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Occupational health in the construction industry

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Occupational health in the construction industry

Construction remains a dangerous business. To take Great Britain, where it is now the country's biggest industry and where reporting is, generally speaking, accurate, construction (employing 6–7% of the working population) accounted for 31% of fatalities to workers in 2002–2003 when compared with 27% in 1991–1992. The rate of fatal injuries to workers generally fell in the 1990s until 1998–1999 but rose in the subsequent 2 years, in 2000 and 2001. The rates have remained fairly constant over the last 10 years at 4–5 per 100 000 workers, which compares with an average of about 10 per 100 000 during the 1980s (1).

Some improvement has occurred, therefore, and it is paralleled in the experience of many other economically developed countries. In the United States, for example, the fatality rate in construction seems to hover around 13 per 100 000 employed, but it has to be said that intercountry comparisons of these rates is fraught with difficulty because of the varied ways in which they are calculated, recorded, and presented (2–4).

In developing countries, estimates of fatality rates are difficult to come by, but there have, in the past, been reports of 300 per 100 000 in large dam building projects.

Other consistent findings show that fatal injuries are higher than nonfatal injuries when compared with other industries, presumably reflecting the greater likelihood of not surviving a construction accident than an accident in another industry. Nonfatal injuries are, however, seriously under-reported in comparison with fatal injuries, increasing the fatal-to-nonfatal ratio. Employment in construction has risen substantially in recent years throughout the world with a reduction in fatal and major injury rates in the well-controlled sectors.

Whatever the rates, the causes are similar—for example, in the United States falls from or through roofs lead all other causes in the number of fatal events (11.8%), followed by falls from or through structures (8.9%), electric shock by equipment contacting a power source (6.1%), being crushed or run over or trapped by operating construction equipment (5.8%), lifting operations (5.8%), trench collapse (5.7%), and electric shock from equipment installation or tool use (5.5%). In terms of where they occurred, 45% of fatalities to United States construction workers in private industry in 2001 occurred at a construction site, industrial place or premise, 22% on a street or highway excluding road construction, 18% at another location, 10% in residential construction, and 5% in road construction (5).

In Great Britain, construction plant and related operatives and other laborers accounted for about 30% of all fatal and major injuries in the last 2 years with twice the rate of the industrial average. Those with three to four times the average number of construction industry injuries are roofers, scaffolders, steeplejacks, steel erectors, and metal trades workers. Workers in construction who have spent the least time with their current employer have the highest rate of reportable injuries such that the annualized rate of injuries to workers with a short job tenure (less than 6 months with the employer or being self-employed) is 5.3 times that of workers whose job tenure is at least 5 years (1).

Reasons for the problem

It is not difficult to ascertain why the industry has such a poor health and safety record, although most of the accidents at least are potentially preventable. The work itself is dangerous, comprising plenty of vertical and horizontal movement, the use of heavy equipment, components requiring manual handling,

the use of many toxic substances, and the production of a lot of dust. Behind these dangerous activities, however, lies an incoherent system of working that highly differs from that in factories or the fixed extractive industries, and construction workers become the victims of that system. As one author—the Chairman of a medium-sized construction company in the United Kingdom—put it “the construction industry workforce is composed largely of unregistered, nonunionized, subcontracted gangs. Construction has an open air, gung-ho, macho image, and human attitudes are too often formed by the terrible twins Custom and Practice” (6).

As another group of authors has commented that construction rarely provides steady employment and that construction workers are always working themselves out of their jobs. They point out that, because of bad weather and layoffs between assignments, in most countries an individual worker may achieve only 1500 hours of work or less yearly, compared with 2000 hours in other industries (7).

This mobility, lack of fixed or long-term employment, poor labor organization, and, moreover, the tendency to subcontract within the industry so that any “controlling mind” is difficult to identify mitigates against the creation of a health and safety culture dedicated to continuous improvement, including sustained training and the like.

Construction workers, for their part, tend towards the itinerant, unskilled, foreign, and illicit. Most construction companies are very small (which is in itself a predictor of poor health and safety performance), and many of the people working for them do it as a “fallback” occupation, having failed to secure employment in more salubrious industries.

The very term “construction worker” presents problems for the occupational epidemiologist every bit as vexatious as their tendency to move about and become lost to follow up. A group of skilled trades persons such as painters, carpenters, plumbers, electricians, roofers, and iron workers (and their “mates”, many of whom are exposed to the same specific hazards) are distinguished in the United States from “construction laborers” by job subclassification into over 100 subgroups, many with exotic names, “din spotters”, “gunnite nozzle men”, “trick helpers” (8). This classification, published in 1982, already sounds archaic. Since then, there have been huge changes in construction methods, largely brought in for economic reasons or for the exploitation of new materials, but sometimes also for reasons of health and safety (using low-density material blocks to reduce manual handling injuries, for example, or adding ferrous sulfate to cement in order to reduce contact dermatitis) (9, 10). The use of prefabricated units has revolutionized office building, tunnels are now rarely driven using compressed air, bridges and dams are created by new engineering methods, and insulation materials are safer. In some ways, with the exception of the necessary excavation and temporary works, the hazards to health from construction have shifted from new building and civil engineering to demolition and renovation, which are more labor intense, less amenable to prefabricated techniques or systems building, and more prone to utilize “older” crafts and skills, which may result in greater exposure under less controlled conditions.

The ill-health problem

When in 1984, I wrote one of the first overviews of occupational health concerns within the construction industry as a book chapter, there was very little to be found in the academic literature on which to base findings and conclusions (11). The situation was not so different in 1990 when, in an editorial, I again drew attention not only to the poor record of construction health and safety, but also to the lack of occupational health provision in the industry (12). At that time, Sweden and Finland provided exceptions, and services of a sort were in place or being established in France, Germany, and The Netherlands. Since that time, there has been a veritable explosion of interest in the occupational health problems of construction workers and the publication of many papers containing mortality and morbidity statistics from various countries, investigations of many of the hazardous areas of the industry and their effect on

the health of construction workers, and at least one longitudinal study, which has provided a profile of the health of construction workers over the years (13, 14).

Construction workers have a high overall mortality rate, independent of social class. This is the case of both those employed in specific trades and of construction workers not otherwise classified. Some kinds of construction workers in Great Britain have had very high mortality ratios indeed—for example, bricklayers and laborers at times had the second highest standardized mortality ratios of all occupations at 273 (15). Construction laborers in the United States show very similar patterns, with elevated mortality risks for all malignant neoplasms, including lung, stomach and thyroid gland, high levels of mesothelioma deaths, and the expected elevated risks of transportation and other injuries (4, 8).

Because of the great variation of construction operations, almost every occupational affliction has been recorded among construction workers. A few examples follow:

- Exposure to bacteria [eg, tetanus (contaminated soil)], Lyme disease (outdoor work), molds such as histoplasmosis (bat droppings, etc), organic dust, reactive airways dysfunction syndrome, blood-borne pathogens (eg, from sewage sources), and insect bites (fleas, etc). In tropical countries, yellow fever, Lassa fever, and snake bite threaten construction workers who break new ground in remote areas. Legionellosis is more common in hot countries
- Exposure to a wide variety of chemicals: solvents in paints and glues (intoxication, liver and nerve damage), caustic materials, cement, cleaning products, coal tar (burns and dermatitis), dust (anything from silicosis to bronchial irritation), epoxy resins and isocyanates (asthma), carbon monoxide and lead (poisoning), asbestos and man-made mineral fibers (lung damage, skin irritation), wood dust (nasopharyngeal cancer) (16–18).
- Exposure to ergonomic hazards such as heavy lifting, awkward postures, pulling and pushing (back pain and shoulder disorders, repetitive strain disorders) (19, 20).
- Exposure to the elements (heat and cold stress), exposure to hand-arm vibration and whole body-vibration (“white finger”, back pain), exposure to noise (hearing loss and tinnitus) (21), work in confined spaces (asphyxiation), compressed air work (decompression sickness and osteonecrosis), exposure to ultraviolet radiation (skin cancer).
- Exposure to psychosocial hazards (all the problems of a mainly male workforce often living away from home), violence, bullying, drug and alcohol abuse, and sexually transmitted diseases; the development of stress-related disorders due to oppressive management, long workhours, excessive travel, lack of stability, low pay, and lack of psychosocial support; and poor hygiene on sites and primitive welfare facilities.

Most of the literature on occupational health and safety in the construction industry is still at the stage of descriptive epidemiology and is shot through with expressions of concern and frustration that the very nature of the industry and the people who work in it mitigate against improvements. There have been improvements certainly in safety, but much remains to be done about the continuing poor occupational health of the industry’s employees. More research, for example, is needed on the extent of fatigue and untreated ill health among construction operatives, along with more intervention studies to investigate the effectiveness of implementation strategies.

Response to the problem

Attempts to turn construction sites into “healthy workplaces” have been made in many countries. In Great Britain, it would be fair to say that the Health and Safety Executive has approached this by means of traditional law enforcement methods and the setting of targets. The British Construction Industry

Training Board operates separately, raising funds through a compulsory levy and training-grant scheme. In Sweden, Bygghälsan was a scheme which, at its peak, covered over 70% of the construction workers, providing an on-the-spot occupational health service. It also pursued research into construction hazards and tracked construction workers' health during their time with the industry. There are many other models:

- The Italian USL (Unita Sanitarie Locali) system, which offers a combination of public health and occupational health services but are only developed in certain regions.
- The German Berufsgenossenschaft system of social insurance, which has evolved into an effective preventive system.
- The Spanish approach to occupational health services—highly prevention oriented following the implementation of the European Framework Directive.
- The Dutch Arbouw Institute, the national institute of occupational health and safety for the construction industry that has become an example to many other countries. It covers 100% of the construction workforce and provides free preventive occupational health care at 150 local occupational health services. Arbouw pursues research and development activities, establishes environmental monitoring and health surveillance, and also provides information and education services. There is a somewhat similar system in Denmark. There, as in other countries with advanced attitudes towards labor relations, the approach has been on a tripartite basis. In Austria the law requires employers to contract with approved organizations for occupational health support. One of these specializes in construction.

In Finland there is a highly developed, nationally coordinated system enhanced by an institute that acts as a center of excellence. Outside Europe, particularly in Australia and North America, other systems link sickness absence management to preventive programs in the workplace, often involving the insurance sector. Worker participation has been particularly emphasized in the United States in connection with a major transportation and civil engineering program in Boston (sometimes referred to as “The Big Dig”).

Improvement is coming about in different ways in different countries, and undoubtedly the worst abuses are occurring in developing countries where it is still not unusual to see very long workhours, precarious bamboo scaffolding, unguarded machinery and vehicles, unlabeled toxic chemicals improperly used, and a reliance on human labor (even women and children carrying head pans filled with stones) a complete lack of protective equipment, no workclothes, and bare feet.

Clearly the law must lay down standards, and the enforcement agencies must play their part. They can do much to encourage better practices by means of education and example, as well as enforcement. They may also work hand in hand with public health authorities, insurers, and treatment services to, for example, establish a register of construction industry employees complete with exposure records and facilitate the rehabilitation of injured or ill workers. Governments cannot do everything however; change has to occur from within the industry—employers and their trade associations, employees and their trade unions.

The “industry” is more than building and engineering contractors, however. Prevention starts upstream. Designers rarely design for health and safety during construction (or even for safe maintenance operations such as window cleaning). They could do much to reduce accidents by building in ledges to prevent falls, by reducing the need for welding on site, and by specifying cement blocks that are either light enough to be safely manhandled or so big they have to be lifted by machine. Clients and developers also, if they were interested (which they rarely are), could get together with architects, engineers, designers, and suppliers to reduce harmful exposure on site. There is no place now for timber treatment with chemicals or exposure to wet cement on site. Pretreatment in a well-organized

factory is safer, and cement can be better handled and pumped mechanically. There are now substitutes available for toxic or irritant paints. Breakers and scabblers can be designed to be quiet and vibration-damped. Roofing materials should be designed not to shatter when walked over. In maintenance operations, ladders could largely be phased out. Simple measures, such as the design of vehicles to improve visibility and give warnings while backing up can help reduce traffic accidents, as can a thought-out traffic management system on and around sites.

Eliminating the problem

In view of the widespread nature of the industry, its variability, and the mobility of its workforce, traditionally lacking in power and coherence, a devolved, multi-professional occupational health support system is needed to provide information and education, identify and measure hazards, offer health surveillance and treatment, and record exposures and morbidity, ideally evidence-based (22). There are many ways in which a support system can be established, depending on the country and its economic circumstances. Large companies, especially multinationals, are crucial in this context. They can force up and maintain consistently high standards wherever in the world they operate and often have their own in-house occupational health services. The industry itself waxes and wanes, and so do its profit margins and its feelings of responsibility to its workforce. The influence of trade unions worldwide has been varied. There is, however, growing public recognition that it is unethical for people to go to work in conditions which are inherently dangerous, damaging their health in the process—a similar sentiment to that which has developed towards child labor, now generally condemned.

Industries tend to rise and fall, usually to be replaced by cleaner, safer, healthier alternatives. Others, the worst ones usually, are exported to less favored parts of the world. Construction, on the other hand, is bound to rise and rise and cannot, by its nature, be exported (unlike its workforce for whom work away from home is the rule rather than the exception). Progress in occupational safety has definitely been made in some countries, especially in new build. Workers in the less favored sectors, demolition, maintenance and refurbishment, and in developing countries need better health protection and the support of occupational health professionals.

The International Commission on Occupational Health (ICOH), through its specialist group dealing with the construction industry, is in a good position to highlight and compare work hazards in different countries, foster research and initiatives, and publish examples of good practice for all to learn from.

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