

Back Pain in the Workplace

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IN 1911, NEW YORK WAS THE FIRST STATE TO LEGISLATE “workmen’s compensation insurance.” By 1949, all states independently administered workers’ compensation insurance programs. Several stipulations were common to these statutes and remain so today. Foremost is to indemnify medical costs and lost wages when a worker has experienced a work-related personal injury, generally defined as an injury that arose “out of and in the course of employment.”¹ The intent of these schemes is to minimize the financial toll that compounds such injuries. From the outset, the notion of “injury” was contentious. For instance, if an inguinal hernia is first noticed at work, is that a compensable injury? It became so when “rupture” became parlance.

Regional back pain frequently affects adults who are generally otherwise well and who experienced no unusual, let alone traumatic, precipitant.² Regional back pain was not considered an injury until the mid 1930s when Mixter and Ayer ascribed cauda equina syndrome, if not all backache,³ to disk “rupture” and described a surgical remedy. “Rupture” captured the attention of all workers’ compensation administrators and adjudicators, as well as others involved in workplace safety and in providing a remedy whenever safeguards failed. If the outcome is a “rupture,” even if the precipitant is an activity that is customary and customarily comfortable, the worker has sustained a compensable back “injury.” Ever since, back “injury” has hung like Damocles’ sword over the resource-advantaged world, inside and outside the workplace, wreaking havoc on the lives of workers with disabling backache for whom workers’ compensation insurance is designed to provide a remedy. Over the past few decades, the construct, the diagnosis, and many of its ramifications have been systematically studied.⁴ Diskal “rupture” is a flawed pathogenetic theory and compensable back “injury” an iatrogenic sophism.

The causes of regional back pain continue to elude scientific inquiry. The degenerative changes that characterize spinal pathoanatomy escalate in incidence with each passing decade until they are ubiquitous but have almost nothing to do with life activities. The age of onset and the degree of degenerative change are largely genetically determined; the contri-

butions of environmental influences are barely discernable.⁵ Age-appropriate spines, however hoary, do not bear witness to a life of damaging trauma, nor do they offer anatomical clues as to the cause of backache. They mark longevity, not decrepitude.⁶ Therefore, “wear and tear” and “injury” are no longer tenable pathogenetic inferences.

The common cold can arise both in the course of working and out of the course of working because exposure to droplet infections occurs in the workplace. The common cold can be a transiently disabling illness but is not considered an injury or even an occupational disease. Certainly regional backache can also occur in the course of working. But can backache also “arise out of the course of working,” as an injury? Can biomechanical stressors that are usually comfortable turn pathogenic? After all, regional back pain is mechanical; pain increases when biomechanical strain is exerted across the hurting back simply by leaning forward. Tasks that were always comfortable at work and at home become more daunting, if not prohibitive.

The back “injury” construct holds that physical demands that render the pain less tolerable are the proximate cause of the back pain and hence the agent of “injury.” This is a damaging misconception for the medical and workers’ compensation systems. Multiple cohort studies in the contemporary workplace can discern little if any influence of a vast array of task demands on the incidence of disabling backache. As is true of spinal pathoanatomy, the incidence of backache has almost nothing to do with “minor trauma.”⁷ Furthermore, the incidence of back “injury” has proved refractory to successive waves of ergonomic advice and devices, of clinical and rehabilitative inventiveness, and of regulatory and legal machinations in the United States⁴ and across the resource-advantaged world.⁸

Regional backache is a common predicament inside or outside the workplace. Whatever the biomechanical precipitants, they cannot be shown to be more specific to the workplace than the viruses that cause upper respiratory tract infection. Backache is the bane of many individuals; back “injury” remains the bane of the workforce even though tasks in the modern workplace are far less physically demanding than

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those of earlier generations. Workers' compensation insurance costs US employers 2% to 4% of gross earnings,⁹ the majority of which underwrites compensable back "injuries."¹⁰ The back claim rate in the United States varies widely across industries but not across states, approaching 1 in 10 000 covered workers compensated for at least 3 days of lost time each year (a rate some 60-fold higher than that in Japan).¹¹

Fortunately, modern science has probed for and discerned associations with disabling backache that supersede the "injury" paradigm. The result is an entirely different conception of backache. Like the "common cold," backache is an intermittent and remittent predicament of life. It is unlikely that a healthy adult will escape a year without at least 1 important episode of low back pain.¹² For most adults, the episodes resolve rapidly, but often have lingering symptoms.¹³ Some, a substantial minority, heal slowly if at all and face daily biomechanical challenges. A worker facing these challenges might see no option but to seek a disability award under workers' compensation if the backache is viewed as an "injury." Common sense dictates that the reasons a worker is more likely to find backache disabling relate to the intensity of the pain, the physical demands of tasks, and the effectiveness of health care interventions. Common sense is often incorrect, particularly in the case of the compensable back "injury." Extensive and compelling science^{14,15} supports the premise that confounders to coping with backache lurking in the psychosocial context of work are far more consistently associated with disabling backache than confounders to coping that lurk in the physical demands of tasks at work. Studies from Manchester,¹⁶ London,¹⁷ Leiden,¹⁸ Helsinki,¹⁹ and Copenhagen²⁰ bolster this inference. Still, the back "injury" construct is entrenched; it supports and is supported by an enormous enterprise that is unshaken by studies impugning its validity.

The convergence of the inferences of Mixter and Ayer regarding disk rupture³ and the workers' compensation insurance paradigm have transformed backache into a surrogate complaint. If life is bleak, particularly life at work, and there is no alternative employment, the next backache is likely to seem more than the proverbial "straw"; it is an "injury." No physician, employer, human resource professional, claims adjuster, or worker is likely to realize that the backache is intolerable and disabling because the job is intolerable, unsatisfying, or insecure; the supervisor is insensitive, hostile, or cruel; coworkers are antagonistic; the worker feels undervalued or underpaid; or the worker is overburdened by personal baggage—and sees no way out. "I injured my back" is this semiotic.

Does it matter that back "injury" is often a surrogate complaint? After all, the backache can be disabling nonetheless—not because of what is lifted, but whether or when it is to be lifted. Such a surrogate might be countenanced if launching a workers' compensation claim benefited the worker who is hurting. Too often a salutary outcome proves elusive. Resources are expended in the attempt to fix the "injured" spine; in demanding the worker prove that the "injury" is disabling;

in attempting to teach the disabled worker that the "injury" is not disabling; and to blame the worker for not returning to the work that was unpleasant, even abhorrent, in the first place. In the aggregate, these are great sums of money in an exercise that misses the forest for the trees. More important, these expenditures miss the central issue and capture the worker in escalating iatrogenicity. The workers' compensation system is transferring the majority of its largesse to provide the worker with a back "injury" treatment that is tinged by racial bias,²¹ ineffective surgery,^{22,23} and invalid, if not fatuous, determinations of residual disability.²⁴

Certainly the resource-advantaged world owes its workforce employment that is comfortable when workers are well and accommodating when they are ill, even ill with such predicaments of life as the next episode of disabling backache.²⁵ However, there is a far more important legacy from the 20th century's debacle with back "injury." Even more important than a workplace that is comfortable when workers are well and accommodating when they are ill is a workplace that appreciates each individual's humanity: the need to be valued, the need to feel secure, the need for some autonomy, and the need to see a future. "Human capital" deserves no less.

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Crash Risk in General Aviation

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IN THE AFTERNOON OF OCTOBER 11, 2006, A PRIVATE PLANE crashed into an apartment complex in Manhattan, killing the pilot, New York Yankees pitcher Cory Lidle, and his flight instructor Tyler Stanger. The impact destroyed the 4-seat, single-engine aircraft and set the building on fire. The crash scene brought aviation safety back to national headlines.¹ In this article, we examine the crash risk of private flights, identify major factors influencing survival in aviation crashes, and discuss possible approaches for improving the safety of general aviation.

Crash Rates

Civilian aviation generally can be divided into 2 groups: commercial and noncommercial flights.² Commercial flights transport individuals and goods to generate revenue; they include operations of major airlines, commuter air carriers, and air taxis. Noncommercial flights, usually called general aviation, encompass a wide array of activities—emergency medical services (EMS), sightseeing, flight training, traffic reporting, aerial surveys, search and rescue, crop dusting, firefighting, logging, recreation, and personal or business use. General aviation aircraft range from small private airplanes and business jets to helicopters, hot-air balloons, and gliders.

Currently, there are approximately 228 000 active private pilots and 220 000 registered general aviation aircraft in the United States; 93% of the aircraft are planes, 4% are rotorcraft, and 3% are nonmotorized craft such as gliders.³ From 2002 through 2005, general aviation, with an annual average of 1685 crashes and 583 deaths, comprised 91% of all aviation crashes and 94% of all aviation fatalities.⁴ The fatal crash rate for general aviation, 1.31 fatal crashes per 100 000 flight hours, is 82 times the rate for major airlines (0.016).³ This difference in crash rates has persisted over many decades.

Risk Factors for Crash Involvement

Due to their relatively small aircraft size and low altitude, general aviation flights are especially vulnerable to adverse weather conditions. Flight procedures vary with weather conditions. Visual flight rules regulate procedures for flight under visual meteorological conditions (defined as a ceiling of 1000 feet and 3 miles of visibility), with the guiding principle of “see and avoid.” Flight under reduced visibility is governed by instrument flight rules, for which the navigation and control of the aircraft are performed using instruments. Although commercial flights are almost always operated under instrument flight rules, general aviation pilots often fly under visual flight rules and may not have the necessary training for flying under instrument meteorological conditions. For pilots without instrument training, flying from visual flight rules into instrument meteorological conditions is a perilous scenario. A case-control study revealed that having been initially licensed after age 25 years and not having an instrument rating (ie, not being qualified for flying under instrument flight rules) are each associated with a 4-fold increased risk of being in a general aviation crash in instrument meteorological conditions.⁵ Partly reflecting inadequate training and flight experience, pilot error is a contributing factor in 85% of general aviation crashes compared with 38% of airline crashes.⁶

Other environmental factors (eg, airport features, wires, and terrain) also play an important role in general aviation safety. Flying is especially hazardous in Alaska, where the crash rate per flight hour for general aviation is nearly 3 times the national average.⁷

A considerable body of research literature on pilot characteristics and crash risk exists.⁸ Alcohol-impaired flying is a well-established risk factor for general aviation crashes.

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