The Inquiry into the Waterfall train crash: implications for medical examinations of safety-critical workers

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ABSTRACT

- The implications arising from the Inquiry into the Waterfall train crash for medical examinations of safety-critical workers are discussed.
- Examinations need to be appropriate for the level of risk in the job and apply current medical thinking.
- A careful balance is required between the various legal obligations, including duty of care, disability discrimination and privacy.
- The frequency of examinations depends on a combination of medical, economic and logistical factors.
- Health professionals who conduct examinations should be familiar with the occupation of the person being examined.
- Ethical relationships with the worker's general practitioner or specialist(s) must be observed.
- The procedures associated with the examinations are as important in achieving safety as the actual examinations. These include complying with relevant standards; providing all relevant documentation with a referral for an examination; acting on the doctor's report appropriately; and auditing the process.

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On 31 January 2003, a suburban passenger train travelling from Sydney to Port Kembla left the track and overturned at high speed on a curve near Waterfall railway station (Box 1). The train driver and six passengers were killed and many of the remaining passengers were injured.

Between 2003 and 2004, an Inquiry (Waterfall Rail Safety Investigation) was conducted by the Honourable Peter McInerney QC to determine the causes of the accident and to identify any safety improvements to prevent further train accidents. The Inquiry made interim (2004) and final (2005) reports.[1] It found that, apart from inadequacy of the "dead man's" system, engineering factors relating to the track and rolling stock could be excluded as causes of the crash. (A "dead man's" system is a device which should stop a train in the event of incapacitation of the driver.)

The Inquiry concluded that the driver had suffered an episode of ventricular fibrillation, as there was no evidence of an infarct on autopsy, although the left anterior descending artery was narrowed. The guard, who had not acted promptly when the train increased in speed, possibly had an anxiety–depression state that contributed to his inaction.

Deficiencies were found in, and recommendations made for, a wide range of rail-safety issues, including: design of rolling stock; training of drivers and guards; risk assessment procedures; emergency response preparedness; independence of the rail-safety regulator; and medical assessments for rail workers.

Medical assessments for rail workers

The Inquiry identified many deficiencies in the medical assessment system used by the rail company (Box 2), and there are several lessons to be learned from this Inquiry. These are relevant to both organisations who employ, and doctors who examine, people involved with safety-critical work. In safety-critical work, ill-health may have serious, immediate community impact. Such jobs include control-room workers in large chemical or nuclear power plants, public transport drivers and airline pilots, as well as drivers of dangerous goods vehicles. The recent Inquiry into a ferry disaster in New York, in which medical factors were causative, also found deficiencies in the system of medical examinations.[2] The new Australian medical standard for rail workers gives one possible framework for managing medical examinations for safety-critical workers and has met with approval from the Waterfall Inquiry.[3,4]

Medical examinations of safety-critical workers need to be particularly designed to take into account the company's duty of care to the public and other employees, as well as privacy and disability discrimination legislation. The factors that should be considered when designing such a medical examination system are discussed below and summarised in Box 3.

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What examinations should be done?

The thoroughness of the examinations needs to be commensurate with the consequences in the event of illness occurring. Examinations should apply current medical thinking and be reviewed periodically; for example, the present national medical standards for rail workers and commercial vehicle drivers have a "sunset clause" of 5 years. All medical examinations involve a standard format of medical history, examination and relevant tests. The examination needs to focus on safety; questions and physical examinations not clearly relevant to safety in the work context, such as "men's health", should not be included, as privacy may be infringed. However, for efficiency, the examination may need to integrate related occupational health and safety concerns (eg, working with chemicals or noise).

In situations where sudden incapacity, like a heart attack, could lead to serious consequences, a quantitative and predictive risk assessment should be considered, such as that based on the American Heart Foundation cardiac risk score, with appropriate use of stress electrocardiography.[5] If loss of concentration is an important consideration, tools such as the *K10 assessment for anxiety and depression*,[6] and the *Epworth Sleepiness Scale*[7] for excessive daytime sleepiness, may be useful.

Disability discrimination may be managed firstly by ensuring the examination criteria are clearly task-related and based on current

1 The Waterfall train crash — 31 January 2003

Six passengers and the driver died in this train crash. The train was travelling from right to left on the lower train track in the photo. ◆

medical thinking; and secondly by allowing for advice to be given to an employer, such as "fit, subject to regular review", in the case of well controlled chronic diseases. Practical tests, which should be judged against pre-determined criteria, may be relevant for assessing people with musculoskeletal conditions or sensory deficiencies. However, it has to be recognised that practical test results are situation specific and cannot be generalised to other work settings.

The results of medical examinations may need to be integrated with the results of psychological assessments, and drug and alcohol screening tests.

How often should examinations be done?

The frequency of examination will be influenced by a mix of factors including the usual age at onset of the conditions of concern, the prognostic value of clinical data, the economics and logistics of the examinations, and public perception of risk. The desire to meet a duty of care should be tempered by considering the feelings of workers facing repeated examinations, and their fear of losing their jobs if they fail.

Whatever frequency of examination is set, ill-health may occur in between assessments and this needs to be managed. Organisations should establish a system to monitor safety-critical workers for markers of ill-health, such as escalating sick leave or incidents at work, and then arrange "triggered referrals" to a doctor. The system should also encourage self-referral for workers concerned about their health.

Who should conduct examinations?

Any occupational health examination is best conducted by a doctor who has a good understanding of the particular occupation. It is highly desirable for the doctor to visit the work site and talk with the workers to understand what the job entails, including any emergency responses required. Provision of duty statements alone is a second best. Occupational health nurses may be particularly helpful in conducting selected parts of examinations, providing that they can readily refer to a doctor. Inputs from clinical psychologists and occupational therapists also may be helpful.

A difficult issue is whether a person's own general practitioner can conduct the examination. Obviously, the GP knows a lot about the person's health and life circumstances. However, because of this, he or she may have a conflict of interest and may not necessarily know the intricacies of the person's job. For these reasons, sometimes independent doctors are preferred for safety-critical examinations, and the GP is consulted for other matters. However, a GP should be aware of a patient's occupation and

2 Six aspects of the medical assessment requiring attention — the interim report of the Waterfall train crash

1. *The absence of any predictive element in medical assessments.* This could assist in determining whether a particular train driver or other safety-critical employee was in a high-risk category for sudden incapacitation.
2. *Inadequately qualified medical practitioners.* The doctors conducting the examinations were general practitioners who did not have any particular skills in occupational medicine and were not instructed about the nature of the work performed by the person they were examining.
3. *No access to medical histories.* The examiners did not have the medical histories of the people they were examining.
4. *No system for follow-up or referral of patients.* Patients whose examinations revealed the possibility of some significant health risk that required referral (eg, to a cardiologist) were not followed up.
5. *No review from an occupational physician.* The rail organisation had no system for an appropriately qualified occupational physician to review the reports from the medical examiners.
6. *No monitoring of the medical histories.* There was no monitoring of employees' medical histories to identify trends, and, in particular, trends that may indicate a deteriorating state of health as the employees aged. ◆

3 Checklist for examinations of safety-critical workers

1. What examinations should be done?
- Is the thoroughness of the examination commensurate with the consequences of an illness occurring?
- Is the examination current for medical knowledge and reviewed periodically?

2. How often should examinations be done?
- Is the frequency of examination based logically on epidemiological and medical grounds?
- Is the frequency of examination justifiable in social and economic terms?
- Is there a system for monitoring workers' health that could lead to a "triggered referral"?

3. Who should conduct examinations?
- Is the examining doctor familiar with the demands of the occupation of the person being examined?
- Can occupational health nurses conduct some parts of the examination?
- What is the role of the general practitioner?

4. How should examinations be conducted?
- Is comprehensive information provided to the examining doctor?
- Is there a system to efficiently manage the examining doctor's findings?
- Are correct ethical relationships with the general practitioner or other doctors observed?
- Are privacy and disability discrimination concerns being met? ◆

counsel them about safety when a serious illness is diagnosed during routine practice. In the case of commercial drivers, the Austroads guidelines provide ready advice on safe driving.[8] Appropriate communication between the GP, the employing company, and any medical adviser, should be encouraged.

How should examinations be conducted?

The procedures associated with medical examinations are as important as the actual examinations. The development of a sound administrative structure is crucial to achieving an effective balance between the competing legal demands of duty of care, disability discrimination and privacy. In large organisations, both the health assessment process and the examinations should be subject to periodic audits involving the expertise of occupational physicians.

For employers, the process should include providing the examining doctor with any relevant information the organisation holds about the employee — sick leave record, drug and alcohol testing results, accident and incident reports — to give a total picture of health at work.

After the examination, the results should be explained to the employee and then conveyed to the employer in functional not diagnostic terms. This is partly because medical diagnostic information is confidential and must not be divulged without the employee's agreement, and partly because the employer needs information meaningful to employment, not medical information which may be only partly understood. This is consistent with the privacy legislation. There needs to be a system in place whereby the employer is advised promptly if an employee is found to be unfit for safety-critical work, or has been identified at examination as needing frequent follow-up review. A doctor would want to follow up, for example, a safety-critical worker returning to work after commencing treatment for obstructive sleep apnoea or diabetes. Such a system also helps balance the duty of care and the disability discrimination obligations of the employer.

Ethical relationships with the worker's GP must be observed. If significant findings are made at examination, they should be discussed with the worker and then conveyed to the GP. Conversely, if the examining doctor senses a need for more medical information, he or she should obtain the worker's permission to communicate with the GP. If this consent is not given, the worker cannot be passed as fit.

Conclusions

While control of the risks to public health associated with transport and some other industries depends primarily on good engineering and safe work practices, the health of safety-critical workers is an important element. The findings of the Waterfall Inquiry have given useful guidance to organisations and doctors for best practice in assessing such workers. Doctors who conduct, and organisations that require, these examinations should be mindful that, in the event of an incident, both the relevant medical examination and all associated procedures may be subjected to intense scrutiny.

Competing interests

I was the medical consultant to the National Transport Commission in the development of the new national medical standards for road[8] and rail.[3] I have been a consultant to RailCorp (NSW), and have conducted an external audit of the implementation of the national medical standards by RailCorp and its medical provider. I gave evidence at the Waterfall Inquiry.

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