Diabetes, a new challenge for the mining industry.

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The mining industry is entering a new era in health and safety. No longer is managing the health and safety of the workforce only about avoiding injury and environmental hazards, chronic disease is now emerging as an important risk for the industry and a new area of investment for workplace health and safety professionals.

Type 2 diabetes is a serious chronic disease that is predicted to afflict 30million Australians within the next 20 years.[1] Described as the silent pandemic, many people have type 2 diabetes for some time without being diagnosed.

Diabetes refers to a group of conditions where there is too much glucose (sugar) in the blood resulting from a lack of insulin or ineffective insulin. The most common types of diabetes are type 1 and type 2. Type 1 diabetes is an autoimmune disease that is usually diagnosed at childhood whereas type 2 diabetes is usually diagnosed in adulthood and is often related to lifestyle factors. In addition to the impacts of the condition itself, people with diabetes are at higher risk of other chronic diseases including heart and kidney disease.

The Existing Problem

Already type 2 diabetes is impacting on the mining workforce and mining communities. Every day, 60 Queenslanders are diagnosed with type 2 diabetes and mining communities are among the worst hit with rates of type 2 diabetes increasing by as much as 67% over four years.[2] Table 1 shows rates of type 2 diabetes in a sample of Queensland mining communities.

Table 1. Rates of type 2 diabetes in Queensland mining communities in 2007 and 2011[2]

Local government area	2007	2011	% Increase
Mount Isa City Council	3.75%	4.19%	11.72%
Mackay Regional Council	3.9%	5.25%	34.63%
Isaac Regional Council	1.67%	2.6%	56.17%
Gladstone Regional Council	3.64%	4.79%	31.4%
Western Downs Regional Council	2.86%	4.8%	67.86%
Cloncurry Shire Council	3.67%	5.39%	46.96%

[1] Baker IDI. (2012). *Diabetes: the silent pandemic and its impact on Australia*. Retrieved from www.bakeridi.edu.au/Assets/Files/14814%20Diabetes%20management%20booklet%205%20Mar_FINAL.pdf

[2] Diabetes Australia – Queensland. (2011). The diabetes epidemic. Retrieved July 14, 2012, from http://www.diabetesqld.org.au/media-centre/diabetes-information/diabetes-epidemic.aspx

The Emerging Threat

Employees in the mining industry are at increased risk of developing type 2 diabetes due to the presence of several existing risk factors for the condition.

Obesity is a major risk factor for type 2 diabetes and one that is of particular relevance for the mining sector. The mining sector has the highest rate of overweight and obesity compared to all other sectors in Australia, with 76% of mining employees being overweight or obese[3].

Coal miners have also been shown to have higher rates of high blood pressure than the general population[4] another important risk factor for diabetes as well as for other chronic diseases.

In addition, the characteristics of the workforce and the nature of the work involved places mining employees at higher risk of type 2 diabetes and other chronic diseases:

- **A largely male workforce:** in all subdivisions of the mining industry men made up at least 80% of the total employees.[5] Being male is an independent risk factor for type 2 diabetes and men are also more likely to be overweight or obese than women.[6]
- **Shift workers:** rates of diabetes appear to be higher among shift workers[7] and higher rates of obesity are also more often seen in shift workers.[8,9] Shift workers are also more likely to smoke and follow a poor diet which are also risk factors of the condition.[10]
- **Largely sedentary tasks:** Extended periods of sitting, such as seen in many mining jobs, is associated with increased waist circumference and increased mortality rates.[11,12]

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[3] Australian Bureau of Statistics. (2008). *Overweight and obesity in adults Australia.* Retrieved from http://www.abs.gov.au/ausstats/abs@.nsf/mf/4719.0/

[4] Bofinger, C. & Ham, M. (2002). Hearts, health and mining. Paper presented at 2002 Mining industry health and safety conference. Retrieved from www.qrc.org.au/conference/_dbase_upl/2002_spk07_Bofinger.pdf

[5] Australian Bureau of Statistics. (2012). *Labour Force, Australia, Detailed, Quarterly, May 2012.* Retrieved from www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6291.0.55.003May%202012

[6] Australian Bureau of Statistics. (2011). *Overweight and obesity in adults: a snapshot.* Retrieved from www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/7DC7186F4A9950DECA25789C0023DCEF/$File/4842055001_200708.pdf

[7] Knutsson, A. (2003). Health disorders of shift workers. *Occupational Medicine, 53*, 103–108.

[8] Di Lorenzo, L et al. (2003). Effect of shift work on body mass index: results of a study performed in 319 glucose-tolerant men working in a Southern Italian industry. *International journal of obesity*, *27*, 1353–1358.

[9] Suwazono, Y, et al. (2008). A Longitudinal Study on the Effect of Shift Work on Weight Gain in Male Japanese Workers. *Obesity, 16,* 1887–1893.

[10] Zhao, I & Turner, C. (2008). The impact of shift work on people's daily health habits and adverse health outcomes. *Australian journal of advanced nursing, 25* (3), 8-22.

[11] Katzmarzyk ,PT, Church, TS, Craig, CL & Bouchard C. (2009). Sitting time and mortality from all causes, cardiovascular disease, and cancer. *Med Sci Sports Exerc. 41*(5),998-1005.

- **Rural and remote locations:** People living in rural and remote areas are more likely to be overweight or obese and are more likely to smoke.[13]

Impacts of Diabetes on Productivity

If left undiagnosed or poorly managed, diabetes can affect vision and cause lethargy having direct implications on safety and production. Obesity itself poses significant financial impacts to the industry, with productivity losses and premature death estimated to cost Australian workplaces $6.4 billion in 2008/09.[14]

Rates of absenteeism are known to be higher in employees with chronic disease and/or chronic disease risk factors. An Australian Institute of Health and Welfare report showed that people with a chronic disease had, on average, 0.48 days off work in the previous fortnight due to their own illness, compared with 0.25 days for those without chronic disease.[15] People with risk factors of chronic disease also report more sick days than those without risk factors. People with a chronic disease risk factor averaged 0.32 days away from work in the previous fortnight due to their own illness, while the average for people without chronic disease risk factors was 0.20 days. Additionally, absenteeism was approximately twice as high in people who reported multiple risk factors compared with those with who reported no risk factors.[16]

Implementing diabetes prevention interventions

The Health and Productivity Institute of Australia (HAPIA) Best-Practice guidelines outline the key steps for planning, implementing and evaluating workplace health interventions. [17] The guidelines indicate that creating an environment and workplace culture that supports healthy behaviours are vital for successful workplace health programs. Due to the nature of the sector and fact that employees are often provided with accommodation and meals during their swings, mining companies are in an ideal position to implement such changes. The HAPIA guidelines also suggest engaging with employees to undertake a participatory planning process to address health and wellbeing. Discussed below is an example of an intervention targeting type 2 diabetes awareness and prevention that was completed at two Queensland mine sites.

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[12] Healy, GN. et al.(2008). Objectively Measured Sedentary Time, Physical Activity, and Metabolic Risk The Australian Diabetes, Obesity and Lifestyle Study (AusDiab) *Diabetes Care 31*, 369–371.

[13] Australian Institute of Health and Welfare. (2008). *Rural, regional and remote health: indicators of health status and determinants of health*. Rural Health Series no. 9. Cat. no. PHE 97. Canberra: AIHW.

[14] Medibank Australia. (2010). *Obesity in Australia: financial impacts and cost benefits of intervention*. Retrieved from http://www.medibank.com.au/About-Us/Publications.aspx

[15] Australian Institute of Health and Welfare. (2009). *Chronic disease and participation in work.* Cat. no. PHE 109. Canberra: AIHW.

[16] Australian Institute of Health and Welfare. (2010). *Risk factors and participation in work.* Cat. no. PHE 122. Canberra: AIHW.

[17] Health and Productivity Institute of Australia. (ND). *Best-practice guidelines workplace health Australia*. Retrieved from http://www.hapia.com.au/CorporateWellness.html

The Healthy Mining People program, a social marketing based initiative that utilised new media, was piloted at two Queensland mine sites in 2011. As part of the employee engagement and participatory planning process focus groups were held with employees to identify the best way to implement a small scale intervention targeting awareness and prevention of type 2 diabetes. Focus groups included discussion on issues a campaign should focus on, what messages would be most effective and the best ways to deliver those messages.

Employees clearly indicated that messages should focus on the seriousness of the condition and utilise scare tactics in delivering these messages. Employees often gave the examples of recent road safety and anti-smoking campaigns. Employees indicated that once their attention had been gained, they would like to receive practical and simple information on the actions they could take to prevent the condition.

In regard to the ways they like to receive information, employees indicated that posters and information booklets placed in areas that they spend time would be most useful. Crib rooms and dining areas were the most commonly suggested areas to place program materials. Presentations to staff during toolbox talks and workplace health and safety meeting were also commonly suggested. Both sites suggested a video or similar type of presentation could be played on television in the site crib rooms.

Focus group participants were shown examples of resources that had been developed for similar target groups and asked to provide comments. Overwhelmingly, employees responded very positively to images showing the amount of fat and sugar in different foods and information on the amount of exercise that would need to be completed to burn off the energy in various foods. This reflects the employee's desire for practical and simple ways they can reduce their risk.

Focus group participants suggested that using mining specific images and photos of employees from the target mine sites in the program materials would also be a good way of attracting the attention of the target group and prompting them to read the resources. It was also suggested that the types of foods that were used in the resources were foods that were commonly consumed by employees and examples of common meals were provided by the focus group participants.

In direct response to the information gathered during the focus groups, a range of industry specific resources were developed and then presented back to employees for their feedback. The final resources included:

- A set of four posters which focused on the complications that occur as a result of diabetes.
- Tape measures to encourage self assessment of risk based on waist circumference.

- Table talkers with recommendations for healthy choices at point of decision. (in dining hall and crib room)
- A 16 page booklet containing information on the condition and simple ways to make healthy lifestyle choices every day.
- Images of employees from one of the mine sites were used on the front cover of the booklet and a story from one of the employees who has type 2 diabetes was included on the first page.
- A slideshow containing diabetes awareness messages and simple lifestyle changes that can reduce risk. The presentation ran on continuous loop in the mine crib rooms.

Type 2 diabetes risk assessments using the AUSDRISK tool on touch screen tablets were conducted at both pilot sites. The AUSDRISK survey tool includes 10 questions relating to key type 2 diabetes risk factors and allocates participants a risk score of low, moderate or high risk. Participants were provided with information on how they can reduce their risk and if they were at moderate or high risk they were advised to discuss the results with their doctor.

Results

The type 2 diabetes risk assessments conducted confirmed that a large number of mining employees are at risk of type 2 diabetes, with almost 75% (n=129) of employees obtaining moderate or high risk scores. The two main risk factors that were identified in the risk assessments were being male and having a waist circumference outside of the recommendations for good health.

Pre and Post-evaluation surveys were distributed to assess changes in awareness, beliefs and behaviours and to evaluate the resources.

Knowledge about type 2 diabetes was high pre-intervention. The majority of employees (97.4%, n=72) had heard of type 2 diabetes and believed it was a serious condition (95.8%, n=72). When asked about the importance of meeting a range of health recommendations the majority felt it was important to:

- eat the recommended amount of fruit (89%, n=72)
- eat the recommended amount of vegetables (90.3%, n=72).
- meet the recommended amount of physical activity (91.6%, n=72)

The majority of participants were able to correctly identify risk factors, symptoms and complications of type 2 diabetes. Participants were also asked if they intended to make a change in coming month that they believed would reduce their risk of developing type 2 diabetes. 55.2% (n=69) indicated that they did intend to make a change.

Intention to change and acting on intention to change were also measured post intervention. 58.1% (n=44) of participants indicated they had made a change in the previous month (i.e. during the intervention period) to reduce their risk. 36.4% (n=44) indicated they intended to make a change in the coming month that they felt would reduce their risk of the condition.

Conclusion

Type 2 diabetes, along with other chronic diseases, is emerging as a new priority for workplace health and safety professionals in the mining sector. Due to a range of existing risk factors, mining sector employees are at increased risk of developing type 2 diabetes. This has been further confirmed by evidence based risk assessments conducted with 129 mining employees. Key risk factors for the mining employees are being overweight or obese, being inactive and having predominately male workforce.

The increased risk of type 2 diabetes in the workforce has implications both for productivity and employee wellbeing. Increased rates of absenteeism are seen in employees with an existing chronic disease as well as those with chronic disease risk factors. Considerable direct costs to the organisation in lost productivity and premature death are also evident due to current rates of overweight and obesity.

Interventions targeting the prevention of type 2 diabetes and other chronic diseases are best done in consultation with staff. Experience from the Healthy Mining People project indicates that employees respond best to scare tactics balanced with practical information on how risk of disease can be reduced. Employees are also more likely to take interest in materials that they can relate to, for example those featuring mining images and familiar faces. For successful sustainable diabetes prevention interventions environmental and policy changes coupled with health education strategies are most effective and the mining sector is very well placed to create working and living environments that encourage and support healthy choices.