperidine and haloperidol while in restraints for toxic agitation." A toxicologist detected acetaminophen and antihistamines in the tissues. Radioimmunoassay revealed trace amounts of cocaine in a specimen from the patient's nostrils. Gas chromatography did not confirm this finding, but serum samples obtained before death were found to be positive for cocaine by radioimmunoassay. The medical examiner considered the evidence of cocaine use to be presumptive but not conclusive.

Although the grand jury returned no criminal indictments against the New York Hospital or its physicians, it found much fault with a system of residency training and physician staffing that could allow such a tragic death to occur. The grand jury's report was, in effect, an indictment of American graduate medical education. In it, the jury emphasized five circumstances it believed contributed to Libby Zion's death and made recommendations for corrective action in five corresponding aspects of hospital care.

First, Libby Zion had initially been evaluated in the emergency room by a junior (second-year) resident, who had discussed her care over the telephone with the referring attending physician; however, she had not been examined in the emergency room by an attending physician. The first recommendation of the grand jury was that

The State Department of Health should promulgate regulations that mandate all level one hospitals to staff their emergency rooms with physicians who have completed at least three years of postgraduate training and who are specifically trained to evaluate and care for patients on an emergency basis.

Second, Ms. Zion had been admitted to the medical service under the immediate care of an intern and a junior medical resident. The grand jury's second recommendation was that

The State Department of Health should promulgate regulations to insure that interns and junior residents in level one hospitals are supervised contemporaneously and in-person by attending physicians or those members of the housestaff who have completed at least a three-year postgraduate residency program. These regulations should narrowly define the circumstances under which interns may practice medicine without direct supervision.

Third, Ms. Zion had been admitted to the medical service at 2:00 a.m., when the intern and junior resident caring for her had each been at work for 18 hours. The third recommendation of the grand jury was that

The State Department of Health should promulgate regulations to limit consecutive working hours for interns and junior residents in teaching hospitals.

Fourth, Ms. Zion had been placed in physical restraints on the orders of the intern, who had examined her an hour earlier but did not reexamine her at the

time of the order, which was given by telephone. The fourth recommendation of the grand jury was that

Legislation should be enacted to prescribe when a patient in a medical hospital may be physically restrained and to standardize the care and attention necessary for a patient in restraints.

Fifth, Ms. Zion had been given a dose of meperidine despite the physician's knowledge of her history of treatment with phenelzine. The *Physician's Desk Reference* lists treatment with phenelzine as a contraindication to meperidine. The fifth recommendation of the grand jury was that

The State Department of Health should conduct a study to determine the feasibility of requiring level one hospitals to implement a computerized system to check for contraindicated combinations of drugs.

The grand jury report was issued at a time when media coverage of the Libby Zion case was prompting questions about the quality of care in teaching hospitals. Many questions focused on the long hours that interns and residents work and on their lack of adequate supervision. At the same time, a sociological study of house officers suggested that long work hours and other intense pressures of clinical training condition physicians to view patients as enemies, in contradiction of the implicit and desired principles of patient care.²

Meanwhile, New York City Council President Andrew Stein, who had established himself politically as a consumer advocate for health care in New York City (and who, coincidentally, had employed Libby Zion as a student intern), published a health department study suggesting that mistakes were to blame for many deaths in hospitals in New York City.³ In that climate David Axelrod, commissioner of the New York State Department of Health, appointed Bertrand Bell to chair the Ad Hoc Advisory Committee on Emergency Services, composed of nine distinguished New York physicians.

The committee reviewed the grand jury's report on the Zion case and released a preliminary statement in early June 1987 that assessed and ultimately endorsed each of the report's five recommendations.⁴ The proposed limits on consecutive working hours for interns and residents prompted the committee to suggest that the shifts worked by house staff and attending physicians in emergency services be limited to 12 hours and that physicians caring for patients outside of emergency services work in shifts limited to 16 hours, with at least 8 hours off between shifts.

The committee recognized that its five recommendations would have a profound impact on the health care system. During August, therefore, the committee heard testimony from concerned and informed parties, including the Accreditation Council of Graduate Medical Education, the American College of Physicians, the American College of Surgeons, the American Medical Association, the Association of American Medical Colleges, the Association of Program Direc-

tors in Internal Medicine, the Committee of Interns and Residents, the Greater New York Hospital Association, and the Health and Hospitals Corporation. Much of the testimony concerned potential problems of implementation, including effects on graduate medical education, hospital staffing, malpractice litigation, and health care financing. The Greater New York Hospital Association offered a detailed analysis of the committee's preliminary report and estimated that the proposed recommendations would require an additional 2045 full-time-equivalent attending physicians and 974 full-time-equivalent ancillary personnel in 50 New York City hospitals, at a total annual cost of \$203,955,001.⁵

In October the Committee on Emergency Services modified their preliminary statement and issued 19 recommendations to the New York State Department of Health. Its comprehensive report called for on-site supervision of busy emergency rooms by attending physicians and 24-hour supervision of acute care inpatient units by experienced physicians. The committee also called for improved working conditions and greater ancillary support for residents. It suggested guidelines for the use of physical restraints and recommended further study of drug-information systems. The committee upheld its recommendation of a 12-hour limit on coverage of emergency departments by attending physicians and residents. Although it did not suggest that work shifts be abandoned altogether in the inpatient setting, the committee replaced the rigid 16-hour limit with more flexible guidelines. The 13th recommendation of the committee was that

Individual residents who have direct patient care responsibilities in areas other than the Emergency Department shall have a scheduled work week which will not exceed an average of 80 hours per week over a 4 week period and should not be scheduled to work as a matter of course for more than 24 consecutive hours, with one 24 hour period of non-working time per week. . . .⁶

FORCES FROM WITHIN THE PROFESSION

The political pressures to limit residents' working hours stem from a desire to improve patient care. Parallel to these political pressures is the growing influence of the life-style preferences of graduate medical trainees. As medical industrialization and patient consumerism change traditional concepts of the physician's role, the personal demands of residents and other physicians for more leisure are becoming more compelling. The growing allure of specialties like radiology, anesthesiology, and ophthalmology and the trends toward shared medical practices and employment in health maintenance organizations are easy to explain in economic terms. But these trends may also reflect a desire for predictable working hours and increased leisure time.

The Committee of Interns and Residents, a union of about 5000 residents working in public hospitals in New York, New Jersey, and the District of Columbia, testified to the Ad Hoc Advisory Committee on Emer-

agency Services in favor of the 16-hour limit on work shifts and suggested an additional restriction on cumulative weekly working hours. The Committee of Interns and Residents was instrumental in the 1975 strike by residents in several New York hospitals, when a demand for a 15-hour limit was met only by a reduction in the frequency of overnight on-call duty from every second to every third night.

WHY LONG HOURS?

The long working hours of residency are a tradition in physicians' training. Some believe the tradition is maintained by inertia, in a bow to medicine's historic foundations. Others believe it is a rite of passage that tests residents' worthiness. Still others claim that the long hours are essential to proper training — that an understanding of the evolution of many acute diseases can be gained only through the observation of affected patients over time. Finally, some argue that residents are an elastic source of physician labor and that extended hours are a concession to the economic realities of fiscal temperance.

All these popular arguments hold some truth. But when a house officer attends to an acutely ill patient he admitted 30 hours earlier, the issue is the quality of care — not history, rite, training, or economics. Residents recognize their obligation to provide care and believe that their work with the patient fosters a special understanding that cannot be fully transferred to another, perhaps equally qualified, covering resident. The care another resident provides will at best be a pale form of their own. The concept of shift hours denies this aspect of physicianship.

SHIFT HOURS AND THE PROBLEM OF CONTINUITY

Patients require care 24 hours a day, and although the medical system can operate on a continuous schedule, physicians cannot.⁷ Shift work offers one solution to this conflict; however, it subjects patients to a succession of physicians, exposes residents to patients in fragmented blocks of time, and subordinates the Samaritan aspects of physicianship to shift loyalty and the organizational needs of the system.

Doctors form relationships with their patients and have a sense of responsibility to them that does not start and stop at scheduled times. At some point, however, the benefit of having a patient's own physician available is offset by that physician's fatigue. At other times, physicians' personal needs for leisure interfere with their availability to their patients. In these situations, covering residents or attending physicians represent an appropriate compromise for continuity. But if we impose rigid shift hours on graduate medical trainees and make them abandon their patients' bedsides at preestablished times, we will give future practitioners the wrong message about caring for patients.

These conflicts do not arise in all medical settings. In emergency rooms and walk-in ambulatory care centers, the doctor-patient relationship is defined by acute rather than longitudinal needs, and shift work

makes sense. Equally qualified physicians will, in general, provide equivalent and substitutable care in these settings.

In systems in which patient care is performed by physicians working in shifts, the medical profession is reshaped into an industry that follows the traditional models of business organization and management. To this end, Harvard Business School's Theodore Levitt warns that

If we continue to approach service as something done by individuals rather than by machines or systems, we will continue to suffer from . . . distortions in thinking. . . . Service will be viewed as something residual to the ultimate reality — to a tangible product, to a specific competence (like evaluating loans, writing insurance policies, giving medical aid, preparing on-premises foods).⁸

Administrators have powerful incentives to embrace these systems, because the implementation of shift hours undermines physicians' power: the fragmented, production-line approach to continuous care increases the substitutability of physicians, making each one more replaceable.

THE ZION CASE IN ITS BROADER CONTEXT

The grand jury's recommendations were motivated by a desire to improve hospital care. But the grand jury confused professional incompetence with long working hours. In concentrating on the fact that the residents caring for Libby Zion had been working for 18 hours by the time they evaluated her, the grand jury assumed that the residents were fatigued and that fatigued residents threaten patients' safety. Such assumptions are not well supported: physicians differ in their tolerance for sleeplessness, and it is not easy to prove a correlation between fatigue and medical incompetence.^{9,10} Instead, the grand jury might have recommended that working conditions in hospitals not contribute to professional incompetence. Limiting working hours is only one way to improve working conditions for residents. Other ways include ensuring a tolerable balance between residents' medical education and their responsibility for patients; respect from professional staff and allied personnel; adequate ancillary and administrative support services; sufficient educational resources in the form of libraries, conferences, and role models; salaries and benefits commensurate with service; and institutional and departmental recognition of residents' human needs.

Patients should be protected from physicians who are so overworked that their competency is challenged. Residents should work in environments that satisfy their professional and personal needs. Neither goal requires categorical limits on working hours. We must separate the issues of professional incompetence and prolonged hours, and we must distinguish working hours from the larger issue of working conditions. These challenges will best be met through further study.

The Libby Zion case has achieved its profound influence through the political climate surrounding it. In making its recommendations, the grand jury acted

as a consumer advocate, expressing to the New York State Department of Health the limits of consumers' tolerance. The rise of consumerism among patients set the stage for the jury's directives.

The heroic image of the physician is fading. As patients are increasingly recognized as consumers of health care and physicians as its producers, physicians are more willing to abandon a tradition of service for an industrial work ethic. The predictable schedules afforded by time clocks are compelling benefits of this ethic. Although the Ad Hoc Committee on Emergency Services ultimately tempered its suggestion of work shifts for residents, the issue will surface again.

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THE IMPACT OF LONG WORKING HOURS ON RESIDENT PHYSICIANS

EVEN without long hours, residency training would be stressful. Multiple demands are placed on house officers, who often find there is more work to do than time to do it. The beeper interrupts; pages come more quickly than they can be answered. Residents feel insecure about their competence; they must assume major responsibility for medical decisions, even though their knowledge and clinical skills are at times inadequate. The sense of inadequacy is exacerbated by the competitive environment and the intimidating nature of teaching rounds, especially in university hospitals. To disagree with attending physicians over questions of patient care can bring stress, especially when the disagreement concerns the appro-

priateness of aggressive measures in a critically ill patient.¹ The constant exposure to death, suffering, and disability tests the house officer's emotional stability. It is especially difficult for residents when younger patients die. Because of the acquired immunodeficiency syndrome (AIDS), many residents are seeing a dramatic increase in deaths of young persons. The AIDS epidemic has also added to residents' anxieties about themselves. Even though AIDS is not easily transmitted to medical personnel, residents fear inadvertent inoculation with the virus during invasive procedures — especially when they are deprived of sleep.

Other sources of stress for residents bear no relation to their work in the hospital. The normal pressures of young adulthood include separating from parents, forming committed relationships, and having children. Relocating geographically for residency training adds stress by separating residents from friends and family just when social support is most needed. Moreover, it is difficult to develop new support systems when free time is so limited.²

Finally, huge debts from medical school are a constant worry.^{3,4} The average expenses of 1988 medical school graduates will be almost \$50,000 at public institutions and twice as much at private schools. Many house officers moonlight to earn extra money, thus adding to their already very heavy work schedule.

THE IMPACT OF LONG HOURS ON RESIDENTS' LIVES

But more than anything else, long hours add to the stresses of an already demanding job. House officers frequently work more than 100 hours per week. In such a week, assuming two nights on call, sleep consumes 44 hours: 8 hours on nights off and a 2-hour nap after each night on call. Transportation may take 5 to 10 hours, depending on the commute. Getting ready for work takes 5 hours, allowing 1 hour to shower, dress, and eat each morning. This leaves 9 to 14 hours free per week. In those hours, residents must recover from a stressful job, spend time with their spouses and families, and take care of errands. There is little time to pursue hobbies or visit friends. Moreover, residents are expected to study medicine while off duty.

Lack of free time interferes greatly with personal relationships. Even if residents have time when they come home from work, they are often so emotionally and physically drained that they have little energy left to give to their mates. Residents wanting only to "turn their brains off" may be resented by partners who have not seen them for days. In one study, more than 40 percent of medical residents and fellows reported major problems with their spouses or lovers; 72 percent of these respondents thought the problems were due to their residency. Of those with major relationship difficulties, 21 percent thought their work at the hospital was also being adversely affected.⁵

Residents not in relationships have little opportunity to form them, given the time constraints. This prob-