Assessment of cancers among staff of Queensland Rail’s Jilalan Rollingstock Maintenance Depot, 2009

Prepared by:

Noore Alam
Principal Epidemiologist
Division of the Chief Health Officer
Queensland Health
15 Butterfield St. Brisbane
Ph: 3328 9278
Email: noore_alam@health.qld.gov.au
Background

On 11 September 2009, the Tropical Population Health Services (TPHS) received information from Queensland Rail (QR) regarding employee and union concerns about several cancer incidents among QR employees at the Jilalan Rolling-stock Maintenance Depot (hereinafter referred to as ‘depot’) owned and operated by QR. The depot is situated in a rural area off the Bruce Highway near Sarina, approximately 46km south of Mackay, Queensland. There were about 65 employees working at the depot in October 2009. The employees at the depot were predominantly men.

There were 16 cases of cancer reported to have occurred in depot employees over an estimated 20-year period (1989-2009), five of which have been diagnosed in the past three years. These cancers were reported from among five current and 11 former employees of the depot. The initial concern of QR staff and Rail, Tram and Bus Industry Union (RTBU) was that it could possibly be a cluster of cancer and therefore requested QH to investigate the health concerns of the staff and Union. Queensland Health launched an immediate assessment into the matter.

Cancer in Queensland

Cancers are a group of over 100 different diseases in which the cells that make up the body’s tissues and organs grow and divide abnormally and out-of-control. Cancers are common diseases in Australia where one in every two Australian men and one in every three Australian females develop an invasive cancer in their lifetime.1 In 2006, there were 21,250 new cases of cancer diagnosed in Queensland (12,094 males and 9,156 females). The four most commonly reported cancers in Queensland males in 2006 were cancers of prostate (3,266 cases), melanoma of skin (1,448), lung (1,277) and colon (928). Together, these cancers accounted for 57.2% of all cancers in Queensland males in 2006. The four most common cancers for Queensland females in 2006 accounting for 55% of all female cancers were cancers of breast (2,491 cases), melanoma of skin (1,004), colon (883) and lung (665).2 Cancers were the leading broad cause of the burden of disease in Queensland in 2006, accounting for 19.0% of the total burden of disease and injury.3

According to an Australian Bureau of Statistics report, cancer was the second leading cause of deaths claiming 7,152 lives or 27.7% of all deaths in Queensland in 2007.4

Queensland Health’s assessment

Process of assessment

Queensland Health undertook an epidemiological assessment into the reported cancer incidence using the Queensland Health (QH) Guidelines for Assessment of Clusters of Non-communicable Disease (the ‘guidelines’).23 It was a type 1 assessment with the main purpose to determine whether the cancer cases reported by the QR could potentially be a cluster. Details of the methods of a type 1 assessment are available in the guidelines.23 Queensland Health assigned a senior epidemiologist (Noore Alam, Director of Health Surveillance, TPHS), for the assessment.

On 22 September 2009, a teleconference was held in which Dr Stephen Donohue, Public Health Medical Officer - TPHS, Mr Brad McCulloch, Senior Director - TPHS, Mr Noore Alam, Director, Health Surveillance - TPHS and Associate Professor Tim Driscoll, an independent investigator recruited by QR attended and discussed a framework for collaboration in the assessment.
Governance
Queensland Rail is the Cluster Manager for this reported cancer cluster assessment. Queensland Health is providing epidemiological expertise to Queensland Rail on cluster assessment and will submit its epidemiological assessment report to Queensland Rail. Environmental assessment is performed and reported independently by A/Prof. Tim Driscoll.

Scope
Epidemiological and environmental assessments are complementary in a disease-cluster assessment. The epidemiological assessment sought to collect information of the reported cases (numerator) as well as QR employees who worked at the depot in a 20-year period, 1989-2009 (denominator). However, the period of numerical assessment was later narrowed down to 1999-2009 only, as this was the period for which QR employee records for Jilalan depot were available for review. Assessments can only be conducted for periods, from which reliable data on both cases and employee demographics are available,

The scope of this assessment was limited by the Type 1 assessment protocols as prescribed in the guidelines.

Reference group
On 6 October 2009, a reference group (the Group) was set up with the following members:

- A/Prof. Tim Driscoll, Independent medical expert hired by QR
- Mr Noore Alam, Queensland Health
- Mr Stephen Muller, Jilalan Depot Manager
- Mr Craig Allen, Rail, Tram and Bus Industry Union
- Mr George Thompson, Health and Safety Committee (employees’) representative
- Ms Katie McMahon, QR representative

The terms of reference for the Group were to:

- Facilitate the overall assessment process;
- Provide a channel of communication between the assessment team, staff, unions and management; and to
- Assist with information about employees at the depot for the purposes of the assessment.

Site inspection
On 8-9 October 2009, Mr Noore Alam, QH assessor inspected the depot and, with the assistance of Mr George Thompson, staff health and safety representative, collected information on the affected staff. QR organised a briefing session for the relatives of the depot staff in the evening of 08 October 2009 at the depot where A/Prof. Driscoll, in the presence of the QH investigator, QR staff and their relatives, delivered a presentation about cancer clusters in general terms. The next day (09 Oct.), the Group held a meeting for the first time and discussed the process of assessment, roles of the Group members and the prospects of the assessment. It was agreed that the Group would meet 2-3 times during the course of the assessment.

QH assessor collected information regarding the depot staff in general and staff reported with cancer with the assistance of Ms Sally Goan, QR Administration and Mr George Thompson,
Employee Representative, QR Jilalan Depot respectively. The latter was also a member of the Reference Group.

Results

Staff profile
Although the reported cancer cases were identified by Queensland Rail as those staff who worked in the last 20-year period, 1989-2009, QR was able to supply records of employees at Jilalan depot for the period 1999–2009 only. The study (assessment) period has therefore been set to as 1999-2009.

Between 1 January 1999 and 01 October 2009, there was a total of 247 staff that worked at the depot. Ninety six per cent of the workforce was male. The staff worked at the depot for an average of 9.5 years. One hundred and eighteen worked for 10 or more years, 26 worked for 5-<10 years and 92 worked for less than five years. Of the total 236 male staff, 76 worked for the whole study period (1999-2009). The median age of the staff was 43 years (range: 16-64 years of age). Most (86%) men joined the depot when they were less than 40 years of age. Most men were aged in their 20s (31.6%) when they entered the study period; 19.7% in their 30s, 10.3% in their 40s, 11.0% in their 50s and 1.7% in their 60s.

Self-reported cancer cases
Altogether, there were 16 possible cancers reported from among the depot staff. All were self-reported cancers in male staff members. Three had reported throat cancers; three had colon cancer; one prostate cancer; one brain cancer; one lung, one leukaemia and six unknown cancer type. Six of the 16 reported cancer cases were deceased at the time of notification. Although we have no information about the time of diagnosis of their cancers, based on the employee-records provided by QR which showed their period of employment at Jilalan, as well as the staff representative’s knowledge about the former depot staff, it is thought that their cancers were diagnosed prior to the study period. These six possible cases that were deceased have therefore been excluded from the numerator. Of the remaining 10 reported cases, four were further excluded for the following reasons:

- Staff (with cancer) who worked at the depot before the study period = two (one prostate cancer and one unknown cancer type)
- Insufficient information (name only) = one
- Not a QR staff member at Jilalan depot = one (unknown cancer type)

Six probable cases were retained for assessment. They had cancers of throat, colon, and brain. Of the six probable cases, five were reportedly diagnosed between 1999 and 2008. One had his cancer diagnosed in 1996 but he worked through the year 2000.

Staff included in the assessment
The staff in-scope of the assessment were those who worked at any time between 1 January 1999 and 01 October 2009. Five of the six reported cancer cases were aged between 50-59 years when they were diagnosed with cancers. One was aged 49 years. The median age for all six cases was 56 years. Five of the six were current employees at the time of assessment. They worked at the depot for 4, 5, 19, 29, 34 and 39 years (median=24 years). Four of them were either locomotive or wagon maintainers (2 throat cancers, 2 colon cancers), one was supervisor (throat cancer) and one was material handler (brain cancer). Details of their nature of work and exposure to potential cancer-causing agents are beyond the scope of this (Type 1) assessment.
Staff not included in the assessment

The staff members who were beyond the scope of this assessment are those that worked prior to the year 1999, and/or those with cancers who were deceased at the time of the information and/or those with inadequate information. Information regarding cancer type reported by staff was available for four staff only (Lung, leukaemia, colon and prostate). Information regarding age at diagnosis was available for only three staff (51, 58 and 65 years of age). For seven of the 10 staff, the duration of work at the depot was available. They worked between four and 35 years with a median of 16 years. Information about their job-types was available for eight staff; three loco/wagon maintainers and examiners, three labourers and two supervisors. With the limited information available for the out-of-scope staff, they appear to be comparable with the staff in-scope.

Risk factors for cancers under assessment

Brain cancer

There are only a few known risk factors for brain cancer. Exposure to ionising radiation to the head, such as for X-ray diagnosis and treatment of diseases, is an established risk factor for brain cancer.\(^5,6\) Some types of brain cancer may be associated with occupational exposure to certain chemicals used in oil refining, rubber manufacturing, vinyl chloride, petroleum, pesticides and nuclear industries. However a definite link between significant exposure to these chemicals and brain cancers has not been proven.\(^7,8\) People with impaired immune systems, side effects from cancer treatment, immunosuppressive therapy or HIV infection are also at increased risk.\(^7,9\)

Colon cancer

The well-known risk factors published in the literature are mainly lifestyle factors. Obesity, including abdominal obesity, is an established risk factor for colon cancer.\(^10,11\) Diets containing a high intake of red meat, processed meat and alcoholic drinks also increase the risk of colon cancer.\(^12,13\)

Throat cancer

Tobacco smoking and alcohol consumption are the two well-established risk factors for head and neck cancers which include throat cancer (cancer of the larynx) and the effects of tobacco and alcohol together are additive.\(^14,15\) Genetic/hereditary factors have also been implicated and some studies have suggested as much as a threefold increased risk of developing head and neck cancers in individuals that have a first-degree relative with head and neck cancer.\(^16,17\) Recent studies also indicated an association between human papillomavirus infection and head and neck cancers.\(^18-20\) Occupational exposures to wood and nickel dust inhalation have also been implicated as risk factors for head and neck cancers.\(^21,22\)

Discussion

Cancers are common diseases in Australia. In 2006, cancers of throat, colon and brain were among the leading 20 cancer sites in Queensland males.\(^4\) Each type of cancer has its own risk factors and causes. For most cancers the causes are not fully known but various risk factors are implicated. Some cancers occur as a result of smoking, dietary factors, infectious agents or exposure to radiation (for example, ultraviolet radiation), or chemicals, while others may be a result of inherited genetic faults.\(^7\) Tobacco and alcohol consumption are major established risk factors for many cancers which are therefore preventable. For example, 84% of all lung cancers (ICD-03-C33, C34) and 73% of throat cancers (ICD-03-C32) in Australian men are attributable to tobacco smoking. Fifty-one percent of cancers of throat in Australian men are also attributable to excessive alcohol consumption.\(^1\) The effects of tobacco and alcohol consumption

5
are additive for head and neck cancers which include throat cancer.\textsuperscript{7,14,15} In addition to exposures to the known risk factors, other issues for consideration, when assessing cancer risk in an individual include type and rarity of cancer, age, duration and intensity of exposure, level of immunity and family history of cancer.\textsuperscript{7} Details of how these factors may have influenced Jilalan staff are beyond the scope of this assessment. However, acknowledging these factors and understanding the multiplicity of their roles may help better understanding of the Jilalan depot cancer incidents.

Because cancers are common diseases, they frequently appear to occur in clusters. When several cancers are reported in a workplace, people tend to think it a cluster because the numbers are obvious and concerning due to the close working environment. The number of cases may seem high, particularly among a small group of staff who have something in common with the cases, such as working under the same shed, raising concern for an apparent cancer cluster in an occupational setting. The preliminary assessment, such as this (Type 1) assessment, of such concern seeks to answer questions such as:

- whether the cases in a given workplace are of the same type;
- whether there appear to be high numbers of a common cancer or multiple cases of a rare cancer;
- whether the cancer types are occurring in younger age-groups than expected;
- are there apparent high exposures to one or more biologically plausible causal agents, that could account for the types and numbers of cases.

Most reported non-infectious disease clusters involve situations that are clearly not clusters and do not require further investigation.\textsuperscript{23} Available evidence in Australia\textsuperscript{24} and internationally\textsuperscript{25} suggests that an estimated 75-95\% reported clusters can be appropriately closed at the point of initial contact from an informant. Internationally and nationally it has been reported that nearly all suspected clusters are found to be normal occurrences, with no identifiable environmental cause. In the rare situations where causes have been found these have nearly all been in the occupational setting and the causal agent fairly obvious. Some clustering of cancer cases happens by chance alone and, as with any random pattern, there will be more cases than expected in some areas, and fewer cases than expected in others. The areas with more cases than expected are more likely to be noticed, and if this is a small workplace, it is most likely to become noticeable.

Even when greater than expected number of cases is found in a cluster, the apparently higher rates do not necessarily indicate the presence at a workplace of an element responsible for these cancers. Statistical significance is based on numbers, and needs to be tempered by an understanding of biological plausibility. A qualitative approach often carries more weight than a statistical analytical approach, especially when number of reported cases is small.\textsuperscript{24}
Conclusions

Based on the available information collected and reviewed as part of a Type 1 cluster assessment under the Queensland Health cluster assessment guidelines, the reported cancer cases at the Jilalan Rollingstock Maintenance Depot do not appear to constitute a cancer cluster for the following reasons:

1. The number of reported cases and types of cancers do not appear unusual when considering the numbers, age and gender of the staff, based on the available scientific evidence.

2. The different types of cancers do not suggest a common causal exposure.

3. For two of the six reported cancer cases, their cancers were diagnosed within four and five years of commencement of their employment at the depot. Although a period of five years is the minimum latency period used in the assessment of some cancers (leukaemia, for example), a period of 10-20 years is considered more realistic for most cancers. The duration of employment for these two reported cases does not appear sufficient for their cancers to be associated with their employment at the depot.

Recommendations

1. That no further assessment be undertaken by Queensland Health. Through the Reference Group, Queensland Rail employees can be reassured there is not a cancer cluster at the Jilalan Depot.

2. That QR management and union make this report (and the environmental assessment from A/Prof Tim Driscoll) available in full to its employees at the Jilalan depot.

3. That QR management and union encourage employees to learn about known cancer risk factors, and measures they can take to substantially reduce their risk for cancer, as well as the availability of screening and diagnostic tests for certain types of cancer.

Acknowledgements

The Queensland Health assessor would like to acknowledge the assistance provided during his assessment by the QR Jilalan depot staff. In particular, the contributions from:

Mr George Thompson, Health and Safety Representative of QR Jilalan Depot
Mr Charles Berry, Manager Risk and Accreditation, QR NationalCoal
Ms Sally Goan, Administration, QR Jilalan Depot

This report has been reviewed and approved by the following Queensland Health experts:
Dr Steven Donohue, Public Health Physician, Tropical Regional Services
Dr Andrew Langley, Public Health Physician, Central Regional Services
Ms Annette Neill, Acting Coordinating Epidemiologist
Mr Brad McCulloch, Senior Director, Tropical Regional Services

End of report

*A period defined in the Queensland Health cluster assessment guidelines (2009) as the time of exposure to a potential cancer-causing agent to the time of diagnosis of cancer.
References


