Canadian Health and Safety Workplace Fundamentals

CANADIAN HEALTH AND SAFETY WORKPLACE FUNDAMENTALS

CONNIE PALMER

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PREFACE

It is the intent of this OER to highlight Canadian occupational health and safety workplace fundamentals. The photo on the cover of the OER depicts a group of individuals, all rowing together. This photo has been selected as it represents a health and safety program at work. For the program to work, everyone needs to be working in unison and rowing in the same direction.

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CHANGES FROM ADAPTED RESOURCE

This book is largely an adaptation of [Health and Safety in Canadian Workplaces](#) by Jason Foster and Bob Barneston Athabasca University Press is licensed under a [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License](#) unless otherwise noted. Below is a list of changes made from this version.

Overall	• Modified some chapter titles • New and updated images were added to every chapter. Images were re-created for consistency throughout. • New Chapter added: Chapter 12 (WHMIS 2015) • Added in additional resources: knowledge checks
Chapter 1: Injuries in the Workplace	• Modified chapter title • Added definition of a workplace • Removed boxes 1.1 – 1.3 • Removed Exercises • Added lost-time injury definition • Removed overview of book • Modified learning outcomes and discussion questions • Added new images From Chapter 1
Chapter 2: Occupational Health and Safety Legislation	• Modified chapter title • Added new images • Removed gas station case study • Removed boxes 2.1 – 2.7 • Added in additional resources: knowledge checks From Chapter 2
Chapter 3: Hazard Recognition, Assessment and Control	• Added new images • Added new learning outcomes • Added the business case for hazard recognition • Added in additional resources: knowledge checks • Removed political economy wording • Removed hierarchy of control critiques • Modified some risk assessment wording • Removed boxes 3.1 to 3.5 From Chapter 3
Chapter 4: Physical Hazards	• No changes – from Chapter 4
Chapter 5: Chemical and Biological Hazards	• No changes – from Chapter 5
Chapter 6: Psycho-social Hazard	• No changes – from Chapter 6
Chapter 7: Health Effects of Employment	• No changes – from Chapter 7
Chapter 8: Training and Injury Prevention Programs	• No changes – from chapter 8

Chapter 9: Incident Investigation	•Added new images • Created new learning outcomes • Added an introduction to incident investigation • Added a business case for incident investigation • Added contents of an investigation toolkit in a graphic • Removed some discussion around root vs proximate cause • Removed boxes 9.1 and 9.2 • Added in additional resources: a knowledge check From Chapter 9
Chapter 10: Disability Management and Return to Work	• Added new images • Created new learning outcomes • Added the business case for disability management • Deleted box 10.2 and 10.3 • Added in additional resources: a knowledge check • Changed the discussion questions From Chapter 10
Chapter 11: The Practice of Health and Safety	• No changes – from chapter 11
Chapter 12: WHMIS 2015	• Newly created chapter

CHAPTER 1: INJURIES IN THE WORKPLACE

Chapter Outline

1.0 LEARNING OBJECTIVES

Learning Objectives

1. Explain the meaning of a workplace injury
2. Identify the 5 categories of hazards that are responsible for workplace injuries
3. Explain the importance of accurately reporting injury statistics

1.1 WHAT IS A WORKPLACE INJURY?

Broadly speaking, a **workplace injury** is any form of ill health—such as a physical or mental injury or illness—that arises because of a worker's employment. Instances of work-related ill health can encompass a vast array of injuries and illnesses. Most work-related injuries will be minor and temporary (such as a slight burn), while others will be permanent (such as an amputation) or life-threatening (such as cancer). Some injuries will be acute (such as a laceration) and some will take years to manifest themselves (such as silicosis). Let's review a workplace incident that resulted in several workplace injuries and two fatalities.

Story: The Lakeland Sawmill

On Monday, April 23, 2012, the Lakeland sawmill exploded and then burned, lighting the night sky of Prince George, British Columbia. The explosion and subsequent fire killed Alan Little, 43, and Glenn Roche, 46, and injured more than twenty other workers. Brian Croy, a vice-president with the United Steelworkers' local, was sitting in a training session when the mill exploded. The room's plywood walls were blown down on top of the workers, and Croy and his colleagues escaped through a section of outer wall that had been destroyed by the blast.

"It's almost like you were coming out of a war zone. Everything was leveled. I met one fellow I think his fingers were blown off, and his clothing, a lot of it was gone. It was off and his hair," Croy told The Canadian Press. Upon arriving at an outdoor first-aid station, Croy found workers sitting on a tarp, holding up burned arms and hands while one worker lay naked on the tarp, burned black and without any hair. [1]

A WorkSafeBC investigation found that an overheated fan shaft had ignited the dust-laden air,

1. Hoekstra, G., & Carman, T. (2012, April 25). Two dead, 22 injured after massive explosion destroys Prince George sawmill. Vancouver Sun. http://www.vancouversun.com/dead+injured+after+massive+explosion+destroys+Prince+George+sawmill/6506952/story.html

resulting in the explosion. [2] Wood dust is a well-known explosion hazard in sawmills. The Lakeland mill was sawing large amounts of trees killed by pine beetles. This wood is extremely dry and, when milled, creates a large amount of fine dust.

The employer had been aware of the dust issues, and five dust-related incidents (e.g., fires) had been recorded in the months leading up to the explosion. The employer had failed to remediate the hazard or, indeed, engage in adequate preventive maintenance of the mill's systems. Internal safety inspections were inconsistently undertaken and dust buildup was not mentioned, with some workers stating "that they were tired of complaining about it as nothing was ever done."

The Lakeland mill explosion—one of two in BC that year—was a major workplace incident. Yet, sadly, these deaths and injuries were but a drop in the bucket. In 2012, the Association of Workers' Compensation Boards of Canada (AWCBC) reported 245,365 accepted workers' compensation claims for time-loss injuries. Time-loss injuries are injuries so serious that workers cannot go to work for a period of time. The AWCBC also reported 977 accepted workplace fatality claims. [3] As we'll see below, these (alarming) statistics significantly under-report the true level of workplace injury in Canada.

What is a Workplace ?

The Occupational Health and Safety Act defines a workplace as ""workplace" means any land, premises, location or thing at, upon, in or near which a worker works"[4] which could include locations such as a factory, office, food truck, or a delivery vehicle.

Before turning our attention to the practicalities of how to reduce the risks of work-related injuries, it is important to spend some time thinking about what we mean by a workplace injury. While there is little dispute that the injuries that occurred at the Lakeland mill were workplace injuries, the work-relatedness of other

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2. You can read the full incident investigation report here: https://www.worksafebc.com/en/resources/health-safety/incident-investigation-report-summaries/lakeland-mills-incident-investigation-incident-investigation-report?lang=en

3. AWCBC. (2014). National work injury, disease and fatality statistics 2010–2012. Ottawa: Association of Workers' Compensation Boards of Canada.

4. Occupational Health and Safety Act, R.S.O. (1990, c.O.1). Retrieved June 7, 2022, from https://www.ontario.ca/laws/statute/90o01

injuries can be contested. It is also important to give some thought to what causes workplace injuries. Most explanations tend to focus on the immediate cause of the injury (e.g., the mill blew up). While the explosion did indeed cause the workers' injuries, that is a superficial analysis of injury causation. Other, less obvious factors created the conditions that led to the explosion.

Despite the vast range of potential injuries, when most people think of a workplace injury, what comes to mind is an acute injury caused by an obvious physical cause. For example, a fall from a height may break a worker's wrist. There are three main reasons why we tend to focus on acute physical injuries:

- Acute injuries are commonplace. In 2012, 92.5% of Canada's 245,365 accepted time-loss injuries were acute physical injuries while only 7.5% were illnesses. [5]
- Acute injuries are easy to see and understand. It is obvious when a worker falls from a height, and we intuitively understand how the fall hurt the worker. Contrast this with a diagnosis of mesothelioma (a form of cancer caused by asbestos). Such a diagnosis is often known only to the worker, his family, and his doctor. And the 20-year lag between exposure and diagnosis obscures the work-relatedness of the injury. Indeed, the worker may not know that he was exposed to asbestos in the workplace.
- Acute injuries receive a disproportionate share of public attention. Most of us have limited personal experience with workplace injuries. Instead, what we know about them comes from media reports.

Occupational health and safety (OHS) laws often specify clear rules to protect workers from falls and other physical hazards. The rules around exposing workers to hazardous substances are much more ambiguous.

Similarly, **workers' compensation boards** (WCBs)—which provide injured workers with wage replacement and other benefits—use the "arises-and-occurs" test to determine whether an injury was work-related (and thus whether the worker will receive compensation). The **arises-and-occurs test** requires workers to demonstrate that their injury arose from and occurred during the course of their employment. It is easier for workers with acute physical injuries to show that this is the case than it is for workers who have developed an occupational disease. This is because occupational diseases often take years to manifest themselves and the cause of the disease may be unclear. Not surprisingly, then, the majority of accepted workers' compensation claims are for acute physical injuries.

5. Ibid

1.2 INJURY CAUSATION

What causes workplace injuries? The obvious answer is workplace hazards. A **workplace hazard** is any source of potential injury or illness in a workplace. For example, a puddle of water on a floor creates a slipping hazard that could result in a worker sustaining injuries from a fall. Similarly, the presence of lead in the workplace could result in lead poisoning. Yet work-related hazards are not always so obvious. Sometimes the way in which work is organized causes health effects. For example, **precarious employment**—"paid work characterized by limited social benefits and statutory entitlements, job insecurity, low wages"—is associated with high risks of ill health.[1] Some studies suggest that jobs that demand a lot of effort but provide workers with little control over their work and little support can damage workers' health via stress.[2]

In order to cause a workplace injury, the hazard acts upon the worker in some way. **Physical hazards** often entail a transfer of energy that results in an injury, such as a box falling off a shelf and striking a worker. **Ergonomic hazards** occur as a result of the interaction of work design and the human body. **Chemical hazards** are more complex. They may cause harm to human tissue in a variety of ways (e.g., some chemicals cause burns) or interfere with normal physiological functioning (e.g., some substances cause hallucinations). **Biological hazards** are organisms—such as bacteria, molds, funguses—or the products of organisms that harm human health. **Psycho-social hazards** are social environment and psychological factors that can affect human health and safety.

When considering the cause of an injury, it is useful to distinguish between proximate cause and root cause. **Proximate cause** is the event that is immediately responsible for the injury. **Root cause** refers to the ultimate or "real" cause of an injury. For example, if a worker falls down, the proximate cause may be that the worker lost her footing on a wet surface. Yet why was the surface wet? The root cause of the injury may have been an inadequately maintained hose that leaked. Considering both the proximate cause and root cause of an injury results in a better understanding of what caused the injury and, consequently, what can be done to prevent it.

The real world, of course, is messier than the proximate-and-root-cause model suggests. There is often a chain of causality that leads to an injury. In the example above, why was the hose not properly maintained? The root cause of that may well have been inadequate staffing levels. And what caused the inadequate staffing

1. Vosko, L. (2006). Precarious employment: Towards an improved understanding of labour market insecurity. In L. Vosko (Ed.), Precarious employment: Understanding labour market insecurity in Canada. Montréal: McGill-Queen's University Press, p. 4.
2. Lewchuk, W., Clarke, M., & de Wolfe, A. (2011). Working without commitments: The health effects of precarious employment. Montréal: McGill-Queen's University Press.

levels? Perhaps the employer was trying to minimize the cost of production. Why would the employer be trying to minimize costs? Perhaps because the employer feels pressure to maximize profitability.

"Approaches to Injury Causation" by Alyssa Giles CC BY-NC-SA 4.0

When thinking about what causes injuries, it is also important to realize that there are both technical explanations and political-economy explanations. The **technical approach** to injury emphasizes the mechanism(s) of injury.

The **political-economy approach** to explaining workplace injury examines issues of power and financial gain to reveal why some hazards are remediated and others are not. This approach recognizes that employers and workers have differing interests in the workplace and therefore view workplace injuries differently.

Since perfect safety is unattainable, employers often adopt a **cost-benefit approach** to safety: safety should only be improved when it costs less to prevent the injury than the injury itself costs.[3] This isn't to suggest that employers actively wish to see their workers injured or don't take safety seriously. Rather, it highlights that employers and managers face structural pressures and that these pressures shape how they behave and, indeed, how they view issues like workplace safety.

These pressures are also felt in the public and non-profit sectors, where profit affects decisions in a more indirect fashion. While neither sector worries about profit per se, both have finite resources and face pressure to keep costs down. Non-governmental (non-profit) organizations rely heavily on funding from private donors and government grants, and these funders demand efficient use of their dollars.

3. Tucker, E. (1983–84). The determination of occupational health and safety standards in Ontario, 1860–1982. McGill Law Journal, 29, 260–311.

1.3 INJURY STATISTICS

The introduction to this chapter noted that there were 245,365 accepted workers' compensation claims for time-loss injuries in 2012.[1] As astounding as these annual time-loss injury numbers are, they profoundly understate the true level of workplace injury in Canada. The understatement of injury numbers occurs in a number of ways. First, **time-loss injuries** are accepted workers' compensation claims where a worker could not report to work due to the injury.

Lost-time Injury

"A "lost time" claim is created when a worker suffers a work-related injury/disease which results in:

- being off work past the day of accident
- loss of wages/earnings, or
- a permanent disability/impairment."[2]

Not all workers must (or can) report their injuries to a workers' compensation board (WCB). In fact, only about 85% of workers are covered by workers' compensation in Canada. So, right out of the gate, we know time-loss claims represent only 85% of all time-loss injuries. Second, WCBs don't accept every time-loss claim filed by workers. Exact data on acceptance rates is unavailable, but approximately 5% of all workers who submit a claim have that claim rejected and thus those injuries are excluded from the total above. So far, then, the 245,365 claims represents only about 80% of all time-loss injuries. Third, not all workers report their injuries. The best data available suggests that 40% of injuries go unreported.[3] All in all, this suggests the true number of time-loss injuries likely is closer to 430,000 per year.

1. AWCBC. (2014).
2. WSIB Ontario. (2021, April 9). Lost time claims. Operational Policy Manual. Retrieved May 27, 2022, from https://www.wsib.ca/en/operational-policy-manual/lost-time-claims
3. Shannon, H., & Lowe, G. (2002). How many injured workers do not file claims for workers' compensation benefits? American Journal of Industrial Medicine, 42(6), 467–473.

Moreover, time-loss claims comprise only a fraction of all injuries. Missing from these numbers are all other injuries where the worker could go to work (albeit with an injury). This includes injuries requiring medical aid only or injuries where the employer was able to modify the worker's duties to prevent time loss. It also includes injuries where the worker just decides to soldier on, such as burns, cuts, sprains, and strains, as well as injuries where the worker receives benefits from private medical insurance. The true number of workplace injuries is possibly as great as 10 times the reported number of time-loss injuries.[4] The idea that there might be 2.4 million workplace injuries in Canada each year suggests that state injury-prevention efforts are not very effective.

So why are so many workplace injuries not reported? There are several explanations. Employers may discourage workers from reporting injuries because injury claims can affect employers' workers' compensation premiums as well as their ability to successfully bid on some contracts. Employers may offer workers paid time off and private insurance benefits in order to avoid workers' compensation claims. The risk of this arrangement for workers is that, if the worker is re-injured at a later date and requires workers' compensation benefits, there will be no record of the original injury and thus the "new" injury may not be fully compensable.

4. Barnetson, B. (2012). The validity of Alberta safety statistics. Just Labour, 19, 1–21.

1.4 SUMMARY

At the end of the investigation into the Lakeland mill explosion, the company was fined $724,000—a fine the owners are appealing at the time of writing. The decision of a coroner's jury that the explosion was an "accident"—the outcome of unintended or unexpected events—outraged families of the dead workers. The BC government had earlier decided not to proceed with criminal charges. Throughout this text, we will explore workplace hazards, assessments and controls that may help employers eliminate or reduce the likelihood of occupational injuries.

Discussion Questions

1. Explain the meaning of a workplace injury and discuss workplace injuries you have been involved in.
2. Identify 5 categories of hazards that cause that cause of workplace injuries and provide an example of each.
3. Explain the importance of accurately reporting injury statistics, including lost-time incidents.

Notes

1. Hoekstra, G., & Carman, T. (2012, April 25). Two dead, 22 injured after massive explosion destroys Prince George sawmill. *Vancouver Sun*. http:// www.vancouversun.com/ dead+injured+after+massive+explosion+destroys+Prince+George+sawmill/6506952/ story.html
2. You can read the full incident investigation report here: https://www2. worksafebc.com/

PDFs/investigations/IIR2012136900086.pdf

3. AWCBC. (2014). National work injury, disease and fatality statistics 2010–2012. Ottawa: Association of Workers' Compensation Boards of Canada.

4. Ibid.

5. Barnetson, B., & Foster, J. (2015). If it bleeds, it leads: The construction of workplace injury in Canadian newspapers, 2009–2014. *International Journal of Occupational and Environmental Health*, 21(3), 258–265. doi: 10.1179/ 2049396715Y.0000000003 . This study extends the analysis of coverage in newspapers, Gawley, T., & Dixon, S. (2015). "One Side of the Story: Examining newspaper coverage of workplace injury and fatality in Ontario, 2007–2012." *Work: A Journal of Prevention, Assessment, and Rehabition*, 53 (1), 205–18.

6. Dembe, A. (1996). *Occupation and disease: How social factors affect the conception of work-related disorders*. New Haven: Yale University Press.

7. McDiarmid, M., Oliver, M., Ruser, J., & Gucer, P. (2000). Male and female rate differences in carpal tunnel syndrome injuries: Personal characteristics of job tasks? *Environmental Research*, 83(1), 23–32.

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10. Rennie, R. (2006). "All part of the game": The recognition of and response to an industrial disaster at the Fluorspar mines, St. Lawrence, Newfoundland, 1933–1978. In E. Tucker (Ed.), *Working disasters: The politics of recognition and response* (pp. 77–102). Amityville: Baywood.

11. Hilgartner, S. (1985). The political language of risk: Defining occupational health. In D. Nelkin (Ed.), *The language of risk: Conflicting perspectives on occupational health* (pp. 25–65). Beverly Hills: Sage.

12. Tucker, E. (1983–84). The determination of occupational health and safety standards in Ontario, 1860–1982. *McGill Law Journal*, 29, 260–311.

13. Ashford, N. (1976). *Crisis in the workplace: Occupational disease and injury*. Cambridge: MIT Press.

14. Kirsh, B., Slack, T., & King, C. (2012). The nature and impact of stigma towards injured workers. *Journal of Occupational Rehabilitation*, 22(2), 143–154.

15. Graebner, W. (1984). Doing the world's unhealthy work: The fiction of free choice. *The Hastings Center Report*, 14(4), 28–37.

16. Alberta Cancer Board and Alberta Cancer Foundation. (2005). *Cancer and the workplace: An overview for workers and employers*. Edmonton: Authors.

17. Draper, E. (2000). Competing conceptions of safety: High-risk workers or high-risk work? In S. Kroll-Smith, P. Brown, & V. Gunter (Eds.), *Illness and the environment: A reader in contested medicine* (pp. 217–234). New York: New York University Press.

18. Tucker, E. (1990). *Administering danger in the workplace: The law and politics of occupational health and safety regulation in Ontario, 1850–1914*. Toronto: University of Toronto Press.

19. AWCBC. (2014).

20. Shannon, H., & Lowe, G. (2002). How many injured workers do not file claims for workers' compensation benefits? *American Journal of Industrial Medicine*, 42(6), 467–473.

21. Barnetson, B. (2012). The validity of Alberta safety statistics. *Just Labour*, 19, 1–21.

22. Petrie, P. (2014). Fair compensation review: A review of the impact of the Manitoba WCB assessment rate model on fair compensation for workers and fair assessments for employers. Winnipeg: Minister of Family Services and Labour, p. 35.

CHAPTER 2: OCCUPATIONAL HEALTH AND SAFETY LEGISLATION

Chapter Outline

2.0 LEARNING OBJECTIVES

Learning Objectives

1. List the three rights of the worker
2. Explain the intent of the Internal Responsibility System
3. List the legal responsibilities of the employee, employer, and supervisor

2.1 INTRODUCTION TO OCCUPATIONAL HEALTH AND SAFETY LEGISLATION
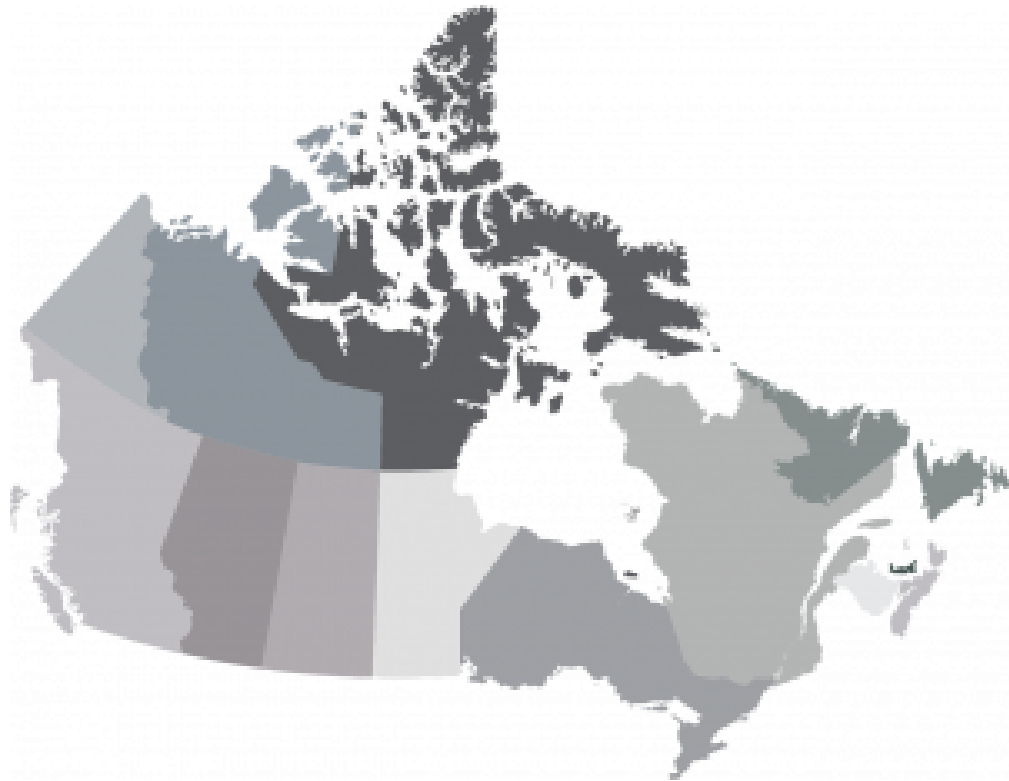
Image by Craig Clark, Pixabay License

All 14 of Canada's jurisdictions, have occupational health and safety legislation—laws that grant rights to and impose duties upon workers and employers in order to reduce the level of workplace injury. In this chapter, we will review the responsibilities and the rights of workers, the legal implication of the legislation, and the relationship between safety laws and other pieces of legislation.

Beginning in the 1970s, the federal, provincial, and territorial governments all enacted legislation—laws—that regulate occupational health and safety (OHS). The distribution of powers under the Canadian constitution means Canada has 14 **jurisdictions** (federal, 10 provincial, and 3 territorial) when it comes to health and safety laws. Most employers and workers are covered by the occupational health and safety law of the province or territory in which they work. About 10% of the workforce is, however, covered by the occupational health and safety provisions in the federal government's *Canada Labour Code*. The *Canada Labour Code* covers employees of the federal government. It also covers workers in industries that are, by

their nature, interprovincial, such as banking, telecommunications, interprovincial transport, and uranium mining. Each jurisdiction has its own amalgam of acts, regulations, policies, and guidelines.

An **act** is a federal, provincial, or territorial law that sets out the broad legal framework around occupational health and safety in each jurisdiction.

A **regulation** typically sets out how the general principles of the Act will be applied in specific circumstances and is enforceable. Guidelines and policies are more specific rules about occupational health and safety. Other supporting guidance can be found in standards and codes. These documents provide employers with direction on health and safety implementation in the workplace. An example would be CSA Z795-03 which refers to the Coding of Work Injury or Disease Information and is published by the Canadian Standard Association (CSA).[1]

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1. Employment and Social Development Canada (ESDC). (2017, February 16). Psychological Health in the Workplace. Retrieved May 30, 2022, from https://www.canada.ca/en/employment-social-development/services/health-safety/reports/psychological-health.html

2.2 RIGHTS AND RESPONSIBILITIES

Occupational health and safety legislation consists of rights and responsibilities. Let us look at the foundation of health and safety, the internal responsibility system, and explore the topic of due diligence. In addition, we will take a closer look at the rights and responsibilities of employers, employees, supervisors and joint health and safety committees.

The Internal Responsibility System (IRS)

Canadian OHS is based upon the **internal responsibility system** (IRS). The IRS assumes that workers and employers have a shared responsibility for workplace health and safety. Employers are obligated to take steps to ensure that workplaces are as safe as reasonably practicable.[1] Employers are also required to advise workers of hazards and to require workers to use mandated safety equipment. The decision by governments to give employers the power to determine how to address workplace hazards bolsters employers' broader **management rights** to control and direct work.

It can be difficult for employers to know when they have met their duty to make work as safe as reasonably practicable. Meeting the **reasonably practicable** standard means taking precautions "that are not only possible but that are also suitable or rational, given the particular situation."[2] The generally accepted test is that of due diligence.

Due Diligence

Due diligence is taking reasonable precautions and steps to prevent injury, given the circumstances. It is assessed using a three-part test:

1. **Foreseeability:** Reasonable employers are expected to know about the hazards of their

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1. For example, Section 3-8(a) of the Saskatchewan Employment Act (2013) states: "3-8 Every employer shall: (a) ensure, insofar as is reasonably practicable, the health, safety and welfare at work of all of the employer's workers;"
2. Government of Canada, Labour Program. (1993). Labour Standards Interpretations, Policies and Guidelines 808/819-IPG 057, p. 4.

business. Injuries that arise from events that other operators in the industry expect might occur are foreseeable events.

2. **Preventability:** Reasonable employers are expected to take steps to prevent injury. The normal steps include identifying hazards, preparing and enforcing safe working procedures, training and monitoring worker safety, and ensuring compliance with safety procedures. Injuries that arise because an employer did not take these steps are preventable injuries.

3. **Control:** Reasonable employers are expected to take action on hazards that they can control. Injuries that arise from such hazards suggest the employer failed to control these hazards.[3]

Employers who have taken the steps to address the hazards within their control to prevent foreseeable injuries have exercised their due diligence. This matters for two reasons. First, due diligence prevents injuries by controlling hazards. Second, if an injury occurs, employers who have completed the steps can use this due diligence as a defence to avoid penalties under OHS legislation.

Three Rights of the Worker

To offset the power of employers under the IRS, governments have granted workers three safety rights:

1. **Right to know**: Workers have a right to know about the hazards they face in their workplace. While many hazards are readily apparent, chemical and biological hazards may not be. The right to know has given rise to systems such as the Workplace Hazardous Materials Information System discussed below, which provides workers with information about hazards materials and their safe handling.

2. **Right to participate**: Workers have the right to participate in workplace health and

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3. Government of Alberta. (2005). Due diligence. Edmonton: Employment and Immigration.

safety activities. Participation most often occurs through joint health and safety committees (JHSCs) but can be through other means.

3. **Right to refuse**: Workers have the right to refuse unsafe work. The right to refuse represents one of the few instances where workers can disobey their employer. A refusal requires employers to investigate and remedy unsafe work. Although the right to refuse sounds like a powerful right, it is one workers rarely use.

Employer Responsibilities

Employers have specific responsibilities when it comes to health and safety legislation. In Ontario, for example, some of the employer responsibilities include:

- Establish and maintain a health and safety committee , or cause workers to select at least one health and safety representative.
- Take every reasonable precaution to ensure the workplace is safe.
- Train employees about any potential hazards and in how to safely use, handle, store and dispose of hazardous substances and how to handle emergencies.
- Make sure workers know how to use and handle the equipment safely and properly.
- Make sure workers use any necessary personal protective equipment.
- Immediately report all critical injuries to the government department responsible for OH&S.
- Appoint a competent supervisor who sets the standards for performance, and who ensures safe working conditions are always observed.

Employee Responsibilities

There exists a misperception that only the employer has responsibilities under occupational health and safety legislation. Employees, however, have specific responsibilities under the law. Some of the employee responsibilities under the *Occupational Health and Safety Act* include:

- Work in compliance with OH&S acts and regulations.
- Use personal protective equipment and clothing as directed by the employer.
- Report workplace hazards and dangers to the supervisor or employer.
- Work in a safe manner as required by the employer and use the prescribed safety equipment.

- Tell the supervisor or employer about any missing or defective equipment or protective device that may be dangerous

Supervisor/Manager Responsibilities

Individuals with titles such as supervisor or manager have specific responsibilities under occupational health and safety legislation. In Ontario, for example, supervisors and managers are to:

- Make sure workers work in compliance with OH&S acts and regulations.
- Make sure that workers use prescribed protective equipment and/or devices.
- Advise workers of potential and actual hazards.
- Provide workers with written instructions as to the measures and procedures to be taken for protection of the worker.
- Take every reasonable precaution in the circumstances for the protection of workers.

This section on responsibilities was taken from:

OH&S Legislation in Canada – Basic Responsibilities, https://www.ccohs.ca/oshanswers/legisl/responsi.html, *OSH Answers*, Canadian Centre for Occupational Health and Safety (CCOHS), *April 8, 2019*. Reproduced with the permission of CCOHS, 2022.

Joint Health and Safety Committee

Joint health and safety committees are an important mechanism by which workers exercise their right to participate in occupational health and safety matters. Joint health and safety committees comprise employer and worker representatives who regularly meet to discuss health and safety issues. The "logic" of these committees is that they marry the job-specific knowledge of workers with the broader perspective of managers to identify and resolve OHS issues. The legislative requirements for JHSCs vary by jurisdiction and organization size. Unions may also negotiate mandatory JHSCs into their collective agreements.

In smaller workplaces, a joint health and safety committee may not be required. Be certain to refer to your federal, provincial or territorial legislation to determine if your workplace needs a safety committee or a safety representative. Here is a quick reference from the Canadian Centre for Occupational Health and Safety:

https://www.ccohs.ca/oshanswers/hsprograms/hscommittees/whatisa.html

Among the tasks joint health and safety committees perform are conducting hazard assessments, providing education and training, and investigating incidents. While a joint health and safety committees can propose hazard mitigation strategies, occupational health and safety legislation empowers the employer to determine how to control such hazards. In this way, joint health and safety committees are advisory committees rather than decision-making committees. Research suggests that worker participation in occupational health and safety tends to be more effective in larger workplaces and in the presence of trade unions.[4] Workers in smaller firms and in workplaces reliant upon various subcontracting and outsourcing arrangements are less likely to have access to joint health and safety committees.[5]

How workers behave on joint health and safety committees can influence the effectiveness of worker participation. Worker representatives who collect their own information about occupational health and safety assert their knowledge about hazardous conditions, mobilize their co-workers to support demands for improvements, and propose alternative solutions appear to be more effective than more passive representatives.[6] The effectiveness of this more activist orientation suggests employer occupational health and safety behaviours can be shaped by workers' behaviour in the workplace, as well as by external enforcement by the state.

4. Nichols, T., & Walters, D. (2009). Worker representation on health and safety in the UK – Problems with the preferred model and beyond. In D. Walters & T. Nichols (Eds.), International perspectives on representing workers' interests in health and safety (pp. 19–30). Basingstoke: Palgrave Macmillan.

5. Johnstone, R. (2006). Regulating occupational health and safety in a changing labour market. In C. Arup, P. Gahan, J. Howe, R. Johnstone, R. Mitchell, & A. O'Donnell (Eds.), Labour law and labour market regulations (pp. 617–634). Sydney: Federation Press.

6. Hall, A., Forrest, A., Sears, A., & Carlan, N. (2006). Making a difference: Knowledge activism and worker representation in joint OHS committees. Relations Industrielles/Industrial Relations, 61(3), 408–436.

2.3 POWERS, AUTHORITY AND LEGAL IMPLICATIONS

The role of the state in the Internal Responsibility System is primarily one of education and enforcement. Governments often run safety awareness campaigns aimed at workers. Governments also employ OHS officers who perform **worksite inspections** in order to identify health and safety violations and ensure their remediation. Inspections may be random or targeted (e.g., focusing on high-injury industries, such as residential construction). Inspections may also be triggered by worker complaints.

Inspectors will also investigate serious workplace injuries and fatalities. Where inspectors find violations of OHS rules, they may order employers to remedy the situation. This is the most common response of OHS inspectors and can sometimes include issuing a **stop-work order**, which halts operations at the worksite until an unsafe situation is resolved. Some jurisdictions also give OHS inspectors the power to issue tickets or other financial penalties to workers and employers who are in contravention of OHS rules. The government can also seek to **prosecute** those who violate the law. This most often occurs when there has been a serious injury or fatality or a pattern of non-compliance with the law. Conviction can result in fines, jail time, or other penalties. Prosecutions are relatively rare in Canada.

"A Day in the Life of an Inspector" by Bureau of Safety and Environmental Enforcement, Public Domain

Canada's *Criminal Code* was amended in 2004 to allow for the criminal prosecution of individuals and organizations that direct the work of others when a worker is injured and the employer failed to meet its due diligence requirements. Criminal prosecution is designed to address cases of profound moral failings, such as the wanton disregard for safety that cost 26 workers their lives in 1992 at the Westray Mine in Nova Scotia. Only a handful of prosecutions under the *Criminal Code* have occurred, with few resulting in convictions.[1]

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1. Bittle, S. (2012). Still dying for a living: Corporate criminal liability after the Westray mine disaster. Vancouver: University of British Columbia Press.

2.4 RELATED LEGISLATION

Occupational health and safety laws are part of a broader **web of rules** that regulate employment. Other laws passed by legislatures that impact OHS include fire and building codes, occupational-specific regulations, laws regulating hazardous materials (both in the workplace and the broader environment), employment (or labour) standards, human rights, and workers' compensation schemes.

Hazardous Products

The federal *Hazardous Products Act* established the **Workplace Hazardous Materials Information System** (WHMIS). WHMIS protects workers by requiring employers to label hazardous materials and provide **safety data sheets** (SDS) which outline the hazards of the substance. This information assists workers in exercising their right to know about workplace hazards. Each of Canada's 14 jurisdictions have included aspects of WHMIS in their own OHS systems.[1]

Governments also regulate aspects of certain occupations. For example, workers whose job requires them to handle or use explosives may be required to undertake specific training and hold a permit. Governments have also enacted environmental laws that regulate air, water, and soil pollution, waste management, and climate change. While environmental regulations are not normally considered a part of occupational health and safety, there is no clear boundary between environmental hazards and workplace hazards.

Employment Standards

All Canadian jurisdictions have enacted laws setting out the minimum terms and conditions of work. These **employment standards** (or labour standards) acts often outline maximum hours of work and required rest breaks. These requirements prevent workers from becoming overly tired, which increases the risk of injury. Employment standards legislation also usually contains limits on the employment of minors, reflecting their greater vulnerability to occupational injury due to their physical and intellectual immaturity. Such laws preclude employers from recovering the cost of customer theft from workers' wages. As the vignette at the beginning of this chapter suggests, though, employment standards laws are unevenly enforced, thereby reducing their contribution to injury prevention.

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1. You can learn more about WHMIS at http://whmis.org/

Human Rights

It is important to consider the impact of **human rights legislation** on OHS. Human rights acts preclude discrimination on various grounds, such as gender, family status, age, sexual orientation, and disability. The **duty to accommodate** injured workers that flows from human rights legislation. In short, employers are expected to modify work and workplaces, up to the point of undue hardship for the employer, so as not to discriminate against workers with temporary or permanent disabilities.

Workers' Compensation

Being injured on the job affects workers in many ways. Historically, injury has often meant poverty, because injured workers frequently can't work. At the beginning of the 20th century, provincial governments enacted **workers' compensation** systems to provide injured workers with wage-loss benefits, medical treatment, and vocational rehabilitation. Prior to the creation of workers' compensation, workers injured on the job were forced to sue their employers for compensation. Workers often could not afford to sue, and if they did sue they rarely won, which meant injured workers often ended up financially dependent upon their families or charity. The unfairness of this system was a source of significant social instability, and governments enacted workers' compensation laws to partly address workers' needs and thereby stave off industrial and social conflict.[2] In exchange for immediate, predictable, and stable compensation, injured workers gave up their right to sue their employer for workplace injury. This exchange is often called the historic compromise.

> The Ontario workers' compensation system, which was Canada's first, was based upon the recommendations of a 1913 Royal Commission on Workers' Compensation headed by William Meredith.[3] The Meredith principles underlying workers' compensation remain the basis for workers' compensation in Canada:
>
> 1. **No fault**: How the injury occurred is irrelevant. Compensation is paid on a no-fault basis and workers cannot sue their employer.
> 2. Accident fund: The WCB maintains an accident fund to guarantee the availability of

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2. Risk, R. (1983). This nuisance of litigation: The origins of workers' compensation in Ontario. In D. Flaherty (Ed.), Essays in the history of Canadian law (Vol. 2, pp. 418–491). Toronto: University of Toronto Press.

3. The Meredith Report can be viewed at http://awcbc.org/wp-content/uploads/2013/12/meredith_report.pdf

benefits over time.

3. **Collective liability**: All employers pay premiums and thereby share the cost of injuries collectively.

4. Independent administration: The WCB—which operates independently of employers, workers, and the state—administers the workers' compensation system.

5. Exclusivity: The WCB is the only provider of workers' compensation. This differs from arrangements in some US states where multiple private insurers offer compensation. The WCB is also the final arbiter of all claims.

Every province and territory has established a WCB that operates under these principles. When workers experience a serious work-related injury (e.g., the worker requires medical aid or can't go to work the next day), the worker, employer, and doctor are all required to report the injury to the WCB. In assessing whether an injured worker is eligible for benefits, the WCB uses the two-part "arises-and-occurs" test. To be compensable, an injury must be caused by an event arising out of, and occurring during the course of, employment.

Where it is not possible to determine if an injury arose or occurred, workers' compensation legislation generally gives the benefit of the doubt to the injured worker. Some workers' compensation systems also grant **presumptive status** to certain types of injury. Certain diseases, for example, are so closely linked with certain kinds of work (e.g., farming and farmer's lung) that claims are presumed to have arisen and occurred unless there is evidence otherwise.

Once an injury has been found to be compensable, workers are eligible to receive wage-loss, medical, and vocational rehabilitation benefits. **Wage-loss benefits** provide financial compensation to workers whose income is reduced by an injury. The level of wage-loss benefit and when wage-loss benefits commence varies by jurisdiction, although rates are set so that workers ordinarily receive less than their regular wage. Injured workers can also receive medical and vocational rehabilitation benefits. **Medical benefits** cover the costs of treating an injury, thereby relieving workers and the taxpayer-funded health care system of these costs. **Vocational rehabilitation benefits** include programs designed to increase the probability of a worker returning to employment. When a worker dies as the result of a workplace injury, the worker's dependents are eligible to receive **fatality benefits**, including funeral costs and wage-loss benefits.

While workers' compensation entails significant benefits to injured workers, the administration of these benefits has come under heavy criticism. Injured workers often report that their interactions with the WCB—wherein workers' claims are often met with skepticism and workers are sometimes surveilled—can

be psychologically damaging.[4] Injured workers are also more likely to live in poverty.[5] In some jurisdictions, workers face having their wage-loss benefits reduced because the WCB deems them to be employable, even though they have been unable to find a job.[6] These concerns are often related to the way workers' compensation is funded and, in particular, to the operation of experience-rating systems.

Employers fund workers' compensation by paying premiums. Premiums are based upon an employer's payroll multiplied by the assessment rate the WCB has set for the industry in which the employer operates. Typically premiums are expressed in the form of X dollars per $100 of payroll. Some provinces further modify individual employer's premiums based upon the employer's claims record. These experience-rating systems reward employers that have low claim costs and penalize employers that have high claim costs. As we saw in Chapter 1, experience rating is a controversial system. Linking claim costs to premium rebates does reduce the number and duration of claims, but it is unclear if this means an actual reduction in the number or severity of injuries or reflects employer **gaming** of the experience-rating system.[7] Gaming may include suppressing claims as well as disputing worker claims, thereby undermining the no-fault basis of workers' compensation.

Many injured workers are able to perform productive work while they are recovering from injuries. Providing workers with an opportunity to **return to work** (RTW) by, for example, modifying their duties may help workers recover. The idea that return-to-work is rehabilitative is hotly contested. Less controversial is that RTW programs help employers minimize their claims costs.[8] Such programs also ensure that employers meet the duty to accommodate workers found in human rights legislation.

4. Lippel, K. (2007). Workers describe the effect of the workers' compensation process on their health: A Québec study. International Journal of Law and Psychiatry, 30, 427–443.

5. Ballantyne, P., Casey, R., O'Hagan, F., & Vienneau, P. (2016). Poverty status of worker compensation claimants with permanent impairments. Critical Public Health, 26(2), 173–190. doi: 10.1080/09581596.2015.1010485

6. Barnetson, B. (2010). The political economy of workplace injury in Canada. Edmonton: Athabasca University Press.

7. Tompa, E., Hogg-Johnson, S., Amick, B., Wang, Y., Shen, E., Mustard, C., Robson, L., & Saunders, R. (2013). Financial incentives for experience rating in workers' compensation: New evidence from a program change in Ontario, Canada. Journal of Occupational and Environmental Medicine, 55(3), 292–304.

8. Tompa et al. (2013).

2.5 SUMMARY

This chapter outlined the legal framework the state has enacted to prevent and compensate work-related injuries. To fully appreciate how injury prevention and compensation laws operate we have to be prepared to understand both the technical requirements of the laws and the political economy of their enforcement.

Canadian governments have made employers and workers jointly responsible for OHS via the IRS. In addition to OHS laws, governments have passed other legislation that makes workplaces safer, including fire and building codes and hazardous materials and environment protection regulations. It is essential that every employer understand the occupational health and safety legislation that applies to their workplace(s) and implements the essential components of a safety program including training, hazard identification, incident investigation and controls.

Check Your Knowledge

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://ecampusontario.pressbooks.pub/cdnhealthsafetyworkplacefundamentals/?p=1607#h5p-4

Discussion Questions

1. What are the occupational health and safety (OHS) rights and obligations of workers and employers?
2. How does the internal responsibility system (IRS) operate? What challenges does the IRS face?
3. How effective are state OHS enforcement efforts? What might states do to make enforcement more effective?

Exercise

Go online and find your jurisdiction's rules around the workers' right to refuse. Write a 500-word answer to the following questions:

1. Explain the circumstances in which workers can refuse unsafe work or the tests applied to determine if work is unsafe.
2. Outline the process by which workers refuse unsafe work.
3. Explain what an employer must do when faced with a worker refusal.
4. Identify the consequences if an employer coerces an employee to perform unsafe work.
5. If you were a worker, why might you be reluctant to refuse unsafe work?

Notes

1. (2012, September 20). Worker claims she was asked to pay for gas and dash. http://www.cbc.ca/news/canada/toronto/worker-claims-she-wasasked-to-pay-for-gas-and-dash-1.1128621

2. (2012, September 19). Ontario to probe gas-and-dash death: MPP to introduce 'pay before you pump' private member's bill Thursday. http:// www.cbc.ca/news/canada/toronto/ontario-to-probe-gas-and-dashdeath-1.1157251

3. 610 CKTB News. (2015, June 16). The gas and dash, pre-pay at the pump debate. http://www.610cktb.com/news/2015/06/16/the-gas-and-dashpre-pay-at-the-pump-debate

4. For example, Section 3-8(a) of the *Saskatchewan Employment Act* (2013) states: "3-8 Every employer shall: (a) ensure, insofar as is reasonably practicable, the health, safety and welfare at work of all of the employer's workers;"

5. Government of Canada, Labour Program. (1993). *Labour Standards Interpretations, Policies and Guidelines 808/819-IPG 057*, p. 4.

6. Government of Alberta. (2005). Due diligence. Edmonton: Employment and Immigration.

7. Nichols, T., & Walters, D. (2009). Worker representation on health and safety in the UK – Problems with the preferred model and beyond. In D. Walters & T. Nichols (Eds.), *International perspectives on representing workers' interests in health and safety* (pp. 19–30). Basingstoke: Palgrave Macmillan.

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17. Weil, D. (2011). Enforcing labour standards in fissured workplaces: The US experience. *The Economic and Labour Relations Review*, 22(2), 33–54.

18. Hasle, P., & Limborg, H. (2006). A review of the literature on preventive occupational health and safety activities in small enterprises. *Industrial Health*, 44, 6–12.

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23. Von Drehle, D. (2003). *Triangle: The fire that changed America*. New York: Atlantic Monthly Press.

24. You can learn more about WHMIS at http://whmis.org/

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37. Tompa et al. (2013).

CHAPTER 3: HAZARD RECOGNITION, ASSESSMENT, AND CONTROL

Chapter Outline

3.0 LEARNING OBJECTIVES

Learning Objectives

1. Explain how to identify a workplace hazard
2. List hazard assessment techniques
3. Explain how to control hazards at the source-path-employee

3.1 INTRODUCTION TO HAZARD RECOGNITION, ASSESSMENT AND CONTROL

The key to preventing workplace injuries and fatalities is to identify hazards and control them, otherwise known as **Hazard Recognition, Assessment and Control** *(HRAC)*. This chapter examines how workers and employers identify, prioritize, and control workplace hazards. A workplace hazard is anything that might harm, damage, or adversely affect any person or thing under certain conditions at work. It can be an object, process, context, person, or set of circumstances which has the potential to create injury or ill health. While this definition may seem vague, it is intentionally vague in order to ensure that anything that could potentially harm a worker is included.

Hazard recognition (which is sometimes called hazard identification) is the systematic task of identifying all hazards present, or potentially present, in a workplace. It is the first step of any HRAC process. The second step is **hazard assessment** (which is sometimes called hazard analysis). In a hazard assessment, workers and employers determine which of the hazards needs to be addressed most urgently. Finally, the **hazard control** process sees preventive and corrective measures implemented to eliminate or mitigate the effect of the hazard(s). Let's review a mobile workplace incident to see how hazard recognition, assessment and control measures may have prevented such a tragedy.

Story: Interlake Paving in Stony Mountain

On July 25, 2008, 15-year-old Andrew James was working as a labourer for Interlake Paving in Stony Mountain, Manitoba. Interlake, a small company owned by Gerald Shepell, had been contracted to pave a parking lot. James was standing on the box of a semi-trailer, scooping out asphalt with a shovel. The trailer gate unexpectedly swung open, shaking the truck. James lost his footing and fell into the asphalt in the trailer, which quickly poured out through the trailer gate onto the ground, burying him. James died almost immediately from the intense heat of the asphalt.

Shepell tried to dig James out, sustaining severe burns to his own hands, arms, feet, and legs. [1] Shepell later pled guilty to breaches of the *Workplace Safety and Health Act* and the *Employment Standards Code* (James was under-age) and was fined $34,000. [2]

In the case of Andrew James, the process of hazard recognition, assessment and control would have identified the risks posed by the trailer's inadequately latched gate, the unsafe unloading practices, the absence of an emergency plan, and other issues. It might also have raised questions about the adequacy of the training provided to James, the legality of his employment, and the OHS complexity of mobile workplaces—workplaces where the hazards are ever-changing.

The core purpose of HRAC is to methodically identify and control workplace hazards. Some hazards are easier to identify than others. For example, it is easy to see that an extension cord lying across a busy hallway may cause someone to trip. It is more difficult to determine if a cleaning agent is toxic or if a machine is producing too much noise. Even more challenging is identifying factors that are increasing stress among workers or are the precursors of harassment. Similarly, some hazards are also easier to control than others. Eliminating the hazard posed by the extension cord is a quick and easy fix. Other hazards may be much more expensive to control or may reflect a core aspect of the production process. Some controls may be complex, requiring multi-faceted solutions. Further complicating the HRAC process are the conflicting interests between workers and employers around hazards. Employers and workers might disagree over what constitutes a hazard, how serious the hazard is, and what the most appropriate control should be.

A near miss is an unwanted, unplanned event that did not cause an injury or property damage but may have done so if conditions had been slightly different.[3]

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2. McIntyre, M. (2010, November 30). Asphalt firm fined $34K in teen's death. Winnipeg Free Press, p. A7.

3. Infrastructure Health & Safety Association. (n.d.). Never miss reporting a near miss. IHSA.ca Magazine, 18(1).

3.2 THE BUSINESS CASE FOR HAZARD RECOGNITION, ASSESSMENT AND CONTROL

Hazard recognition or identification is perhaps that most important function of an employer, a safety program, a health and safety representative/committee. Let's review the business case for making hazard recognition a key activity at work.

Reduce Risk. The best way to reduce the number of workplace incidents is to avoid the incidents completely. Get ahead of the hazards, be proactive, identify hazards, assess risk and implement the controls necessary to minimize or eliminate the risk. An example, if the employer identifies low-lighting in the parking lot, have the lighting fixed, updated, replaced to reduce the chance of a workplace incident in the parking lot such as a slip and fall or a theft. The goal of the hazard recognition activity is to eliminate or reduce the risk of future incidents.

Financial. The investment in hazard recognition is low compared to the cost of a workplace incident. Employees that will assist with hazard recognition are already on the payroll. The employer needs to task employees to complete a thorough review of the workplace. Don't forget meeting rooms, washrooms, eating areas, storage cabinets and parking lots. The employer may choose to hire a third-party company to assist or lead the hazard recognition activity. Either way, the cost of these pro-active activities is less than the cost of a workplace incident.

Participation. In some jurisdictions, the legal system talks about the "rights of the worker" which includes the right to know and the right to participate. There is no easier way to provide workers with the right to participate than to involve them in the identification of workplace hazards. An example, strike a small committee consisting of members of the health and safety committee and employees that work in the maintenance area to perform a walk through of the maintenance area to identify hazards that others may not see.

Training. Once an employer identifies workplace hazards, it is easy to establish a safety training program. An example, a wheelchair manufacturer recognizes they cannot eliminate the use of sharp objects and metal in their work process. They implement a "sharps" training program that emphasizes the use of proper PPE (Personal Protective Equipment) such as gloves, to every employee and re-trains employees on the sharps safety program annually.

Due Diligence. At the center of each safety program is due diligence, or the act of doing everything possible to ensure the safety of individuals in the workplace. An example, employers should the appropriate safety signage is located throughout their workplace in languages that represent the diversity of their employees.

Internal Responsibility System. The IRS or Internal Responsibility System suggests everyone is responsible for safety. An example, at the monthly staff meeting, the leadership team encourages employees to report hazards in the workplace and reviews safety concerns identified in the past 30 days, as well as the actions taken to eliminate or minimize each hazard.

Compliance and Record Keeping. Should an employer need to provide evidence of their safety program and compliance with safety legilation, keeping hazard identification forms on file is a required practice. For example, should an organization receive unplanned visit from their government safety agency or ministry, the organization must be able to retrieve hazard identification records that demonstrate a pro-active approach to safety.

3.3 HAZARD RECOGNITION
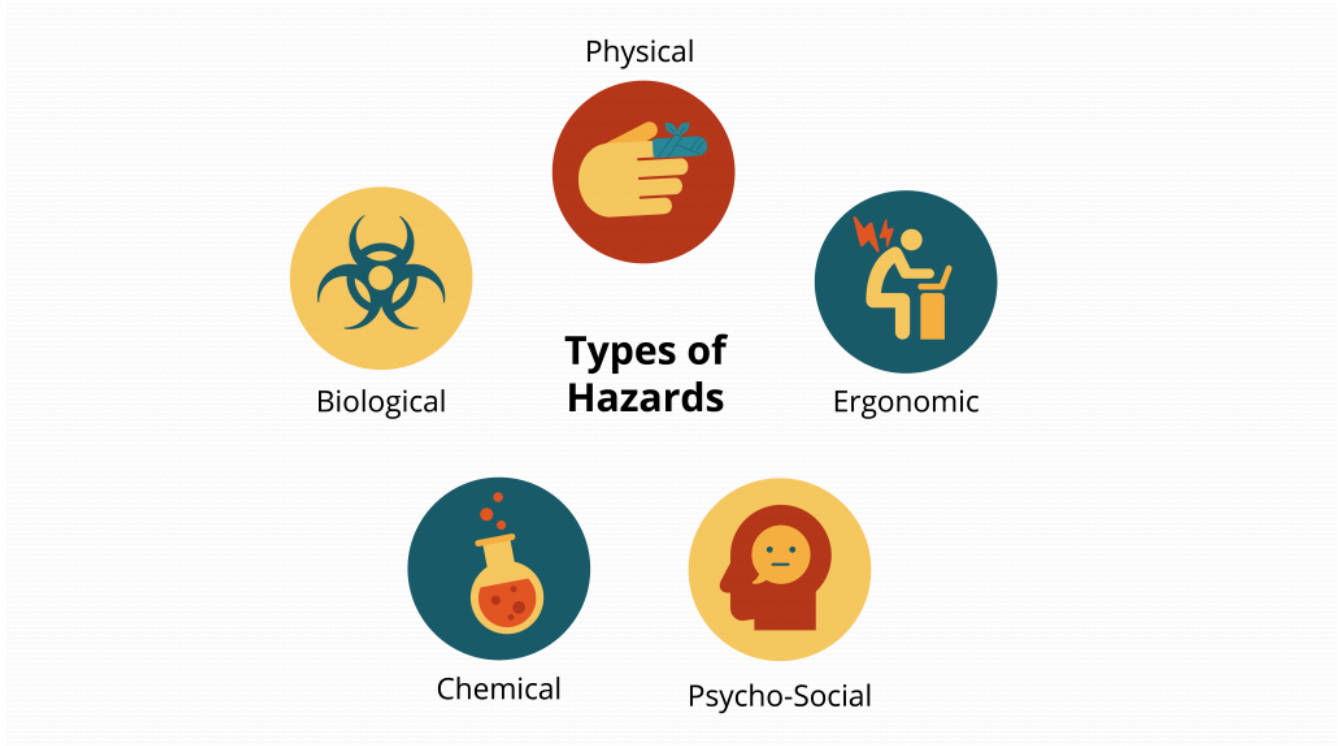
"The five categories of hazards" by Alyssa Giles CC BY-NC-SA 4.0

The HRAC process starts with comprehensively identifying all the hazards in a workplace. The five categories of hazards include physical, ergonomic, chemical, biological and psycho-social. Let's review each one in detail.

1. **Physical hazards** typically entail a transfer of energy from an object, such as a box falling off a shelf, which results in an injury. These are the most widely recognized hazards and include contact with equipment or other objects, working at heights, and slipping. This category also includes noise, vibration, temperature, electricity, atmospheric conditions, and radiation. All of these hazards can create harm in certain contexts.
2. **Ergonomic hazards** occur as a result of the interaction of work design and the human body, such as work-station design, tool shape, repetitive work, requirements to sit/stand for long periods, and manual handling of materials. Ergonomic hazards are often viewed as a subset of physical hazards. For the purposes of hazard assessment, it is useful to consider them separately because they are often overshadowed by more obvious physical hazards.
3. **Chemical hazards** cause harm to human tissue or interfere with normal physiological functioning. The

short-term effects of chemical hazards can include burns and disorientation. Longer-term effects of chemical hazards include cancer and lead poisoning. While some chemical substances are inherently harmful, ordinarily safe substances can be rendered hazardous by specific conditions. For example, oxygen is essential to human life, but in high doses can be harmful.

4. **Biological hazards** are organisms—such as bacteria, molds, funguses—or the products of organisms (e.g., tissue, blood, feces) that harm human health.

5. **Psycho-social hazards** are social, environmental, and psychological factors that can affect human health and safety. These hazards include harassment and violence but also incorporate issues of stress, mental fatigue, and mental illness.

Recognizing each type of hazard requires different methods and approaches. Analyzing each category of hazard separately allows us to consider the specific issues associated with the category. There are many ways to identify hazards in a workplace. There are many companies and consultants offering commercial hazard assessment packages to employers for a fee. The pre-prepared packages can help establish a framework upon which to build. There are also free resources available from reliable organizations, such as the Canadian Centre for Occupational Health and Safety which allow the hazard assessment process to be tailored to specific workplaces. A common feature of robust hazard recognition systems is that they examine the workplace from multiple perspectives to ensure that all hazards are identified.

It is useful to start the hazard assessment process by considering the nature of the work and workplace. The context of work affects the type of hazards in the workplace. For example, recognizing that work takes place at a remote workplace—such as a tree-planting operation or oil-field drilling site—raises issues of emergency response times, travel hazards, and working alone. Similarly, if workers are hired on a part-time or temporary basis, this may affect communication and training. Vulnerable workers—such as newcomers to Canada or youths—may be reluctant to identify hazards for fear of losing their jobs. These examples demonstrate that hazards do not merely reside in the task of working but also in the wider context of the employment relationship. One of the common omissions in hazard recognition is ignoring the underlying factors that lead to the creation of hazards. A narrower scope of recognition fits the employer's interests in limiting safety to proximate causes but it can undermine the effectiveness of the HRAC process.

Hazard Identification Techniques

There are a variety of hazard-identification techniques, and these are often used in combination to create a fuller picture of a workplace's hazards:

- **Inspecting the workplace:** Physically observing the workplace and how work is performed within it is a powerful step in identifying hazards. The inspection should not be limited to considering physical objects, such as machines, tools, equipment, and structures, but should also include observing processes,

systems, and work procedures.

- **Talking with workers:** Passive observation can miss many important aspects of how work is performed. Getting the perspective of the people conducting the work will reveal other insights. This can be done informally through discussions or through more formal means such as surveys or interviews.

- **Job inventory:** Acquiring job descriptions and specifications can also reveal hazards. Mapping out the flow of work to create a **task analysis** allows for a systematic examination of how a job is supposed to be conducted. It is important to compare this data with worker interviews to identify instances where work practices differ from formal procedures.

- **Records and data:** Reviewing records of previous workplace incidents, safety reports, and other documentation can yield useful information about the hazards in a workplace.

- **Measuring and testing:** Sometimes, to discover if something is a hazard, you will need to measure or test it. This is particularly true for noise, chemical hazards, and biological hazards.

- **Research:** Knowing something is present in the workplace may be insufficient to determine if it is a hazard. You may need to conduct research on a substance, material, design, or environment to assess its potential for harm.

The hazard identification process must be carefully documented. Hazard identification forms should break the identified hazards into their main types as well as by work area, job, or process performed. There are many generic forms available online. It will be necessary to adapt these to reflect the nature of the work and the workforce.

3.4 HAZARD ASSESSMENT

Once hazards have been identified, it is necessary to prioritize which hazards will be controlled first. Much like hazard recognition, hazard assessment is not just a technical practice. Through prioritizing, certain hazards will be brought to the forefront, and will therefore be more likely to be controlled, while others will be downgraded and likely receive little or no attention. It is important to be mindful of who benefits and who is harmed by the prioritization decisions.

Risk assessment is a common tool used by those determining the priorities in hazard assessment. **Risk** is the likelihood that a hazard will result in injury or ill health. A **risk assessment** quantifies the likelihood of injury or ill health by assessing the probability, consequences, and exposure posed by the hazards:

- **Probability** is the likelihood that the hazard will result in an incident.
- **Consequences** refers to the severity of injury or ill health that will result from an incident.
- **Exposure** refers to how often or regularly workers come in contact with the hazard.

Figure 3.1 Simplified Risk Assessment Tool

Figure 3.1 gives an example of a simplified tool for assessing the probability, consequences, and exposure associated with a hazard. Assessors use the description (e.g., rare, possible, probable, or likely). Each descriptor is then assigned a numerical value (e.g., 1, 2, 3, or 4).

Probability: Likelihood hazard will result in an incident.

☐   ☐   ☐   ☐

Rare (1)   Possible (2)   Probable (3)   Likely (4)

Consequences: Severity of injury/ill health caused by incident.

☐   ☐   ☐   ☐

Negligible (1)   Marginal (2)   Significant (3)   Catastrophic (4)

Exposure: Frequency workers contact the hazard.

☐   ☐   ☐   ☐

Rare (1)   Occasional (2)   Frequent (3)   Continuous (4)

Once the probability, consequences, and exposure of a hazard have been quantified, they can be inputted into a mathematical formula to quantify the risk:

$$risk = probability \times consequences \times exposure$$

The greater the final number, the greater the risk posed by the hazard. Quantifying risk allows us to compare the relative risk of several hazards. For example, workers in a gas station face all manner of hazards, including slippery surfaces, gasoline fumes, and the potential for robbery. Without looking at the assessment below, which of these three hazards should the employer control first? Most people tend to say robbery. Yet quantifying the risks suggests that robbery poses the least risk of the three hazards:

1. Slippery surfaces: Possible (2) × Significant (3) × Frequent (3) = 18
2. Exposure to gasoline fumes: Possible (2) × Significant (3) × Continuous (4) = 24
3. Robbery of cash on premises: Rare (1) × Catastrophic (4) × Continuous (4) = 16

Risk assessment tools allow the assessor to compare hazards, either overall or on a factor-by-factor basis, in order to identify which hazards should have the highest priority for control. It may be important, for example, to note that robbery poses the least risk of the three hazards but has the highest level of consequence and is a hazard to which workers are continuously exposed. These features may influence the type of control that is appropriate.

3.5 HAZARD CONTROL

Hierarchy of Controls

- Elimination
- Substitution
- Engineering Control
- Administrative Control
- Personal Protective Equipment

"The hierarchy of controls" by Alyssa Giles CC BY-NC-SA 4.0

The final step in the HRAC process is to determine and implement the most appropriate control for each hazard. Hazard control is a regulatory requirement in every Canadian jurisdiction and entails implementing measures to eliminate or reduce the potential of a hazard causing an incident. Employers must exercise due diligence in the HRAC process in order to avoid prosecution for any workplace injuries under OHS law. Some forms of hazard control are more effective than others, and, consequently, a hierarchy of controls (with five levels) has been established:

- **Elimination** removes the hazard from the worksite. For example, relocating work performed at a height to ground level eliminates the risk of falling. This control is most easily implemented at the design stage, thereby preventing the hazard from entering the workplace.
- **Substitution** entails replacing something that produces a hazard with something that does not. For example, we might replace chemical-based cleaning solvents with plant oil–based solvents. Substitution is similar to elimination but is less effective because the new object or process may introduce different hazards or fail to completely remove the original hazard.

- **Engineering controls** are modifications to the workplace, equipment, materials, or work processes that reduce workers' exposure to hazards. For example, installing guards on machinery, building guard rails, installing ventilation systems, or purchasing ergonomically designed workstations all isolate workers from hazards, but they do not eliminate the hazard. These controls can be incomplete, become inoperative due to lack of maintenance, or be overridden and therefore are less effective than elimination or substitution.

- **Administrative controls** are changes to work process, policies, training, or rules designed to reduce exposure to hazards. For example, policies restricting the time workers spend in contact with a chemical hazard, "no-go" zones that restrict workers' movements in certain locations, mandatory training sessions, permit systems to control access to equipment or spaces, changes to schedules to prevent excessive shift work, or working-alone procedures that require regular check-in are all administrative controls. Administrative controls do not actually control a hazard. Rather, they attempt (via rules and processes) to limit workers' exposure to the hazard.

- **Personal protective equipment** (PPE) is equipment worn by workers that is designed to protect them should they come into contact with a hazard. For example, helmets, goggles, gloves, and fall protection systems are forms of PPE. PPE is considered the least effective control because it does not control the hazard or restrict workers' contact with the hazard and is heavily reliant upon human action for its effectiveness. PPE places the burden of implementation on the worker. Workers may choose not to wear or be pressured into not wearing the PPE.

Multiple controls can be combined to provide a higher degree of control. Different levels of control may be appropriate at different times. For example, when first addressing a hazard it may be necessary to use PPE until a more permanent engineering control can be implemented. It is important to not unduly delay the implementation of the (likely more effective) engineering control. Employers have flexibility in how they control hazards, but that flexibility should not be interpreted as permission to disregard their due-diligence obligation to implement the most effective hazard control.

Types of Control

Control at the Source

Control along the Path

Control at the Worker

"Types of controls" by Alyssa Giles CC BY-NC-SA 4.0

A more worker-centered approach is to consider the **location of the control**. In this approach, the focus is on where and when the hazard is controlled in the context of where the worker is in the **production process**. In this approach, hazards can be controlled at three locations:

- **Control at the source** addresses the hazard where it first occurs. This type of control prevents the hazard from entering the workplace via elimination, substitution, or some types of engineering controls.
- **Control along the path** addresses the hazard at some point between its source and when workers encounter the hazard (i.e., it prevents the hazard from reaching the worker). Some types of engineering controls (e.g., machine guards, local ventilation) control the hazard along the path.
- **Control at the worker** implements controls over the hazard only after it reaches the worker. These controls are designed to prevent or reduce the consequences of the hazard, rather than control the hazard itself. PPE and administrative controls are both examples of control at the worker because they both require that the burden of the control be placed almost exclusively upon the worker.

Examining controls by considering their location relative to the worker changes how we assess whether a control is effective by emphasizing the burden placed on workers with each control option. Note how the effectiveness of the control increases as the control moves closer to the source of the hazard.

The location approach allows for a more nuanced understanding of how different groups of workers can be differentially affected by a hazard. When attention is turned to the worker, rather than the hazard, differences

between workers become more evident. For example, administrative controls are less effective for new workers, because they are less familiar with the rules and have not yet developed the skills required to work safely. Looking at how those administrative controls are located relative to the worker makes it more likely that their shortcomings for new workers will be identified. Similarly, the location approach draws more attention to the consequence of control failure and emphasizes the harm that can occur to workers when the system fails.

3.6 SUMMARY

Fifteen-year-old Andrew James died under a pile of hot asphalt because his employer failed to identify, recognize, and control workplace hazards. While the HRAC process doesn't guarantee that workers will never be injured on the job, it can dramatically reduce the incidence of workplace injuries and fatalities. Following the HRAC process should have changed the work processes James's employer used and, in turn, would likely have saved James's life despite the challenges posed by the mobile nature of the worksite.

HRAC is not immune from the conflicts inherent in the employment relationship. Employers and workers each have vested interests in the outcomes of an HRAC process. Collaboration is key to the hazard recognition, assessment and control process. Stackholders from various areas of the business need to be included in the hazard identification, assessment and control process in order to eliminate or reduce workplace incidents.

Check Your Knowledge

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://ecampusontario.pressbooks.pub/cdnhealthsafetyworkplacefundamentals/?p=1415#h5p-2

Discussion Questions

1. What are the main steps in the HRAC process? What is the underlying goal of HRAC?
2. Why is it necessary to prioritize hazards? What are the potential concerns about applying a risk analysis perspective?
3. How would employers and workers perceive the relative merits of PPE versus engineering controls?
4. How might looking at the location of hazard control affect the decisions made about which control is most appropriate?
5. What challenges arise in hazard control for telecommuters?

Exercises

1. Reread the case that opens this chapter and write 150-word answers to the following questions. Be sure to save your answers as we will return to this vignette later in the book.

   ◦ What hazards were present at the worksite?
   ◦ How would you prioritize the identified hazards?
   ◦ What controls should have been implemented?

2. Write two to three paragraphs providing your opinion on the following statement:

"Some accidents are unavoidable. There is only so much we can do to control hazard"

Notes

1. James, R. (2011). 15-year-old Andrew James loved his dream job. *Threads of Life Newsletter*. 9(4), p. 3.

2. McIntyre, M. (2010, November 30). Asphalt firm fined $34K in teen's death. *Winnipeg Free Press*, p. A7.

3. Fenn, P., & Ashby, S. (2004). Workplace risk, establishment size and union.*British Journal of Industrial Relations*, 42(3), 461–480.

4. Champoux, D., & Brun, J-P. (2003). Occupational health and safety management in small size enterprises: An overview of the situation and avenues for intervention and research. *Safety Science*, 41(4), 301–318.

5. International Labour Organization. (2013). *Training Package on Workplace Risk Assessment and Management for Small and Medium-Sized Enterprises*. Geneva: ILO.

6. Eakin, J. (1992). Leaving it up to the workers: Sociological perspective on the management of health and safety in small workplaces. *International Journal of Health Services*, 22(4), 689–704.

7. Lansdown, T., Deighan, C., & Brotherton, C. (2003). *Health and safety in the small to medium-sized enterprise: Psychosocial opportunities for intervention*. London: HSE Books.

8. Unnikrishnan, S., Iqbal, R., Singh, A., & Nimkar, I. (2015). Safety management practices in small and medium enterprises in India. *Safety and Health at Work*, 6(1), 46–55.

9. International Labour Organization. (2013).

10. Boyd, C. (2004). *Human resource management and occupational health and safety*. London: Routledge.

11. Gadd, S., Keeley, D., & Balmforth, H. (2004). Pitfalls in risk assessment: Examples from the U.K. *Safety Science*, 42, 841–857.

12. Messing, K. (2014). *Pain and prejudice: What science can learn about work from the people who do it*. Toronto: Between the Lines.

13. Adler, M. (2005). Against "individual risk": A sympathetic critique of risk assessment. *University of Pennsylvania Law Review*, 153(4), 1121–1250.

14. *Alberta Occupational Health and Safety Code*, 2009, s. 2-1.

15. The Vector Poll Inc. (2013). The Alberta Worksite Hazard Assessment Survey: Report to Alberta Workers' Health Centre. Toronto: Author.

16. Government of Canada, Labour Program. (1993). *Labour Standards Interpretations,*

Policies and Guidelines 808/819-IPG 057, p. 4.

17. All jurisdictions define workplace in broad enough terms that all forms of telework apply. The Ontario *Occupational Health and Safety Act* offers a good example: "(s. 1.1) 'workplace' means any land, premises, location or thing at, upon, in or near which a worker works."

18. Crandell, W., & Gao, L. (2005). An update on telecommuting: Review and prospects for emerging issues. *SAM Advanced Management Journal*, 70(3), 30–37; Healy, M. (2000). Telecommuting: Occupational health considerations for employee health and safety. *AAOHN Journal*, 48(6), 305–315.

19. Workers Health and Safety Centre. (1998). *Occupational Health and Safety: A Training Manual* (3rd ed.). Don Mills: Author.

CHAPTER 4: PHYSICAL HAZARDS

Chapter Outline

4.0 LEARNING OBJECTIVES

Learning Objectives

1. Define physical hazards and explain how they operate.
2. Describe root and proximate causes of physical hazards and how they affect hazard control.
3. Identify techniques to control workplace noise.
4. Explain why vibration is a hazard and consider control options.
5. Discuss why radiation and temperature extremes are hazards and consider control options.
6. Outline the longer-term health effects of work design and the principles of ergonomics.

4.1 IDENTIFYING PHYSICAL HAZARDS

Photo by IlyaYurukin, CC0

Story: Physical Hazards

On Christmas Eve, 2009, six employees of Metron Construction were repairing balconies at a Toronto high-rise apartment. All the men were newcomers to Canada, hailing from Latvia, Uzbekistan, and Ukraine. They were on a swing-stage scaffolding (the type of suspended scaffolding you often see on the outside of tall buildings) working on a 13th- floor balcony. Their

project manager, Vadim Kazenelson, was on the balcony handing them tools. As Shohruh Tojiddinov, one of the workers on the scaffolding, later reported, Kazenelson decided to climb on to the scaffolding. "He said 'where is the lifeline' and [the site supervisor Fayzullo] Fazilov said 'don't worry'. . . .[Kazenelson] jumped onto the stage and the stage broke." Tojiddinov was wearing a harness and when the stage broke he was left hanging in mid-air. "I looked up and I saw Vadim pulling me up. . . . I saw four deaths and one was still alive. I vomited."[1]

As Kazenelson landed on the scaffolding, it split in two. Kazenelson was able to scramble back onto the balcony. The other five men fell to the ground, instantly killing four (Alesandrs Bondarevs, Aleksey Blumberg, Vladamir Korostin, and Fazilov). The fifth, Dilshod Marupov, was left permanently disabled. The scaffolding had only two lifelines available for the seven men and Tojiddinov was the only one using the fall protection. The scaffolding had been provided to Metron by Swing N Scaff Inc., a scaffolding supply company.

The investigation that followed the incident revealed that the scaffold was faulty and had not been designed or inspected properly by Swing N Scaff. It also found that the men, whose knowledge of English was limited, were not provided with any training about working at heights or using fall protection.[2] There was insufficient fall protection gear available to secure all the men. Subsequently, Kazenelson attempted to cover up the incident. He told Tojiddinov to say that Kazenelson had been on the ground and he gave him a safety manual on fall protection (in English, which Tojiddinov could not read), instructing him to say he had received it before the incident. [3]

This incident dramatically demonstrates what can happen when an employer fails to protect their workers from physical hazards. In this case, the employer failed to provide the workers with safety training and equipment to protect them from the primary hazard (falling from a height). The danger of the hazard was compounded by the workers' limited ability to enforce their safety rights due to their limited language skills, minimal knowledge of health and safety laws, and weak negotiating position as new Canadians.

A **hazard** (which is sometimes called an agent) is anything that might harm, damage, or adversely affect any person or thing under certain conditions at work. It can be an object, process, context, person, or set of circumstances that has the potential to create negative health and safety outcomes. In this chapter, we will

1. Mehta, D. (2015, January 27). Manager didn't insist on lifelines, court hears; Scaffold collapse. National Post, p. A8.
2. Wetselaar, S. (2014, December 4). Company fined after Christmas Eve scaffolding tragedy that killed four. Toronto Star.
3. CBC News. (2015, June 26). Vadim Kazenelson found guilty in deadly Toronto scaffolding collapse. CBC News Website, http://www.cbc.ca/news/canada/toronto/vadim-kazenelson-found-guilty-in-deadly-toronto-scaffolding-collapse-1.3128868

focus our attention on physical hazards. A ***physical hazard*** typically (but not always) entails a transfer of energy that results in an injury, such as box falling off a shelf and hitting a worker or a worker falling from a scaffold and hitting the ground.

Physical hazards are the most widely recognized hazards and include contact with equipment or other objects, working at heights, and slipping. This category also includes noise, vibration, temperature, electricity, atmospheric conditions, and radiation. More recently, OHS practitioners have also included the design of work and the workplace as physical hazards, suggesting it is important to attend to the ergonomic effects of work. This chapter discusses how to identify physical hazards and to determine ways to control some of the more common physical hazards. In discussing physical hazards, it is important to keep in mind that non-traditional work relations, such as the one highlighted in the opening vignette, can compound the risk associated with a physical hazard. We discuss the health and safety implications of non-traditional work relations more fully in the book.

Identifying Physical Hazards

In 2012, 50% of all WCB time-loss injuries in Canada were caused by physical hazards. Injuries caused by contact with an object/machine or falls was the most common type of injury.[4] Injuries caused by physical hazards are both overrepresented and underestimated in mainstream OHS. As we saw in Chapter 1, physical hazards are overrepresented in media portrayals of workplace incidents because they conform to commonly held views of safety hazards.[5] Hazards such as a slippery floor or an unguarded saw blade are easy to imagine and their effects on workers' health are clear and direct.

At the same time, employers often underestimate the prevalence of (and thus fail to control) physical hazards. For example, an extension cord lying across a hallway floor is often seen as no big deal because it is a readily apparent and easily understood tripping hazard that we expect workers to avoid as a matter of course ("pick up your feet!"). When such hazards result in an injury, we often blame the worker for her inattention to the hazard rather than examine why the hazard was present and why the hazard was not controlled. The loose extension cord, for example, could have been eliminated as a hazard by re-running the wiring through the ceiling or moving the powered device closer to the plug in.

This example is a reminder that the definition of cause affects decisions about injury control. If worker carelessness or inattention is deemed to be the cause of an incident, then the controls will focus on correcting the worker rather than removing the hazard. Indeed, often the nature of physical hazards lends itself to devising "simple" solutions designed to alter worker behaviour rather than controlling the hazard itself. For example,

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4. AWCBC. (2014). National work injury, disease and fatality statistics 2010–2012. Ottawa: Association of Workers' Compensation Boards of Canada.

5. Barnetson, B., & Foster, J. (2015). If it bleeds it leads.

the contact hazard posed by a doorway with unusually low clearance may be addressed by posting a sign saying "caution: low doorway" and expecting workers to duck as they pass through it. A more effective (but costlier) solution is to increase the doorway's height.

Physical hazards also sometimes hide in plain sight. Often a hazard is so pervasive or workers' behaviours to avoid the hazard are so routinized that the hazard is rendered almost invisible. For example, workers in a kitchen may use a dishtowel when opening an oven door to prevent the hot handle from burning them. Habitually turning a dishtowel into PPE prevents the injury and renders the hazard invisible. When identifying physical hazards, it is important to adopt the outlook of someone new to the workplace to bring back into view any hazards that have become invisible over time.

Prevention of Slips, Trips and Falls

What is the most effective way to prevent slips, trips, and falls in the workplace? This is an important question. In 2012, 18% of all Canadian lost-time claims involved a worker falling, either from a height or on the same level.[6] This figure significantly underrepresents the total number of incidents, as many slips and trips do not result in injury requiring time off work.

Most studies of trips and falls focus on factors related to workers, such as what caused workers to lose their balance, workers' demographic characteristics, or whether workers followed safety principles they were taught in training.[7] Despite many such studies, most injury prevention efforts have been ineffective at reducing the incidence of slip, trips, and falls.[8] This may indicate that these studies are focused on the wrong issues.

In a recent analysis, Tim Bentley argues that the study of slips, trips, and falls has been focused too narrowly on what he calls the "active failures" that lead to incidents. Active failures are the immediate factors that lead to risk of injury, including individual factors connected to the time and place of the event such as demographics, perception, use of equipment, and the exposure to the hazardous situation.

6. AWCBC. (2014).

7. Hsiaoa, H., & Simeonova, P. (2001). Preventing falls from roofs: A critical review. Ergonomics, 44(5), 537–561; Kemmlert, K., & Lundholm, L. (2001). Slips, trips and falls in different work groups—with reference to age and from a preventive perspective. Applied Ergonomics, 32(2): 149–153; Lipscomb, H., Dale, A. M., Kaskutas, V., Sherman-Voellinger, R., & Evanoff, B. (2008). Challenges in residential fall prevention: Insight from apprentice carpenters. American Journal of Industrial Medicine, 51(1), 60–68.

8. Rivara, F., & Thompson, D. (2000). Prevention of falls in the construction industry: Evidence for program effectiveness. American Journal of Preventive Medicine, 18(4), 23–26.

Bentley calls for greater emphasis on latent failures, which are the "conditions that elicit substandard or unsafe behaviours that are present in the system without causing immediate threats but have the potential of being a step in an injury event."[9] These include factors such as workplace design, the organization of work, management decisions, and environmental conditions such as climate. He argues that the perceptions and decisions made at the moment of active failure are shaped and bounded by existing latent failures.

The core of Bentley's argument is that it is easy to look at who the worker was (e.g., a new worker) and what they were doing at the moment of the fall (e.g., not paying attention). As a result, most injury prevention efforts are focused on the worker. Bentley argues that employers should be focusing on the latent features of the incident— the pace of work, the design of the workplace, stress levels, and other systemic factors—that are more important in determining when a trip of fall will occur.

Bentley's approach is similar to the notion of proximate and root cause. Essentially, injury prevention is more effective if we look beyond the obvious causes to see the underlying causal factors. This more holistic approach is supported by studies that suggest the most effective method for preventing slips, trips, and falls is to adopt a multi-faceted approach that includes enhanced hazard assessment, preventive design changes, training, management leadership, and greater attention to environmental factors.[10]

9. Bentley, T. (2009). The role of latent and active failures in workplace slips, trips and falls: An information processing approach. Applied Ergonomics, 40, 177.

10. Bell, J., et al. (2008). Evaluation of a comprehensive slip, trip and fall prevention programme for hospital employees. Ergonomics, 51(12), 1906–1925.

4.2 NOISE AND VIBRATION

Noise and vibration are related physical hazards that are treated very differently in OHS regulation and management. Noise has been well studied and there is a long (albeit incomplete) list of rules for controlling noise hazards. By contrast, less than half of Canadian jurisdictions have any regulations governing vibration exposure. This section examines the nature of each hazard, their health effects, and briefly considers effective control options.

Noise is simply defined as sound energy that moves through the medium of the air. More scientifically, sound consists of small air-pressure changes caused by the vibration of molecules. The energy from the molecules exerts influence on neighbouring molecules, causing the sound to disperse throughout an area. Human eardrums are designed to detect the small pressure changes and then transfer them through a network

of three bones to the inner ear where tiny hair-like cells turn the vibrations into electrical impulses interpreted by the brain. Noise is always present around us.

Noise can damage the structures of our ears and lead to hearing loss. Noise can also cause other health effects (see below). Three characteristics of noise affect whether it becomes a hazard: frequency, duration, and loudness.

- **Frequency** is vibration of the medium (e.g., air molecules) through which sound energy moves. We measure frequency in Hertz (Hz) (i.e., the number of vibrations per second). We experience sound frequency as the pitch of noise. Fast vibration yields a higher-pitched noise than slow vibration. We can normally hear sounds with frequencies between 20 Hz and 20,000 Hz. Sounds extending beyond the low and high end of our hearing range are not registered by our brains (i.e., we cannot hear them), but they can still harm our ears.
- **Duration** is the length of time a worker is exposed to noise. How long a worker is exposed to noise is important. Yet, as discussed below, even short-term exposure can cause damage, especially if the noise is sudden and at a high frequency.
- **Loudness** (or intensity) is the amount of energy that is being carried through the medium. Loudness is measured in decibels (dB). The key feature of decibels is that they are a logarithmic scale. Unlike linear scales (where each step on the scale represents the same increase, such as a car's speedometer), each increase on a logarithmic scale is an order of magnitude greater than the previous increase. For example, a sound measured at 10dB is 10 times more intense than a sound measured at 0dB (the lowest audible sound). But a sound measured at 20dB is 100 times more intense than the sound measured at 0dB. Noise over 85dB is generally considered hazardous for human hearing.

The mostly widely accepted health effect of noise exposure is hearing loss. If the loss is temporary, such as after a music concert, it is called a **temporary threshold shift (TTS)**, meaning the normal range of human hearing has been reduced. This effect usually reverses itself over a short period of time. Nevertheless, TTS is a signal that the noise exposure was harmful and that continual or repeated exposure can accumulate and lead to **Permanent threshold shift**(PTS). Men typically have higher rates of PTS. Some of this gender effect is due to job segregation (i.e., men typically work in louder workplaces than women). It is also possible that some of this effect reflects

physicians failing to link female hearing loss to occupational exposures. Women are often exposed to noise in food, bottling, and textile factories as well as service industry jobs.[1]

Extended exposure to noise hazards can lead to non-hearing health effects as well. It can induce a sensitive startled response to sound and cause changes in endocrine and biochemical systems, nausea, headaches, and constricted blood vessels.[2] Sound can also create health effects without prolonged exposure. **Acoustic trauma** is caused by a short, intense exposure to noise, usually of high frequency (see Box 4.2). Exposure to this hazard can lead to a series of short- and long-term health effects. Short-term effects include a full sensation in the ears, sharp pain around the ear, nausea, or dizziness. Longer-term effects can include headaches, fatigue, anxiety, and hypersensitivity to sound.[3]

Acoustic trauma in call centres

Workers in call centres, often women, immigrants, and young workers, are exposed to a variety of physical and psycho-social hazards. Exposure to noise is not regarded as a significant source of ill health. While call centres can be loud places, testing has found that noise exposure is usually well under the regulated exposure limits (85dB over 8 hours). Traditional analysis has suggested minimal risk for hearing loss.

Recently, however, studies in Sweden, Europe, and Australia have reported on growing incidence of acoustic trauma, sometimes called acoustic shock, among call centre workers.[4] The trauma is the result of sudden, intense, startling, and often high frequency sounds emitted through the telephone headset, frequently described as a squawk or squeal. Often the sounds are loud (over 100dB), but the negative effects do not seem to be connected to volume and are more associated with the sudden, sharp nature of the sound. Following the incident, workers report pain, tinnitus (ringing in the ears), loss of balance, nausea, and sensitivity to sound. Symptoms might last from a few minutes to days. Increased frequency of incidents appears to increase the intensity and length of the symptoms.

1. European Agency for Safety and Health at Work. (2003). Gender issues in safety and health at work: A review. Luxembourg: Author.

2. Key, M. M., Henschel, A., Butler, J., Ligo, R. N., Tabershaw, I., & Ede, L. (1977). Occupational Diseases: A guide to their recognition (Rev. ed.). Cincinnati: U.S. Department of Health, Education and Welfare.

3. Safe Work Australia. (2011). Managing Noise and Preventing Hearing Loss at Work. Canberra: Author.

4. E.g., Groothoff, B. (2006). Proceedings of Acoustics 2005, Australian Acoustics Society: 335–340. http://www.acoustics.asn.au/conference_proceedings/AAS2005/index.htm

For a long time, these worker reports were not taken seriously as their experience did not fit the traditional view of hazardous noise exposures. Most call centre systems have sound inhibitors cutting out any noise that exceeds about 115dB. Considering that the natural response to such a sound is to remove the headset quickly, it was determined they would only have a few seconds exposure and thus would not be at risk of hearing loss. Only when additional research was conducted, spurred on by a campaign from the Trade Union Confederation in England, did the medical evidence appear to support worker reports of ill health caused by short and intense sounds.

All jurisdictions in Canada regulate workers' exposure to noise. Most jurisdictions utilize an exposure model that factors in duration and loudness, known as a **time-weighted average** (TWA). Government regulations use dB(A), which is a weighted measure of loudness that factors in the frequency of the noise. Lower-frequency noises are weighted in the calculation so that their dB(A) is lower than their unadjusted dB. This reflects a belief that lower-frequency noises are less harmful than higher-frequency noises.

The regulations generally seek to limit worker's noise exposure to no more than 85dB(A) during an eight-hour shift. The duration of acceptable exposure declines by half for every 3dB(A) increase. So acceptable worker exposure drops to 4 hours at 88dB(A), 2 hours at 91dB(A), and so forth. The logic of TWA leads to a ceiling of noise exposure at approximately 115dB(A). Box 4.3 provides some real life examples of these noise levels.

There are significant shortcomings in this approach to regulating noise exposure. First, while the use of dB(A) does partially address the issue of frequency, regulations do not adequately address the health effects of short, intense, and high frequency sounds, such as those that cause acoustic trauma. Second, there is insufficient evidence to determine if an exposure at 85dB every day over a period of many years is safe. Third, the rules do not account for individual variation. Research has established that people possess different degrees of sensitivity to noise. Some have greater physiological and psychological reactions to lower levels of noise, while others appear to be more tolerant.[5] As with other types of hazards (e.g., carcinogenic substances), some individuals appear to be more susceptible to harm than others. The reasons are complex, but a universal standard designed to address the so-called "average" person will leave some workers inadequately protected from noise hazards.

5. Passchier-Vermeer, W., & Passchier, W. F. (2000). Noise exposure and public health. Environmental Health Perspectives, 108 (Suppl. 1), 123–131.

Decibel equivalencies

The table below provides examples of the noise levels of common items and indicates how long government OHS regulations permit exposure to those noises. A question to ask yourself is whether you would like to be exposed to that noise for the prescribed length of time (e.g., a truck backup alarm for eight hours)? Do you think such an exposure might affect your health?

Decibels (dB(A))	Item	Regulatory Time Limit[6]
50	Refrigerator	n/a
60	Conversational speech	n/a
75	Vacuum cleaner	n/a
80	Alarm clock	n/a
85	Truck backup alarm	8 hours
90	Lawnmower	2.6 hours
95	Food processor	50 minutes
100	Motorcycle	15 minutes
100	Handheld drill	15 minutes
110	Jackhammer	1 minute 38 seconds
115	Emergency vehicle siren	0 seconds
120	Thunderclap	0 seconds
140	Jet engine takeoff	0 seconds

Vibration is the oscillating movement of a particle around its stationary reference position. In the workplace, a mechanical process usually causes vibration. Vibration becomes a hazard when workers come into contact with the vibration, causing energy to be transferred to the worker. Two types of workplace vibration are important for OHS. **Whole-body vibration** occurs when a worker's entire body experiences shaking caused by contact with the vibration. This is most common with low-frequency vibration (below 15 Hz), as when driving in a car or working near a large machine, such as an air compressor. The health effects of whole-body vibration include a general ill feeling, nausea, motion sickness, and increased heart rate. Extended exposure to whole-body vibration can lead to lower-spine damage and, sometimes, internal organ damage.

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6. Based on Alberta Occupational Health and Safety Code, Schedule 3, Table 1.

Segmental vibration occurs when only parts of the body are affected by the vibration. This is usually caused by higher-frequency vibration. The most common and concerning form of segmental vibration is hand-arm vibration. Hand-arm vibration results from gripping power tools such as jackhammers, saws, and hammer drills. An important aspect of **hand-arm vibration** is that a tight grip is required to control the vibrating tool, but the tighter the worker grips, the worse the effects of the vibration. Hand-arm vibration syndrome (sometimes called Raynaud's phenomenon or "white finger") is caused by restriction of blood and oxygen supply to fingers and hands, which causes damage to blood vessels and nervous systems. The first symptoms are tingling in the fingers, loss of sensation, loss of grip strength, and whitening of the fingers when exposed to cold. Initially, these effects are reversible, but over time they become permanent.[7] Because vibration is the movement of particles, it is related to noise and is often associated with noise exposure. As with noise, individual susceptibility to vibration exposure effects varies. How hard the worker grips the tool, their posture, their sensitivity to motion sickness, and other factors can shape how the exposure manifests itself, which can make it difficult to ascertain the seriousness of the health risk. Men most often manifest vibration-related injuries, reflecting occupational segregation. That said, women in some female-dominated occupations (e.g., dental hygiene) frequently report vibration-related injuries.[8] Exposure to vibration, while widely recognized as a safety hazard, is largely unregulated. Only British Columbia has standards restricting exposure to types of vibration. Those rules adopt a time-weighted average approach similar to that used for noise regulations.

Noise and vibration are measured in similar ways. Both require a specialized meter to detect the intensity of the molecular movement. These meters can provide accurate measurements of real-time levels. Nevertheless, the meters cannot assess the susceptibility of a worker to noise/vibration exposure, nor the degree of damage sustained by the exposure. This means that, even if vibration standards are established, workers may still be harmed by these hazards. OHS regulations also require that workers exposed to noise undergo regular audiometric testing to detect any threshold shift (there are no equivalent requirements for vibration exposure).

Controlling noise and vibration hazards is a complex undertaking. In both cases, the most effective way to control the hazard is elimination, substitution, or engineering controls. Such controls can be expensive, as they require replacing machinery, altering processes, or eliminating tasks from the workplace. Controls along the path can also be implemented by erecting sound barriers to muffle noise or installing vibration resistant material on tool handles. The most common, yet least effective, controls for noise and vibration are time restrictions and PPE. Restricting workers' exposure to noise or vibration can reduce the effect of these hazards but does not address the full range of risk to the worker.

7. Groothoff, B. (2012). Physical Hazards: Noise and Vibration. In Health and Safety Professionals Alliance, The Core Body of Knowledge for Generalist OHS Professionals. Tullamarine, VIC: Safety Institute of Australia, p. 12.

8. European Agency for Safety and Health at Work. (2003).

4.3 TEMPERATURE

Photo by Totolowe, Pixabay License

Humans are a temperature-sensitive species and have evolved a finely tuned system that regulates our internal temperature. Under normal circumstances, the body interacts with its environment to maintain a core body temperature at about 37 degrees Celsius. When the environment becomes too cold or hot, our bodies have difficulty generating or shedding sufficient heat to maintain **temperature homeostasis**.

When temperature extremes prevent our bodies from properly self-regulating, we experience **thermal stress**. Temperatures that are too high can lead to **heat stroke**. Early signs of heat stroke include fatigue, dizziness, confusion, lightheadedness, nausea, and sudden, unexplained mood swings. Prolonged exposure leads to fainting and death. Heat stroke can cause damage to muscles, the heart, kidneys, and the brain. Humidity interferes with the body's ability to shed heat (through sweating) and, therefore, can lower the temperature at which thermal stress occurs. Conversely, when temperatures are too low, we can experience **hypothermia**. Initial symptoms of hypothermia include dizziness, fatigue, nausea, sudden euphoria, or irritability. Pain in extremities and severe shivering may also occur. Advanced hypothermia can lead to frostbite

and frozen extremities, and unconsciousness leading to death. Wind can intensify the effects of cold, as it strips heat away from the body.

Exposures to extreme temperature are most common among workers working outdoors, although thermal stress can occur in some indoor locations (e.g., a meat cooler or a non-air-conditioned office on a hot summer day). Employers should also pay attention to **thermal comfort**. Thermal comfort is the condition in which a person wearing normal clothing feels neither too cold nor too warm. It is a function of temperature, humidity, and air movement within an indoor workplace. A lack of thermal comfort may not pose a direct health risk, but it can exacerbate existing hazards or be a factor that increases risk of an incident occurring. For example, thermal discomfort may lead to rushing, heat-induced fatigue, or mental distraction.[1]

Extreme temperature is unevenly regulated in Canada. Some jurisdictions, such as Alberta and Ontario, have no OHS provisions addressing extreme heat or cold. Other provinces offer general duties to prevent thermal stress, while a minority of jurisdictions have adopted temperature limits established by external agencies. Gender-based job segregation can affect heat and cold exposures on worksites. For example, Karen Messing's study of meat processing found that, while women did not work in the extreme cold of meat freezers, their work required them to stay relatively immobile at their work stations, where temperatures hovered around 4 degrees Celsius. Men in the study experienced significant lower temperatures working in the meat freezers, but their work was more active and the additional body heat generated by this activity attenuated the effects of the cold.[2]

Temperature poses a unique OHS challenge in that it is often not possible for an employer to control the hazard at the source (since the weather is out of our control). The most effective control for preventing thermal stress is to limit workers' exposure to hazardous temperatures. It can, however, be difficult to determine what temperature is too hot or cold for work to occur. There are many factors, including wind chill and humidity, individual temperature sensitivity, and the nature of the work being performed (light or heavy effort) that shape when a worker is at risk of thermal stress. Compounding these issues is that of variability. Weather conditions and work tasks change over time. This instability in working conditions requires closer monitoring of changes in the hazard than is the case with most other physical hazards.

The American Conference of Governmental Industrial Hygienists (ACGIH), an industry group of OHS professionals working in government, has established a matrix for determining when work should be reduced and, ultimately, ceased.[3] For example, the ACGIH recommends that work cease completely at temperatures between −32 and −43 Celsius, depending on wind chill. On the warm end, the limits are more complicated due to humidity effects, but temperatures above 30 Celsius require work reduction or cessation. Within the recommended maximum and minimum, the degree of exposure is dependent upon clothing and other factors, such as access to fluids and rest breaks to warm/cool. Thus the need to establish controls extends

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1. Health and Safety Executive, Government of Great Britain. (2011). Thermal Comfort. http://www.hse.gov.uk/temperature/thermal/

2. Messing, K. (1998). One-eyed science: Occupational health and women workers. Philadelphia: Temple University Press.

3. ACGIH. (2013). Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati: ACGIH.

beyond the extremes to ensure workers are shielded from the effect of hot or cold temperatures. Other controls include relocating work, installing heating/cooling devices, work-rest cycles, preventing working alone, and minimizing manual effort.

4.4 RADIATION

"Gogatha tower repair" by Oregon Department of Transportation, CC BY 2.0

Radiation is any energy emitted from a source, including heat, light, X-rays, microwaves and other waves, and particles. Radiation is categorized into two forms: ionizing and non-ionizing. **Ionizing radiation** is radiation with enough strength to remove electrons from a molecule as it passes through. The electron loss causes the molecule to become positively charged (called an ion). Examples of ionizing radiation include X-rays, gamma rays, alpha particles, and neutrons. **Non-ionizing radiation** is unable to ionize molecules but may have other effects, and includes microwaves and radio waves as well as ultraviolet, visible, and infrared light.

Ionizing radiation can occur naturally at low levels from a variety of sources but is uncommon in workplaces. It is most often found in medical, nuclear, and research facilities. When ionizing radiation is present in a workplace, it poses a significant safety hazard. Both short exposures to high levels of radiation and long-term exposure to lower levels have serious health consequences. It is estimated that people are exposed to approximately 0.0125 **rem** (a standard measure of radiation) of naturally occurring radiation per year. Short-

term exposure of 1000 rem will lead to death within a few days. An exposure as low as 10 rem will lead to significant increase in the risk of cancer later in life.

Long-term, lower-level exposure is also a concern as it, too, can lead to increased risk of cancer. The recommended annual exposure for the general public is 0.1 rem. Nevertheless, the ACGIH recommends an annual limit for workers exposed to ionizing radiation to be 2 rem, a figure much higher than public health limits. Controls for ionizing radiation are quite expensive and technical, requiring significant engineering controls. Specialized training is also required, and exposure to ionizing radiation should never be taken lightly.

Warning Sign of Ionizing Radiation

Story: The Elliot Lake strike and the origins of OHS

Comprehensive injury-prevention legislation was only enacted in the late 20th century. One of the catalyzing events was an April 1974 wildcat strike by 1000 uranium miners from Elliot Lake, Ontario, that lasted three weeks. A wildcat strike is an unsanctioned, spontaneous strike by workers. The workers struck over high levels of radiation exposure, and Elliot Lake was one of Canada's first health- and safety-related walkouts.

Officials from the United Steelworkers of America (USWA), the union representing the workers, had just returned from a uranium safety symposium in France, where they became aware of a

study by the Ontario Ministry of Health that showed Elliot Lake miners were three times more likely to die of lung cancer than the rest of the population. The culprit was radiation caused by the release of radioactive radon gas during uranium mining.

The news hit the workers like a bombshell. They did not even know the government was studying them. The workers walked out immediately after the union meeting where the study was revealed. For 10 days, the employer refused to even talk to the workers about the issue, and only agreed to negotiate around safety issues after the strikers refused to return to work.

The workers were particularly angry that both the employer and the government had long known the workers were being exposed to dangerous radon gas but had said and done nothing. As striker Ed Vance put it: "They deliberately kept us ignorant. There is no other way to describe it. Government has a responsibility and in this case they failed to keep the workers advised. They failed to warn the workers of their work environment. And, they were part of that conspiracy."[1]

The efforts of the Elliot Lake workers eventually resulted in changes to OHS rules. As for the employers, "[the mining companies] were brought in kicking and screaming" to protecting workers, says former miner and President of USWA, Leo Gerard.[2] Elliot Lake revealed how employers' economic interests combined with the state's role in maintaining production (in this case, by supporting employers' interests) can lead to the injury or death of workers.

The Elliot Lake strike, and other direct action taken by workers in defence of their health in the early 1970s, forced governments to do more to protect workers' health. Within a few years, Ontario's first *Occupational Health and Safety Act* was passed and more stringent controls placed upon radiation exposure and other hazards. Other jurisdictions soon followed suit (Saskatchewan actually passed Canada's first OHS act in 1972). The disturbing question that lingers is whether any of these legislative changes would have come about if the group of miners hadn't decided they were no longer prepared to die because of their job.

Non-ionizing radiation, in comparison, has less dire health effects, but should not be ignored. Longer-wave non-ionizing radiation (such as microwaves) can cause deep tissue damage, cataracts and other eye issues, and skin rashes as well as interfere with the operation of pacemakers. Infrared radiation can lead to corneal and retinal burns and other eye injuries.

1. Quoted in Storey, R. (2005). Activism and the making of occupational health and safety law in Ontario, 1960s–1980. Policy and Practice in Health and Safety, 3(1), 48.
2. Quoted in Lopez-Pacheco, A. (2014). The strike that saved lives. CIM Magazine (June/July), 34.

The most common non-ionizing radiation exposure is ultraviolet light (UV). UV radiation damages our skin, leading to burns and permanent skin darkening as well as heightened risk of skin cancer. It also damages our eyes and can cause pain and swelling in the eye and blurred vision, a condition variously called snowblindness, welder's flash, or flash burn. The sun is the most common source of UV radiation, but UV radiation can also be produced by welding equipment, black light lamps, mercury lamps, counterfeit currency detectors, fluorescent tubes, and nail-curing lamps.

Controls for non-ionizing radiation should include replacing radiating equipment, proper maintenance to prevent fugitive radiation (such as with microwave ovens), separating workers from the radiation source, reducing exposure time to low levels, and using UV-blocking PPE (e.g., hats, clothing, sunscreen).

Are cell phones a cancer risk?

Cell phones are ubiquitous in workplaces, in particular for white-collar occupations. There is an ongoing debate about whether cell-phone use increases a person's risk of cancer. The main concern is that cell phones emit low-energy radio frequency radiation. It is known that low-energy radiation (such as microwaves) can cause molecules to heat up (which is how microwave ovens work). When a cell phone is used at someone's ear, the radiation is quite strong near the brain, raising fears of possible risk of brain cancer.

To date, the risk posed by cell phones remains unclear. A number of large-scale studies have failed to find an overall link between cell phone use and cancer.[3] These results have led some organizations, such as the US National Cancer Institute, supported by most governmental agencies, to downplay the risk.[4] However, a number of studies have found possible links between heavy users of cell phones and increased cancer, as well as higher sensitivity to low-energy radiation among children.[5] The International Agency for Research on Cancer (IARC),

3. Frei, P., Poulsen, A. H., Johansen, C., Olsen, J. H., Steding-Jessen, M., & Schüz, J. (2011). Use of mobile phones and risk of brain tumours: Update of Danish cohort study. British Medical Journal, 343:d6387, 1–9; Cardis, E., Richardson, L., Deltour, I., et al. (2007). The INTERPHONE study: Design, epidemiological methods, and description of the study population. European Journal of Epidemiology, 22(9), 647–664.

4. National Cancer Institute. (2013). Cell phones and cancer risk. http://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/cell-phones-fact-sheet

5. Coureau, G., Bouvier, G., Lebailly, P., et al. (2014). Mobile phone use and brain tumours in the CERENAT case-control study. Occupational & Environmental Medicine, 71(7), 514–522. doi: 10.1136/oemed-2013-101754. Morgan, L. L., Kesari, S., & Davis, D. (2014). Why children absorb more microwave radiation than adults: The consequences. Journal of Microscopy and Ultrastructure, 2(4), 197–204.

classifies cell phone radiation as "possibly carcinogenic to humans" (class 2B). Class 2B classification means the IARC feels there is "limited evidence of carcinogenicity in humans and less than sufficient evidence of carcinogenicity in experimental animals."[6] In short, the IARC feels there is some evidence of a cancer risk but not enough to reach a definitive conclusion.

In contrast, in spring 2015, a group of 195 scientists from 39 countries released a joint letter to the United Nations declaring their position that electromagnetic field (EMF) radiation (of which cell phones are one source) poses a serious health risk to humans, including "increased cancer risk, cellular stress, increase in harmful free radicals, genetic damages, structural and functional changes of the reproductive system, learning and memory deficits, neurological disorders, and negative impacts on general well-being in humans."[7]

The lack of clarity around the risk of cell phones points to the need for continued research to determine the effects of low-energy radiation. It also suggests a need for increased efforts to decrease the amounts of non-ionizing radiation emitted by cell phones and other devices, even before final conclusions have been drawn.

The current uncertainty over the hazard posed by cell phones (and other EMF sources such as video display terminals and WiFi) is an example of how technology moves much faster than our knowledge of its effects. It can be difficult to gather sufficient evidence to make a clear case (one way or another) in a short period of time, especially when dealing with diseases like cancer, which can have a latency period of decades.

Health agencies tend to be conservative in their recommendations regarding health risks. In the period between introduction of the technology and a clear scientific outcome, workers can be left without adequate protection. Indeed, workers are often the first to exhibit health-related effects of new hazards because they are often the most intensively exposed. The case of cell phones highlights the importance of considering the precautionary principle when adopting new technology.

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6. IARC. (2015). "Preamble." In IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Lyon, France: IARC, p. 23.

7. EMFScientist.org. (2015). International Appeal: Scientists Call for Protection from Non-ionizing Electromagnetic Field Exposure, p. 1. https://emfscientist.org/index.php/emf-scientist-appeal

cause molecules to heat up (which is how microwave ovens work). When a cell phone is used at someone's ear, the radiation is quite strong near the brain, raising fears of possible risk of brain cancer.

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8. Frei, P., Poulsen, A. H., Johansen, C., Olsen, J. H., Steding-Jessen, M., & Schüz, J. (2011). Use of mobile phones and risk of brain tumours: Update of Danish cohort study. British Medical Journal, 343:d6387, 1–9; Cardis, E., Richardson, L., Deltour, I., et al. (2007). The INTERPHONE study: Design, epidemiological methods, and description of the study population. European Journal of Epidemiology, 22(9), 647–664.

9. National Cancer Institute. (2013). Cell phones and cancer risk. http://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/cell-phones-fact-sheet

10. Coureau, G., Bouvier, G., Lebailly, P., et al. (2014). Mobile phone use and brain tumours in the CERENAT case-control study. Occupational & Environmental Medicine, 71(7), 514–522. doi: 10.1136/oemed-2013-101754. Morgan, L. L., Kesari, S., & Davis, D. (2014). Why children absorb more microwave radiation than adults: The consequences. Journal of Microscopy and Ultrastructure, 2(4), 197–204.

11. IARC. (2015). "Preamble." In IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Lyon, France: IARC, p. 23.

12. EMFScientist.org. (2015). International Appeal: Scientists Call for Protection from Non-ionizing Electromagnetic Field Exposure, p. 1. https://emfscientist.org/index.php/emf-scientist-appeal

are often the most intensively exposed. The case of cell phones highlights the importance of considering the precautionary principle when adopting new technology.

4.5 ERGONOMICS

Ergonomics is the study of how workers and the work environment interact. It is a broad-based approach to OHS that considers how the design of work affects the human body and its health. Ideally, ergonomics starts with job design. **Job design** comprises the decisions employers make about what tasks will be performed by workers and how that work will be performed.

Job design includes establishing the physical dimensions of work. This includes the size and location of the workspace, and what furniture, tools, and equipment will be used, as well as the temperature or lighting of the workspace. Job design also determines the nature of the tasks, including their complexity, pace, and duration and how individual tasks and jobs relate to one another. Finally, job design often includes making decisions and assumptions about the characteristics of the workers who will perform the work, including their height, weight, sex, and other physical and mental abilities.

The decisions made during job design can have significant effects on workers' health and safety. Poor work design has negative effects on worker health. For example, if you have ever worked at a job where, at the end of the day, your eyes hurt (due to poor lighting) or your back was sore (because of standing on a cement floor), you have experienced ill health caused by poor ergonomics.

A core principle of ergonomics is "fit the job to the worker, not the worker to the job." More specifically,

ergonomics seeks to ensure that the design of work matches the anatomical, physiological, and psychological needs of the worker. Yet some ergonomic hazards are easier to "see" than others. For example, back pain from heavy lifting is easier to identify than fatigue to due poor shift rotation design. The broad acceptance of lifting as hazardous and requiring control shows that the relationship between the hazard and the injury is both direct and well accepted. By contrast, there are many factors contributing to worker fatigue. This makes it difficult to definitively prove that shift rotation is an important factor in worker fatigue.

The aspects of ergonomics that have been more readily adopted are the design of tools, equipment, and workspaces. For example, we have seen an increase in more appropriately designed keyboards, work stations, retail scanners, and other equipment. There has also been greater attention paid to minimizing manual lifting and handling of loads. Buildings are being built with better climate and air-quality control.

Employers have been more reluctant to address other ergonomic issues because the required changes affect the work process or may impede management's ability to direct work. For example, providing a better-designed chair to prevent spinal deterioration is easier and cheaper than altering the work flow to reduce the mechanical forces exerted on workers' spines by twisting to reach objects. This reluctance to address some ergonomic hazards echoes employers' preference for PPE over engineering and administrative changes that we saw in Chapter 3. As well, government OHS regulations tend to address only small pockets of ergonomics, such as manual lifting, while remaining silent on many other aspects.

A common health effect of poor ergonomic design is repetitive strain injury (RSI). As we saw in Chapter 1, RSIs (which are sometimes called cumulative trauma disorders) are injuries to muscles, nerves, tendons, or bones caused by repetitive movement, forceful exertions and overuse, vibration, and sustained or awkward positions. RSIs frequently occur in the hands, wrists, and arms but can also afflict legs and other key joints. Carpal tunnel syndrome, frozen shoulder, trigger finger, tendonitis, bursitis, and (more recently) Blackberry thumb are all examples of RSIs.

Any task that requires either the same movement over and over again or puts the body in an awkward position can lead to RSIs, especially if repeated over a long period of time. RSIs have only gained acceptance as the outcome of workplace hazards over the past 20 years. They were first acknowledged in factories with workers on assembly lines. Even today workers in some occupations, such as retail clerks, typists, and restaurant servers (notably occupations dominated by women), still have greater difficulty having RSI claims accepted. Among the reasons for the slow acceptance of RSIs is the murky causality of the disease: did you get it from keyboarding at work or playing squash on your own time? RSIs may also worsen even after the hazardous tasks are eliminated and can appear as a result of work not normally associated with repetition. There has been inadequate epidemiological research into the full range of factors that lead to RSIs.[1]

Meat-processing and cashier jobs are both associated with the development of RSIs. Meat-processing is a difficult job that involves heavy, dirty, and repetitive work. "Workers must repeat the same motions again and

1. Helliwell, P., & Taylor, W. (2004). Repetitive strain injury. Postgraduate Medical Journal, 80, 438–443.

again throughout their shift. Making the same knife cut 10,000 times a day or lifting the same weight every few seconds can cause serious injuries to a person's back, shoulders, or hands. Aside from a 15-minute rest break or two and a brief lunch, the work is unrelenting."[2] Cold temperatures (most of the work is performed in coolers to delay deterioration of the meat) compound the risk of injury. One study found that meatpacking workers are up to 80 times more likely to experience RSIs than other workers.[3]

In the past 20 years, RSIs have become widely acknowledged as a serious OHS issue in meat-processing plants. Facing significant economic pressure, meat processors have kept the speed of the production line high. They have also gotten rid of unions and shifted their hiring to more vulnerable immigrants and migrant workers. In short, employers have not controlled the hazards—they have just made it harder for workers to assert their safety rights. Not surprisingly, meat-processing workers frequently have difficulty having their RSIs accepted as "real" injuries and the hazards posed by the work process controlled.

Stories of Repetitive Strain Injuries

Ana Ramos came from El Salvador and went to work at the same IBP plant as Albertina Rios, trimming hair from the meat with scissors. Her fingers began to lock up; her hands began to swell; she developed shoulder problems from carrying 30- to 60-pound boxes. She recalls going to see the company doctor and describing the pain, only to be told the problem was in her mind. She would leave the appointments crying. In January 1999, Ramos had three operations on the same day—one on her shoulder, another on her elbow, another on her hand. A week later, the doctor sent her back to work.[4]

Being a grocery clerk—moving small items across a scanner and bagging them—may not seem like physically demanding work. Over the course of a shift, however, a clerk can be required to lift more than 2000 kg of groceries. The lifting is in thousands of swipes of mostly small packages. The

2. Schlosser, E. (2001). The chain never stops. Mother Jones, 26(4). http://www.motherjones.com/politics/2001/07/dangerous-meatpacking-jobs-eric-schlosser

3. Piedrahita, H., Punnett, L., & Shahnavaz, H. (2004). Musculoskeletal symptoms in cold exposed and non-cold exposed workers. International Journal of Industrial Ergonomics, 34(4), 271–278.

4. Schlosser, E. (2001). The chain never stops.

repetition, combined with twisting and awkward positioning as well as standing for long periods, make grocery clerks highly susceptible to RSIs.

Mary Ann Anderson has been a cashier at a grocery in Queens for about 12 years. With a remodeling about two years ago, the store replaced old-style cash registers with price scanners at the checkout stands. That's when Anderson's pain began. She noticed the scanner made her do more pulling, lifting and twisting of her wrist—she held each item at an angle so the scanner could read the price code. Also, Anderson and others found that taller clerks handled the raised weight scales and register tapes better than shorter clerks, but the shorter clerks were more comfortable with the scanner height. And nothing was adjustable. Last year the tendinitis in Anderson's arms and wrists forced her to miss more than two months' work.[5]

The part-time, gendered nature of retail work has made it more difficult to get retail-related RSIs recognized. Employers are reluctant to make substantial design changes to checkout stalls, as they are designed for consumer, rather than worker, convenience. It is easier to replace the workers when they "wear out."

Engineering controls are the best way to address ergonomic hazards. Wrist supports, rest breaks, and other controls-at-the-worker fail to address the root cause of the hazard and do not effectively prevent the onset of injury. Ergonomic principles require that the design of the work be altered to better fit the needs of the workers in question. What those specific controls look like is highly dependent upon the nature of the work and the demographics of the worker.

5. Cummins, H. J. (1992, January 26). Scanners add up injuries for grocery checkout clerks. Seattle Times. http://community.seattletimes.nwsource.com/archive/?date=19920126&slug=1472135

4.6 SUMMARY

Returning to our opening vignette, the owner of Metron Construction, scaffold supplier Swing N Scaff, and project manager Vadim Kazenelson were all convicted of offences after the Toronto scaffolding collapse. Metron was fined $750,000 for offences under the Ontario *OHS Act*. Swing N Scaff was ordered to pay $400,000, also under the *OHS Act*. In June 2015, Kazenelson was convicted under the *Criminal Code* for criminal negligence causing death and criminal negligence causing bodily harm. He was sentenced to 3½ years in prison. At the time of writing, both his conviction and his sentence are under appeal. Criminal prosecution is rare in Canada (there have been fewer than 10 since the Westray amendments were enacted in 2004) and so Kazenelson's conviction is noteworthy.

These convictions may have brought some solace to the families of the four killed workers. Yet, given the number of annual injuries in Canadian workplaces, clearly many hazards—including obvious physical hazards—remain uncontrolled in Canadian workplaces. While this situation may, in part, reflect the fact that some hazards are difficult to identify and control, we also need to be cognizant that employers often have a financial incentive to cut corners on safety.

Discussion Questions

1. Why are some physical agents difficult to identify?
2. How are noise hazards identified and what are the shortcomings of current approaches to controlling it?
3. Why might vibration and noise exposure appear together?
4. What are the effects of thermal stress and how can they be prevented?
5. How are ionizing and non-ionizing radiation different and in what ways are they both hazards?
6. What is the core principle of ergonomics and why have OHS practitioners been slow to adopt it?

Exercises

1. Identify three physical hazards present in the workplace.
2. Using the process in Chapter 3, assess the risk and prioritize the three hazards.
3. Identify engineering, administrative, and PPE controls that would eliminate or reduce the hazards.
4. Discuss the pros and cons of each control from both a worker and employer perspective.

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5 Barnetson, B., & Foster, J. (2015). If it bleeds it leads.

6 AWCBC. (2014).

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11 European Agency for Safety and Health at Work. (2003). Gender issues in safety and health at work: A review. Luxembourg: Author.

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CHAPTER 5: CHEMICAL AND BIOLOGICAL HAZARDS

Chapter Outline

5.0 LEARNING OBJECTIVES

Learning Objectives

1. Define chemical hazards and explain how they affect workers.
2. Interpret toxicity data to prioritize chemical hazards.
3. Explain how occupational exposure limits were set and assess the validity of these limits.
4. Define biological hazards and explain how they affect workers.
5. Assess the positive and negative impact of science on worker safety.

5.1 CHEMICAL HAZARDS

"Fracking operation" by Joshua Doubek, CC BY-SA 3.0

Story: Lawsuit over hydraulic fracturing ("fracking")

In the spring of 2015, the Supreme Court of Canada agreed to review a decision made by the Alberta courts in a lawsuit brought forward by Jessica Ernst against Alberta's energy regulator.

Ernst filed a suit against the province and Calgary-based energy company Encana over the contamination of her groundwater by hydraulic fracturing.[1] Hydraulic fracturing (or 'fracking') is a petroleum-extraction process wherein workers drill deep holes and then inject fluid into the ground under high pressure to fracture rock layers and thereby recover otherwise inaccessible petroleum. The occupational and environmental risks associated with fracking are significant and complicated.

Each fracking effort can require up to 8 million gallons of water and 400,000 gallons of fracking chemicals. Wells can be fracked up to 20 times. Fracking fluid contains water, sand, and various chemicals. When researchers examined the 632 chemicals known to be used in fracking, they found that 75% of them negatively affect the skin and sensory organs as well as the respiratory and gastrointestinal systems. At least 40% are believed to negatively affect the brain and/or nervous system, immune system, cardiovascular system, and kidneys. And 25% are believed to cause cancer and other mutations.[2]

Workers can be exposed to these hazards while fracking. Yet the chemical hazards of fracking don't just endanger workers. Like most chemical hazards, they also endanger the general public. For example, fracking chemicals can enter the local water table (which often serves as the source of local drinking water). Leakage can occur along the fissures caused by the fracking, from the well casings (which often pass through local water tables), and from inadequate storage of fracking wastewater. Ernst, for example, alleges that fracking northeast of Calgary has resulted in so much methane entering her well that she can now light her drinking water on fire.

Fracking also causes earthquakes and releases airborne chemical hazards. Drilling the well site alone can release "benzene, toluene, xylene and ethyl benzene (BTEX), particulate matter and dust, ground level ozone, or smog, nitrogen oxides, carbon monoxide, formaldehyde and metals contained in diesel fuel combustion—with exposure to these pollutants known to cause short-term illness, cancer, organ damage, nervous system disorders and birth defects or evendeath."[3] Workers on site and individuals passing or living nearby are affected by these chemical hazards.

Fracking is but one example of the growing threat that chemical hazards pose to the health of workers. It also demonstrates that there is no clear division between a workplace hazard and an environmental hazard. There is

1. Canadian Press. (2015, April 30). Jessica Ernst's fracking case to be heard by the Supreme Court of Canada. CBC. http://www.cbc.ca/news/canada/calgary/jessica-ernst-s-fracking-case-to-be-heard-by-supreme-court-of-canada-1.3055627

2. Colborn, T., Kwiatkowski, C., Schultz, K., & Bachran, M. (2012). Natural gas operations from a public health perspective. Human and Ecological Risk Assessment, 17(5), 1039–1056.

3. Hoffman, J. (2015). Potential Health and Environmental Effects of Hydrofracking in the Williston Basin, Montana. Geology and Human Health. http://serc.carleton.edu/NAGTWorkshops/health/case_studies/hydrofracking_w.html

no comprehensive list of chemical substances that workers may be exposed to in the workplace, but the number is suspected to be at least 80,000. As we will see below, there is toxicological data available for about 1% of these chemicals, and the data that is available is highly suspect. The essentially unregulated nature of chemical exposures in the workplace is an important argument for adopting the precautionary principle in occupational health and safety.

Chemical Hazards

Chemicals are everywhere in the modern workplace, from printer toner to engine exhaust to sink cleaners. While most chemical exposures do not cause ill effects, some certainly do. As we saw in Chapter 3, **chemical hazards** cause harm to human tissue or interfere with normal physiological functioning when they enter our bodies. Some chemicals irritate our tissue while others poison our systems or organs. Chemicals can asphyxiate us or negatively affect the functioning of our central nervous systems. Chemicals can also cause our immune systems to overreact, change our DNA, cause cancer, or damage a fetus.

There are four **routes of entry** by which chemicals can get into a worker's body, the most common being through respiration (i.e., breathing in contaminated air) and absorption through the skin. Chemicals can also enter our bodies through ingestion (i.e., we can eat them—usually accidentally) and through cuts in our skin. Our bodies excrete some chemicals in our sweat, exhaled breath, urine, or feces, while retaining other substances. Our bodies metabolize some chemicals into other substances, which may be more or less toxic than the original substance.

Chemical hazards have varying levels of **toxicity** (i.e., ability to cause injury). Toxicity can be local or systemic. **Local toxicity** is a reaction at the point of contact. For example, you might experience a burn on the skin of your fingers after handling spicy peppers in a restaurant kitchen. **Systemic toxicity** occurs at a point in the body other than the point of contact. Allergic reactions after prolonged exposure to latex would be an example of systemic toxicity (see Box 5.1). Another example might be organ damage following skin absorption of a pesticide while picking fruit.

Contact dermatitis among food service workers

Many food service workers cope with a chronic rash on their hands. This **dermatitis** is caused by exposures to chemical substances such as cleaners and food products as well as by frequent handwashing—all of which can irritate a worker's skin. Workers can develop severe itching, burning, flaking, cracking, blistering, and bleeding of their hands. Over time, repeated exposures

to chemical substances can also make workers allergic to those chemicals. Allergic reactions mean workers can develop symptoms on other parts of the body. There are over 1000 workers' compensation claims for dermatitis in Ontario alone each year. [4]

Other factors appear to play a role in food service workers' propensity to develop dermatitis. Extreme temperatures (such as hot dishwater and serving dishes as well as cold freezers), mechanical trauma (such as friction, pressure, abrasions, and lacerations) and biological agents (such as bacteria on meat and vegetables) are common food service hazards. Each of these hazards can increase the likelihood of workers developing dermatitis.[5]

Some food service workers wear latex gloves as a form of PPE in order to reduce their contact with chemical substances. Latex gloves are also widely used by health care workers. Ironically, latex gloves themselves contain multiple chemicals (called rubber accelerators). These chemicals have allergenic properties and may contribute to the skin damage that gives rise to dermatitis. Workers can also become allergic to the latex gloves themselves, an allergy that can subsequently be triggered by household, recreational, medical, and clothing items. Proper skin care combined with eliminating or reducing exposures to the chemical, physical, and biological hazards of food service is likely to be more effective in reducing the incidence of dermatitis.

Acute toxicity represents the immediate harm caused by exposure to a chemical substance. **Chronic toxicity** represents a substance's ability to cause harm over a longer period of time. The time between exposure to a chemical hazard and the development of symptoms from that exposure is called the ***latency period.*** Many of the consequences of exposures to chemical hazards (e.g., occupational diseases) have a latency period that is measured in years. As we saw in Chapter 2, this delay can confound the relating of diseases to occupational exposures.

Although only a fraction of all chemical exposures result in a worker's death, toxicity is often measured in terms of a substance's ***lethal dose*** (LD) as determined from animal experiments. For example, the toxicity of a chemical tested on rats via ingestion might be expressed as Oral LD50 (rat): 56mg/kg. What this means is that when rats were fed the substance, half (the '50' after the LD) died shortly after ingestion when given 56 milligrams of the substance per kilogram of animal weight. These LD50 values are measures of substances' acute toxicity and allow us to compare the toxicity of substances. Substances with a lower LD50 are more acutely toxic than substances with a higher LD50 because lower LD50 substances cause half of

4. Morra-Carlisle, M. (2012, August 23). Service industry hazards getting under workers' skin. Canadian Occupational Safety. http://www.cos-mag.com/Hygiene/Hygiene-Stories/service-industry-hazards-getting-under-workers-skin.html

5. Centres for Disease Control and Prevention. (2012). Skin exposures and effects. http://www.cdc.gov/niosh/topics/skin/

the animals to die at lower doses. The toxicity of substances may also be measured based upon their **lethal concentration** (LC) in the air or water.

These toxicity measures show us that the **dose** (or amount) of a chemical that enters the body affects whether the chemical exposure causes harm and the degree of harm. For example, some chemicals are relatively harmless in low concentrations, such as the methane gas found in Jessica Ernst's well water. But, in high concentrations, methane can displace oxygen and cause rapid heart rate, fatigue, nausea, and, eventually, death by asphyxiation. (It is also flammable and potentially explosive.) That said, it is important to note that doses that are too low to cause acute toxicity can still cause chronic toxicity, especially if the dose is repeated over time. Prolonged exposure to silica dust, for example, can give rise to silicosis—a lung disease that impedes respiration—but silicosis may not manifest itself for 10 to 30 years after the exposure.

While toxicity data is helpful in identifying chemical hazards, it is important to be cautious when using it. Lethal dose measures focus on the acute toxicity of a substance and are less useful in assessing a substance's chronic toxicity or the effect of repeated exposures to low doses. Toxicity experiments also tend to be based upon ingestion of the substance because ingestion-based experiments are less expensive than experiments based upon respiration or contact. This bias may reduce the accuracy of the resulting data because most chemicals enter our bodies through respiration or skin absorption. Toxicity data is also based upon animal experiments, and these results may not be perfectly applicable to humans. Perhaps most concerning is that toxicity experiments typically assess the toxicity of a single substance in isolation. This ignores the reality that most workplaces expose workers to multiple chemicals and these exposures may interact **synergistically**. That is to say, exposures to multiple chemicals may increase the toxicity of each chemical out of proportion to its toxicity in isolation.

As discussed in Chapter 3, controlling chemical hazards begins by identifying worker tasks and environmental factors associated with the location. Subsequently, we must identify and list each chemical a worker is exposed to and the route(s) of entry for that chemical. The potential hazard posed by each exposure and the risk of exposure should be determined along with control strategies. Control strategies used should follow the hierarchy of controls, beginning with elimination (e.g., using non-chemical processes) and substitution (e.g., using a less hazardous chemical), then progressing to engineering controls (e.g., physically isolating workers from the chemical). [6]

Less effective control approaches include administrative controls that minimize or standardize exposures and the provision of personal protective equipment (PPE). In addition, some workplaces provide special facilities (e.g., showers, lunch rooms) to minimize workers' exposure to chemicals. Some organizations will also undertake extensive medical and environmental monitoring and record keeping. This can include monitoring the level of a hazard in a specific area area, the dose experienced by a worker (**personal monitoring**), or the presence of a chemical or its metabolic residue in a worker's blood, body fluids, or tissues (**medical**

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6. Government of Alberta. (2011). Best Practices Guidelines for Occupational Health and Safety in the Healthcare Industry. Edmonton: Author.

monitoring). While not hazard controls per se, monitoring and record keeping can provide data that can help to adjust administrative controls, assess the effectiveness of PPE, and identify early signs of health effects.

In practice, controlling exposure to chemical substances can be difficult. Workplaces often use multiple chemicals, which may have poorly documented synergistic effects. Further, the ways in which products are used may change over time, thereby reducing the effectiveness of administrative controls such as exposure and handling protocols. For example, a reduction in the number of cleaning staff in a hotel may mean workers must now work faster because their workloads have increased. Prior to the staffing change, workers may have used one chemical product to clean toilets and, subsequently, another product to clean the bathroom floors. To cope with the reduced time the workers are given to clean the entire bathroom, the workers may begin applying both products at the same time, creating the possibility of hazardous chemical interactions. Such a change in practice may be unknown to the employer. This example demonstrates that health and safety can be profoundly affected by other human resource practices, such as job design, staffing, and scheduling.

5.2 OCCUPATIONAL EXPOSURE LIMITS

"Industrial site in Nijmegen" by Trougnouf, CC BY 4.0

Toxicity data is used to generate ***occupational exposure limits*** (OELs). OELs for chemical hazards represent the maximum acceptable concentration of a hazardous substance in workplace air. In theory, workers exposed to a chemical substance at the OEL for their entire working life will experience no adverse health effects. Each jurisdiction in Canada sets its own OELs. As we saw in Chapter 4, there are also OELs for physical hazards such as noise, radiation, and (more rarely) vibration. There are approximately 800 OELs in Canada.

Provincial and territorial regulations can set three types of OELs, depending on the nature of the substance's toxicity:

- A ***time-weighted average exposure value*** (TWAEV) is the maximum average concentration of a chemical in the air for a normal 8-hour working day or 40-hour working week.
- The ***short-term exposure value*** (STEV) is the maximum average concentration to which workers can

be exposed for a short period (e.g., 15 minutes). The STEV is often higher than the TWAEV.

- The ***ceiling exposure value*** (CEV) is the concentration that should never be exceeded in a workplace.

OELs for a vapour or gas are often set as parts per million (ppm). Aerosols (e.g., dust, fumes, mist) are normally set as milligrams per cubic meter of air (mg/m^3). Fibrous substances (e.g., asbestos) are typically set as fibres per cubic centimeter of air (f/cc or f/cm^3). Compliance with OELs is often assessed via air sampling. Periodic air samples do not necessarily capture normal working conditions because the act of testing may temporarily change workplace behaviour. This dynamic is called the ***observer effect.***

When establishing OELs, governments often follow threshold limit values (TLVs) published by the ACGIH. The TLVs are the ACGIH's recommendations for allowable chemical exposure. While it is an arms-length body, concerns about its recommendations have been raised. Nearly one sixth of all the ACGIH's TLVs have been set based upon unpublished corporate data, which raises concerns about the validity and reliability of the results. Further, the committees that set these standards have included a significant number of industry representatives and consultants—many of whose relationships to industry were hidden while they were members—thereby raising concerns about conflict of interest in the establishment of TLVs.[1]

Indeed, many scientists dispute the notion that there is any safe level of exposure for carcinogens and reproductive hazards. In this view, so-called safe levels of exposure reflect simply the point below which scientists are (at present) unable to detect ill effects. Box 5.2 takes on the thorny issue of why the ongoing reduction in OELs—while doubtlessly beneficial to workers—is evidence that OELs have not been very effective at protecting them.

Why are declining OELs so concerning?

A concerning trend in OELs is that so-called safe levels of exposure go down over time, often dramatically. The exposure level for benzene, for example, dropped from 100 ppm to 10 ppm between 1945 and 1988, and exposure limits on vinyl chloride dropped from 500 ppm to 5 ppm. This phenomenon is not just a part of the distant past. Alberta reduced its OEL for chrysotile asbestos from 2 f/cc in 1982 to 0.5 f/cc in 1988 to 0.1 f/cc in 2004.

On the surface, this trend toward ever-lower OELs seems to indicate the system works: as new scientific evidence about chemical hazards becomes available, regulators revise their OELs. Yet

1. Castleman, B., & Ziem, G. (1988). Corporate influence on threshold limit values. *American Journal of Industrial Medicine, 13*(188), 531–559.

let us think about this a bit more deeply. The law of probability suggests that, all else being equal, sometimes initial OELs will set be too high and sometimes they will be set too low. So why do OELs always go downward? Shouldn't they go up at least some of the time?[2]

The constant downward trend in OELs actually demonstrates a systemic underestimation of risk to workers by regulators. That is to say, regulators almost always err on the side of over-exposing workers to chemical hazards. Why is this? There are likely three reasons.

The first is that the science underlying OELs has not been very good. For example, in, 90% of cases where TLVs have been set, there is insufficient data on the long-term effects of exposure from either animal or human studies.[3] This introduces uncertainty into the regulatory process. This uncertainty is exacerbated when employers hide evidence that substances negatively affect workers, sometimes by producing studies of questionable validity.[4] The second reason (explored later in this chapter) is that the threshold of scientific certitude is often set very high and this makes it hard to "prove" substances are hazardous.

The third reason is that regulators operate in a political environment, where workers, employers, and the state all seek to advance their interests. It follows that regulators setting standards must ask what actions will be politically palatable. In this way, setting exposure limits is not a purely scientific process, but also a political one. Among the findings of researchers is that most exposure limits have been set at levels industries were already achieving.[5] That is to say, "safe" OELs appear to be defined in practice as "convenient for employers" rather than "posing no hazard to workers." Even with processes that involve multiple stakeholders at the table (i.e., labour and employers), the outcomes tend to favour employers due to imbalances in political power and access.[6]

This discussion expands our understanding of how the social construction of hazards affects workplace safety. By labelling levels of exposure as "safe" (even when they are not), the state is able to define some hazards out of existence. This benefits employers because many of these

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2. Dorman, P. (2006). Is expert paternalism the answer to worker irrationality? In V. Mogensen (Ed.), Worker safety under siege: Labor, capital and the politics of workplace safety in a deregulated world (pp. 34–57). Armonk, NY: M.E. Sharpe.

3. Castleman, B., & Ziem, G. (1988). Corporate influence on threshold limit values. American Journal of Industrial Medicine, 13(188), 531–559.

4. Michaels, D. (2008). Doubt is their product: How industry's assault on science threatens your health. Toronto: Oxford University Press.

5. Roach, S., & Rappaport, S. (1990). But they are not thresholds: A critical analysis of the documentation of threshold limit values. American Journal of Industrial Medicine, 17, 728–753.

6. Foster, J. (2011). Talking ourselves to death? Prospects for social dialogue in North America—Lessons from Alberta. Labor Studies Journal, 36(2), 288–306.

substances are integral to industrial processes or are the least expensive substance available to do the job. The effect of such hazardous substances on workers is ignored. After all, how can a "safe" substance cause harm to a worker?

Compounding concerns about the validity of OELs is their usefulness in today's labour market. OELs assume a standard employment relationship with a single employer and an 8-hour workday. Many workers have more than one job and may experience chemical exposures at each worksite. These combined exposures may exceed OELs or may entail complicated chemical interactions. Yet OHS regulations do not require employers to consider chemical exposures workers experience from other jobs or in the community. Employers may well not even know that workers have a second job, let alone what chemical exposures they have. In this way, the trend toward increasingly precarious employment can create workplace hazards that are essentially invisible. There is also a gendered dimension to OELs. Most OELs have been set based upon studies of healthy young men, and the resulting standards are applied to both genders.[7] OELs do not take into account individuals' varying sensitivities to chemicals. The same exposure level may result in no ill effects for one worker, while the next person next might experience health effects.

This critique of OELs raises important questions about the validity of information contained in material safety data sheets (MSDS). An MSDS is supposed to contain information about potential hazards, safe use, storage, and handling practices, and emergency procedures. Manufacturers and suppliers must provide and employers must make available an up-to-date MSDS for any chemicals that are considered controlled products by WHMIS. Often the information in MSDSs is based upon OELs. Inaccurate OELs can undermine the utility of MSDSs, which are the key method by which information about chemical hazards is communicated. Further, analysis of the content of MSDSs has also found them to be incomplete, inaccurate, sometimes out of date, and often incomprehensible to workers.[8] These findings raise profound questions about the effectiveness of chemical hazard assessment, recognition, and control efforts. More detailed and accurate information is available in databases provided by organizations such as the Canadian Centre for Occupational Health and Safety (e.g., ChemInfo database), but these resources can be expensive to access and difficult for workers to find.

7. Messing, K. (1998). One-eyed Science: Occupational health and women workers. Philadelphia: Temple University Press.

8. Nicol, A-M, Hurrell, C., Wahyuni, D., McDowall, W., & Chu, W. (2008). Accuracy, comprehensibility, and use of material safety data sheets. American Journal of Industrial Medicine, 51(11), 861–876.

5.3 BIOLOGICAL HAZARDS
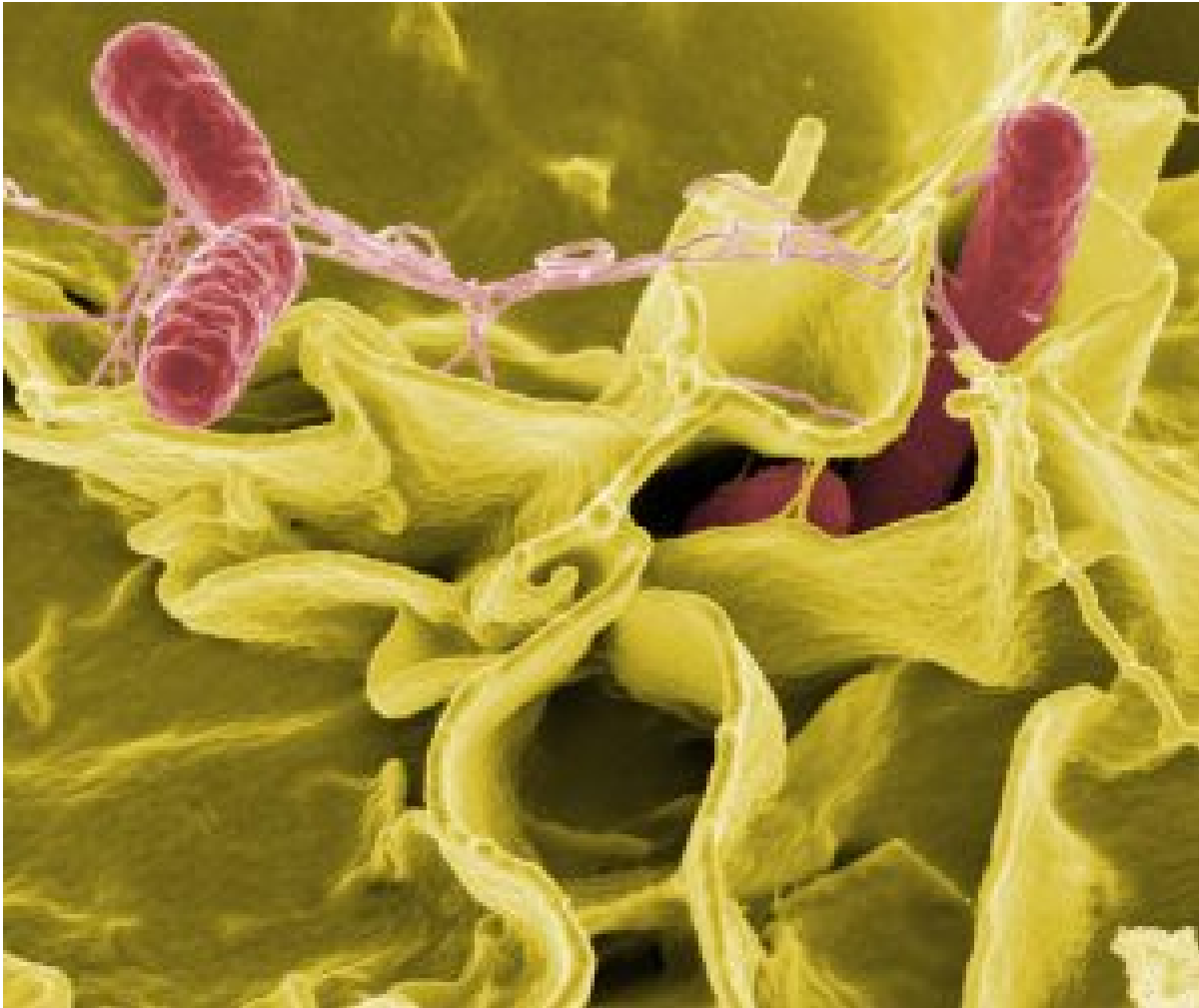
As we saw in Chapter 3, ***biological hazards*** are organisms or the products of organisms (e.g., tissue, blood, feces) that harm human health. There are three types of organisms that give rise to biological hazards:

- ***Bacteria*** are microscopic organisms that live in soil, water, organic matter, or the bodies of plants and animals. For example, the E. coli bacterium lives in human and animal digestive tracts and some strains can cause food poisoning, infections, or kidney failure when ingested.
- ***Viruses*** are a group of pathogens that cause diseases such as influenza (the "flu") when they enter our

bodies.

- *Fungi* are plants that lack chlorophyll, including mushrooms, yeast, and mould. Many fungi contain toxin or produce toxic substances. For example, *stachybotrys chartarum* (black mould) produces toxins called mycotoxins that cause nausea, fatigue, respiratory and skin problems, and organ damage when the toxic spores are inhaled.

Insect stings and bites, poisonous plants and animals, and allergens are also biological hazards. Like chemical hazards, biological hazards can enter our bodies via respiration, skin absorption, ingestion, and skin penetration and can cause both acute and chronic health effects. Our bodies do have mechanisms by which to cope with some biological hazards. For example, our respiratory system has five layers of defence to prevent harmful particles from entering our body, beginning with the hair-like projections (cilia) on the cells that line our airways (which filter out particles) and ending with cells (macrophages) in the air sacs (alveoli) of our lungs that trap and route impurities into the lymphatic system for disposal. Organisms that enter our body are also subject to attack by our immune system. Yet these mechanisms are not effective against every biological hazard or every exposure.

Like all workplace hazards, control strategies for biological hazards should follow the hierarchy of controls. Historically, the provision of adequate washing and toilet facilities was an engineering control that significantly reduced worker exposure to many biological hazards. Recent technological improvements, such as automatically flushing toilets and automatic taps, soap dispensers, and towel dispensers, have further limited workers' contact with bacteria in washrooms.

As noted in Box 5.3, providing workers with **vaccinations** is an administrative control that can reduce worker susceptibility to viruses. Mandatory vaccinations are, however, controversial. Public health officials in Alberta have been attempting to increase the rate of annual vaccination for influenza among health-care workers (which sits at about 55%) and are considering mandatory vaccinations. In British Columbia, workers who do not receive a flu shot must wear a mask when interacting with patients.[1]

While mandatory vaccination for health-care staff is advocated as an important step to protect patients (who may be particularly vulnerable to influenza), opponents note that mandatory vaccination significantly interferes with the rights of health-care workers to control their own health and that the annual "flu shot" is only about 60% effective at preventing influenza.[2] Some critics privately assert that employers may be more interested in reducing worker sick-time totals than protecting patient health. This charge should again draw our attention to the potential for financial considerations to affect employer OHS practices.

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1. CTV. (2014, December 1). Doctors split on mandatory flu vaccines for health-care workers. http://www.californiahealthline.org/capitol-desk/2015/8/committee-oks-vaccine-requirement-for-day-care-workers-floor-vote-next

2. Simons, P. (2014, January 4). Time for Alberta's health care workers to roll up their sleeves and get the flu shot. Edmonton Journal. http://www.edmontonjournal.com/health/ns+Time+Alberta+health+care+workers+roll+their+sleeves+shot/9348177/story.html

Communicable diseases, immunization, and child care workers

Public immunization programs during the latter half of the 20th century—focused specifically on vaccinating school children—have largely eliminated diseases such as polio and smallpox. While primarily aimed at controlling disease in the broader population, vaccination programs have also reduced occupational exposures to biological hazards among health-care and child-care workers.

A since-discredited 1998 study that linked autism to the MMR (mumps, measles, and rubella) vaccine has contributed to declining vaccination rates in Canada and the United States. Fewer immunized children means that child-care workers—95% of whom are female—are increasingly exposed to biological hazards that can cause diseases, such as hepatitis B and measles.

Indeed, child-care workers face many biological hazards in the course of their daily work. Respiratory infections—spread through the air—are commonplace among children, as are measles, chicken pox, and whooping cough. Intestinal infections can be spread through contact with feces during diapering or through inadequate hand washing. And skin infections (such as ring worm) and infestations (such as lice) can be transmitted through direct contact.

Following a 2014 outbreak of measles in Disneyland linked to unvaccinated children, the State of California made vaccination of school-aged children mandatory. The state has since enacted further legislation requiring child-care workers to be vaccinated against measles, whooping cough, and influenza [3] Mandatory worker vaccination (which is controversial) helps to control some of the biological hazards faced by child-care workers. Other administrative controls include environmental monitoring and sanitization protocols, such as ensuring that there are adequate facilities for diapering and toileting and physically separating these areas from food preparation and eating areas.

The interaction of public health campaigns (such as immunization) with workplace OHS demonstrates the need for OHS practitioners to be mindful of health issues beyond the workplace. In Chapter 8, we'll examine the issue of pandemic planning. ***Pandemics*** are caused by the widespread outbreak of a new strain of a virus that spreads quickly (due to a lack of

3. Simmons, C. (2015, October 11). Gov.Brown signs California day care centre worker vaccination bill–SB 792. California Newswire. http://californianewswire.com/gov-brown-signs-california-day-care-center-worker-vaccination-bill-sb792/

immunity) and for which there is no immediately available vaccination. While they are relatively rare, the workplace impact of a pandemic could be severe and many employers have developed plans for coping with such an event.

5.4 SCIENCE AS A DOUBLE-EDGED SWORD

Science plays an important role in both injury prevention and compensation. It has identified hazardous chemical and biological agents, determined the mechanism(s) by which these substances cause harm, and suggested ways to control hazards and treat injuries. It is important for OHS practitioners to understand how scientific conclusions are reached and the limitations of these conclusions.

The **scientific method** is a process of formulating, testing, and modifying hypotheses. A **scientific hypothesis** is a proposed explanation of a phenomenon that can be empirically tested to confirm, refine, or refute this explanation. We conduct measurement, observation, and experimentation to gather data that is compared against the hypothesis. If the data agrees with our hypothesis, we may conclude the hypothesis to be true. However, we cannot be certain the results are not the result of chance or a flaw in the method design. In other words we need to ensure the results are both valid and reliable. **Validity** means the results of the experiment or observation accurately reflect the real world. For example, a scale measuring weight is valid if it

correctly reports your actual weight. **Reliability** is the degree to which the results would be consistent if the measurement or observation were performed again. The scale in our example would be reliable if it produced the same result every time you step on it (assuming your weight has not changed).

The questions of validity and reliability plague scientific researchers, and achieving them is a key element of the scientific method. They are particularly challenging for the kinds of research usually associated with OHS-related matters because most of those issues involve human behaviour and physiology. When dealing with humans acting in the real world, there are limits to the control we can achieve over the measurement. It is unethical, for example, to intentionally expose someone to a toxic substance to measure its effects. Also, we cannot identify and control all the possible variables that may affect our results.

As a result, we can never be absolutely certain our results are accurate. As a result, scientists are concerned with *false positives* and **false negatives**. A false positive result occurs when we conclude a difference or relationship exists when it does not. False negatives occur when we conclude no difference or relationship exists when it does. Scientists tend to be particularly concerned with false positives because of their potential consequences. For example, saying a drug is effective at treating a disease when it actually is not can harm patients by subjecting them to an ineffective course of treatment. False negatives can also have real-life consequences as they may lead to inaction on health threats. The potentially harmful consequences of false positives means scientists are prone to being very conservative in their conclusions.

Further complicating matters is that most research conducted on OHS matters can only identify a correlation between two variables (e.g., exposure to asbestos and lung cancer). Demonstrating that asbestos (rather than some other, unmeasured, substance) causes lung cancer requires more complex research. The lack of clarity around cause also contributes to scientists' conservatism around findings. Unclear causation also is used by employers and government agencies, such as WCBs, to deny the harmfulness of a substance and the injury claims associated with exposure to it. For example, smoking also causes lung cancer and so, if an asbestos-exposed worker also smokes, it can be much more difficult for her to demonstrate that her cancer was the result of the asbestos exposure. This is a common issue for workers who develop long-latency diseases.

The reason that scientific practices matter to OHS practitioners is that health and safety is contested terrain. As we saw in Chapter 1, the interests of employers and workers don't always align. While scientific analysis has been immensely helpful to workers seeking to identify chemical and biological hazards or receive compensation for injuries caused by such hazards, employers can use the conservative culture of scientific research to slow or block worker efforts in these regards. As Box 5.4 shows, employers will often exploit such doubt in an effort to block regulation of hazardous substances.

Avoiding regulation by manufacturing doubt

Today we know that both vinyl chloride and benzene are dangerous chemicals that affect human health. Vinyl chloride is a polymer used in the production of many plastics, and until the 1970s, it was used in aerosol sprays and other products. Benzene is a component of crude oil that is a powerful industrial solvent and used in production of many products, including nylon. Their dangers were not always widely known.

Debra Davis, a renowned **epidemiologist** (a scientist studying the patterns and causes of illness and disease in the population), has traced what happened as scientists started to become aware of the health consequences of these chemicals. She found a story of active corporate involvement in the suppression of scientific evidence and discouragement of regulatory controls that she terms "a sophisticated game of scientific hide and seek."[1]

These cases draw attention to the strategies employers use to protect their interests in the face of scientific, public, or government pressure for regulation. In both cases, the corporations possessed studies demonstrating the health hazards of the chemicals but refused to allow public access to the results. Insiders trying to get the information into the public's hand were fired or silenced. Employer strategies in the face of growing public awareness are also illuminating:

To the manufacturing companies, it made sense to fight any effort to restrain production. From the very first reports that vinyl chloride could dissolve the finger bones of workers, cause cancer in animals and deform babies, the industry had a simple response: more research is needed.[2]

This tactic is aimed at delaying any regulation of the chemical in question. Employers would also sponsor their own research into a substance. In the case of vinyl chloride, employers hired prominent and well-respected scientists such as Sir Richard Doll, considered one of the world's premiere epidemiologists, whose results downplayed health concerns.

Not until 2000 did it become known that Doll's efforts on vinyl chloride had not been the independent musings of a disinterested expert. A letter found after his death in 2005 indicated

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1. Davis, D. (2007). The secret history of the war on cancer. New York: Basic Books, p. 380.

2. Ibid., p. 372.

that Doll had served as a consultant to Monsanto [a manufacturer of vinyl chloride] since at least 1979, at a fee of $1,500 a day.[3]

These efforts are part of a well-documented employer game plan for delaying the recognition of chemical hazards. It starts out with the employer decrying the lack of evidence to substantiate worker concerns about a particular hazard. If the workers have managed to gather evidence to support their claim, employers—sometimes acting through industry associations—will often criticize the methods by which that research was conducted and request additional research, which can cause a multi-year delay in the process.

If the employer has generated research that suggests a substance is hazardous, they may prohibit the researchers they contracted to do the research from publishing the results. They may also misrepresent the findings to government or hire a more compliant researcher to create evidence that the substance poses no risk. Finally, when it is no longer possible to deny that a substance is hazardous, the employer may seek to blame the workers for their exposure or argue that continued use of the substance is economically necessary.[4]

Despite the voluminous research into the hazards of benzene and vinyl chloride, neither has been banned or significantly restricted in industrial processes. OELs have been established, and other safety regulations govern their handling, but thousands of workers continue to be exposed to both chemicals.

The standards set by scientific research can make it very difficult at times to establish that a chemical (or other exposure) is hazardous. Employer use of this conservatism can mean that workers can be exposed to hazards with inadequate information about their effects. By contrast, if those regulating chemical and biological hazards adopted the precautionary principle—where the absence of scientific certainty that a substance was hazardous did not preclude regulating potentially hazardous materials or activities associated with it and the burden of proof fell on those advocating its use—it would be much more difficult for employers to resist this regulation. Box 5.5 considers the precautionary principle in more detail.

3. Ibid., p. 378

4. Bohme, S., Zorabedian, J., & Egilman, D. (2005). Maximizing profit and endangering health: Corporate strategies to avoid litigation and regulation. International Journal of Occupational and Environmental Health, 11(6), 338–348.

Politics and the precautionary principle

The **precautionary principle** asserts that when a substance is suspected of causing harm to workers, the public, or the environment but there is no scientific consensus on the question, then those seeking to use the substance must prove it is not harmful. In essence, this principle reverses the current evidentiary burden around chemical and biological hazards, which requires critics to prove a substance is harmful before regulation occurs.

The precautionary principle is premised upon the notion that decision makers have a social responsibility to protect workers and the public from harm when there is a plausible case that a substance is harmful. Europe has moved in the direction of the precautionary principle with its Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) regulations. These regulations place a greater burden on employers and chemical companies to demonstrate that a new chemical is safe, although a number of significant loopholes remain.[5]

One of the impediments to the adoption of the precautionary principle is that it brings into stark relief and conflict the differing interests of employers and workers around safety. Governments generally prefer to avoid making clear choices between the demands of workers (from whom they derive political legitimacy and electoral support) and the demands of employers (who are economically powerful). Consequently, governments are reluctant to seriously consider the precautionary principle (which most employers oppose). One outcome of this reluctance (albeit an outcome that is difficult to see) is that employers retain the right to continue exposing workers to substances that are possibly (and even probably) hazardous.

5. Lokke, S. (2006). The precautionary principle and chemicals regulation: Past achievements and future possibilities. Environmental Science and Pollution Research International, 13(5), 342–349.

5.5 SUMMARY

As noted at the beginning of the chapter, the health risks from fracking affect both workers at the well sites and nearby residents. This example demonstrates that when it comes to chemical and biological hazards there is no clear boundary between occupational health and safety and public health or between workplace hazards and environmental hazards. In this way, biological and chemical hazards can be pervasive and difficult to recognize because exposure occurs in multiple settings.

Chemical and biological hazards are also challenging because of the level of complexity involved in their interactions with the human body. It is much harder to ascertain the risk associated with using a cleaning agent than the risk posed by working on a roof or operating an espresso maker. Health effects may only develop from prolonged exposure, or the disease may have a long latency period. Often, pinpointing the cause of a disease can also be difficult due to exposure to multiple hazards, a lack of knowledge about what we are exposed to in the workplace, and the lack of a clear boundary between work-related and environmental exposures.

As a result, this area of OHS relies heavily on science to understand the effects of chemical and biological hazards. Nevertheless, the nature of scientific practices often result in overly conservative conclusions when assessing the risk these hazards pose to workers. Issues with such scientific conventions can be compounded by employers' long-standing efforts to deny the existence of chemical and biological hazards and avoid taking action to control them. As a result, there is strong evidence suggesting that current protections are inadequate and systematically under-protective of workers. Even if the precautionary principle is not a legal requirement in Canadian workplaces, this dynamic makes a strong argument for adopting the principle for moral reasons when it comes to chemical and biological hazards.

Discussion Questions

1. How do chemical hazards harm workers?
2. What chemical hazards have you encountered in the workplace? What were the route(s) of entry of those hazards? What acute and chronic effects did they have?
3. Why might we be skeptical about the utility of OELs?

4. What biological hazards have you encountered in the workplace? What were the route(s) of entry of those hazards? What acute and chronic effects did they have?

5. Do you think scientists are too conservative when they assess whether certain substances are hazardous to workers? Why or why not?

Exercises

1. Go online and find information about black mould. Specifically, try to determine:

- How can black mould be recognized?
- What health effects does black mould cause? And what is the route(s) of entry for black mould?
- What controls are effective for working near black mould? And how can it be eliminated from the workplace?

2. Go back online and find out what regulations regarding black mould and its remediation operate in your jurisdiction. You will want to consider occupational health and safety rules, as well as environmental regulations and building codes. Now consider the following scenario.

- Pretend you are an employer operating a building cleaning company. One of your employees has reported finding black mould in the basement of a building you require the employee to regularly clean.
- Using your knowledge of black mould, write a 500-word plan to respond to the employee's concerns given the rules governing mould in your jurisdiction and the health effects of mould exposure for workers.

3. If possible, swap plans with another student. If this is not possible, use your own plan. Pretend you are the employee who has received this plan in response to your concerns about black mould in

the workplace. What concerns do you have about your employer's plan? And how would you use your occupational health and safety rights to seek remedy for these concerns?

CHAPTER 6: PSYCHO-SOCIAL HAZARDS

Chapter Outline

6.0 LEARNING OBJECTIVES

Learning Objectives

1. Define psycho-social hazard and its effects on the health and safety of workers.
2. Explain the causes and consequences of stress and fatigue in the workplace.
3. Discuss the factors related to workplace violence and the effectiveness of prevention programs.
4. Explain the root causes of bullying and how to properly manage bullying and harassment.
5. Identify the hazards associated with working alone and discuss strategies for controlling them.

6.1 PSYCHO-SOCIAL HAZARDS

"Walmart Supercentre Brockville" by Benchapple, CC BY-SA 3.0

Story: Walmart Employee Meredith Boucher

Meredith Boucher began working for Wal-Mart in 1999. She was well regarded and received a number of promotions over the years. In 2008, she was made a Lead Assistant Manager in a

Windsor, Ontario, store. Initially, her relationship with the Store Manager, Jason Pinnock, was positive and her performance appraisals were glowing. Then, in May 2009, Pinnock asked Boucher to falsify a log recording temperature in meat and dairy coolers. Boucher refused. Pinnock, who was worried the incomplete logs would negatively affect the store's ratings in an upcoming inspection, subjected Boucher to a disciplinary meeting.

Concerned about this unfair reprisal, Boucher approached a superior to express her concerns. When Pinnock learned of the complaint, "he subjected her to an unrelenting and increasing torrent of abuse. He regularly used profane language when he spoke to her. He belittled her. He demeaned her in front of other employees. He even called in other employees so he had an audience when he berated her and showed his disdain for her."[1] Boucher complained of Pinnock's escalating harassment to senior management. Their investigation found her complaint was "unsubstantiated" and they threatened her with discipline for making the complaint.

Pinnock's behaviour and Wal-Mart's lack of response negatively affected Boucher's health. "She said that she was stressed out. She could not eat or sleep. She had abdominal pain, constipation and bloating. She lost weight and began vomiting blood. Co-workers testified that Boucher went from a fun-loving, lively, positive leader to a defeated and broken person."[2] On November 18, 2009, Pinnock once again berated Boucher over ten skids of product that were not unloaded. He "grabbed Boucher by the elbow in front of a group of co-workers. He told her to prove to him that she could count to ten."[3] Boucher was so humiliated that she ran out of the store. She never returned to work. Boucher sued for unfair dismissal. At appeal, she was awarded $300,000 in damages against Wal-Mart and $110,000 against Pinnock. After her departure from the store, Boucher's health gradually improved.

Workplace harassment—often perpetrated by supervisors on subordinates—is a pervasive issue in workplaces. Wal-Mart's unwillingness to protect Boucher when she complained is also not uncommon. Interestingly, the hazard posed by harassment and the injury it caused to Boucher were only recognized when she sued her employer, a process entirely separate from Ontario's OHS and workers' compensation systems. The case demonstrates both that workplace harassment has real health consequences and that employers are often reluctant to recognize psycho-social hazards as legitimate health and safety concerns.

Psycho-social hazards are the social and psychological factors that negatively affect worker health and

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1. Boucher v. Wal-Mart Canada Corp., 2014 ONCA 419 (Ontario Court of Appeal 419, May 5, 2014), para 24.

2. Ibid., para 37.

3. Ibid., para 34.

safety. Psycho-social hazards can be hard to isolate in the workplace because they reside in the dynamics of human interactions and within the internal world of an individual's psyche. Yet it is increasingly recognized that social and psychological aspects of work have real and measurable effects on workers' health. Harassment, bullying, and violence are examples of psycho-social hazards. Other forms include stress, fatigue, and overwork. Even the absence of social interaction, in the form of working alone, produces its own hazards. Much of the challenge is recognizing that these hazards pose real threats to workers' health. This chapter examines the types of psycho-social hazards and discusses their impact on health and safety.

6.2 STRESS AND FATIGUE

We all experience stress at some point in our lives. **_Stress_** is a change in our physical and mental state in response to situations we perceive as challenging or threatening. Situations causing stress are known as **_stressors._** Stress can have a positive effect, making us more alert or more prepared to take on an important challenge. Stress can also have a negative effect, causing a range of physical and mental ailments. There are four types of stressors:

- **Acute stressors** are time-specific events of high intensity and short duration that occur infrequently, such as a performance review, a car accident, or unexpected encounter.
- **Episodic (or daily) stressors** may be similar to acute stressors but occur more frequently, have a longer duration, and may be of lower intensity. Making repeated requests of a worker to work overtime is an example of an episodic stressor.
- **Chronic stressors** are stressors that persist over a sustained period of time, and include job insecurity, work overload, or lack of control.
- **Catastrophic stressors** are a subset of acute stressors but differ in their intensity, threatening life, safety, or property. Robbery and physical assault are examples of catastrophic stressors.

Stress can arise from all aspects of our lives, including our work. ***Workplace stress*** is stress that is brought on by work-related stressors. Canadians report work to be the biggest source of life stress. Almost three quarters of Canadian workers report that their work entails some stress, with 27% reporting that work is "quite a bit" or "extremely" stressful.[1] The most frequently identified workplace stressors are heavy workloads, low salaries, lack of opportunity, unrealistic or uncertain job expectations, and lack of control over work.[2]

Researchers typically identify five factors contributing to workplace stress:

1. characteristics of the job being performed, such as workload, pace, autonomy, and physical working conditions,
2. a worker's level of responsibility in the workplace, including the clarity of their role,
3. job (in)security, promotion, and career development opportunities,
4. problematic interpersonal work relationships with supervisors, co-workers, or subordinates, including harassment and discrimination, and
5. overall organizational structure and climate, including organizational communication patterns, management style, and participation in decision making (job control).

These five factors demonstrate that workplace stress arises out of situations and events within the employer's control. This, in turn, makes the occurrence of workplace stress an occupational health and safety issue.

Workplace stress produces a range of physical and mental health effects. Early physical signs of negative stress include increased heart rate, sweating, and nausea, reddening of the skin, muscle tension, and headaches. Early emotional and mental effects of negative stress include anxiety, depression, apathy, sleep disturbance, and irritability. Long-lasting or intensifying stress results in a worsening of these symptoms as well as the appearance of new symptoms, such as lasting depression, heart disease, chronic digestive issues, reduced sex drive, uneven metabolism, and increased susceptibility to infectious diseases.

Research led by Robert Karasek has revealed that job control is a key factor in determining how work-related stress affects us. His **job demands-control model** is explained in Box 6.1. It is also possible for negative effects of stress to manifest themselves in groups of workers and not just individuals, due to workplace dynamics and environment. Group manifestation can arise from so-called toxic workplaces. ***Toxic workplaces*** are

1. Crompton, S. (2011, October). What's stressing the stressed? Main sources of stress among workers. Canadian Social Trends, 44–51.
2. American Psychological Association (2015). *2015 Work and Well-Being Survey*. Washington: APA.

characterized by "relentless demands, extreme pressure, and brutal ruthlessness," and represent the extreme of stressful workplace environments.[3]

Karasek's job demands-control model

Before Robert Karasek's groundbreaking work, most research into work-related stress focused on the effects of job demands, such as overload. Karasek discovered that the degree of control a worker has in her job plays a significant role in whether job-related stress will be positive or negative and whether ill health results.[4]

Karasek developed a model that analyzed the interaction of job demands with job control. He created a matrix that included four types of work, as illustrated below (adapted from Karasek, 1979).

3. Macklem, K. (2005). The toxic workplace. Maclean's, 118(5), 34.

4. Karasek, R. (1979). Job Demands, job decision latitude, and mental strain: Implications for job redesign. Administrative Science Quarterly, 24(2), 285–308.
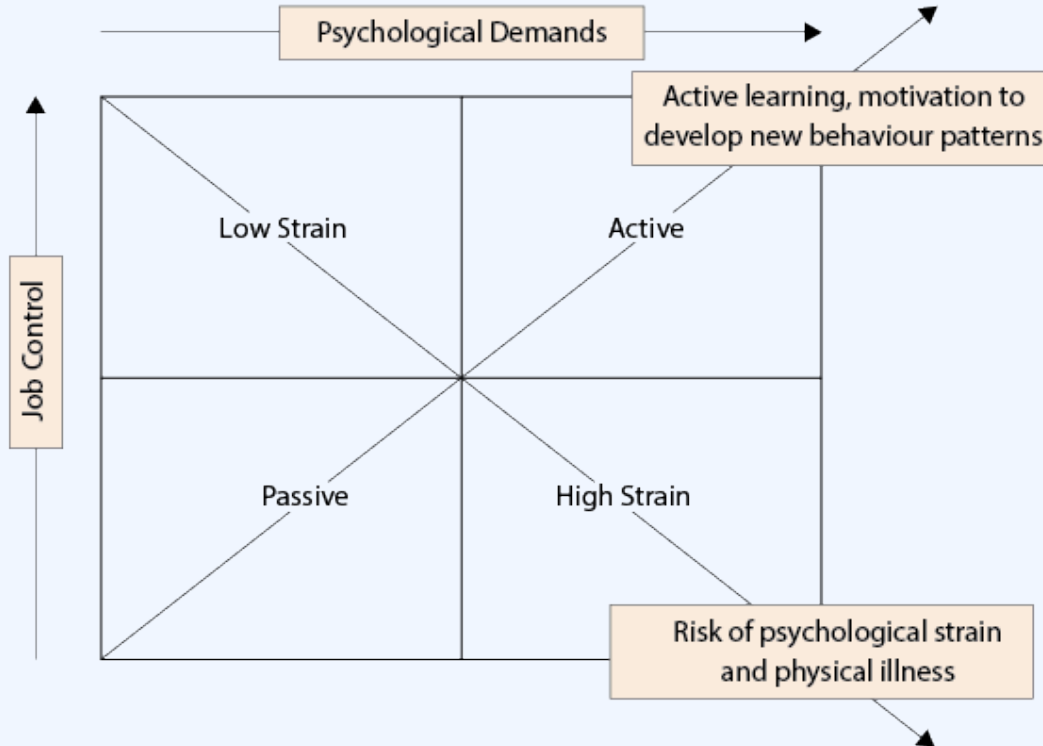
Low-strain and passive jobs are associated with low stress, although passive jobs can lead to low motivation and dissatisfaction. The important boxes are active jobs, associated with high job demands but where workers possess a high degree of decision latitude (i.e., control) in the work, and high-strain jobs, which contain high demand but little job control. The cumulative effect of working in an active job is that workers builds their ability to cope with stress. Conversely, sustained exposure to high-strain work leads to psychological and physical illness.

Karasek and his research partner later added the concept of "social support" to the model. Social support is the degree of isolation or support provided by both supervisors and co-workers. They found that high levels of social support can mitigate some of the negative effects of high-strain work. They also note that the most hazardous form of work is work combining high demand, low control, and low social support.[5] Karasek found the effects most acute for workers in blue-collar occupations, which typically give workers little job control.

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5. Karasek, R., & Theorell, T. (1992). Healthy work: Stress, productivity, and the reconstruction of working life. New York: Basic Books.

Research into the model has found links between high-strain jobs and high incidence of heart disease, hypertension, mental health issues, and other negative health outcomes. While men and women experience job strain in similar ways, some recent research suggests that the presence of social support has a stronger effect in ameliorating negative stress effects for women than for men.[6] Also, the stress-buffering effects of job control have a greater impact on older workers than younger workers, suggesting older workers have developed coping techniques that younger workers have yet to discover. [7]

Karasek's groundbreaking work reveals that job design, work environment, and worker autonomy are significant factors in determining whether work stressors will lead to negative health effects for workers. This finding suggests that HR tasks such as job design can profoundly affect the workplace hazards faced by workers.

There are two main challenges associated with recognizing workplace stress as a hazard. First, stress is often perceived as an individual's response to a situation, and any two individuals can react differently to the same stressor. This perception can lead managers to identify the issue with the individual rather than the stressor itself. This response is an example of an employer blaming the worker for an injury and a variation on the careless worker myth that we read about in Chapter 1. Faced with an explanation that blames the worker, it is important to be cognizant of the difference between root and proximate cause. "Stress is not merely a physiological response to a stressful situation. Stress is an interaction between that individual and source of demand within their environment."[8] In other words, while individuals may respond differently to stressors (which is the proximate cause of the health effect), the root cause of the reaction is the workplace dynamics that create the stressor.

Second, isolating workplace stressors can be difficult, especially chronic stressors. Non-work stressors do affect workers and can also be used by employers as an excuse to deny that stress-related health effects have workplace causes. Also, as with other types of ill health, individuals have different tolerances for stress, meaning the same stressors may affect one worker more than another. As a result, it can be difficult to have chronic stress recognized as a workplace hazard or the cause of a workplace injury or ill health. A workers' compensation

6. Rivera-Torres, P., Araque-Padilla, R., & Montero-Simó, M. (2013). Job stress across gender: The importance of emotional and intellectual demands and social support in women. International Journal of Environmental Research and Public Health, 10(1), 375–389.
7. Shultz, K., Wang, M., Crimmins, E., & Fisher, G. (2010). Age differences in the demand–control model of work stress: An examination of data from 15 European countries. Journal of Applied Gerontology, 29(1), 21–47.
8. Colligan, T., & Higgins, E. (2006). Workplace stress. Journal of Workplace Behavioral Health, 21(2), 89–97, p. 92.

board, for example, is more likely to accept claims resulting in catastrophic or acute stress (e.g., post-traumatic stress disorder) than chronic stress.

Story: Workers' compensation and chronic stress

In January 2007, Parks Canada employee Douglas Martin filed a claim with Alberta's WCB for chronic stress. For the previous seven years, Martin had spearheaded an effort to have park wardens armed while they were performing their duties (an ongoing health and safety issue in Parks Canada). This effort was stressful and conflict-ridden, and Martin felt he had experienced reprisals by his employer in the form of lack of promotion, training, and work.

The previous month, Martin had received a letter threatening him with disciplinary action over an unrelated matter. Martin "already had a written reprimand on his file and feared that the next disciplinary action would be dismissal. He alleged the letter, following the stress of years of conflict over the health and safety issue, triggered a psychological condition. He took medical leave beginning December 23, 2006, consulted medical professionals for treatment, and initiated a claim for compensation for chronic onset stress the following month."[9]

Martin's workers' compensation claim was refused and he lost his appeals of the decision. Alberta's WCB policy stated that it accepts claims for chronic stress only if the worker meets each of four criteria:

- there is a confirmed psychological or psychiatric diagnosis as described in the psychiatric manual of mental disorders (commonly called DSM),
- the work-related events or stressors are the predominant cause of the injury; predominant cause means the prevailing, strongest, chief, or main cause of the chronic onset stress,
- the work-related events are excessive or unusual in comparison to the normal pressures and tensions experienced by the average worker in a similar occupation, and
- there is objective confirmation of the events.[10]

The WCB accepted that Martin was experiencing psychological effects and that the stressors were

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9. Martin v. Alberta (Workers' Compensation Board), [2014] 1 SCR 546, 2014 SCC 25, para. 6.
10. Alberta WCB. (2014). Policies and Information Manual, Policy 03-01, Part II: 6.

predominantly work-related. They denied the claim on the grounds that the events were not excessive or unusual in comparison to normal pressures and that there was not objective confirmation of the events.

As in all WCB cases, the decision revolves around the specifics of Martin's situation. Nevertheless, it demonstrates how the bar to successfully establish a WCB claim for chronic stress can be set so high as to be unreachable by most workers. Further, the requirement that the events be "excessive or unusual in comparison to the normal pressures and tensions experienced by the average worker" marginalizes workers who may have a heightened sensitivity to stress. Finally, the decision, by arguing that fear of dismissal is not unusual in the workplace, downplays the role of management in creating an unusually stressful situation.

Workplace stress is the result of workplace factors. Consequently, preventing the negative effects of workplace stress requires changes to job design, workload, organizational culture, and interpersonal dynamics. These factors are both broadly known to employers and within their control. What the persistence of stressful workplaces reveals is that employers in such workplaces prioritize maintaining profitability, productivity, and control of the work process over workers' health.

Related to stress is the experience of fatigue. **Fatigue** is the state of feeling tired, weary, or sleepy caused by insufficient sleep, prolonged mental or physical work, or extended periods of stress or anxiety. *Acute, or short-term, fatigue* can be caused by failure to get adequate sleep in the period before a work shift and is resolved quickly through appropriate sleep. Chronic fatigue can be the result of a prolonged period of sleep deficit and may require more involved treatment. **Chronic fatigue syndrome** is an ongoing, severe feeling of tiredness not relieved by sleep. The causes of chronic fatigue syndrome are unknown.

While lack of sleep is the primary cause of fatigue, it can be enhanced by other factors, including drug or alcohol use, high temperatures, boring or monotonous work, loud noise, dim lighting, extended shifts, or rotating shifts. As with other conditions, workers have differing sensitivity to fatigue. Fatigue can also make workers more susceptible to stress and illness.

Fatigue is a legitimate health and safety concern because workers who are experiencing fatigue are more likely to be involved in workplace incidents. Lack of alertness and reduced decision-making capacity can have negative effects on safety. Research has shown that fatigue can impair judgment in a manner similar to alcohol. WorkSafeBC reports the following effects:

- 17 hours awake is equivalent to a blood alcohol content of 0.05 (the legal limit in B.C. and Alberta)
- 21 hours awake is equivalent to a blood alcohol content of 0.08 (the legal limit in Canada)
- 24–25 hours awake is equivalent to a blood alcohol content of 0.10.[11]

Most cases of fatigue are resolved through adequate sleep. The average person requires 7.5 to 8.5 hours of sleep a night (remember, this is an average—some require more, some less). While an employer cannot control how well a worker sleeps, they can adjust the workplace to mitigate fatigue. Shift scheduling is one of the most important administrative controls of fatigue: employers can ensure shifts are not too long or too close together as well as avoiding dramatic shift rotations (we discuss shift work in more detail in Chapter 7). Employers can also ensure that workplace temperatures are not too high, work is interesting and engaging without being too strenuous, and adequate opportunities for resting, eating, and sleeping (if necessary) are provided.

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11. WorkSafeBC. (2014). Fatigue can also make workers more susceptible to stress and illness. WorkSafe Bulletin WS2014-14: 1.

6.3 VIOLENCE

"Intimidation Sculpture" by Michel Rathwell, CC BY 2.0

Workplace violence is any act in which a person is abused, threatened, intimidated, or assaulted in his or her employment. It can include physical attack, threats of physical attack, threatening language or behaviour (e.g., shaking a fist), or physically aggressive behaviour. The data around the prevalence of workplace violence is mixed. If judged by workers' compensation claims, workplace violence is quite rare: only 2.5% of all Canadian lost-time injury claims in 2012 were related to incidents of violence (about 6000 incidents).[1] That said, Statistics Canada reports that 17% of all acts of criminal violence (violence illegal under the *Criminal Code*) occurred at a workplace. They calculate that this amounts to more than 350,000 acts of workplace violence in Canada.[2] The discrepancy is partially explained by the fact that many of those criminal acts did not result in the

1. AWCBC. (2014). National Work Injury, Disease and Fatality Statistics 2010–2012. Toronto: Association of Workers' Compensation Boards of Canada.
2. Statistics Canada. (2008). National Yearbook 2008. Ottawa: Government of Canada.

acute injury of a worker and, therefore, no workers' compensation claim was filed. This discrepancy reinforces the limited value of workers' compensation claim data as an indicator of hazardousness in the workplace.

Whether more or less prevalent, workplace violence can extract a significant toll on workers, leading to injury and psychological ill health (e.g., post-traumatic stress disorder). Health-care workers are most likely to experience workplace violence, followed by social workers and workers in retail or food service. It is notable that these occupations tend to be female-dominated. Customers, clients, and patients are the most common perpetrators of workplace violence, although violence from co-workers or supervisors remains prevalent.

Story: The myth of the disgruntled employee?

In February 2014, Jayme Pasieka, an employee at the Loblaw's Distribution Centre in northwest Edmonton, Alberta, burst into his workplace and attacked several workers with a knife, fatally stabbing two people and injuring four others.[3] The incident sparked extensive media coverage, much of it focused on Pasieka's history of mental illness and erratic behaviour. Many commentators speculated that he was a "disgruntled employee."

Such horrific incidents are, thankfully, rare. When they do occur, these types of incidents tend to receive a lot of media coverage, most of which focuses on the mental state of the perpetrator. The notion of the "disgruntled employee" returning to their place of work to exact revenge for some perceived grievance is well embedded in public mindset. Consider the popularity of the term "going postal"—coined after a postal worker shot a number of co-workers in the United States.

Our familiarity with the disgruntled-employee frame means journalists and employers often use it to quickly explain what caused a workplace incident. In a commentary on a raft of workplace shootings in the United States in 2010, Richard Denenberg and Tia Schneider Denenberg make this observation:

- In sum, the Missouri and Georgia cases exemplify a media tendency to reach for facile explanations—notably the vague concept of disgruntlement—obscuring the complexities that may lie behind an outbreak of workplace violence. Such generic assumptions often

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3. Klingbeil, C., Wittmeier, B., Dawson, T., & Pruden, J. (2014, March 1). 'It was a really scary moment'; Knife attacks at Loblaw centre leave two dead, four injured. *Edmonton Journal*, p. A3.

conflict with the specific facts, once they are revealed in second-day and third-day accounts. The notion that an aggressor feels aggrieved is essentially a tautology, yielding little insight, unless the reasons for the extreme behavior are adequately explored.

Attention should focus not only on the person but also on any defects in policies, procedures, or judgment that may have allowed rage to fester and ultimately explode.

Examining the characteristics of the workplace may enhance our ability to prevent violence as much as probing the character, personality, and belief systems of the offender.[4]

In short, newspaper reporters' use of the disgruntled-worker frame simplifies the (likely complex) circumstances that led to the violence. This can obscure root causes of the incident by hiding the effect of employer behaviour or inaction. As we saw in Chapter 1, the social construction of an incident can result in a misdiagnosis of the cause and, consequently, inappropriate recommendations for future prevention.

A variety of factors can increase the risk of violence in the workplace. Common concerns are the presence of money, drugs, and alcohol (which make workplaces targets for theft and robbery). Late operating hours and extensive access to the public are also factors that heighten the risk of violence. One of the reasons health-care workers are at greatest risk is their close proximity to people under physical or mental stress. The workplace environment can also play a role leading to violence. Stressful work situations, insecure and precarious employment arrangements, work overload, and unhealthy interpersonal dynamics can also increase the risk of violence.

While acts of violence are unpredictable, an employer can take steps to develop a violence-prevention plan to minimize both the risk of a violent act and the harm caused by the act. Violence prevention should be a part of the overall HRAC process. Particular actions to consider include workplace design to restrict access, increasing visibility and communication, and creating escape routes for workers. Administrative policies and work practices can reduce some of the common risks: these might include reducing the use of cash, eliminating the use of working alone, and implementing a buddy system. A prevention program should also incorporate training for managers to spot warning signs of violence, and steps to reduce stress levels in the workplace. Governments can also take action by expanding the definition of violence as a workplace hazard.

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4. Denenberg, R., & Schneider-Denenberg, T. (2012). Workplace violence and the media: The myth of the disgruntled employee. Work, 42(1), 5–7.

Family Violence as Safety Hazard

In November 2015, the Alberta Family Violence Death Review Committee, a government committee mandated to investigate deaths due to family violence, reported on its investigation into the 2011 murder of a woman by her spouse at her workplace. The husband had called and visited her repeatedly at work, threatening violence. The employer, co-workers, and security guards at the site were aware of the threats but did little. The woman did not press charges at any time, in part due to cultural pressures. No one attempted to prevent the husband from accessing the workplace on the day he killed her.[5]

In its report the Committee made the following recommendation:

- The Alberta Government amends the Occupational Health and Safety Act and Code to recognize and include family violence as a workplace hazard. Family violence is to be defined as it is in the *Protection Against Family Violence Act* and must include: direct family violence (where the family violence is at the workplace) and indirect family violence (where the family violence is outside of the workplace) and it directly affects the workplace through employee's performance or by creating an unsafe work environment.[6]

Recommending that violence as a safety hazard be defined to include violence that may take place outside the workplace (but has workplace consequences) is a significant shift from traditional approaches to violence as a safety issue, which tend to focus only on workplace-based violence.

The government accepted the recommendations of the report and promises to implement changes to the *OHS Act* (as of time of writing, they had not yet been introduced). An interesting follow-on question is whether injuries occurring at work that stem from family violence will now be deemed compensable injuries by the Workers' Compensation Board. At present, such injuries are not considered to arise from the course of work and are thus non-compensable.

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5. Sinnema, J. (2015, November 3). Family violence 'a workplace hazard'; Death review committee calls for better protection for employees. Edmonton Journal, p. A4.

6. Alberta Family Violence Death Review Committee (2015). Case Review Public Report, November 2, p. 3.

6.4 BULLYING AND HARASSMENT

A growing concern in workplaces is the issue of workplace harassment and bullying. **Workplace harassment** is behaviour aimed at an individual (or group) that is belittling or threatening in nature. This can include actions (e.g., unwanted touching) or words (e.g., insults, jokes) that have the effect of causing psychological harm to victim(s). Harassment can take a variety of forms, including racial/ethnic harassment, sexual harassment, and general workplace harassment. **Bullying** is similar to harassment and comprises repeated actions or verbal comments that lead to mental harm, isolation, or humiliation of a worker (or group), often with the intent to wield power over them. Often harassment and bullying are used interchangeably and, indeed, the definitions are highly similar. In this book, we differentiate the terms for two reasons. First, harassment is often associated with specific grounds protected under human rights legislation, such as gender, race, age, and religion. Bullying applies more broadly to any set of behaviours that create harm. Second, it is accepted that harassment can occur unintentionally, while bullying is a more intentional process. Both are ways for the harasser/bully to exercise control and power over the harassed/bullied through fear, humiliation, embarrassment, and denigration.

Harassment and bullying can involve physical contact but are distinguished from violence in that the purpose is not physical harm but emotional and psychological harm. Harassment and bullying can also include acts that indirectly affect the targeted worker(s), such as undesirable shift scheduling, unreasonable workloads, spreading rumours, or denying leave requests. Harassment, bullying, and violence can occur concurrently.

There is debate about how to best conceptualize harassment and bullying. Many argue that it is a human rights issue and should be treated through human rights processes, usually meaning independent tribunals or the courts. Others suggest that harassment and bullying are instances of individual misconduct best resolved through human resources processes such as better selection, training, and disciplinary practices. The authors of this text argue, without intending to reduce the significance of the human rights dimensions of harassment, that harassment and bullying are also health and safety issues. The reason harassment and bullying are OHS issues is that they can be controlled by the employer and have clear health effects for the targeted worker(s).

The psychological effects of harassment and bullying can be extensive and include anxiety, panic attacks, depression, shame, and anger. The physical effects mirror those of stress and can include inability to sleep, stomach pain or headaches, high blood pressure, heart palpitations, and loss of concentration/memory, as well as eating and digestive disorders. Further, workers exposed to harassment are found to be more at risk of illness, injury, and assault.[1] The negative health outcomes and increased risk of illness and injury can persist well after the harassment has ceased. In extreme cases, bullying and harassment can cause **post-traumatic stress disorder** (PTSD). PTSD is typically brought on by a terrifying event, and symptoms include flashbacks, severe anxiety, and uncontrollable thoughts about the event.

While all workers can be victims of harassment and bullying, certain groups of workers are more likely to be the targets, because of their respective statuses in society at large. Two such groups include women and racialized workers (see Box 6.5), who make easier targets because the bullying and harassment are consistent with widely held prejudices (e.g., consider how common race and gender jokes are). Recent research has shown that experiencing multiple forms of harassment—gender and ethnic harassment along with general workplace harassment—compounds the negative health effects compared to experiencing one form, putting racialized women at particular risk of negative health effects from harassment.[2]

1. Rospenda, K., Richman, J., Ehmke, J., & Zlatoper, K. (2005). Is workplace harassment hazardous to your health? Journal of Business and Psychology, 20(1), 95–110.

2. Raver, J., & Nishii, L. (2010). Once, twice, or three times as harmful? Ethnic harassment, gender harassment, and generalized workplace harassment. Journal of Applied Psychology, 95(2), 236–254.

Racialized workers

Discussing issues such as race can be challenging. In one respect people possess certain immutable characteristics, including skin colour and other surface features, that are associated with "race." However, race is a social construction. Society imbues certain characteristics (i.e., skin colour) with meaning and not others (e.g., eye colour) and as a result ascribes significance to them. The trait in itself is not significant but is given importance through social convention. The ascribed meaning leads people to experience the world differently based upon the immutable characteristics.

Society not only ascribes significance to these traits but structures social relations around them. People are differentiated and distinguished according to the characteristics. This is the process of racialization.[3] All people are racialized; society implies meaning to being "white" or "black," for example. Our experiences of the world are thus shaped by this social construction. However, the ascription of characteristics is not neutral. Some "races" are imbued with positive qualities and some negative. Whether society ascribes negative or positive qualities shapes a person's status in society.

In this book we utilize the term *racialized workers* to apply to individuals perceived to be a part of a race or ethnicity to which particular, often negative, characteristics are ascribed by social structures (e.g., Black, Hispanic, Asian). We also recognize that race intersects with other characteristics, including gender, age, sexual orientation, and ability, to form a matrix of human experience in society.

There is no clear profile of who might be a harasser. The range of tactics, behaviours, and approaches used by bullies and harassers is extensive and reflective of specific contexts. One typology of bullies includes four categories:

- The screaming Mimi: A bully who displays mood swings and unpredictable anger and commonly uses public humiliation as a tool.
- The constant critic: A hypercritical nitpicker who regularly points out others' inadequacies and errors,

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3. Anthias, F., & Yuval-Davis, N. (1992). Racialized boundaries: Race, nation, gender, colour and class and the anti-racist struggle. New York: Routledge.

and uses negative evaluation of performance as a tool to belittle.

- The two-headed snake: Aimed at rising in the organization, they aim their bullying at those below them, using rumours and divide-and-conquer schemes to turn co-workers against the target.
- The gatekeeper: Obsessed with control, they allocate resources and information in ways to ensure the target's failure and to create reasons to question their performance.[4]

These types of bullies may sound very familiar, but it is important to not forget that the issue of bullying is workplace-wide and not solely the result of an ill-mannered or calculating personality. The categories should be interpreted as strategies employed by bullies, rather than personality sketches.

Often, managers bully or harass subordinates (although bullying from co-workers and clients/customers is also common). This is not surprising, given that bullying and harassment are ways to wield power over another person. Managers, because of their role in an organization, already possess power over workers. Attempts to exercise this power can lead to management approaches that rely upon bullying. Some researchers suggest that employers may overtly or covertly encourage bullying by managers as a way to maximize the work the employer can extract from its workers.[5]

The line between "tough" management and "bullying" management can be difficult to ascertain, especially if the bullying takes the form of misuse of managerial prerogatives such as scheduling, work assignments, and the like. Usually bullying as a management technique is reflective of the organizational culture that has developed in a workplace. For their part, workers respond to OHS threats such as bullying with a range of behaviours that include *exit, voice, patience, and neglect.*

Responses to harmful work environments

When a worker experiences any OHS hazard, including harassment, bullying, or a toxic workplace, the worker can respond in a range of ways. In examining individual behaviour in response to deteriorating conditions, Albert Hirschman first developed the notion that people respond either through exit or voice, and the choice is determined by attitudes toward the situation.[6] Others later added to Hirschman's theory by positing two other options, patience (sometimes referred to as loyalty) and neglect:

4. Namie, G. (2003). Workplace bullying: Escalated incivility. London, ON: Ivey School of Business.

5. Beale, D. (2011). Workplace bullying and the employment relationship. Work, Employment & Society, 25(1), 5–18.

6. Hirschman, A. (1970). Exit, voice, and loyalty: Responses to decline in firms, organizations, and states. Cambridge: Harvard University Press.

- **Exit:** The worker decides to get away from the undesired situation, either by quitting the employer or transferring to another location or job within the same employer.
- **Voice**: The worker decides to speak up in an attempt to change the situation. Voice can take a number of forms, including attempting to repair the situation directly, lodging a complaint, filing a grievance or, less constructively, retaliating with their own inappropriate behaviour.
- **Patience:** The worker decides to do nothing in the hopes that the situation will eventually improve. Workers adopt a patience approach when their loyalty to the organization or the cost of exiting is greater than the price of experiencing the negative situation.
- **Neglect**: The worker does nothing, based on the belief that the situation will not change or might grow worse. The worker might try to avoid the source of the situation but will generally take no action to change the situation. Workers choose this option when the costs of exiting are too high and their relationship to the organization is sufficiently damaged to prevent either voice or patience.[7]

Workers may adopt different strategies when confronted with bullying behaviour or may cycle through the various options. For example, a group of workers facing a co-worker who undermines them in meetings, makes false claims about their work performance, and verbally attacks them may react in different ways. Those workers who are not very invested in the workplace (e.g., they are new or they feel they have options elsewhere) may simply start looking for a new job.

Other workers may at first choose patience (in the hope the worker's behaviour will change) and then move to voicing their concerns (e.g., filing a complaint or by socially excluding the bully). If the issue remains unresolved, some workers (e.g., those close to retirement) may choose neglect while others will move to exit the workplace.

Recognizing that workers might respond in four different ways to the same negative situation reminds us that there is no single "sign" of a poor workplace environment. Employers interested in preventing harassment and bullying must be careful to observe the myriad ways in which workers react to deteriorating situations.

7. Leck, D., & Saunders, D. (1992). Hirschman's loyalty: Attitude or behavior? Employee Responsibilities and Rights Journal, 5(3), 219–230; Rusbult, C., Farrell, D., Rogers, G., & Mainous, A. G. (1988). Impact of exchange variables on exit, voice, loyalty, and neglect: An integrative model of responses to declining job satisfaction. Academy of Management Journal, 31(3), 599–627.

There are several ways to address harassment and bullying in the workplace. First, an employer should (and, in some jurisdictions, must) develop policies regarding harassment in the workplace. The administrative controls should outline acceptable and unacceptable behaviours and actions, indicate employer and worker responsibilities, and create a process for investigating and resolving complaints. Any investigation must proceed in a manner that is transparent, fair to both parties, and as confidential as is possible. Investigations should also identify the root cause of the incident and how to prevent similar incidents in the future.

Workplace policies are important, but they are only as effective as the degree of their implementation and enforcement. Effective policy implementation requires the employer to train all workers, including managers, on how to prevent and address harassment. Training for managers is particularly important. It can help managers spot possible harassment and teach them the difference between legitimate management discretion and bullying management techniques. Training workers around respectful interactions and cultural sensitivity can help distinguish between legitimate interpersonal conflict and bullying and harassment.

Finally, research shows that the leading indicator of workplace bullying and harassment is the organization's climate. In workplaces where workers feel unsafe, incidents of bullying and harassment are more frequent. Conversely, creating a safe and respectful climate increases workers' sense of safety and lowers the negative consequences of bullying and harassment.[8] Creating a safe workplace climate is a multi-levelled process, requiring a high degree of commitment to respectful interactions, clear communication, transparent management, and individual and collective accountability.

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8. Law, R., Dollard, M., Tuckey, M., & Dormann, C. (2011). Psychosocial safety climate as a lead indicator of workplace bullying and harassment, job resources, psychological health and employee engagement. Accident Analysis & Prevention, 43(5), 1782–1793.

6.5 WORKING ALONE

It may seem strange to include working alone as a psycho-social hazard, given that it is a working condition that removes psycho-social interactions from the workplace. Yet it is precisely the absence of other people that makes working alone a significant psycho-social hazard. Working alone is a unique type of hazard in that, in and of itself, it may not be hazardous. Nevertheless, working alone exacerbates other hazards present in the workplace.

Working alone occurs when a worker is performing tasks out of contact with persons capable of offering assistance in case of emergency. If an incident were to occur (e.g., if the worker became unconscious) there would be no one available to respond, increasing the risks of harm to the worker. The key to working alone is that the worker is isolated in some fashion from co-workers or responsible individuals. A worker can be working alone even if there are other people present in the workplace. For example, a receptionist in the front room is working alone if others in the office cannot hear or see him.

A second key aspect of the concept is that the contact needs to be with someone capable of and responsible for responding. A worker can be working alone even if there are members of the public present (e.g., a crowded

street). The public are not responsible for the worker and so may not respond (or even be aware of the need to respond) should something happen. Certain types of working alone situations come quickly to mind (e.g., the gas station attendants discussed in (Chapter 2), but there are many types of working alone that may not be as obvious.

Who works alone and why?

Many different kinds of workers can find themselves working alone. Consider these common examples:

- A barista opening up a coffee shop early in the morning
- A farm worker cleaning out a grain bin
- A homecare nurse visiting patients in their homes
- A custodian cleaning a school overnight
- A postal worker delivering mail
- A front receptionist greeting customers
- A truck driver transporting goods between cities
- A maintenance worker repairing a machine in a shut-down portion of a factory

How many of these jobs could be performed more safely if there were two workers present? Most of these jobs would have a lowered risk of incident or reduced consequences from an incident if a second worker were present. This raises the question as to why these jobs are routinely performed alone.

Usually employers cite economic efficiency as the reason for having workers work alone. It makes no sense (financially) to have two receptionists greeting customers or having a passenger with the truck driver. Nevertheless, in many cases, assigning two workers to perform a job has little effect on efficiency. For example, sending homecare workers in pairs adds safety, increases the quality of patient care, improves working conditions, and does not negatively affect the number of patients seen in a day.

Employers utilize working alone when it makes economic sense for them. Those considerations are valid, but for OHS practitioners, safety considerations must also be included in the calculation. How many jobs regularly performed alone really need to be structured in that fashion? And how much working alone is simply the result of habit and convention?

The risks associated with working alone are diverse. Common concerns include the possibility of theft, assault,

or attack by an outside party or a worker's client or patient. This risk is increased by the presence of money, drugs, or other valuables. Women are also more at risk of assault when working alone in these situations. Other risks include uncontrolled hazards causing harm to a worker without others noticing and taking action. For example, a worker working alone may pass out from gas exposure or fall on a slippery surface and have no one to come to their aid. Even injuries like heart attacks or other health issues can be made worse by the lack of immediate response.

There are two basic ways to control the hazard posed by working alone. The first approach is to eliminate it by ensuring workers are never in a situation where they are out of contact with other workers. Policies that require a minimum of two workers to be on shift at a time, or prohibiting late night overtime, can administratively control working alone. Prohibiting working alone is a central practice of emergency first responders (i.e., police, fire, ambulance). Keep in mind that eliminating working alone does not eliminate other hazards, which may require other controls. For example, two workers in a remote location will still require some communication strategy in case something happens to either or both of them.

The second approach to controlling working alone is to establish a two-step communication process with workers working alone. First, the worker needs a way to communicate to another person if they are in need. Radios, telephones, or panic buttons can all work as outgoing communication devices. Second, there needs to be incoming communication on a regular basis in case the worker is unable to communicate (e.g., they are unconscious). This incoming communication can take the form of a regular check-in to the worker or an automatic response if the worker fails to complete a periodic check-in. The frequency of check-ins is determined by the nature of the hazards to which the worker is exposed.

The choice between hazard elimination and communication controls is controversial. Employers argue that prohibiting working alone is too costly and inefficient. Some also argue that employing two workers is not necessarily safer than one worker (e.g., two workers can just as easily be rendered unconscious by hydrogen sulfide gas on a remote worksite as one). This latter argument confuses hazards associated with working alone (e.g., lack of assistance) with other hazards of the work (e.g., chemical hazards). Worker advocates, on the other hand, argue that communication devices, while useful, are not fail-safe and do not address all the risks associated with working alone. For example, there can be significant time delays between when an incident occurs and when the automatic response is triggered. Further, the automatic response may not result in immediate assistance being rendered.

There are times when prohibiting working alone is not practicable. Yet the bulk of the debate about working alone rests around issues of cost, efficiency, and employer control over the work process. Working alone is another example of how employer and worker interests may conflict around issues of health and safety.

6.6 SUMMARY

Somewhat ironically, Meredith Boucher's experience of harassment at Wal-Mart occurred because she refused to create a safety hazard by falsifying food inspection data. Her supervisor's subsequent decision to expose her to a psycho-social hazard (which her employer failed to control despite repeated requests) was only resolved when she sued her employer and manager. A faster and less costly way to resolve this issue would have been to treat the harassment she experienced as a health and safety issue. This would have allowed Boucher to refuse the unsafe work and force an investigation when Wal-Mart failed to remediate the hazard. It also would have made her eligible for workers' compensation benefits if the harassment caused her to experience ill health.

Psycho-social hazards—such as stress, fatigue, violence, harassment, and bullying—are the result of inadequately controlled workplace hazards. Working alone is a product of choices about how to prioritize safety and efficiency. While not all aspects of psycho-social hazards are within the control of employers (e.g., how much an employee sleeps at night), employer decisions about job design, workplace culture, and acceptable behaviour from co-workers, supervisors, and members of the public are among the root causes of the injuries caused by psycho-social hazards.

Discussion Questions

1. What are some of the negative consequences of workplace stress and how can providing greater job control alleviate them?
2. What steps can an employer take to prevent fatigue in the workplace? What factors affecting fatigue are outside of an employer's control?
3. Would you say workplace violence is rare or common in Canadian workplaces? How do you interpret and reconcile the two sets of data about workplace violence presented in this chapter?
4. How might harassment and bullying be a management strategy for controlling workers and the work process?
5. Why is working alone considered a hazard?

Exercise

Write a 400- to 500-word essay answering each of the following questions:

1. If workplace harassment was more readily perceived as an OHS issue, rather than a human rights violation or human resources problem, how might that change how employers respond to complaints of harassment? In answering, examine how harassment violates the OHS Act in your jurisdiction and consider options for remediation (with attention to the exit-voice-patience-neglect theory).
2. Consider a case of working alone, either from the examples in the text or your personal experience. What are the pros and cons of preventing the working alone (assigning two workers to the task) versus reducing the hazard via communication systems?

CHAPTER 7: HEALTH EFFECTS OF EMPLOYMENT

Chapter Outline

7.0 LEARNING OBJECTIVES

Learning Objectives

1. Describe the ways in which the organization of work can affect workers' health.
2. Explain the link between precariousness and poor health outcomes.
3. Explain how the size of an employer can lead to differential health outcomes.
4. Discuss how gender and race are relevant to the issue of healthy work.

7.1 WORK AND HEALTH EFFECTS

"Overworked" by Zach Aysan, CC BY 3.0

Story: Karen Maleka

Karen Maleka is a personal support worker (sometimes called personal care attendant) in Guelph, Ontario. Personal support workers care for elderly, disabled, and sick persons in their homes by providing services such as bathing and dressing. Maleka can work up to 70 or 80 hours in a week. "I do full-time hours but I'm classified as part time. I take care of sick people and I don't have a sick

day." [1] As a result of her status, Maleka has no pension and her benefits are not guaranteed. "Because my employer says I'm part time I have to re-qualify for benefits every year, by working at least 1500 hours. Last year my friend found out she had cancer. She missed a lot of work because she was so sick, and she lost her benefits."[2] Maleka is paid $15 an hour during her time with clients, but she is not paid for her travel time. Maleka cannot afford a car so often rides the bus 35 to 40 minutes, unpaid, between appointments.[3] She has no guaranteed hours in the week and no job security.

Maleka is a precarious worker. **Precarious employment** is non-standard work that lacks stability, security, and control. It can be part-time or temporary, and is under-protected by regulation. Precarious workers lack control over how or when the work is performed. Benefits are rare and usually the wages are insufficient to support a family. [4] Women and racialized workers are more likely to be found in precarious employment. [5] Precarious work is also linked to increased risk of work-related injury and poorer health outcomes, including increased stress and poorer physical well-being. The precariousness of the employment relationship leads to worse OHS conditions. Further, gender and race have OHS implications because certain groups of workers are more likely to hold precarious jobs.

Precarious work is one example of how the structure of work and the employment relationship itself can be linked to ill health. This chapter will discuss how work itself can be an OHS issue. In addition to explaining the reasons precarious work leads to worse health, it will also examine work structure issues such as shift work, working for a small employer, and the health effects of different forms of work.

OHS practitioners rarely identify work itself as an occupational hazard. Traditional approaches look at aspects of work—such as work location, tools, and processes—to identify hazards that could harm workers. Yet studying the entirety of work, and even broader effects of work that spill over into workers' home lives, provides a fuller picture of the health effects of work. Indeed, there is a growing body of research that shows that the structure of work, the nature of the employment relationship, and the type of the employer all have measurable physical and psychological effects on workers. For that reason, it is an area demanding greater attention by OHS practitioners.

Karasek's Job Demands-Control Model, which was introduced in Chapter 6, links high demand and low

1. Quoted in Warren, M. (2015, June 26). Precarious work takes a toll, area workers say at provincial forum. Guelph Mercury, p. A3.

2. Quoted in Bauman, J. (2015, July 23). A $15-an-hour minimum wage needed to fight poverty. Waterloo Region Record, p. A11.

3. Neilson, W. (2015, July 3). Pitching the $15 Minimum Wage. Woolwich Observer, n.p. http://observerxtra.com/2015/07/03/pitching-the-15-minimum-wage/

4. Vosko, L. (2006). Precarious employment: Understanding labour market insecurity in Canada. Montréal: McGill-Queen's University Press.

5. Vosko, L. (2000). Temporary work: The gendered rise of a precarious employment relationship. Toronto: University of Toronto Press.

control over work to high levels of worker stress. Karasek's model was the first to connect the nature of the employment relationship to health and safety outcomes. Yet the degree of control over one's work is only one aspect of employment that can affect workers' health. This section examines three other dimensions to work that have health consequences: shift work, extended work hours, and emotional labour.

Shift work requires workers to work outside of regular weekday hours. It may include regular evening or night work, rotating schedules, split shifts, irregular shifts, or on-call work. Shift work is a growing trend in Canada. In 2005, nearly 30% of employed Canadians did not work 9 to 5, Monday to Friday hours.[6] The most common form of shift work is rotating schedules, where a worker cycles through a series of day, evening, and night shifts. Not surprisingly, shift work is particularly common in health care and emergency services. It is almost as prevalent, however, in sales and service (e.g., consider the growth in 24-hour stores and restaurants).

The primary concern about shift work is its potential to disrupt a worker's circadian rhythms. **Circadian rhythms**(commonly known as the biological clock) are the daily (24-hour) cycles our body follows to ensure (in humans) high activity during the day and low activity at night. Sleeping and waking, eating, adrenalin, body temperature, blood pressure, pulse, and many other bodily functions are regulated by circadian rhythms. When work occurs outside of that daily rhythm, it places strain on the body as it is forced to alter the cycle. A second concern is that shift work is associated with behaviour contributing to poorer health, including smoking, poor diet, and increased alcohol consumption.[7] Shift work also disrupts family and social activities. This disruption adds stress and reduces the support that workers can draw upon to manage stress.

Some forms of shift work disrupt the rhythms more than others. The worst forms of shifts are those that are constantly changing (irregular shifts, rotating schedules, on-call), as well as those that invert the natural rhythm (for example, permanent night shifts). Workers whose rhythms have been disrupted can experience insomnia and non-restorative sleep, as well as changes in hormone levels, which can affect cell growth. Workers rarely become habituated to shift work, even after long periods on disruptive shifts.[8]

Research into shift work has been extensive and shows a wide range of health effects. In the short term, shift work leads to shortened and less restorative sleep and chronic tiredness and lack of alertness, as well as stomach aches, indigestion, and heartburn. Shift work is associated with increased risk of workplace incidents and injury. The risk increases as the number of days on the disruptive shift grows. It also jumps if the disrupted shift lasts longer than eight hours.[9]

Longer-term exposure to shift work is associated with a series of illnesses and conditions. Shift workers report significantly higher rates of burnout, emotional exhaustion, stress, anxiety, depression, and other psychological distress. Shift work increases a worker's risk of developing diabetes, and some studies have also

6. Williams, C. (2008). Work-life balance of shift workers. Perspectives on Labour and Income, 9(8), 5–16.

7. Saunders, R. (2010). Shift work and health. Toronto: Institute for Work and Health.

8. Haus, E., & Smolensky, M. (2006). Biological clocks and shift work: Circadian dysregulation and potential long term effects. Cancer Causes and Control, 17, 489–500.

9. Institute for Work and Health. (2010).

found a greater risk of heart disease. Some studies have also suggested a link between shift work and pregnancy complications. Likely the most significant long-term risk of shift work is increased risk of cancer, in particular breast cancer. The International Agency for Research on Cancer (IARC) has concluded that disruptive shift work is "probably carcinogenic to humans" (Group 2A)—the second most conclusive category in the IARC.[10]

Much less research has been conducted at mitigating the negative effects of shift work. Some recommendations have included:

- Restricting consecutive evening/night shifts to no more than three
- Avoiding permanent night shifts
- Using forward rotation for rotating shifts (moving from morning to evening to night) rather than the opposite
- Providing more than 11 hours' rest time between shifts
- Limiting weekend work[11]

The effectiveness of these measures has been sparsely studied and therefore their mitigating power is uncertain. At this time, the only reliable method for addressing shift work's health effects is preventive: eliminating or minimizing shift work in the workplace. This may be particularly challenging for essential services such as health care and emergency response, given the 24-hour nature of that work. Nevertheless, considering the health risks, there is room to question the value in 24-hour restaurants, late-night convenience stores, and other all-night service industries.

Extended work hours is defined as working for long hours over a period of time. Most commonly it entails working extra hours in a day or over the course of a week. There is some disagreement whether an extended work day is defined as over 8 hours or over 12 hours. In general, extended work weeks are defined as anything over 40 hours. The most obvious consequence of extended work hours is fatigue and the increased risk of error associated with it.

One of the reasons there is disagreement over how to define extended work days is that the research is contradictory regarding the effect of working between 8 and 12 hours. Some (but not all) studies have shown that working beyond 8 hours in a day leads to increased risk of incidents and sleep disruption. When workers work more than 12 hours, the research becomes clearer that this schedule is linked to increased injury rates, more illnesses, and an overall lower level of perceived general health. Some studies have found a link between long hours and pre-term birth. Over the longer term, extended workdays are associated with weight gain, increased use of alcohol, and smoking.[12]

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10. Ibid.

11. Knauth, P., & Hornberger, S. (2003). Preventive and compensatory measures for shift workers. Occupational Medicine, 53(2), 109–116.

12. Caruso, C., Hitchcock, E., Dick, R., Russo, J., & Schmit, J. (2004). Overtime and Extended Work Shifts: Recent Findings on Illnesses, Injuries, and Health Behaviors. Cincinnati: NIOSH.

Working extended hours over the course of a week is also associated with negative health effects. Workers who work longer than 40 hours in a week are more likely to become injured. One study found that workers who worked 64 or more hours a week were almost twice as likely to be injured than those who worked less than 40.[13] Prolonged exposure to long workweeks leads to worsening mental health and an increase in unhealthy behaviour, including poor diet and increased alcohol consumption. Women's mental health appears to be more negatively affected by long hours than men's mental health.[14]

When the two types of extended work are combined—working both long shifts and long workweeks—the effects are magnified. Other work factors, such as work pace, temperature, and mental exertion required also intensify the health and safety risks of longer working hours. Particularly concerning is the combination of long hours and shift work (common in health care and other emergency services).[15] Extended working hours also create stress in family and social spheres as work encroaches upon those aspects of workers' lives.

At the core of all these findings is the physical strain put on the human body by long hours of work. The worker is unable to achieve sufficient rest between periods of work to recover from the exertion of work. Complicating the picture, however, is that many workers prefer extended hours. Extended shifts often result in a compressed workweek, meaning more days with no work. Others appreciate feeling important, busy, or challenged by long hours. As with many aspects of occupational health, workers vary in their susceptibility to the negative effects of long hours.

This hazard is easily controlled by reducing the number of hours worked. The reason employers don't control this hazard is that longer shifts simplify scheduling and reduce pressure to hire more staff. These economic benefits for employers (paid for by workers in the form of ill health) ensure that long working hours and weeks remain commonplace practices.

Emotional labour is a term describing any aspect of a job that requires workers to regulate their emotions to meet organizationally defined rules and to display the required emotions to customers. In other words, workers engage in emotional labour when they are asked to display an emotion—empathy, happiness, friendliness—that they may not actually feel. Emotional labour is a key part of work in many occupations involving clients, patients, or customers and is required of a wide variety of workers, including nurses and doctors, store clerks, restaurant/bar servers, airline attendants, and teachers. Box 7.1 provides a more detailed discussion of emotional labour and its significance.

13. Lerman, S., et al. (2012). Fatigue risk management in the workplace. Journal of Occupational and Environmental Medicine, 54(2), 231–258.

14. Milner, A., Smith, P., & LaMontagne, A. (2015). Working hours and mental health in Australia: Evidence from an Australian population-based cohort, 2001–2012. Occupational and Environmental Medicine, 72(8), 573–579. doi: 10.1136/oemed-2014-102791

15. Lerman et al. (2012).

What is emotional labour and why do we care?

Think about the last time you had to "fake" your feelings. Maybe you had to stifle your anger at your boss, or needed to pretend to be interested in a boring conversation at a party. Or you had to ignore your distress at leaving a sick child home by herself so you could come to work. Afterward, you may have felt drained, frustrated, or disconnected. This behaviour and its residual effect is emotional labour.

Now think about being a restaurant server. No matter how rude or demanding the customer is or how frustrated you might be at the moment, you are expected to remain pleasant and smile. Certain occupations require workers to respond unnaturally to difficult situations and to ignore their personal lives when they work. It is not always about hiding negative feelings and pretending to be positive. A nurse tending a dying patient needs to stifle his excitement at buying a new house or getting engaged and focus on the patient. Emotional labour is most common in occupations where the worker interacts or works in the presence of the public. That said, it can also emerge in other settings, such as when interacting with powerful individuals like supervisors or executives.

The term emotional labour was first coined in 1983 by sociologist Arlie Hochschild to describe the process of regulating emotions to create a public impression in the workplace.[16] She observed that emotional labour is a distinct dimension of work and is an occupational requirement just as much as wearing uniforms or physical strength requirements. Hochschild recognized that humans engage in emotional regulation in many private settings (e.g., parenting, relationship management), which she called emotional work. Emotional labour is different because it occurs in the context of paid employment and the nature of the emotional regulation is in the control of employer. Emotional labour is also gendered in that women are more likely to be required to perform emotional labour because of occupational segregation.

While Hochschild considers emotional labour to be a negative aspect of work, some researchers argue that, in certain circumstances, emotional labour can be a positive experience, especially if the worker has some autonomy over its use.[17] Anecdotally, many workers report enjoying the exercise of emotional labour. That said, most of the studies examining the effects of emotional

16. Hochschild, A. (1983). The Managed Heart. Berkeley and Los Angeles: University of California Press.
17. Wharton, A. (1993). The affective consequences of service work: Managing emotions on the job. Work and Occupations, 20(2), 205–232.

labour have found it lowers job satisfaction and results in psychological stress to the worker.[18] An interesting question about emotional labour is how social expectations (e.g., a server will always be cheerful or a nurse will always be compassionate) are often seen as a universal right, regardless of the situation. Placing the burden of maintaining social demeanor on workers allows customers to escape accountability for their own behaviour.

Emotional labour is a well-established concept in the study of work but is rarely discussed in OHS. The studies that have been performed find extensive performance of emotional labour leads to higher levels of anxiety, stress, and emotional exhaustion in workers.[19] These psychological states lead to a variety of physical and mental ailments over time, including depression.

Emotional labour can also be linked to workplace violence and harassment, in that moments of intense emotional labour are often associated with managing threatening behaviour from customers or clients. Essentially, the worker is forced (by lack of alternatives) to manage a dangerous situation by regulating her own emotions, including fear. One result is that the trauma of the event may then be compounded by the mental costs of regulating emotions under a stressful situation, leading to intensified psychological stress.[20]

Little work has been done to examine how to mitigate the negative health effects of emotional labour, in large part because it is not widely recognized as a significant health hazard. Reducing the need for emotional labour by allowing for a greater degree of honest expression of feelings is a key aspect of reducing the consequences of emotional labour. Allowing safe spaces for "venting," establishing zero-tolerance policies for customer misbehaviour, and revoking policies requiring workers to engage in emotional labour (e.g., smile policies) are all ways to control the health hazard of emotional labour.

Shift work, long hours, and emotional labour are linked because they all introduce a health risk into the workplace by altering how, when, or what kind of work is performed. In this way, they are distinct from other hazards discussed in previous chapters because they are associated with the nature of work itself rather than a specific task or location. Also, because they are inextricably linked with the employment relationship, employers have been resistant to recognizing and controlling the hazards they pose.

18. Pugliesi, K. (1999). The consequences of emotional labor: Effects on work stress, job satisfaction, and well-being. Motivation and Emotion, 23(2), 125–154.

19. Deery, S., Iverson, R., & Walsh, J. (2002). Work relationships in telephone call centres: Understanding emotional exhaustion and employee withdrawal. Journal of Management Studies, 39(4), 471–496.

20. Smith, P. (2012). The emotional labour of nursing revisited: Can nurses still care? New York: Palgrave-MacMillan.

7.2 HEALTH AND EMPLOYMENT STATUS

Photo by Ümit Yıldırım, Unsplash License

Work in the 21st century is becoming increasingly insecure. While the standard employment relationship **(SER)**, the term for permanent, full-time, secure employment with a single employer, is still the most common form of job, its proport the term for permanent, full-time, secure employment with a single employer, is still the most common form of job, its proportions are dropping. Fewer than two thirds of jobs in Canada fit the definition of SER. The fastest-growing segment of non-SER jobs is precarious employment, which now comprises 20% of jobs in the country.[1] Precarious workers earn less and are less likely to have benefits (or may have fewer benefits) than other workers. Women, immigrants, and young workers are more likely to hold precarious jobs than other Canadians.[2] For employers, precarious work lowers labour costs and increases

1. Lewchuk, W., et al. (2015). The precarity penalty: The impact of employment precarity on individuals, households and communities—and what to do about it. Toronto: McMaster University & United Way Toronto.
2. Vosko (2006).

flexibility, both of which lead to higher profits. While not as prevalent as in the private sector, precarious work is also present in the public and non-profit sector as these employers feel the pressure to reduce costs and emulate private sector practices.

The rise of precarious employment is concerning for a number of economic and political reasons. It reflects growing inequality in Canada and contributes to racial and gender divisions in society. Most worker advocates talk about the economic unfairness of precarious employment and the problems it creates in the labour market and in communities. Precarious employment is also a health and safety issue. The status of being a precarious worker leads to worsened health and safety outcomes.

Repeated studies with different types of precarious workers have shown that they are more likely to get injured at work and their injuries tend to be more severe.[3] Precarious work is associated with deteriorating health and safety conditions in the workplace,[4] and precarious workers are found to be less aware of their safety rights and have more difficulty exercising those rights.[5] Precarious employment has direct effects on workers' health. Precarious workers report worse mental health, including increased stress-related illness, depression, and anxiety. Evidence for decreased physical health is more mixed, but precarious work is associated with higher levels of mortality among workers.[6]

There are two explanations for precarious work being associated with decreased health and safety outcomes. Michael Quinlan and Philip Bohle developed the Pressures, Disorganization and Regulatory Failure **(PDR)** model to explain how precarious work leads to poor health and safety outcomes. Their model looks at three groups of factors that shape practices at precarious workplaces. First, precarious workers experience economic pressures because of income insecurity and competition for work which lead them to accept work intensification and dangerous work while making them reluctant to report injury and ill health. Second, the contingent nature of the work relationship breaks down structures that facilitate workplace safety, such as safety procedures, training, and communication. Third, the effectiveness of government safety regulations is reduced because enforcement is more difficult, some forms of work are not protected by regulation, and some workers lack knowledge of their health and safety rights. The result of these factors is workplaces that are less safe.[7]

The PDR model attempts to explain the increased health and safety risks through precarity's effects on

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3. Underhill, E., & Quinlan, M. (2011). How precarious employment affects health and safety at work: The case of temporary agency workers. Relations Industrielle/Industrial Relations, 66(3), 397–421.

4. Quinlan, M., Mayhew, C., & Bohle, P. (2001). The global expansion of precarious employment, work disorganization and consequences for occupational health: A review of recent literature. International Journal of Health Services, 31(2), 335–414.

5. Lewchuk, W., Clarke, M., & de Wolff, A. (2008). Working without commitments: Precarious employment and health. Work, Employment & Society, 22, 387–406.

6. Lewchuk, W., Clarke, M., & de Wolff, A. (2011). Working without commitments: The health effects of precarious employment. Montréal: McGill-Queen's University Press.

7. Quinlan, M., & Bohle, P. (2004). Contingent work and occupational safety. In J. Barling & M. Frone (Eds.), The psychology of workplace safety (pp. 81–106). Washington: American Psychological Association.

the workplace structure and practice. While this model does help us understand the workplace dynamics of precarious work, it provides an incomplete understanding of the broader effect of precarity on health. The consequences of precarious work do not restrict themselves to the workplace but spill over into the workers' private lives, as they take stress, anxiety, and insecurity home with them.

In an attempt to build a more holistic analysis of precariousness and work, Wayne Lewchuk and his colleagues have developed the **Employment Strain Model (ESM)** . ESM looks at the employment relationship in its entirety to understand how workers' health is affected by engaging in precarious work. The model suggests that the strain of being uncertain about employment combined with the stress of having to make extra effort to maintain and attain work are the cause of the worsened health outcomes. Box 7.2 provides a more complete explanation of the model.

Precarity and the employment strain model[8]

Wayne Lewchuk, Marlea Clarke, and Alice de Wolff have developed a new approach to understanding the health effects of precarious work. They began with the assertion that the reasons for the worse health experienced by precarious workers go beyond the workplace.

While it is sometimes argued that workers in less permanent relationships may be forced into accepting more physically hazardous work, or increased exposure to toxins, this is not the core of our argument. Rather, we argue that there is a limit to how much employment uncertainty and risk can be downloaded to individuals—at some point workers become stressed, and the employment relationship itself becomes toxic.[9]

They argue what takes place inside the workplace is only part of the picture. "Health effects are embedded in the social structuring of labour markets, and therefore begin well before workers cross the factory gates, enter their offices or begin their work tasks."[10]

Their model is influenced by Karasek's job strain model (introduced in Chapter 6). They define employment strain as the interaction of employment relationship uncertainty (i.e., the degree to which a worker is uncertain about his employment future) and employment relationship effort (i.e., how hard a worker works to keep a job or find new ones). This interaction creates four categories of job strain, which can be displayed as quadrants in a matrix.

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8. Lewchuk et al. (2011).

9. Ibid., p. 10.

10. Ibid., p. 137.

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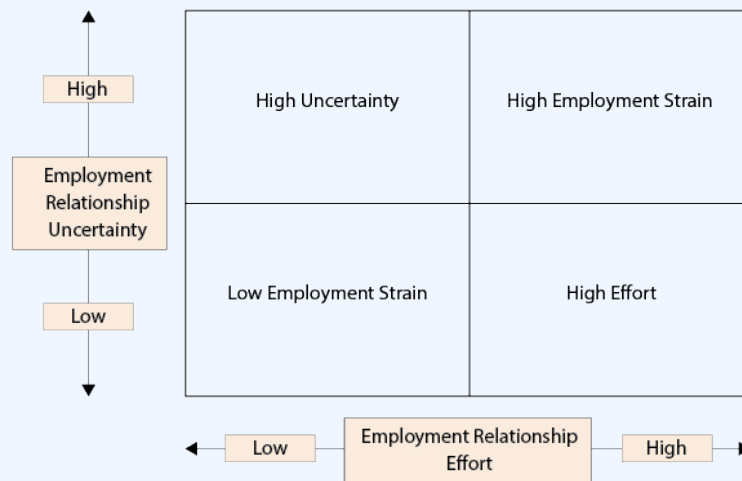
The model includes a third dimension, employment relationship support, which is the degree to which the worker receives support at work from a union, co-workers, family members, or others. Support acts as a buffer to reduce the employment strain experienced by the worker. Precarious workers reported lower levels of support than SER workers.

This research reveals that workers who have high uncertainty, high effort, and low support were two to three times more likely to report poor health than those reporting low uncertainty, strain, and high support. Those experiencing only high uncertainty or high effort but low support also display worse outcomes. The model more accurately explains the complex interaction between ill health and precarious work.

No work has been done to determine how to reduce the ill effects of precarious work, in large part because precarity is not yet widely recognized as a health and safety hazard. Since the origins of its effect begin before work begins, it is a challenge to identify work-related solutions. The only effective method for reducing the health effects of precarity is to create jobs that are more secure and support workers more fully. This solution requires broad-scale social, political, and economic change.

Despite its seeming intractability, it is important to understand the health and safety implications of precarious work. The discussion demonstrates that workplace health extends beyond the workplace. The significance of precarious work is that it is not only the work itself that affects safety; the employment status also plays a large role in determining worker health.

7.3 HEALTH AND EMPLOYER SIZE

Photo by Alex Kotliarskyi, Unsplash License

In Canada, 98% of all employers are small enterprises (<100 employees). Small enterprises employ two thirds of private-sector workers.[1] Small enterprises are also common in the non-profit sector. Most of the research focusing on small and medium enterprises (SMEs) (<500 workers) has been conducted in the past 15 years and has found that workers employed by SMEs are more likely to experience work-related injury and illness. Incidents are more common in SMEs, especially those resulting in fatal or serious injuries, and SME workers are more likely to be exposed to physical and chemical hazards.[2] That said, some studies have found that their

1. Industry Canada. (2013). Key Small Business Statistics, August 2013. Ottawa: Author.
2. Hasle, P., & Limborg, H. (2006). A review of the literature on preventative occupational health and safety activities in small enterprises. Industrial Health, 44, 6–12.

psycho-social working conditions are better due to the close social relationships associated with SMEs. Psycho-social conditions are, however, highly dependent upon the behaviour of the employer.[3]

Researchers attribute these poor outcomes to particular attributes of SMEs. The tendency of SMEs to have informal management structures, unstructured approaches to OHS, and a lack of OHS resources and knowledge are all factors that contribute to the heightened risk of injury. SME owners also tend to downplay safety risks, see safety as a relatively minor matter compared to the other challenges of running a business, and view government regulations as bureaucratic interference. They also overestimate their knowledge of OHS and, importantly, tend to push responsibility for safety down to their employees.[4]

These attributes of SMEs interact with other factors. For example, SMEs are more likely to provide precarious work and employ vulnerable workers such as women, immigrants, and youth. Combining inadequate OHS structures in SMEs with the vulnerable and precarious attributes of SME workers intensifies the health and safety risks to those workers.

When examining how to improve the safety climate in SMEs, attention has tended to focus on tailoring training and education approaches for an SME environment or simplifying safety management systems. Recommendations include building trust and communication, creating action-oriented education, checklists, and integrating safety goals with management goals.[5] Few of these proposed methods have been rigorously evaluated to determine their level of effectiveness, and their application has been sporadic.

A broader view of the issue reveals that the current system of injury prevention, regulation, and enforcement was designed for (and by) large enterprises. Rules are detailed and written in technical and legalistic language. Hazard control efforts often require extensive knowledge, training, and investment. OHS inspectors lack the resources required to cover the large number of SME workplaces, while the close social relations in SMEs make it less likely that workers will complain for fear of being identified and ostracized. Watering down regulations for small workplaces, often the preferred solution of SME employers, would only make matters worse, as it would further relax safety requirements. Improving the safety conditions in SMEs requires reforms to the OHS system that address the dynamics specific to SMEs that place workers at risk.

In particular, the reforms need to recognize that the conflicting interests found in all workplaces are more acute in SMEs. The employer, who is likely on the worksite daily, sees the effects of safety measures on productivity and cash flow, making them more likely to resist safety improvements. Employers' close contact with the workers makes it harder for workers to recognize and give voice to the idea that worker interests (safety) may be in conflict with employer interests (profit or cost containment). More effective training approaches do not erase that conflict.

3. Sørensen, O., Hasle, P., & Bach, E. (2007). Working in small enterprises—Is there a special risk? Safety Science, 45, 1044–1059.

4. Legg, S., Laird, I., Olsen, K., & Hasle, P. (2014). Creating healthy work in small enterprises—from understanding to action: Summary of current knowledge. Small Enterprise Research, 21, 139–147.

5. Hasle & Limborg. (2006).

7.4 RACE, GENDER AND HEALTH

Photo by Zackary Drucker, CC BY-NC-ND 4.0

Who you are affects your safety at work. Different groups of workers have varying safety experiences in the workplace. For example, 63% of WCB-reported injuries in Canada happen to men, even though they make up 52% of the workforce.[1] While it may seem on the surface that race and gender have no impact on health and safety—hazardous workplaces affect every worker—in fact, both have a profound impact on how safe a worker is at work. Race and gender can affect health and safety in two ways. First, they can shape how much risk a worker is exposed to. Second, race and gender affect the kinds of hazard workers face.

As suggested above, men are more likely to be injured and to be more seriously injured than women. Racialized workers are also more likely to be injured among both men and women. This means that racialized

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1. AWCBC. (2014). National Work Injury, Disease and Fatality Statistics 2010–2012. Ottawa: Association of Workers' Compensation Boards of Canada.

men have the highest injury rates overall.[2] Further, immigrants, in particular racialized immigrants, also possess disproportionately high injury rates.[3] Even citizenship status can affect safety, as the lack of status of undocumented workers (i.e., workers who do not have a valid visa to work in a jurisdiction) undermines their safety at work and their ability to stand up for their rights.[4]

A variety of explanations have been offered for these differential safety outcomes. One explanation centres on ascribed characteristics of the workers themselves. Women are claimed to be more risk-averse than men, and thus they seek out less dangerous occupations. Racialized workers are said to be less risk-averse due to lower education levels and lower income levels. They may also be assigned more dangerous tasks because of the belief that they have poorer language skills. A second explanation critiques the assertion that workers "choose" their paths free of social and economic constraints. While some individual choice is always present, workers' choices are often limited by their circumstances. Economic and social vulnerability, fear of losing employment, and lack of options can lead workers to accept degrees of risk they would not otherwise choose.[5]

It is very important to remember that the racial and gender relations present in society do not stop at the workplace door. Attitudes, stereotypes, and behaviours about race and gender that pervade societal structures shape what happens at work. They govern what job opportunities are available to different groups of workers and they shape how work is conducted in the workplace. For example, due to stereotypes about masculinity and femininity, men are more likely to work in more physically demanding jobs (e.g., construction), which are linked to higher rates of injury. Women, in contrast, are discouraged from those occupations—both through overt discrimination and through job designs that do not accommodate the greater social reproductive responsibilities of women. While individuals do choose their career paths, we cannot understand those choices in isolation from the social forces that shape them.

In North America, there are clear power imbalances between men and women and between so-called "white" (or sometimes Anglo) workers and racialized workers. These imbalances do not work in isolation but cut across both race and gender. They are also reproduced in the workplace and thus will shape the health and safety experience of each worker. Those effects are complex but need to be integrated into our understanding of health and work. At the core, workers from groups that have less power in society will also have less power in the workplace to protect their safety. They will have less control over their choice of job. And they will have fewer options in navigating hazards in the workplace.

2. Leeth, J., & Ruser, J. (2003). Compensating wage differentials for fatal and nonfatal injury risk by gender and race. Journal of Risk and Uncertainty, 27(3), 257–277.

3. Mousaid, S., De Moortel, D., Malmusi, D., & Vanroelen, C. (2016). New perspectives on occupational health and safety in immigrant populations: Studying the intersection between immigrant background and gender. Ethnicity & Health, 21(3), 251–267. http://dx.doi.org/10.1080/13557858.2015.1061103

4. Flynn, M., Eggerth, D., & Jacobson, J. (2015). Undocumented status as a social determinant of occupational safety and health: The workers' perspective. American Journal of Industrial Medicine, 58(11), 1127–1137. doi: 10.1002/ajim.22531

5. Leeth, J., & Ruser, J., (2006). Safety segregation: The importance of gender, race, and ethnicity on workplace risk. Journal of Economic Inequality, 4, 123–152.

A second effect of gender and race is that groups of workers experience different kinds of hazards and risks. In part, this is due to occupational differences (e.g., construction entails different hazards than office work). But even workers doing the same job will experience the workplace from a different perspective, altering their health and safety. This can manifest itself in physical and psycho-social ways. As we saw in Chapter 5, women face additional chemical hazard risks (i.e., embryotoxicity and teratogenicity) due to their child-bearing abilities. Racialized workers are more vulnerable to workplace harassment (or violence) motivated by racism. Importantly, these different exposures can have significant health and safety impacts, as outlined below.

Gender and workplace health and safety

Two recently published academic articles examine the role of socially constructed gender roles on the health and safety of men and women.

Waitresses in "Breastaurants"[6]

This study examines the work health effects of women who work in restaurants that require female servers to wear revealing or body-accenting clothing. These restaurants, called "breastaurants" in the article, create environments where the servers are sexually objectified as part of their work. The sexualization occurs in the hiring selection process (picking stereotypically "attractive" women), mandated uniform requirements (tight-fitting or revealing clothing), and regulated behaviour toward customers (expectations of flirtatious friendliness). The study, a survey of 300 waitresses, finds servers in this type of restaurant experience greater rates of unwanted comments and sexual advances than workers in other restaurants. It also finds that the work environment results in negative psychological and vocational health outcomes, such as an increased incidence of depression arising from feelings of powerlessness, ambivalence, and self-blame.

Masculinity and Risk Taking[7]

This study is a review of 96 previously conducted studies examining the role of masculinity in occupational health and safety. Masculinity is the socially constructed set of practices attributed to male roles. The article argues that men are expected to follow four rules to establish

6. Szymanski, D. & Feltman, C. (2015). Linking sexually objectifying work environments among waitresses to psychological and job-related outcomes. Psychology of Women Quarterly, 39(3), 390–404.

7. Stergiou-Kita, M., et al. (2015). Danger zone: Men, masculinity and occupational health and safety in high risk occupations. Safety Science, 80, 213–220.

masculinity: rejection of characteristics associated with femininity; quest for wealth, fame, and success; display of confidence, reliability, strength, and toughness; and willingness to break rules. They isolate five elements of masculinity that affect men's workplace health and safety:

- Celebration of heroism, physical strength, and stoicism
- Acceptance and normalization of risk
- Acceptance and normalization of work injuries and pain
- Displays of self-reliance and resistance to assistance and authority
- Labour market forces, productivity pressures

The five factors combine to cause men to take more risks, under-report incidents, work through pain, reject assistance, and break OHS rules.

The focus of both studies is not on the behaviour or employment choices of the workers but on how underlying social constructions of gender have occupational health and safety consequences. The health and safety experiences of men and women are different because their socialized roles and stereotypes shape those experiences.

The health and safety experience of a worker does not change because they happen to be male or female, Hispanic or Scottish. Rather, their OHS experience differs because the social meaning attributed to a specific gender or ethnicity alters a worker's relationship to work, employers, co-workers, and customers. That relationship then shapes the worker's health and safety at work (and in society). That a worker's health and safety experience is rooted in these social relationships means the experience can be changed. If we alter our notions of masculinity and femininity and break down racial divides, gendered and racialized health and safety outcomes will be diminished. Such large-scale social change goes beyond the role of an OHS practitioner. Yet the differential health and safety experiences of women and racialized workers can be reduced if OHS practitioners become aware of the gender and race in the workplace and take action to reduce the power imbalances that arise from those dynamics.

7.5 SUMMARY

Karen Maleka is more vulnerable to occupational injury and illness, not because of the job she performs but because of the nature of her employment relationship and, possibly, her gender and race. This chapter examined various hazards that arise out of the dynamics of work itself, rather than the tasks and locations of that work. Shift work, extended work hours, and emotional labour—all aspects of the job fully within the control of the employer—have negative health effects, regardless of what other hazards may be present in the workplace. We also saw that the size of the employer can lead to worse safety outcomes, which may interact with the mounting evidence that being a precarious worker has significant health and safety consequences. Finally, we considered how gender and race also shape workers' experience of safety at work.

That the nature of work and the employment relationship can affect workers' health is a new concept for OHS. It requires us to rethink what constitutes a hazard and how hazards cause health consequences, including how they interact with non-work aspects of workers' lives. It also causes us to contemplate new ways of controlling these new types of hazard. The existing recognition, assessment, and control system is inadequate for the task of determining how to reduce hazards of this kind. What is required is a more explicit recognition that employment is a power relationship, and that power permeates all aspects of workers' lives. Addressing the kinds of hazards discussed in this chapter requires a broader, more holistic understanding of how workplace health is shaped.

Discussion Questions

1. Practices such as shift work, extended hours, and mandatory emotional labour have become an essential part of how many occupations operate (e.g., health care, restaurant serving). Can these unhealthy practices be eliminated? How?
2. What are the root causes of the negative health effects from precarious work? What can OHS professionals do to mitigate its effects?
3. How are the close social relations found in SMEs a double-edged sword for safety?
4. Describe how stereotypes and prevailing attitudes about race and gender impact safety in the workplace.

Exercises

1. Consider the working conditions at fast food franchise restaurants, including shifts, wages, job security, and job demand and control. Write 200-word responses to the following questions:

   - Identify the health effects that may arise from this work organization and recommend options for remediating the effects.
   - What are the pros and cons from the employer perspective?

2. Think about your work situation, or that of a person close to you. Write 200-word responses to the following questions:

   - How might dominant stereotypes about race and gender affect your experience of safety in the workplace?
   - Identify five ways in which race and gender shape workplace dynamics

CHAPTER 8: TRAINING AND INJURY PREVENTION PROGRAMS

Chapter Outline

8.0 LEARNING OBJECTIVES

Learning Objectives

1. Explain the purposes of health and safety training.
2. Identify and explain the steps in developing health and safety training.
3. Identify their own beliefs about learning and assess the implications for training.
4. Explain the main components of an emergency plan.

8.1 WORKPLACE HAZARD PREVENTION

Story: Workplace Hazard Prevention

On September 5, 2008, three workers died and two more suffered severe brain injuries when they were exposed to hydrogen sulphide (H_2S) and carbon dioxide (CO_2) gases at a mushroom composting facility in Langley, British Columbia. Two workers and a supervisor were trying to clear

a blocked pipe in a shed. The shed enclosed the work space and exiting the shed required workers to climb a ladder.

The workers' efforts to clear the blocked pipe caused H2S and CO2 to flow from the pipe into the shed, thereby displacing oxygen with these heavier gases. One worker collapsed immediately. While the second worker assisted the collapsed worker, the supervisor climbed out of the shed to call for help. Over the next few minutes, three more workers entered the shed to assist the collapsed worker. The hazardous atmosphere affected each of these workers.[1]

When paramedics arrived, they suspected a hazardous atmosphere in the confined space and decided it was not safe to enter the shed. While they waited for fire-rescue crews to arrive with breathing apparatus, the paramedics prevented even more workers from entering the shed. Fire-rescue eventually extracted the bodies of Ut Tran, Jimmy Chan, and Ham Pham from the shed. Two other rescued workers were transported to hospital and diagnosed with severe brain damage. The supervisor, who was only momentarily exposed to the gases, received medical treatment and was released.

The WorkSafeBC investigation into this incident identified numerous design and operational errors that contributed to the workers' injuries. Of particular note was that none of the three interrelated businesses operating on the site had hazard recognition, assessment, and control plans in place and there was no monitoring of worker exposures to hazardous gases. Workers had no awareness of or training about the hazards posed by confined spaces or hazardous atmospheres and no access to personal protective equipment. There was also no emergency plan. According to WorkSafeBC:

Studies have shown that over 60% of confined space deaths occur among would-be rescuers. Rescue plans and proper training for rescuers must therefore be in place to prevent well-intentioned but untrained workers from entering confined spaces to assist workers in distress and becoming victims themselves.[2]

Further compounding this issue was that the owner and the workers spoke little English and thus had difficulty communicating with various trades workers (who could have identified the hazards for them) and rescue personnel. Following this incident, WorkSafeBC launched an inspection blitz of similar mushroom farms. Some farms took up to two-and-a-half years to develop the required safety plans to protect workers from hazardous gases. Inspections of other mushroom farms—with

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1. WorkSafeBC. (2010). Incident Investigation Report No. 2008095610260. Vancouver: Author. http://www.worksafebc.com/news_room/news_releases/assets/nr_11_25_11/IIR2008095610260.pdf

2. Ibid., p. 45.

slightly different hazards—found that at least 6 of 40 farms did not have adequate plans in place four years after being directed to develop them.[3]

This incident identifies the importance of training and emergency preparedness in minimizing the risks posed and harm caused by workplace hazards. While it would have been better to eliminate (or otherwise control) the conditions that killed and injured the mushroom-farm workers, informing workers about the hazards and what to do in case of emergency could have prevented these injuries. This chapter begins by examining health and safety training in the workplace. It then looks at what learning theory can tell us about designing effective training programs. Finally, we tackle the issue of emergency preparedness in the workplace.

Health and Safety Training

One way to control workplace hazards is to provide workers with health and safety training. **Training** entails providing workers with the knowledge, skills, or behaviours to reduce the risk of a workplace injury. Training is most effective at preventing injuries when the risk of injury is caused (or exacerbated) by a lack of knowledge or skill. Conversely, training will be less effective if the risk of injury is caused by some other factor or if workers are prevented or discouraged from applying the training by some aspect of the job.

There are many forms of OHS training. If you think back to jobs you or family and friends have held, you might well have been given an orientation during your first few days. This might have covered such basic information as the location of the washrooms, fire exits, and some hazards specific to the job. This was a rudimentary (and somewhat inadequate) form of safety training. Some workplaces may offer more thorough **safety orientations** to new workers that address workplace hazards, emergency procedures, PPE training, policies (e.g., how to report injuries and near misses), and job-specific OHS skills (e.g., robbery prevention, fire suppression). Training on how to use equipment and other job-related orientation can also enhance workplace safety. Governments can also provide various kinds of broad safety education, such as Alberta's "Bloody Lucky" campaign discussed in Box 8.1.

Legislation may also compel employers to provide certain kinds of training. For example, if a workplace exposes workers to hazardous materials, workers must be educated about the nature of the hazard(s) and trained in how to work with the product(s) in a safe manner (including responding to spills and emergencies) through WHMIS (described in Chapter 2). This means that WHMIS training may be mandatory for some

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3. Hoekstra, G., & McKnight, Z. (2012, August 8). 4 years after B.C. tragedy, mushroom farms still lack safety plans. Vancouver Sun. http://www.vancouversun.com/health/years+after+tragedy+mushroom+farms+still+lack+safety+plans/7055462/story.html?__lsa=0169-72e8

workers and that the specifics of the training will vary between worksites (or even within one worksite over time) as the hazardous materials change.

Legislation may also require mandatory first-aid training. For example, Ontario requires all employers subject to the *Workplace Safety and Insurance Act* to provide mandatory first-aid equipment, facilities, and trained workers in each workplace. The degree of training required depends upon the number of workers in the workplace. Nova Scotia's *Occupational Health and Safety First Aid Regulations* place additional obligations on employers when workers are employed in remote locations (i.e., locations farther than 30 minutes of surface travel away from an emergency-care facility that is open during the hours of work).

Public safety awareness campaigns

Governments sometimes provide OHS training. For example, students are often exposed to basic OHS information in high school courses. Governments also engage in broader efforts to educate the public about their workplace safety rights. For example, in 2008, Alberta launched its "Bloody Lucky" safety awareness campaign, which featured a series of graphic safety videos aimed at young workers.[4]

This campaign was attacked by both conservative politicians—who found it too gruesome—and by labour groups, who saw the videos as blaming workers for their injuries. The Bloody Lucky campaign clearly foregrounds the role of workers in workplace injuries, while obscuring the role of employers in designing unsafe work and failing to identify and control obvious hazards.[5]

For example, in one video a worker in a shoe store climbs a rickety ladder wearing high heels, overreaches to get at some poorly stacked stock, falls backward shattering a light fixture, and then hits the ground. The message is that the worker was acting unsafely, and the emphasis of the video is on the proximate (i.e., immediate) cause of the worker's injuries, such as poor shoe choice, climbing an unsafe ladder, and reaching too far. The root (i.e., fundamental) causes of the injury (e.g., unsafe ladder, poor stock arrangement, unguarded light fixture) are ignored.

A very similar video from Ontario uses the injured worker's questions to focus viewers' attention on the root cause of the incident: the hazards that the employer is obligated to

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4. The Bloody Lucky campaign remains available online at www.bloodylucky.ca. An alternative link is http://www.youtube.com/watch?v=0k5CFoOGzE8

5. Barnetson, B., & Foster, J. (2012). Bloody Lucky: The careless worker myth in Alberta, Canada. International Journal of Occupational and Environmental Health, 18(2), 135–146.

identify and control.[6] The underlying message about who is responsible for workplace safety in the two videos is very different, with Alberta's videos clearly blaming the careless workers for their injuries.

Research on other youth-focused government OHS training suggests that such training tends to impart knowledge about health and safety rather than assisting young workers to develop the self-advocacy skills necessary for them to assert their rights.[7] Other research suggests that youth-oriented safety training may also gloss over the difficulty teens face in navigating conflicts between job demands and safety rules.[8]

The goal of most safety training is ensuring that work is performed safely in the workplace. For this reason, training tends to focus on developing worker skills and behaviours that prevent incidents. Training can, however, focus on educating workers about their rights at work, including their right to information and their right to refuse unsafe work. That form of training is usually not in the interest of employers, who prefer to focus on modifying worker behaviour via skills and knowledge training. Unions and other worker organizations often incorporate rights education into their safety training courses. This difference is one of the characteristics that distinguish union safety education from employer safety training. Combining safety knowledge with worker rights can be an effective way increase safety in the workplace as workers gain both safety knowledge and insights into how to advocate for themselves. Box 8.2 examines how union safety training can affect workers' health.

Effectiveness of union safety training[9]

In the 1990s, the public transit department in Medicine Hat, Alberta, introduced a fleet of buses fuelled by methanol. At the time, methanol was a popular alternative fuel source. The fuel

6. You can see this video here: http://www.youtube.com/watch?v=0Haa4QImf40&list=PLBE242CF787F0BF0A&index=1.

7. Chin, P., DeLuca, C., Poth, C., Chadwick, I., Hutchinson, N., & Munby, H. (2010). Enabling youth to advocate for workplace safety. Safety Science, 48(5), 570–579.

8. Laberge, M., MacEachen, E., & Calvet, B. (2014). Why are occupational health and safety training approaches not effective? Understanding young worker learning processes using an ergonomic lens. Safety Science, 68, 250–257.

9. Case summarized from Wilson v. Medicine Hat (City of), 2000 ABCA 247, and from files compiled by one of the co-authors.

lowered emissions, but the engines proved to be finicky and required extensive maintenance and repairs. The employer provided no PPE for mechanics, who often inhaled methanol fumes as they worked on engines. Shortly after the introduction of the methanol buses, a number of mechanics began getting sick, complaining of chronic fatigue, pain, mental fuzziness, and other health effects. For some workers, the symptoms were severe enough that they were required to stop working.

No one had an explanation for the onset of the illnesses and the employer denied any work-related connection. A number of months later, a handful of mechanics attended a weekend-long OHS course organized by their union. In the course, they were taught the basics of OHS activism—how to identify hazards, where to find information about hazards, and how to conduct independent research. They came back demanding to see MSDSs for methanol and began researching the health effects of methanol exposure, which can be significant. From this information, the ill workers filed WCB claims and the workers demanded action from the employer to control exposure to methanol.

The WCB claims were rejected and briefly subject to a high-profile court challenge attempting to permit the workers to sue their employer. The challenge failed, but the employer implemented controls over methanol exposure and a few years later abandoned the methanol bus experiment. The example demonstrates that independent training and education, in particular that provided by unions, can provide important tools for workers to advocate for their OHS rights. It also shows, once again, the challenges to having non-traditional occupational illnesses recognized by the WCB.

Broadly speaking, there is good research evidence that OHS training can change workers' safety behaviour. There is also encouraging evidence that OHS training positively affects workers' knowledge and attitudes. That said, there is no conclusive evidence that OHS training has a meaningful effect on workplace injury rates.[10] More striking is that the rate of OHS training in Canada appears to be low, with only 1 in 5 workers reporting health and safety training during their first year of work with a new employer.[11]

This evidence suggests that assertions that training is an effective way to make workplaces safer may not be true. When faced with such an assertion, it is useful to consider who is making that claim and how it may be

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10. Institute for Work & Health. (2010). *Effectiveness of OHS education and training*. Toronto: Author. http://www.iwh.on.ca/sbe/effectiveness-of-ohs-education-and-training

11. Smith, P., & Mustard, C. (2007). How many employees receive safety training during their first year of a new job? *Injury Prevention, 13*(1), 37–41.

in their interest. For example, Alberta farm workers were long excluded from the ambit of OHS legislation because of concerns about the cost of implementing OHS programming on farms. When faced with criticism about the number of workplace injuries on farms, farm industry organizations repeatedly argued for safety training, despite compelling evidence from Saskatchewan that safety training had no effect on farm injury rates.[12] In this case, farmers were using training-as-a-panacea as a way to evade what they feared would be costly regulation. Farm workers—often precariously employed and racialized workers—bore the cost of the lack of regulation in the form of heightened risk of workplace injuries.

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12. Hagel, L., Pickett, W., Pahwa, P., Day, L., Brison, R., Marlenga, B., Crowe, T., Snodgrass, P., Ulmer, K., & Dosman, J. (2008), Prevention of agricultural injuries: An evaluation of an education-based intervention. Injury Prevention, 14(5), 290–295.

8.2 LEARNING THEORY

Image by **mohamed hassan, CC0**

Learning the process wherein we acquire knowledge and skills that can lead to behavioural change—is an important outcome of training. As we saw in the discussion of social construction in Chapter 1, our behaviours are often shaped by our assumptions about the world. OHS training is no different: we each have a theory (albeit perhaps incomplete and poorly articulated) about how "best" to teach others. Over time, educational theorists have identified several different approaches to training. These **learning theories** are conceptual frameworks that describe how learners absorb, process, and retain information. These descriptions of learning often contain prescriptions about how to teach. Two learning theories that are broadly used to structure OHS training are behaviourism and social cognition.

Behaviourism asserts that attaching rewards and punishments to specific worker actions can shape how workers behave. In effect, workers can be conditioned to act in desired ways via positive and negative reinforcement. **Positive reinforcement** is essentially rewarding a worker when the worker demonstrates a desired behaviour in order to elicit further instances of the desired behaviour. **Negative reinforcement** is removing some sort of undesirable stimulus (such as no longer yelling at the worker) when a worker

demonstrates a desired behaviour. (Negative reinforcement is different from punishment, wherein undesired behaviour results in sanctions.) Over time, behaviourism asserts, workers begin to exhibit the desired behaviour even when there is no more positive or negative reinforcement.[1]

The value of behaviourism is that it draws our attention to the fact that rewards and punishment affect learning and that this effect occurs both during and after the training process. For example, we might train workers to always walk around a vehicle to look for hazards or dangerous conditions prior to entering the vehicle and starting it up. This training may require positive reinforcement (e.g., praise) or punishment (e.g., discipline if the worker is observed not doing a walk-around). More importantly, behaviorism tells us that, if workers who act in accordance with their training are mocked by co-workers or hassled by their supervisor for holding up the delivery process, it is unlikely that the workers will continue to do vehicular walk-arounds. This suggests that training may need to also address workplace cultural practices if we want the training to be effective.

Social Cognition theory asserts that learning occurs through observation and imitation and thus through formal and informal interactions with others. The social learning process typically begins by workers observing how others act and the consequences of those actions. Workers may then emulate safety behaviours that appear successful for others, assuming the worker has the confidence and skill necessary to perform these actions. Box 8.3 highlights the time and support that are sometimes necessary for workers to successfully emulate safety behaviours and the need for workers to adapt such behaviours to the continually changing demands of work.

Social cognition theory also suggests workers are often able to manage their own safety behaviours through self-monitoring, self-evaluation, and self-rewarding.[2] This belief in worker self-regulation stands in contrast to the external regulation emphasized in behaviourism. Behaviourism's emphasis on external regulation of workers' behaviours (i.e., workers cannot be trusted to act safely) sometimes harkens back to the negative views of workers embodied in the careless worker myth that we read about in Chapter 1.

Training versus learning

Much of the literature about OHS training focuses on how and what to teach workers. Focusing the attention of safety trainers on how best to transmit information to workers in order to shape their attitudes or behaviours obscures research that suggests workers learn health and safety skills by performing activities (rather than via lectures or online tutorials).

1. Saks, A., & Haccoun, R. (2013). Managing performance through training and development (6th ed.). Toronto: Nelson.
2. Ibid.

A recent study of OHS training among Quebec apprentices found that young workers learned how to work safely while doing their jobs.[3] But the strategies they employed (and indeed, could employ) depended on the circumstances of their job. For example, sometimes safety rules conflicted with productivity demands. In this situation, young workers learned to work as safely as they could while still meeting productivity requirements. Their degree of compliance with OHS rules depended upon how much "space" the workers had to comply with OHS practices. Workers were frequently forced to develop new work strategies to cope with competing demands while minimizing their risk of injury.

The study also found that even supposedly simple workplace tasks required time for workers to become skilled at them and able to perform them safely. One-time demonstrations of skills were generally not sufficient for workers to be able to replicate those tasks.

Further, trainers often omitted information that the trainers deemed to be common sense. Such omissions pose significant hazards for new workers, who may be unfamiliar with job materials and processes. Finally, new workers frequently were not shown how specific job tasks fit into the overall production process or alternative ways to complete work (which would expand their repertoire of safe work behaviours).

An important implication of this study is that, in developing safety training, it is important to be cognizant that learning about OHS is a process that extends beyond training and requires workers to develop OHS strategies that are effective in their workplaces. This suggests that ongoing attention to safety training of new workers is necessary. How these lessons can be reconciled with the finding that only 1 in 5 workers receive any OHS training during their first year with an employer is unclear.

More generally, learning theories draw our attention to the fact that training is not done *to* employees, but rather requires their participation. Consequently, the effectiveness of training is enhanced when it is developed with workers' interests and preferences in mind. For example, an organization may provide WHMIS training primarily to comply with legislative requirements. Workers may be more engaged by the training if it is presented as a way to reduce their risk of injury from hazardous materials and is delivered using training methods that are both practical and interesting.

Skilled trainers also recognize that workers may have both vocational (i.e., job-related) and non-vocational goals when participating in training. Some workers may see training as a way to advance their careers or

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3. Laberge, MacEachen, & Calvet. (2014).

interact socially with co-workers, or simply as a novel experience. Creating room for workers to meet their non-vocational goals may increase their engagement with the job-related material. One way to better address the needs of workers is to involve workers in the development of the OHS training they must take.

As in other aspects of OHS, competing workplace interests shape training. Employers are conscious of productivity and the cost of training, and so they will prefer training that delivers the information quickly, inexpensively, and with minimal impact on production or service delivery. As noted above, workers' interests in training are more varied. Union-sponsored safety education is normally the only alternative source of OHS training available to workers.

8.3 DEVELOPING TRAINING PROGRAMS

Photo by **fauxels, Pexels License**

Instructional Design is a process of systematically developing training to meet particular goals and objectives. Figure 8.1 provides an overview of the process. The process begins by conducting a **needs assessment** to determine what kind of training is required to meet organizational goals. **Organizational goals** for health and safety training often include meeting legislative requirements or seeking to reduce injury rates, enhancing (or remediating!) the organization's reputation for safety, or qualifying for workers' compensation premium rebates. Employers seek to meet these goals by changing workers' knowledge, skills, or behaviours via training.

Identifying specific organizational goals often clarifies who needs to be trained and the nature of the training that is required. Continuing with the example started in the last section, an organization seeking to meet its obligation to provide WHMIS training would train those workers who will work with hazardous materials. The content of the training will be shaped by which hazardous materials were used in the workplace and the selected control strategies. Whether a workplace would retrain workers who had previously received training might depend upon the nature of the hazard (which may have changed over time), the control strategies

adopted (e.g., some PPE may require workers to undergo periodic retraining), and the additional cost (if any) of the retraining.

The question of cost reminds us that a needs assessment is not an entirely technical undertaking. What training is needed is not always perfectly clear, and those responsible for designing training can legitimately choose among different training options. For example, do workers with no responsibility for containing chemical spills require this training? This discretion over how to train is exercised in a particular economic and political context. Employers in capitalist economies are influenced by the profit imperative either directly or indirectly (in the case of public and non-profit sectors), which often causes them to seek to minimize labour costs (which include the cost of training). This often means that a needs assessment entails a cost-benefit analysis of the training, which may shape the kind of training employers choose to provide.

Figure 8.1 The instructional design process
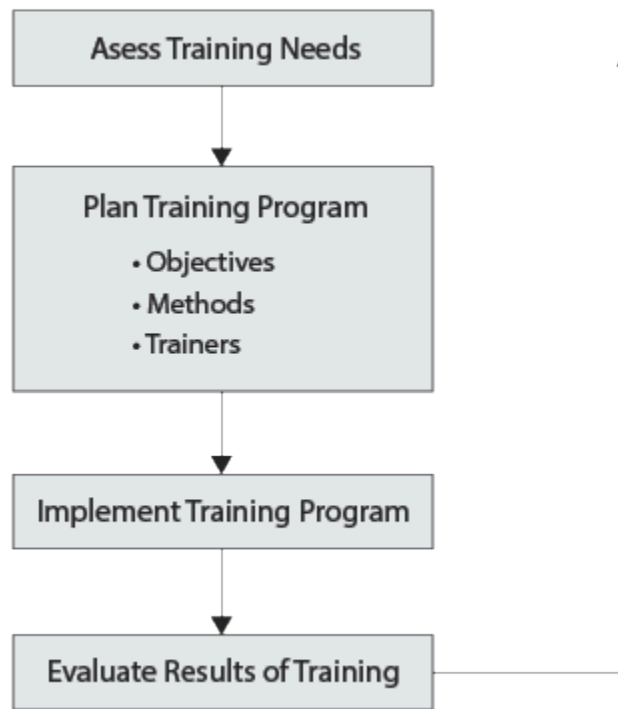
Once the broad organizational goals of training have been identified, our attention then shifts to planning the training program, including developing the specific training objectives and methods and selecting trainers. **Training objectives** typically identify what the worker is expected to know or be able to do at the end of the training and establish some level of acceptable post-training performance. Training objectives may also help employers identify materials (e.g., MSDSs, PPE, administrative procedures) required for workers to apply the training in the workplace. Carrying on with the earlier WHMIS training example, workers might be expected to identify the ways in which each type of hazardous material can cause harm and be able to perform any physical skills associated with the control strategy adopted for each hazard (e.g., monitoring ambient levels of a

gas). They might also be expected to always comply with the control strategies when working with the materials after the training and face periodic evaluation of their compliance and potential sanction for non-compliance.

After the training objectives have been established, it becomes necessary to determine what **training methods** will be used to accomplish the objectives. Most of us have sat through classroom-based training at some point, and online training is becoming increasingly common because its cost is relatively low and it can be offered when it is convenient to the learner. Lecture- or demonstration-style training may not be the most effective way to teach OHS skills and procedures. Experiential training (e.g., hands-on training or real-world simulations) may be more effective. It may also take more than a single demonstration or opportunity to practice for workers to become proficient at OHS skills and then integrate them into their work practices.

The final step in planning the training program is to select the trainer. Training may be provided by staff members or contracted to an outside provider. This decision is often based upon the required expertise (e.g., being licensed to provide training for particular kinds of equipment) and the cost. A common pitfall in OHS training is selecting a provider (who often has a pre-packaged program) before determining the training objectives and methods. This approach may reduce the effectiveness of the training, as usually training is not a one-size-fits-all proposition.

Techniques of delivering training are beyond the scope of this book, although the discussion above provides some examples of different delivery strategies. After the training has been delivered, it is important to evaluate the effectiveness of the training. There are four types of training outcomes that can be assessed and listed in ascending order of measurement difficulty:

- Reaction: Trainees' satisfaction with the training venue, content, and activities is easy to assess (e.g., using a questionnaire). This information may be used to improve participants' subjective experience of future training events but does little to assess the degree to which the training has met the training objectives.
- Learning: It is possible to measure the knowledge and skills trainees gained from the training through testing (e.g., multiple-choice quizzes, demonstrations). These measures are useful at measuring short-term outcomes of training. Learning outcomes can also be assessed partway through a longer training program in order to identify which aspects of the training require reinforcement or additional practice.
- Behaviour: OHS training often seeks to alter trainees' behaviour, so measuring behavioural change in the workplace over time may be a useful assessment. This can be done through observation or by reference to indicators of desired behaviours (e.g., monitoring workers' level of exposure to radiation).
- Results: The purpose of training may be to affect overall organizational performance (e.g., lower injury rates). When assessing such outcomes, it is important to be mindful of non-training factors that may affect organizational results and that a positive outcome may not be due to the training itself.

Behaviour-based safety systems

Training is often said to be an effective means of reducing the incidence of workplace injury. For example, training workers to work safely is a key component of **behaviour based safety** (BBS), a popular approach to OHS among employers. BBS views the workplace as a venue of measurable behaviour that can be properly shaped to prevent injuries.[1] As its name implies, BBS draws heavily on a behaviourist view of learning and focuses on modifying worker behaviour via training-reinforced positive and negative feedback. For example, safety metrics (e.g., number of days without a time-loss injury) may be publicly posted and linked to rewards (e.g., cash bonuses or workplace events such as free pizza lunches). Such rewards certainly can shape worker behaviour. It is unclear, however, if these rewards cause workers to work more safely or simply alter their injury-reporting behaviours.

BBS focuses attention on observable behaviours, most of which are performed by workers. This approach tends to narrow the scope of safety inquiry, neglecting root causes of injuries and factors directly within employer control. In this way, BBS constructs injuries as the result of worker incompetence, inattentiveness, and carelessness, often (and incorrectly) claiming that up to 90% of injuries are caused by unsafe acts.[2] Ignored in this approach to incident prevention are factors that are harder to observe, such as the (un)availability of safety equipment, unsafe production processes and job designs, pressure to work faster, and the employer failing to remediate known hazards.

Moreover, the solutions that flow from BBS tend to focus on modifying worker behaviour (via less effective forms of hazard control, such as administrative controls, PPE, and worker training) rather than remedying the hazardous condition through elimination, substitution, or engineering controls. In this way, BBS leads to an entrenchment of a workplace culture of blaming the worker for mishaps. The United Steelworkers of America have provided a trenchant critique of BBS, showing that it facilitates greater management control over workers

1. Geller S. (2001). Behavior-based safety in industry: Realizing the large-scale potential of psychology to promote human welfare. Applied and Preventive Psychology, 10(2), 87–105.

2. Frederick, J., & Lessin, N. (2000). Blame the worker: The rise of behavioral-based safety programs. Multinational Monitor, 21(11), 10–14.

while providing "no mechanism for the workers to discipline management" for inadequate safety protection.[3]

BBS is a concrete example of how the different views of employers and workers about injury prevention can play out in the workplace. When conducting a needs assessment, it is important for OHS practitioners to be cognizant of the political context in which the training is occurring. This contextual awareness may also help identify the potential for worker resistance to the content or format of training based upon their workplace interests.

Assessment activities are often determined during the design phase. This approach tends to most closely align assessment with the training objectives and ensure assessment is appropriate for the chosen training method. Concluding the WHMIS example, if the organizational goal is meeting (and being seen to meet) legislative requirements around hazardous materials, this goal can be met by demonstrating that workers received the training. Assessing workers' learning and behaviour might tell both the employer and the workers important things about the effectiveness of the training at imparting knowledge and skills and altering behaviour. That said, cost considerations might affect the degree to which the achievement of training objectives get measured.

3. United Steelworkers. (n.d.). The Steelworkers Perspective on Behavioral Safety. Pittsburgh: Author, p. 5. http://assets.usw.org/resources/hse/Resources/uswbbs.pdf

8.4 EMERGENCY PREPAREDNESS

Photo by Rosanna Arias, Public Domain

Emergencies are sudden events that pose a hazard to workers' health and safety and require immediate action. Obvious examples include weather or transportation events such as the 2013 flood in Calgary, Alberta, or the tanker-car explosion in Lac-Mégantic, Quebec. Fortunately, most emergencies are of a much smaller scale. The release of hazardous gases at the Burnaby mushroom farm is an example. The workers had no warning that they would be exposed to a powerful chemical hazard in a confined space, and the exposure rapidly incapacitated, injured, and killed them. While preventing such events is ideal, emergency plans can significantly mitigate the harm caused by emergencies.[1]

Like all HRAC activities, emergency planning begins by evaluating what hazards might trigger an emergency in the workplace. Emergencies can be caused by hazards specific to the workplace (e.g., a leak of dangerous chemicals in a hardware store) or by events outside the workplace (e.g., the risk of retail workers

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1. A good introduction to emergency planning in Canada is available here: http://www.ccohs.ca/pandemic/pdf/Business_continuity.pdf

becoming ill during an outbreak of the flu). Once the most likely causes of an emergency at a workplace have been identified, it is necessary to consider how each cause would affect the workplace and how the underlying hazards can be controlled.

This process can lead to the development of one or more emergency plans that outline the steps necessary to respond effectively to the emergency. The details of these plans will differ based upon the nature of the hazard: a chemical spill obviously requires a different set of responses than a pandemic.

There are three major phases to any emergency plan:

- **Activation**: It is necessary for someone to recognize that an emergency is occurring, activate the emergency plan, and communicate the emergency to workers and any relevant authorities or other affected persons. An activation protocol may identify the circumstances that create an emergency (e.g., triggering events or circumstances) and the steps to commence the emergency response.
- **Evacuation, rescue, or shelter**: Emergencies may require the evacuation of some or all workers. Evacuation routes (including alternative routes), muster points, and a means of determining whether an evacuation is complete are important components of an emergency plan. Depending upon the circumstances, an evacuation plan may also direct the shutdown of certain work processes and the treatment or further evacuation of injured workers. Some hazards—such as chemical hazards in confined spaces—may require specialized rescue skills or equipment in order to evacuate workers before further harm occurs. Other hazards—such as extreme weather—may require workers to take shelter on site.
- **Ongoing management:** A protocol for managing an ongoing emergency is helpful once the initial phase of the emergency has passed. While we tend to think of emergencies as single dramatic events, an emergency may entail an ongoing set of events such as the pandemic discussed in Box 8.5. Ongoing management might include plans to secure equipment and information, ensuring there is a means of communicating with staff and for staff to communicate with their families, a media relations plan, the provision of assistance to help employees cope with their reactions to the event, and a business-resumption plan.

Emergency planning can be much more complicated when the worksite changes frequently (e.g., in construction) or is mobile (e.g., in oil-and-gas exploration). Knowing there is an emergency and developing evacuation protocols is much more difficult when facing constantly shifting circumstances.

Emergency planning is linked to safety training because all workers need to know what to do and where to go in the event of an emergency. Emergency responders (people assigned to respond to the emergency) require additional levels of training to spot hazards and engage an effective response (e.g., evacuate injured workers, stop a gas leak). Part of emergency preparedness is a comprehensive training plan for each worker at the level they require it.

OHS implications of pandemics

A **pandemic** is the sudden outbreak of a disease that affects a large portion of the population due to a lack of natural immunity. A pandemic has significant implications for OHS, particularly in the health-care and service sectors. Not only can workers contract the illness in their workplace, but a widespread pandemic can create new hazards. For example, staff may need to perform tasks they are unfamiliar with or untrained for as other workers fail to report due to illness, fear, or being required to care for others.

Thinking a bit more broadly, equipment and materials may become scarce due to demand or logistics problems. Utilities (e.g., water, power) may be also become unreliable due to high levels of worker absenteeism. Quarantine procedures might significantly affect the availability of workers, while high demand might limit access to emergency and medical services. Such issues may create a series of cascading OHS hazards in the workplace.

Severe Acute Respiratory Syndrome (SARS) provides a useful case study. In late 2002, a patient in China's Guangdong province fell ill with an atypical case of pneumonia. Additional cases appeared in the following months, and the disease was spread to Hong Kong by a health-care worker who attended a family wedding in February 2003. One of the dozen people affected in Hong Kong was a 78-year-old woman who returned home to Toronto, Ontario, and became the Canadian **index case** (the first case that indicates the existence of an outbreak).

The woman died and a family member who provided care for her was hospitalized, resulting in the disease spreading to other patients and staff. In the end, there were up to six generations of disease transmission, and health-care workers comprised 43% of those who fell ill with SARS. There were 44 SARS-related deaths in Canada and over 400 people became ill, while 25,000

people were quarantined.[2] Globally, the death toll was 916, approximately 11% of all who fell ill with SARS.

This emergency required significant changes to normal patient-handling protocols in the health-care system. Despite enacting emergency protocols to contain the pandemic, some workers who fell ill with SARS also experienced long-term physical health consequences as a result of the disease (or its treatment). Others, including health-care workers, experienced post-traumatic stress. The SARS experience resulted in the widespread introduction of pandemic plans in the Canadian public sector. Comprehensive data is lacking, but practitioners estimate that fewer than 10% of private-sector organizations have pandemic plans.

2. Canadian Environmental Health Atlas. (2015). SARS outbreak in Canada. http://www.ehatlas.ca/sars-severe-acute-respiratory-syndrome/case-study/sars-outbreak-canada

8.5 SUMMARY

Health and safety training can play an important role in reducing the number and severity of workplace injuries. The five workers who were injured or killed at the Langley mushroom farm in 2008 were harmed because they were exposed to uncontrolled hazards. While controlling these hazards through elimination, substitution, or engineering controls would have been the best way to prevent this incident, informing the workers about the well-known risks associated with manure composting and enclosed spaces and providing them with the training and equipment necessary to do the work safely might have also prevented it. Even if a hazard is controlled through engineering controls, there is still a need to ensure workers understand the nature of the hazards that could exist if the engineering control failed. Indeed, even providing the workers with basic training about their workplace rights and the hazard recognition process might have prevented the incident or reduced its consequences.

In this case, the employer appeared ignorant of the hazards in the workplace and therefore did not see any reason to provide training. Circumstances like these—where the employer may be unqualified to run their business in a safe manner—is one of the reasons that all Canadian jurisdictions have OHS inspection programs. Had the employer been made aware of the hazard and its obligations to control the hazard, it is possible that these workers would still be alive. Similarly, if the employer had an emergency response plan, it is possible that some of these workers would have avoided injury when attempting to rescue their colleagues.

Discussion Questions

1. What purpose(s) does health and safety training serve?
2. Identify five different instances of health and safety training that you have experienced or have heard about. Which do you think is most important and why?
3. Why might you include workers in the development of OHS training? Why might you want to exclude them?
4. If you were developing OHS training, would you lean toward behaviourism or social cognition theory? Explain your choice.
5. What are the major components of an emergency preparedness plan? Which is the most

important from the perspective of workers?

Exercises

Go online and find the WorkSafeBC Incident Investigation Report for the mushroom farm deaths detailed at the beginning of this chapter.[1] WorkSafeBC also provided an animated video recreation of the incident that you may wish to view.[2] After familiarizing yourself with the facts of this incident, complete the following tasks:

1. Identify two types of training that the employers could have provided to these workers that might have altered the outcome of this incident. In 200 words, explain why you selected each type of training and how you believe it would have altered the course of this incident.
2. Go online and identify a provider of each kind of training in your area.
3. Identify two non-training ways (i.e., controls) by which this incident could have been prevented. In 200 words, discuss whether you think these controls would have been more or less effective in altering the outcome of this incident than providing training and why you think this.

1. This report was located here: http://www.worksafebc.com/news_room/news_releases/assets/nr_11_25_11/IIR2008095610260.pdf
2. This video was located here: http://www2.worksafebc.com/Publications/Multimedia/
   Videos.asp?ReportID=36644&_ga=1.146528498.73131700.1391040249

CHAPTER 9: INCIDENT INVESTIGATION

Chapter Outline

9.0 LEARNING OBJECTIVES

Learning Objectives

1. List the steps in an incident investigation
2. Articulate incident investigation reporting requirements
3. Identify forms to complete during and after an incident investigation
4. List the materials needed for an incident investigation toolkit

9.1 INTRODUCTION TO INCIDENT INVESTIGATIONS

Employers are responsible for investigating workplace incidents. Before the formal incident investigation begins, the employer needs to take the necessary steps to meet both internal and external reporting requirements.

Pre-Investigation

- Has the employer provided the injured parties with the necessary level of first aid and called 9-1-1 if required? Don't forget that witnesses may need support as well.
- Has the employer notified internal stakeholders of the recent incident? These stakeholders may include human resources, health and safety representatives or committee members, union representatives, and the leadership team.
- Has the employer notified the external stakeholders of the recent incident? These stakeholders may include family members of the injured parties, third party contractors/employers, temporary agencies, legal counsel, head-office personnel, law enforcement, workers compensation and necessary government agencies.

Workers Compensation

Regardless of an employer's location, there are reporting requirements following a known workplace injury or illness. In Ontario, for example, the Workplace Safety and Insurance Board (WSIB) requires an employer to submit a Form 7 within three days of being notified of an individuals work related illness or injury. Revithe "Injured at Work" brochure to become familiar with the injured worker reporting expectations of WSIB.

Additional Resources

Injured at Work? A Guide to Reporting Injured Workers and Employers

Government Agencies

When preparing the emergency contact sheet at work, employers need to ensure they include information relating to government agencies that need to be contacted in the event of a workplace incident or death. In Ontario, for example, employers must submit a written report to the Ministry of Labour (MOL) within 48 hours of a critical injury. Refer to the [Ministry of Labour's website](#) to become familiar with their definition of a critical injury.

Incident investigations are intended to uncover all of the key facts about how and why an incident occurred so that action can be taken to prevent it happening again. Not conducting the investigation in a careful and thorough manner can undermine the results and create the risk of a repeat incident. Any incident where significant injury occurs should be thoroughly investigated, but there is value in investigating minor injury and near miss events as well, as they can reveal important insights that might prevent a future injury. Let's look at the incident at a Canadian sawmill to learn more about the impact of workplace incidents.

Story: Incident at a Canadian Sawmill

On January 20, 2012, a massive explosion at the Babine sawmill in Burns Lake in northern British Columbia killed two workers and injured 20 others. The explosion, powerful enough to blow off the mill's roof and send a giant fireball into the sky, was caused by a buildup of wood dust in the mill's atmosphere. Ryan Clay, a worker at the mill, said the dust had built up to dangerous levels. "You couldn't see across the mill, that's how bad the dust levels were. Even with the fans going full blast, the dust was just horrendous."[1] It was the largest sawmill explosion in BC history until the Lakeland sawmill in Prince George exploded three months later.

In incidents this serious, the investigation becomes the responsibility of the provincial government, in this case WorkSafeBC. It took 19 days for WorkSafe investigators to gain access to the site, first because of RCMP investigations of criminal acts and then because of unsafe conditions. The investigation was finally completed on November 29, 2012, with a recommendation to lay charges against the employer under BC's health and safety legislation. Nevertheless, the Criminal Justice

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1. Quoted in Adams, C., & Rowney, M. (2014). What was behind the deadly B.C. sawmills explosions? Global News. http://globalnews.ca/news/1604346/16x9-investigation-what-was-behind-the-deadly-b-c-sawmills-explosions/

Branch (which makes all final decisions about prosecutions) decided it could not proceed with charges due to significant flaws in the investigation procedure. A review of the investigation found it had failed to collect all pertinent information, interview certain key witnesses, and follow due process in interviews with managers. It also came to light that WorkSafe inspectors had been to the mill a month before the incident and, while they issued citations for violation of safety rules, they did not highlight a risk of explosion from the wood dust.[2]

Government investigations serve a different purpose than incident investigations conducted by employers, as government investigators have a legal mandate to determine if penalties under the Act are warranted. Nevertheless, the failures of the Babine investigation show what can go wrong if an investigation is not conducted properly. This chapter will explain how to conduct an incident investigation.

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2. Dyble, J. (2014). Babine Explosion Investigation: Fact Pattern and Recommendations. Victoria: Government of British Columbia.

9.2 THE BUSINESS CASE FOR INCIDENT INVESTIGATIONS

Some employers may not realize the benefits of conducting a thorough incident investigation. The Canadian Center for Occupational Health and Safety suggests the top reasons for conducting incident investigations include:

- most importantly, to find out the cause of incidents and to prevent similar incidents in the future
- to fulfill any legal requirements
- to determine the cost of an incident
- to determine compliance with applicable regulations (e.g., occupational health and safety, criminal, etc.)
- to process workers' compensation claims
- Root cause discovery and the discovery of contributing factors is a significant reason for conducing an incident investigation. Once an employer identifies the root cause and contributing factors, it may result in training or re-training individuals, policy change, signage, PPE just to name a few. An employee cannot work towards avoiding or minimizing the risk of a similar incident without the identification of the root cause and contributing factors.
- Meeting legal expectations and compliance is essential for every employer. A workplace incident may involve government workplace inspectors and, in some instances, law enforcement.
- Understanding both the direct and indirect costs of a workplace incident allow an organization to justify additional safety measures that will eliminate or reduce these financial costs going forward.
- Employers must ensure they have gathered the correct information needed to accurately report workplace incidents to Workers Compensation in a timely manner.[1]

> **REMINDER.** Incident investigation is not limited to employees of the company. Should a visitor (family member, guests, co-workers from other locations), delivery person, contractor, temporary worker, contract employee, or customer be injured at the employer's workplace, the employer needs to provide the appropriate level of first aid and medical attention prior to the

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1. *Incident Investigation, OSH Answers Fact Sheets*, Canadian Centre for Occupational Health and Safety (CCOHS).

formal incident investigation.

9.3 WHO INVESTIGATES WORKPLACE INCIDENTS?

Photo by Jase Bloor, Unsplash License

Who investigates an incident is a particularly important question. The lead investigator should be someone with investigative experience, knowledge of the work and work processes, and an understanding of how incidents are caused. Many workplaces will task a senior health and safety official or senior manager with managing incident investigations. No one should investigate an incident alone, and other people should be selected to assist, to provide different perspectives, and to divide the workload. Other possible participants should include joint health and safety committee members or some other worker representative, people linked to the work that had been performed, and, in most cases, the direct supervisor of the work (although there are cases when inclusion of the supervisor may not be appropriate). Union agreements often stipulate that a union steward or representative participate in incident investigations. Anyone who is identified as an investigator should be properly trained beforehand.

9.4 THE INCIDENT INVESTIGATION TOOLKIT

Creation of an **investigation kit** is also an important pre-incident task. An incident investigation kit is a pre-assembled box or tote containing the tools, forms, and material needed in an investigation. It is recommended the employer place a piece of sealing or tamper proof tape around the investigation kit. This sealing tape can easily be cut open and it allows the employer to quickly identify when the kit has been used in order to re-stock any missing items. Investigators can then act quickly by grabbing the kit and beginning their work. The following graphic illustrates some of the materials that should be included in an employer's investigation kit.

Accident Investigator Toolkit by Alyssa Giles CC-BY-NC-SA

Flashlight	**Pens**	**Paper**
Clipboard	**Measuring Tape**	**Calculator**
Camera	**Laptop (if resources allow)**	**Caution tape**
Blank incident investigation forms	**Blank witness statement forms**	**Emergency contact list**
Hazardous Materials disposal bag	**Gloves**	**Masks**

Don't forget to:

(1) Train everyone so they know where to find the incident investigation kit

(2) Add the investigation kit to the safety checklist so the employer knows the kit is in the designated location and to do a visual check to see if it has been opened.

(3) Replace any necessary items once the incident investigation kit has been opened

9.5 ESSENTIAL INCIDENT INVESTIGATION STEPS

Photo by Veri Ivanova, Unsplash License

A successful incident investigation begins with a consistent process designed to uncover what happened so future incidents can be avoided. Investigations need to be performed as soon after the incident as possible and be completed as quickly as possible. Witnesses' recall may deteriorate over time and important evidence may disappear if there is a delay. The sooner an investigation is completed, the sooner changes can be made to make the worksite safer. Employers may also be required to report incidents and investigation results within a specified time period.

Step 1. Scene Security

Securing the scene entails two actions. First, any uncontrolled hazard (e.g., leaking gas) needs to be eliminated to ensure the safety of the investigators and others. Second, the scene needs to be protected so that no evidence can be destroyed or altered (intentionally or unintentionally) until the completion of the investigation. Protection normally includes restricting access to the scene. In some circumstances, it may also require protecting the scene from inclement weather.

Step 2. Identify and Interview Witnesses

Investigators normally prioritize interviewing witnesses, including the injured worker(s). Witnesses should be interviewed as soon as possible after the incident while their memories are fresh and uncontaminated by discussing the event with others. A few principles should be followed in interviewing to ensure accurate information and the well-being of the witness:

- Ensure the witness is physically and emotionally well. Witnessing an incident can traumatize people and assistance, such as counselling, may be necessary before an interview takes place.
- Be clear about the purpose of the interview and the investigation, highlighting that it is not about laying blame.
- Interview witnesses separately and in a neutral location. A worker representative should be provided if the witness requests it or if the union agreement requires it.
- Allow witnesses to describe what happened in their own words. Do not lead or put words in their mouths.
- Ask only questions that elicit more information or clarify answers. Do not ask the witness "why" they think something happened.
- Be an active listener. Ensure the investigator has correctly heard them by repeating or summarizing what they said.
- Record the interview in some fashion—either with detailed notes or (if appropriate) audio recording.
- Be aware of power relations. Interviews can be distorted by unrecognized power imbalances, such as the interviewer being the supervisor of the worker, or the worker who was injured being under the witness's supervision. These dynamics can be a barrier to accurate reporting of the incident.

Step 3. Complete the Investigation

The next step in an investigation is to gather evidence. There are a number of techniques for collecting the relevant information. They will be used in various combinations depending on the nature of the incident and the workplace. Gathering might begin with a **walk-through**, which is an inspection of the incident scene to get an overall picture of the environment. A walk-through may also clarify which additional evidence-gathering techniques are appropriate. These further techniques should include recording the scene through photos or video or drawings (if photos or video are not practical) to create a visual record of the scene.

Another investigative technique is a **re-enactment** of the incident, which is a simulation designed to recreate the circumstances that led to the incident. A re-enactment might entail asking witnesses to act out the events that took place before the incident, or re-establishing a set of conditions relevant to what occurred. The value of the re-enactment is that it can identify how circumstances, events, or behaviours interacted to cause the incident. These interactions can be difficult to identify solely through witness testimony because of

the limited perspective any one witness will have on an incident. Other investigative techniques might include inspecting machinery and tools, checking logs and records, collecting debris, materials and other relevant items, or conducting air sampling or noise testing. Investigators should also gather any relevant company policies, government regulations, or operator's manuals and guides.

Step 4. Root Cause Analysis

Once all the information has been gathered, the next step is to analyze the data to determine the causes. This is a crucial step, and is often where investigations go wrong. The immediate reasons for the incident will be the first to appear. These causes will usually be worker error or some factor that may appear to be uncontrollable. Stopping the investigation at this point will lead to an incomplete analysis and the investigation will likely fail at one of its key goals—preventing future incidents. Additional analysis of the data will reveal underlying reasons for (the "root cause" of) the incident. A simple way to think about probing data for root causes is to keep asking "why?" Asking why something happened allows the investigators to get past their initial understanding of the incident.

In an attempt to help investigators get to root cause, a variety of analysis models have been developed. The **domino theory** dates back to 1936 and remains popular due to its ease of illustration. It envisions cause as a series of five dominos lined up together.[1] Each domino represents factors reaching back from an incident. The first (closest) domino is labelled Injury, followed by Incident, Unsafe Acts and Conditions, Personal Defects (e.g., equipment failure, personal factors), and finally Background (e.g., lack of management control). The theory contends that injury results from failure at all five levels. If any of the failures does not happen (i.e., one of the dominoes is removed from the chain), an injury will not occur. For example, if a worker is taught to work safely, an injury might be prevented even though failures in background decisions still occurred.

A more recent revision to domino theory is the **Swiss cheese model**.[2] This model retains the five factors giving rise to injuries that are outlined in domino theory. Each of these dominoes is then given "holes" that represent various subfactors that influence whether an incident occurs or not, such as organizational influences, local working conditions, unsafe acts, and defences, barriers, and safeguards. In the Swiss cheese model, an incident requires that the holes in the dominoes line up—in other words, a failure must occur in each domino. This model emphasizes that injuries are the result of multiple failures. If one of the subfactors is functioning properly, then weakness in the other four may still not lead to an incident. For example, bad organizational culture (an organizational influence) around safety may not lead to injury if there are appropriate guards (a defence, barrier, or safeguard) to prevent injury. The domino theory and Swiss cheese

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1. Heinrich, H. (1936). Industrial accident prevention. New York: McGraw-Hill.
2. Reason, J. (1990). Human error. Cambridge: Cambridge University Press.

models are popular because of their simplicity in articulating a core principle that an investigator must look beyond immediate actions and explore underlying factors that contributed to the incident.

Step 5. Reporting and Recommendations

The next step in the investigation process is to write a formal report outlining the findings and making recommendations. In some respects this can be considered the most crucial phase, as a careful investigation is without value if the recommendations fail to improve the situation. The **incident report** will be the permanent record of the incident and its causes and thus should clearly outline what happened and why it happened. It may even have future legal ramifications, as its recommendations may be used by government inspectors to determine if an employer met the standard of due diligence in controlling hazards after the incident.

Incident reports can take different forms depending on context, organization, and situation. All incident reports should include the following elements:

- Who performed the investigation
- Details of the incident, including date, time, persons involved, outcomes
- Details of the investigation and how it was conducted, timelines, etc.
- An outline of the factors that led up to the incident
- Clear identification of the root causes of the incident
- Specific recommendations designed to prevent future incidents

In designing a report template, a report that requires investigators to answer open-ended questions is preferable to a report that provides a checklist of options. To elicit action, recommendations need to be specific and directed to the identified causes. Nevertheless, if they are too specific, they risk not addressing systemic issues adequately. The recommended action also needs to be within the control of the employer. This can be difficult when environmental conditions played an important role in the incident. For example, bad weather may have been a factor in an incident. While the employer cannot control weather, the employer can implement controls that neutralize the effect of weather on workers. There is also the issue of how to report on the role of human error in the incident. Should human error be identified during the incident investigation, it should be identified without assigning blame.

The investigator(s) should ensure all affected parties receive a copy of the investigation report, including involved workers, the joint committee (if applicable), and responsible managers. It is the responsibility of the employer to implement recommendations. Often employers will delay implementation, seek out other solutions, or respond that the recommendation is too expensive or not practicable. Lack of follow-through on recommendations is a reality of in practice and it can undermine both workplace safety and how carefully

investigators examine future incidents. An action plan should accompany the report in order to assign timelines and resources to implement the recommendations.

Step 6. Follow up

The final step in the incident investigation process is follow up. During the reporting stage, specific recommendations were put forward which most often include corrective and preventative measures. The goal is to eliminate or minimize the risk of a similar incident happening in the future. One question to ask is "have the recommendations been implemented?" If the employer discovers the recommendations have not been fully implemented as yet, review the action plan to determine if the appropriate timelines and resources have been assigned to this phase, and revise if necessary.

Finally, the employer needs to determine if the recommendations are effective? As everyone in the workplace is part of the IRS (Internal Responsibility System), it is important to include stakeholders such as the health and safety representative or committee, the area supervisor and union representation (if applicable) to determine the effectiveness of the corrective and preventative measures.

9.6 SUMMARY

All investigations have the task of preventing injury and ill health, meaning they should be conducted with care and precision. This chapter examined the key steps involved in an incident investigation. Every employer must ensure they have trained incident investigators and an incident investigation toolkit on site. There are action items that need to take place following a workplace incident, some to meet internal expectations and some to meet external expectations, such as government and legal requirements. An employer needs to know who to contact under which circumstances, when to contact them and which forms to complete. Every employer needs to be prepared to conduct a thorough and timely incident investigation in order to meet expectations and protect its people.

Discussion Questions

1. Why is it important to collect all the information before beginning the analysis step?
2. Why should investigations focus on root cause and what are some of the ways that investigators can lose sight of it?
3. How might accurately reporting the cause of an incident result in blaming workers for their own injury?

Exercises

Read the following scenario describing a workplace incident:

Amy worked for Chris's Catering, a small catering company that specializes in special events.[1] On June 12, Amy was dispatched to work a small outdoor wedding taking place in a park overlooking the river. The size of the job called for two chefs in the kitchen (the husband and wife co-owners), one wait staff responsible for clearing plates after guests were finished, and two porters who would set up the serving tables and carry chafing dishes (hot metal pans for buffet-style serving) and other serving trays from the kitchen to the serving tables. Amy was assigned as a porter and was required to wear a short-sleeved black uniform with the company's logo.

The wedding was located outside a community hall. The kitchen was inside the hall. The buffet table was at the opposite end of the small park, about 100 metres away. It was a hot and sunny afternoon. The other designated porter, Andy, called in sick at the last minute, leaving Amy to do the job alone with occasional help from the wait staff. As the time of the reception neared, the chefs were running behind schedule. Amy began shuttling chafing dishes to the buffet table. The dishes weighed approximately 12 kg each when filled with food. Amy used dishcloths to protect her hands from the heat of the dishes. She delivered eight dishes to the table.

As Amy was about to place the ninth and final tray, containing a hot minestrone soup, she took a sudden step backward, bumping into a guest behind her. The collision caused Amy to lose control of the dish, which spilled over her and the guest. It also caused Amy to fall into the buffet table. Amy suffered a severely sprained ankle, burns on her arms, and some bruising to her face and arms. The guest also experienced some minor burns.

Write 200-word answers to each of the follow questions:

1. How would you conduct the investigation? What tools and techniques you would use and who you would interview?
2. How you would analyze and report the information you gathered?
3. Identify the potential causes of the incident, distinguishing between proximate and root causes.

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1. This story is fictionalized. Any resemblance to actual people or companies is purely coincidental.

Check Your Knowledge

An interactive H5P element has been excluded from this version of the text. You can view it online here:

https://ecampusontario.pressbooks.pub/cdnhealthsafetyworkplacefundamentals/?p=1325#h5p-3

Notes

1. Quoted in Adams, C., & Rowney, M. (2014). What was behind the deadly B.C. sawmills explosions? *Global News*. http://globalnews.ca/ news/1604346/16×9-investigation-what-was-behind-the-deadly-b-csawmills-explosions/

2. Dyble, J. (2014). *Babine Explosion Investigation: Fact Pattern and Recommendations*. Victoria: Government of British Columbia.

3. Hasle, P., Kines, P., & Andersen, L. (2009). Small enterprise owners' accident causation attribution and prevention. *Safety Science*, 47(1), 9–19, p. 17.

4. Heinrich, H. (1936). *Industrial accident prevention*. New York: McGraw-Hill.

5. Reason, J. (1990). *Human error*. Cambridge: Cambridge University Press.

6. Sklet, S. (2004). Comparison of some selected methods for accident investigation. *Journal of Hazardous Materials*, 111, 29–37.

7. Lundberg, J., Rollenhagen, C., & Hollnagel, E. (2009). What-You-Look-For-IsWhat-You-Find—The consequences of underlying accident models in eight accident investigation manuals. *Safety Science*, 47, 1297–1311.

8. Canadian Centre for Occupational Health and Safety. (2006). OHS Answers Fact Sheet:

Accident Investigation. http://www.ccohs.ca/oshanswers/ hsprograms/investig.html. Accessed September 30, 2015.

9.   CBC News. (2016, January 12). B.C. sawmill explosion victims suing WorkSafeBC. http://www.cbc.ca/news/canada/british-columbia/b-csawmill-explosion-victims-suing-worksafebc-1.3400506

10.   This story is fictionalized. Any resemblance to actual people or companies is purely coincidental.

CHAPTER 10: DISABILITY MANAGEMENT AND RETURN TO WORK

Chapter Outline

10.0 LEARNING OBJECTIVES

Learning Objectives

1. Explain the business case for disability management
2. List disability prevention strategies
3. Identify the key components of a disability management program
4. Explain various return to work strategies

10.1 DISABILITY MANAGEMENT

Disability management is a set of employer practices designed to prevent or reduce workplace disability and assist workers in recovering normal functioning as quickly as and to the maximum degree possible. In sections that follow, we'll examine each of the three interrelated aspects of disability management:
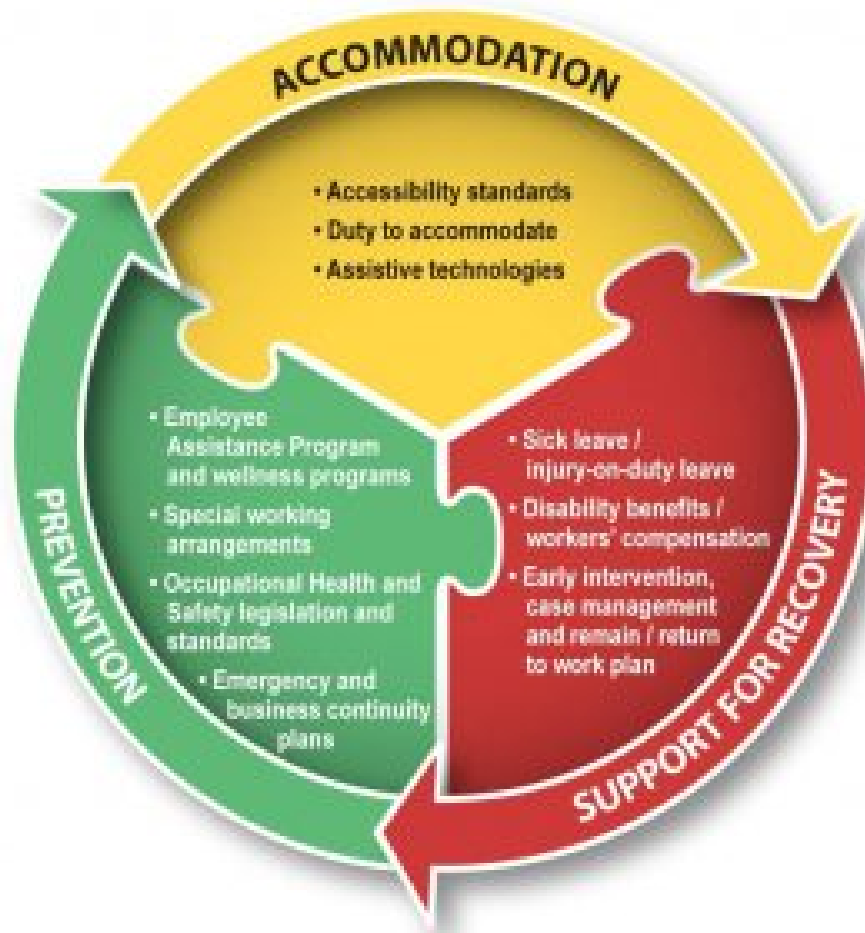
"Disability Management: Accommodation, Prevention and Support for Recovery" from the Government of Canada, reproduced for non-commercial purposes

Prevention	Employers may seek to prevent injuries and illnesses that give rise to disabilities through injury prevention efforts as well as employee assistance and wellness programs.
Accommodation	Workers who have disabilities may require accommodation. This may include assistive technologies and modifications to work, work processes, and the workplace.
Recovery	Some disabilities are temporary in nature. Sick leave, modified work, disability benefits (including workers' compensation), and return to work programs can assist workers during the period of time required for them to recover.[1]

Before discussing disability management, it is useful to consider what the term disability means. Disability is often discussed as a characteristic of a worker (i.e., the worker is disabled). While a worker may indeed have an impairment, it is important to remember that it is the workplace context that turns the impairment into a disability. See more information in the box below.

Conflating impairment and disability

It is useful to be mindful of how we use the term disability. At a very basic level, **disability** means the condition of being unable to perform a function or task as a consequence of a physical or mental impairment. That definition seems pretty straightforward. In this case, being unable to perform a function is only meaningful if performing the function is an expectation of a situation. What this means is that the existence of **impairment** (i.e., a cognitive or physical difference) does not cause a disability. Rather, it is the nature of the tasks in the workplace that turn impairment into a disability.

For example, pretend that your sense of smell is very limited. Is that olfactory impairment a disability? If you were a gas fitter, it might well be considered a disability because being able to smell a gas leak is an expectation of the job (even though there are other ways to detect natural gas). In most other circumstances, few people would consider an impaired sense of smell a disability. Thus the work context turns the impairment into a disability. Impairments are, on their own, not necessarily troublesome, tragic, or disabling. Further, altering the context (e.g., modifying work) can eliminate the disability even though the impairment remains.

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1. Government of Canada. (2011). Fundamentals of disability management. Ottawa: Author. http://www.tbs-sct.gc.ca/psm-fpfm/ve/dee/dmi-igi/fun-fon/intro-eng.asp

One of the ways disability and impairment are socially constructed is that we often associate them with traits that have some form of observable manifestation. It is important to remember that impairment and disability are not always visible or obvious. Much impairment is difficult to casually observe (e.g., diabetes or epilepsy). Cognitive and mental conditions can be particularly difficult to identify. Others can be cloaked through treatment (e.g., prostheses, medication). Society may overlook impairments that are less observable, and thus may be less likely to implement appropriate accommodations to address them.

It is also important to be mindful of the tendency to conflate illness and disability. Illness often entails discomfort, and we seek medical intervention to either resolve the underlying cause or treat the symptoms. Sometimes, illness can cause an impairment that, in specific workplace circumstances, creates a disability. Yet, in most cases, disability and impairment require neither medical supervision nor intervention. In this way, impairment and disability are not questions of health or ill health.[2]

Disability management is often said to minimize the cost of disability to employers.[3] These practices also ensure that employers meet their duty to accommodate. Human rights legislation requires employers to avoid discriminatory workplace practices. This chapter focuses specifically on employers' obligation to accommodate workers with temporary or permanent physical or mental injuries, regardless of whether the impairment was caused by a workplace injury.

Employers' **duty to accommodate** requires employers to alter work, work practices, or the workplace in order to allow workers with disabilities to perform meaningful work. The duty to accommodate requires employers to make any necessary efforts to accommodate the worker's disability-related needs up to the point of **undue hardship**. The threshold of undue hardship varies from workplace to workplace. To claim undue hardship, typically, an employer is required to demonstrate that an accommodation is economically unsustainable, interferes with a legitimate operational requirement, or poses a health-and-safety threat.[4] In these circumstances, an employer is still required to provide whatever accommodation is possible short of undue hardship.

2. Stone, S. (2008). Resisting an illness label: Disability, impairment and illness. In P. Moss & K. Teghtsoonian (Eds.), Contesting illness: Processes and practice (pp. 201–217). Toronto: University of Toronto Press.

3. Tompa, E., de Oliveira, C., Dolinschi, R., & Irvin, E. (2008). A systematic review of disability management interventions with economic evaluations. Journal of Occupational Rehabilitation, 18(1), 16–26.

4. Manitoba Human Rights Commission. (2010). Reasonable accommodation. http://www.manitobahumanrights.ca/publications/guidelines/reasonable_accommodation.html

Additional Resources

Why Have an Approach to Job Accommodation by Workplace Safety and Insurance Board (WSIB)

Undue Hardship – the Ontario Human Rights Commission

10.2 THE BUSINESS CASE FOR DISABILITY MANAGEMENT

"Risk associated with disability management" by Alyssa Giles, CC BY-NC-SA 4.0

Risk assessment is an important part of operations management. One risk to an organization includes the failure to develop and implement a disability management program. Three areas of risk associated with disability management include legal, corporate image and financial.

Legal Compliance

It is important that an employer recognize and follow legislation surrounding disability management. For example, in Ontario, an employer is expected to comply with AODA (Accessibility for Ontarians with Disabilities Act) legislation and the Ontario Human Rights Commission legislation. Both pieces of legislation provide helpful definitions of disability, clearly outline the ways in which individuals with disabilities are to be accommodated in the workplace and provide the employer with useful resources to assist with implementation.

Organizational Reputation

Every organization wants to be known as a responsible corporate citizen. Should an employer develop a reputation for failing to support individuals that have suffered a workplace injury, illness or disability, the impact on the organization may be costly. With the ease of use and popularity of social media, it is easy for employees and former employees to share information about their employer, including disability management and return to work practices. From a morale standpoint, most would agree that a good employer takes care of their employees by introducing disability prevention strategies and return to work programs. Job candidates research potential employers online prior to applying for a job or attending a job interview. What will this potential employee find out about the employer's safety record and culture? Lastly, every organization needs to be concerned about their reputation within their industry as the competition for sales is fierce in a global economy.

Financial Consideration

What is the cost to an organization if they fail to follow good disability management practices? There are direct costs such as the premium costs associated with Workers Compensation. In Ontario, an organization's WSIB (Workplace Safety and Insurance Board) premiums are partially based on the number of lost time accident days an employer incurs. If an injury is deemed to be a lost time accident it typically means the employee is absent from work on the day(s) following their injury. Employers need to use their implement their disability management program to minimize their lost time incident rating. When an injured employee is off work, there are also indirect costs associated with these absences such as productivity issues and the cost of hiring and/or training an employee to cover for an injured employee. Other indirect costs to an employer may include the negative impact on morale and engagement when an employee is off work due to a workplace injury, illness or disease.

10.3 DISABILITY PREVENTION

"Disability Prevention Strategies" by Alyssa Giles CC BY-NC-SA 4.0

While all employers have legislative obligations to prevent injury (as outlined in Chapter 2), some employees also provide an **employee assistance program** (EAP) as part of their disability management program. These programs normally provide access to short-term psychological counselling to help employees to cope with personal problems. The underlying logic of EAPs is that personal issues can affect work performance and, if untreated, can sometimes become more profound.

EAPs are often one aspect of **workplace wellness programs**. Such programs are health promotion activities designed to help workers to improve their health and well-being. These programs often focus on specific issues (e.g., smoking cessation, weight loss, stress management). Again, the underlying logic of these programs is that healthier workers will be more productive workers. It is worth noting that many of these programs help workers to adapt to workplace hazards rather than seeking to remove the hazard by modifying the work. Stress management, for example, rarely seeks to eliminate the workplace causes of stress. Instead, it seeks to help the worker cope with that stress to maintain the worker's productivity.

Some wellness initiatives that do actually modify the workplace are things like **flexible work arrangements**, such as **compressed workweeks**. In a compressed workweek, a worker puts in slightly longer

hours but fewer days per week. Some workplaces will also allow **job sharing**, wherein two workers share a single position with each worker working some portion of the full-time job. Another option is telecommuting, wherein workers perform work away from the office (e.g., at home). This option can allow workers to better balance otherwise conflicting work and home responsibilities.

Other wellness initiatives include job design and job rotation. In job design, department leaders work with the Human Resources department to review the makeup and expectations of a job to ensure the workload and physical requirements of the role are realistic and support good overall health. In job rotation, employers cross-train employees to rotate job coverage so no one person experiences an entire shift of heavy lifting, awkward positioning, or risk of repetitive strain injury. A different strategy for reducing the possibility of injury through interventions in workers' personal lives is the use of alcohol and drug testing in the workplace. Some employers feel this private behaviour outside of work can affect safety at work, and therefore take steps to identify workers whose alcohol or drug use may affect their work.

A **bona fide occupational requirement** (BFOR) is a rule necessary for the proper performance of a job, and such a rule can prevail even if it causes otherwise prohibited discrimination. For example, it is unlawful for an employer to refuse to hire a worker because the worker is blind. Yet, if an employer were hiring a delivery driver, requiring the worker to hold a valid driver's licence (which a blind worker cannot acquire) would be a bona fide occupational requirement. This requirement is permissible because holding a driver's licence is rationally connected to the job and reasonably necessary for the accomplishment of a legitimate work-related purpose.

Ontario suggests a three-part test to determine if drug and alcohol testing is a BFOR:

- the standard or test has been adopted for a purpose that is rationally connected to the performance of the job
- the particular standard or test has been adopted in an honest and good faith belief that it was necessary to the fulfillment of that legitimate work-related purpose
- the standard or test is reasonably necessary to accomplish that legitimate work-related purpose (i.e., it is impossible to accommodate individual employees sharing the characteristics of the claimant without imposing undue hardship upon the employer) [1]

This approach places significant restrictions on employer drug testing. For example, drug testing typically shows the presence of drug-related residue in a worker's system, rather than measuring the actual degree of worker impairment. Since a test that does not measure impairment cannot be rationally connected to job performance, such testing is not a BFOR. Alcohol testing after an incident, when an employer has cause to suspect impairment, or at random for workers in safety-sensitive positions, may be permissible because alcohol

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1. Ontario Human Rights Commission. (2015). Drug and alcohol testing: Basic principles. Toronto: Author. http://www.ohrc.on.ca/en/policy-drug-and-alcohol-testing/drug-and-alcohol-testing-basic-principles

testing does measure impairment. It is important to be mindful that different rules may apply in different circumstances and jurisdictions.

10.4 ACCOMMODATION

There are many causes of disabilities, including workplace injuries. As noted above, all Canadian jurisdictions require employers to accommodate workers with disabilities to the point of undue hardship. Both workers and employers have roles to play in ensuring that a disability is accommodated. Employers do not have to implement the accommodation suggested by a worker. Rather, they are obligated to reasonably accommodate the worker. Once an accommodation is established, the worker is obligated to inform the employer if the need for or nature of the required accommodation changes and provide documentation to support such accommodation.

There are a number of ways that employers commonly accommodate disabilities. The duties of worker may be modified so that the worker is able to perform them despite the disability. For example, a warehouse worker with a torn rotator cuff in her shoulder may still perform those parts of their normal duties that do not require lifting, pushing, pulling, or overhead work. A machine operator who develops contact dermatitis on their hands from exposure to chemicals may be assigned to an entirely different job, such as quality checks. Such **modified work** may be permanent or temporary, depending upon changes in the worker's abilities. Accommodating permanent disabilities may also entail retraining workers to perform jobs they are presently unqualified to perform.

Employers may also make **workplace modifications** in order to accommodate disabilities. A common and obvious change is adjusting buildings, equipment (e.g., work stations), and tools to accommodate workers with mobility impairments. Less obvious changes to the workplace including providing nitrile gloves to staff members who are allergic to latex products or adopting scent-free workplace policies to accommodate workers with chemical sensitivities.

10.5 RETURN TO WORK

"Our research shows that if you don't get a worker back within 90 days of their injury, the chances that they ever go back to work drop by 50 per cent," said David Marshall, president and CEO of Ontario's Workplace Safety and Insurance Board, in 2015. [1] Marshall's views are shared by many employers and OHS practitioners who see a **return-to-work** (RTW) program as a way to reintegrate injured workers into the workplace via practices such as modified work. As an added bonus, RTW programs save employers money on their workers' compensation premiums.

Organized labour and injured worker advocates have a different view of RTW, with Ontario Federation of Labour president Sid Ryan calling Marshall "the equivalent of the modern day bounty hunter. His job is to disqualify injured workers from receiving their rightful benefits . . . [His] $400,000 [salary] is his bounty for his work over the last year." Catherine Fenech, of the Ontario Network of Injured Workers Groups, notes "an increase in workers being told the board thinks they can go back to work no matter how badly injured they are." [2]

The final component of disability management consists of programs designed to assist workers in recovering from temporary impairment (such as injuries and illnesses) that cause disabilities. The most common disability recovery program is **sick leave**, which is paid leave designed to help workers recover from short-term illness or injury. Sick leave is so widely available because it is sometimes specifically required by employment standards legislation and generally seen as a reasonable accommodation required by human rights legislation.

Most employers are required to enroll their workers in their provincial or territorial workers' compensation system, which provides wage-loss and other benefits in the event of a work-related injury of illness. Some employers also provide workers with **disability insurance** purchased from a private insurer. Disability insurance benefits provide wage-loss replacement for workers who require a longer period of time away from work for reasons other than a work-related injury. The specifics of disability insurance vary among workplaces and frequently reimburse only a portion of the wages lost.

Modified work may also be used to help workers to recover from a temporary impairment that causes disability. **Work hardening** entails providing a worker with the opportunity to gradually return to work (via increasing hours and work demands) in order to build stamina. Employers may also provide coaching or other forms of support to workers who are returning to work. As noted below, the beliefs underlying these return-to-work strategies and their manner of implementation are the subject of some controversy. Box 10.4 discusses

1. Brennan, R. (2015, January 31). Meet the man injured Ontario workers 'love to hate.' Toronto Star. http://www.thestar.com/news/canada/2015/01/31/meet-the-man-injured-ontario-workers-love-to-hate.html
2. Ibid.

the National Institute of Disability Management and Research, which provides research-based evidence for practitioners.

Credentials in disability management and OHS

The National Institute of Disability Management and Research (NIDMAR) provides education, training, and research focused on the implementation of workplace-based reintegration programs based on research evidence. [3] Recently, NIDMAR has partnered with British Columbia's Pacific Coast University for Workplace Health Sciences to offer programs focusing on disability management and return to work. [4] This partnership builds upon NIDMAR's existing (and very good) professional certifications in disability management and return to work.

Many professions—including doctors, lawyers and architects—are subject to regulation by their respective provincial and territorial governments. Such regulations are generally managed through government-appointed professional regulatory organizations (PROs), such as a provincial law society or college of physicians and surgeons. PROs generally determine the qualifications required for practice, certify practitioners, and investigate misconduct. While performing a valuable regulatory function, PROs can also limit access to a profession. For example, foreign-trained doctors often complain that accreditation requirements prevent them from practising.

Over time, many otherwise unregulated occupations have developed voluntary associations that often provide professional development opportunities for their members. Some associations have also developed voluntary credentials and certifications. The Certified Human Resource Professional (CHRP) and the Canadian Registered Safety Professional (CRSP) accreditations are two examples. Accreditation is typically awarded based upon a combination of work experience, formal education, completing a certification exam, and paying an annual membership fee. Accreditation may also require ongoing professional development. While these accreditations are not required to gain employment, many employers use these credentials as a screening tool.

Accreditation in unregulated professions likely enhances the knowledge of practitioners. Yet it is

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3. For more information about NIDMAR, see: https://www.nidmar.ca

4. For more information about Pacific Coast University, see: http://www.pcu-whs.ca

useful to consider what other functions accreditation serves. Accreditation gives a small group of actors the power to determine what knowledge, skills, and behaviour are considered necessary and appropriate. Those workers who possess accreditation often have increased legitimacy and standing, even if the knowledge they have been accredited as possessing is contested terrain. The professionalization of safety also has subtle and sometimes negative implications for the effectiveness of the IRS. Finally, meeting the requirements of accreditation can pose an occupational barrier to traditionally disadvantaged workers.

As noted above, return-to-work (RTW) programs are designed to reintegrate injured workers into the workplace via practices such as modified work. This approach stands in contrast to the historical practice of having workers stay off work (most often collecting workers' compensation wage-loss benefits) until they are fully recovered. By providing injured workers with modified work, employers are able to reduce the cost of injury borne by workers' compensation claims. In jurisdictions that operate experience-rating programs, reducing workers' compensation claim costs can result in a reduction in an employer's workers compensation premiums. In short, RTW programs can save employers money.

When considering the relationship between injury duration and the likelihood of workers returning to work, it is important to be mindful that more seriously injured workers are likely to both require a longer period of recovery and have a lower chance of ever returning to work. [5] This is a very plausible explanation for why workers who are off work longer may also be less likely to return to work.

There is some evidence that workers with back pain recover more quickly when they remain active. On the surface, this correlation might seem to suggest that RTW can, in fact, be rehabilitative. It is not clear, however, to what degree work is analogous to the more generalized term *activity*. Work differs from other activities (e.g., going for a walk) because it occurs in the context of a power relationship designed to maximize productivity. Consequently, some employers will promise, but not truly provide, suitable modified work. When this occurs, workers face pressure to work in a manner that can be contrary to their medical restrictions, thereby creating the risk of re-injury. [6] More troubling is that there is no evidence to support the notion that activity aids recovery from injuries other than lower back injuries. That is to say, proponents of RTW are not only misstating the benefits of RTW but are also overstating the medical benefits of activity in general.

5. MacEachen, E., Ferrier, S., Kosny, A., & Chambers, L. (2007). A deliberation on 'hurt versus harm' in early-return-to-work policy. Policy and Practice in Health and Safety, 5(2), 41–62.

6. Ibid.

The "Stakeholders" of Disability Management

Employees   Employers   Government   Unions   Medical Practitioners

"The Stakeholders of Disability Management" by Alyssa Giles CC BY-NC-SA 4.0

There are numerous Stakeholders—primarily employers and workers, but also governments, unions, and medical practitioners—involved in disability management and return to work strategies. Each stakeholder brings a unique perspective to the table. It is the job of the employer to ensure the concerns of each stakeholder is taken into account as they seek to manage workplace disabilities and return to work programs, and stakeholders are included in the process.

Additional Resources
Return to Work Flowchart from Workplace Safety and Prevention Services

10.6 SUMMARY

The field of disability management encompasses disability prevention, accommodation, and recovery. A complete disability management program serves to meet employers' statutory obligations to prevent and accommodate disabilities created by occupational health and safety, human rights, and workers' compensation legislation. Such programs can also minimize the cost of injuries and disabilities borne by employers, primarily by returning workers to productive work as quickly as possible.

Check Your Knowledge

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://ecampusontario.pressbooks.pub/cdnhealthsafetyworkplacefundamentals/?p=1186#h5p-1

Discussion Questions

1. What causes an impairment to become a disability? What does this tell us about the role of the workplace in disability management?

2. How can employers meet their duty to accommodate?
3. How can employers work to prevent disabilities in the workplace?
4. What is the part of the employer in a return to work program?
5. Explain undue hardship as it pertains to the duty to accommodate.

Exercise

1. Go online and identify the legislative requirements in your jurisdiction that require employers to accommodate workers with disabilities. In a short essay of 200 words, explain how a worker would go about enforcing those rights in your jurisdiction.
2. Pretend that you are an HR practitioner tasked with developing an accommodation for a warehouse worker based on the following scenario:

   - The worker's job has three components: (1) lifting materials on and off a skid, (2) moving materials around the warehouse using the skid, and (3) recording such movements and performing periodic inventory.
   - The worker is unable to lift materials because of a disability but can perform the other tasks. It is unknown how long the worker will be unable to perform the lifting component.
   - There are five other workers in the warehouse performing the same job. Each warehouse worker performs all three tasks and each is busy all of the time. There is also a supervisor who monitors performance and resolves problems.
   - The injured worker is personally unpopular and there is skepticism among the other workers about whether his disability is real.

Notes:

1 Brennan, R. (2015, January 31). Meet the man injured Ontario workers 'love to hate.' *Toronto Star*. http://www.thestar.com/news/canada/2015/01/31/ meet-the-man-injured-ontario-workers-love-to-hate.html

2 Ibid.

3 Government of Canada. (2011). Fundamentals of disability management. Ottawa: Author. http://www.tbs-sct.gc.ca/psm-fpfm/ve/dee/dmi-igi/funfon/intro-eng.asp

4 Stone, S. (2008). Resisting an illness label: Disability, impairment and illness. In P. Moss & K. Teghtsoonian (Eds.), *Contesting illness: Processes and practice* (pp. 201–217). Toronto: University of Toronto Press.

5 Tompa, E., de Oliveira, C., Dolinschi, R., & Irvin, E. (2008). A systematic review of disability management interventions with economic evaluations. *Journal of Occupational Rehabilitation*, 18(1), 16–26.

6 Manitoba Human Rights Commission. (2010). Reasonable accommodation. http://www.manitobahumanrights.ca/publications/guidelines/ reasonable_accommodation.html

7 Beach, J., Ford, G., & Cherry, N. (2006). Final report: A literature review of the role of alcohol and drugs in contributing to work-related injury. Edmonton: University of Alberta, Department of Public Health Sciences.

8 Ontario Human Rights Commission. (2015). Drug and alcohol testing: Basic principles. Toronto: Author. http://www.ohrc.on.ca/en/policy-drug-andalcohol-testing/drug-and-alcohol-testing-basic-principles

9 *Dionne v. Commission scolaire des Patriotes*, 2014 SCC 3. http://www.canlii. org/en/ca/scc/doc/2014/2014scc33/2014scc33.html

10 Alberta Human Rights Commission. (2013). Interpretative bulletin: Duty to accommodate. Edmonton: Author.

11 For more information about NIDMAR, see: https://www.nidmar.ca

12 For more information about Pacific Coast University, see: http://www.pcuwhs.ca

13 Brennan, R. (2015, January 31). Meet the man injured Ontario workers 'love to hate.'

14 MacEachen, E., Ferrier, S., Kosny, A., & Chambers, L. (2007). A deliberation on 'hurt versus harm' in early-return-to-work policy. *Policy and Practice in Health and Safety*, 5(2), 41–62.

15 Ibid.

16 Ibid.

CHAPTER 11: THE PRACTICE OF HEALTH AND SAFETY

Chapter Outline

11.0 LEARNING OBJECTIVES

Learning Objectives

1. Identify how power in the employment relationship shapes how health and safety are practiced in workplaces.
2. Discuss the practical shortcomings of the Internal Responsibility System.
3. Explain why workers' rights to know, participate, and refuse are considered weak rights.
4. Describe the effects of self-enforcement and weak regulatory enforcement on safety in workplaces.
5. Outline practical steps that can be taken to improve safety in workplaces.

11.1 A CASE STUDY

Story: Andrea MacPhee-Lay

Andrea MacPhee-Lay was a massage therapist at the Fairmont Chateau Lake Louise hotel near Banff, Alberta. The hotel spa provided a range of massage treatments, including a hot-rock treatment where basalt rocks are heated in water to 49 degrees Celsius and strategically placed on the client's back. Ideally, the rocks should be heated in a purpose-built, stone kettle. Fairmont had developed a practice of using two stainless steel roasters filled with hot water.[1] At a staff meeting on September 12, 2012, the Spa Director announced plans to replace the roasters with a household-grade electric Black and Decker grill.

MacPhee-Lay expressed concern about the proposed change, citing a variety of safety concerns, including the risk of the rocks exploding on the dry heat grill and the fact that dry stone heating was not an approved use of the household grill. After the meeting, MacPhee-Lay conducted internet research into using grills for heating basalt rocks. She later presented her findings to the Spa Director, the Lead Therapist, and a worker representative on the JHSC. Over the next few weeks, she repeatedly raised her concerns about the safety of this practice and also sought advice from Alberta Occupational Health and Safety officials.

On September 28, MacPhee-Lay was suspended and on October 1 terminated. No reasons for the termination were provided, although the employer asserted that there were performance issues that warranted termination.

MacPhee-Lay filed an OHS complaint over her dismissal, claiming she was disciplined for acting in compliance with the OHS Act, which requires her to report workplace hazards that pose an imminent danger. The investigating officer dismissed her complaint, finding insufficient evidence to link the

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1. Alberta Occupational Health and Safety Council. (2014). Order: Andrea L. MacPhee-Lay and FHR Lake Louise Operations Corporation. Edmonton: Government of Alberta.

dismissal to the dispute over the grill. MacPhee-Lay appealed the officer's decision to the Alberta Occupational Health and Safety Council, who upheld the decision.

The decision to uphold the officer's ruling was based mostly on technical grounds. Alberta's OHS Act requires a worker to report and refuse unsafe work if the work poses an imminent danger. The Act also protects workers who exercise this right from retaliation. The panel reasoned that the grill, which was not yet in use, did not pose an imminent danger at the time of the refusal. For this reason, MacPhee-Lay's actions were not strictly "in compliance" with the Act and she could not claim protection under the Act. Interestingly, Fairmont eventually decided not to use the grill for hot-rock treatment.

While the facts are complex, this case illustrates how health and safety issues develop differently in practice than they do in textbook examples. In theory, MacPhee-Lay acted appropriately. She expressed concerns about a hazard and conducted research to support them. Yet her employer seems to have fired her for trying to ensure her workplace was safe. In considering this case, we need to recognize that the circumstances of her complaint cannot be disentangled from the dynamics of her employment relationship, which had begun to deteriorate prior to the complaint. We should also be cognizant that she was challenging her employer's ability to implement a new work process, behaviour that employers often suppress by disciplining one worker as an example to the rest.

The case also points out weaknesses in OHS laws and government enforcement activity. MacPhee-Lay's case was not decided on the merits of her safety concern. Neither the OHS officer nor the panel disputed her claims about the grill's safety hazards. Instead, her complaint was dismissed based upon a narrow reading of the Act that produced a procedural loophole the appeal panel used to excuse the employer's conduct. Research suggests that arbitration and labour boards often defer to employers in matters of disciplining workers who refuse unsafe work. [2]

This chapter examines OHS in practice to reveal the ways in which working toward safety in real workplaces is more complex than we might anticipate. It extends our analysis of how power shapes workplace health and safety. It looks at how the internal responsibility system does not work exactly as intended. And it also considers the nature of government OHS enforcement in the 21st century and how it can impede workplace safety. The chapter concludes by offering some practical tips for workers, OHS activists, and safety practitioners about how to improve safety in Canadian workplaces.

2. Harcourt, M., & Harcourt, S. (2000). When can an employee refuse unsafe work and expect to be protected from discipline? Evidence from Canada. ILR Review, 53(4), 684–703.

11.2 REALITIES OF WORKPLACE UNDER CAPITALISM
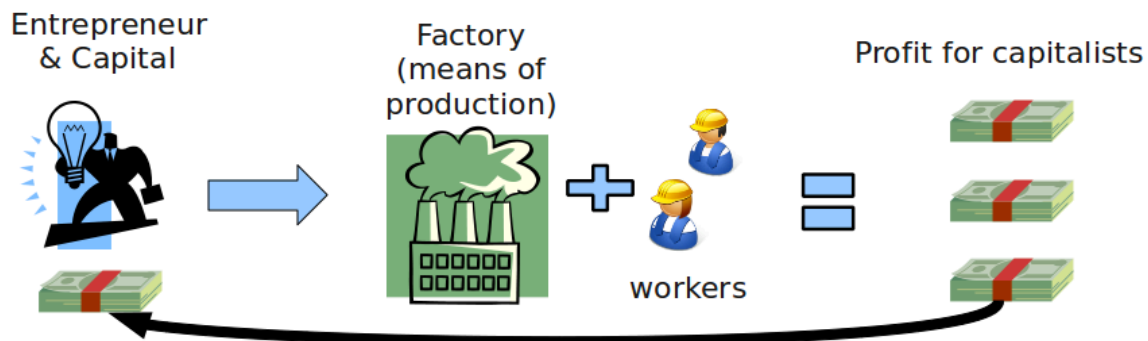
"Graphic depiction of Capitalism" by Rcragun, CC BY 3.0

Throughout this book, we have considered how the power imbalance in Canadian workplaces—an imbalance that favours employers and allows them to advance their interests at the expense of workers' interests—affects OHS policy and practice. We have already discussed many of the mechanisms that benefit employers, from the careless-worker myth to behaviour-based safety. This section extends this analysis to consider how contemporary OHS arrangements developed and how they have slowly eroded the role of workers in workplace safety.

Today, OHS is a highly technical and highly professionalized field. Safety professionals are often extensively trained, and research has improved the effectiveness of hazard recognition, assessment, and control tools. OHS is also a multi-million dollar industry. Employers hire consultants and safety specialists to provide a wide range of services, from training to technical monitoring and control to designing safety systems. Most industries have developed industry safety associations (more on this below), both to offer many of these services and to lobby governments on employers' behalf.

Safety was not always a sophisticated industry. The modern OHS movement arose out of worker activism and (sometimes illegal) workplace action that forced employers and governments to address safety concerns. During the 1960s, a series of wildcat strikes in industrial plants across Canada raised the profile of OHS issues.[1] In the 1970s and 1980s, worker safety activists formed a network that pushed for better hazard control,

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1. Richardson, B., & Newman, D. (1993). Our health is not for sale. Ottawa: National Film Board of Canada.

trained workers to protect their health, and forced legislative change that created the contemporary health and safety regime.[2] Most often the activism was conducted in the face of opposition from both employers and government.[3]

Despite government reluctance to take action on OHS, early government regulators recognized and enacted legislation and enforcement practices designed to mitigate the power imbalance in the workplace. For example, OHS pioneer Robert Sass, who wrote Canada's first OHS legislation (in Saskatchewan) and was the architect of the three worker rights (i.e., the rights to know, participate, and refuse), argued that employer and state resistance to improving workplace safety was driven by the profit imperative of capitalism.[4] This view was consistent with historians' understanding of government and employer safety efforts in the late 19th and early 20th century, which were designed to ensure that unsafe workplaces did not compromise employers' ability to make a profit.[5] It is useful to remind ourselves that the profit imperative is also present, somewhat indirectly, in public and non-profit sector workplaces as well.

Over the last 30 years, the link between OHS and the broader struggle between worker and employer interests in the workplace has been obscured by employer efforts to professionalize safety. Professionalized OHS entails segregating safety issues from the rest of work by transforming OHS into a "neutral" practice of objectively measuring and correcting hazards. Employers benefit from narrowing OHS to a merely technical undertaking because, for example, it allows them to address safety issues with inexpensive (and often inadequate) controls (such as issuing workers PPE) rather than altering the work process to eliminate or at least control workers' exposure to the hazard. This narrow approach has also legitimized employer's cost-benefit analysis in OHS, as discussed in Box 11.1. Overall, this professionalization has rendered invisible the conflicting safety interests of employers and workers.

In professionalized OHS, safety becomes another tool with which the employer can control how the worker will perform their work. Safety becomes a monologue by the employer, rather than the dialogue between workers and employers that was envisioned by Sass and others. The implications of this change are evident in most workplaces across all sectors. There is little discussion between workers and their supervisors about how to control hazards. There is little debate about whether PPE is sufficient or whether something more is required. And the experiences of workers like Andrea MacPhee-Lay tell us what can happen when a worker speaks up about safety.

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2. Storey, R. (2005). Activism and the making of occupational health and safety law in Ontario, 1960s–1980. Policy and Practice in Occupational Health and Safety, 1, 41–68.

3. Storey, R., & Lewchuk, W. (2000). From Dust to DUST to dust: Asbestos and the struggle for worker health and safety at Bendix Automotive. Labour/Le Travail, 45, 103–140.

4. Sass, R. (1986). The workers' right to know, participate and refuse hazardous work: A manifesto right. Journal of Business Ethics, 5(2), 129–136; Sass, R. (1989). The implications of work organization for occupational health policy: The case of Canada. International Journal of Health Services, 19(1), 157–173.

5. Tucker, E. (1990). Administering danger in the workplace: The law and politics of occupational health and safety regulation in Ontario, 1850–1914. Toronto: University of Toronto Press.

The Consequences of cost-benefit analysis in OHS

The Ontario Workplace Safety and Insurance Board (that province's WCB) partnered with the Ontario division of the Canadian Manufacturers & Exporters association to produce a health and safety guidebook for employers, entitled *Business Results through Health and Safety*. The guide makes the economic case for safety:

In 1999 there were over 100,000 lost time injuries and occupational illnesses in Ontario workplaces. Over $2.6 billion (including administrative costs) was paid in compensation claims to injured and ill employees. In addition, indirect costs associated with workplace accidents and illness are conservatively estimated to be at least 4 times the direct costs. Together with direct costs this means there was over a $12 billion drain on Ontario productivity in 1999, and a loss of competitive advantage.[6]

The average workplace lost time injury in Ontario costs over $59,000. Surprised? The average lost time workers compensation claim cost is over $11,771, and other costs add up more quickly than most people realize. Property damage, lost production, manager and supervisor time due to an accident and with the injured person, costs to comply with Ministry of Labour orders, and the employee's lower productivity while on light duty; the source of additional costs is extensive. . . . If your profit margin is 10%, it requires $590,000 in sales to produce $59,000 of profit. . . . A reduction of a lost time injury costing $59,000 has the equivalent profit effect as increasing sales by $590,000 at a 10% profit margin.[7]

These excerpts represent the classic economic argument for health and safety: safety pays. While this argument may persuade some employers to address safety issues, there is an unstated corollary: workplace safety should only be improved when it reduces costs and increases profit. The idea that safety should not be pursued if it costs too much is a pivotally important implication of this cost-benefit approach to OHS.

In this view, safety becomes a commodity that an employer can purchase so long as it has utility. Implied in this reasoning is that some degree of unsafe work is acceptable and that it is

6. Ontario Workplace Safety & Insurance Board & Canadian Manufacturers and Exporters, Ontario Division (2001). Business Results Through Health and Safety. Toronto: WSIB, p. vi.

7. Ibid., p. ix.

an employer's right to decide the level of (un)safety experienced by workers. That OHS—and the human beings that OHS protects—might have intrinsic value is simply ignored in cost-benefit analyses. In this construction of workplace safety, safety is framed as a commodity. This way of conceiving of occupational safety and health . . . reinforces the cognitive tendency to believe individuals make free choices in market transactions, including the choice to work in jobs that have greater safety and health risks. Second, it crowds out the democratic values that led to earlier legislation protecting workers. An economic point of view treats workplace safety and health policy as an issue to be determined using market values, rather than as a matter for democratic deliberation.[8]

Framing health and safety as a way to increase profits may on the surface be an appealing strategy for engaging employers. Yet this cost-benefit approach to OHS also legitimizes danger and ill health and undermines the workers' role in achieving safe workplaces.

Another consequence of professionalized OHS is that the safety role of unions is diminished. When safety is seen as part of the employment relationship, the union has a legitimate role to play in safety (e.g., training workers, inspecting workplaces, raising issues on JHSCs) and safety is a condition of work that can be negotiated. Indeed, many unions appoint or elect a safety representative who engages with the employer to negotiate appropriate safety provisions. When employers outsource OHS to consultants and broadly treat it as a function separate from the work process, the union loses some of its ability to shape workplace safety.

The sidelining of unions is more than just a theoretical labour relations problem. Unions make workplaces safer. Unionized workplaces have lower incident and injury rates than non-union workplaces.[9] Unionized workers are also more likely to hold beliefs—for example, that taking risks is not part of their job—that contribute to safer work practices.[10] Unionized workplaces are safer due to a combination of better training (that teaches workers how to use their safety rights to make the workplace safer[11]), a more formalized process

8. Shapiro, S. (2014). Dying at work: Political discourse and occupational safety and health. Wake Forest Law Review, 49, 831–847, pp. 832–833.

9. Yi, K. H., Cho, H. H. & Kim, J. (2011). An empirical analysis on labor unions and occupational safety and health committees' activity, and their relation to the changes in occupational injury and illness rate. Safety and Health at Work, 2(4), 321–327.

10. Gillena, M., Baltz, D., Gassel, M., Kirsch, L., & Vaccaro, D. (2002). Perceived safety climate, job demands, and coworker support among union and nonunion injured construction workers. Journal of Safety Research, 33(1), 33–51.

11. Hilyer, B., Leviton, L., Overman, L., & Mukherjee, S. (2000). A union-initiated safety training program leads to improved workplace safety. Labour Studies Journal, 24(4), 53–66.

for worker participation (such as safety meetings and JHSCs[12]), and less fear among unionized workers of repercussions for exercising their rights.

The safety effect of unions demonstrates that OHS is most effective when workers are actively engaged in dialogue about safety and empowered to make change. This more democratic approach to safety runs counter to employers' interests in maintaining control over the work process. Thus employers use their greater power in the workplace to shape OHS in ways that diminish workers' roles. The reality of workplace safety under capitalism is that employers and workers want different (and often mutually exclusive) types of OHS, and over the past 30 years employers have slowly been winning this struggle.

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12. Yi, K. H., Cho, H. H., & Kim, J. (2011). An empirical analysis on labor unions and occupational safety and health committees' activity, and their relation to the changes in occupational injury and illness rate. Safety and Health at Work, 2(4), 321–327.

11.3 INTERNAL RESPONSIBILITY SYSTEM IN PRACTICE

The IRS is built upon the premise that employers and workers are jointly responsible for safety and that, by working together, they can make workplaces safer. After almost 40 years of operation, the IRS has not lived up to its potential. While workplaces are safer than they were 40 years ago, particularly when it comes to the dangers posed by physical hazards, workers continue to have little success in exercising their three safety rights and work-related ill health remains largely ignored.

Right to Know

The right of workers to know what hazards they are exposed to in the workplace is a foundational one. Without knowing about workplace hazards, workers cannot meaningfully participate in safety activities or know which

work they ought to refuse as unsafe. In practice, most workers rely upon their employer for safety information.[1] This reality has two consequences. First, whether the worker is informed about a hazard depends on the employer's ability and willingness to provide information. Training has been found to be one of the most effective methods for creating safety awareness and behaviour.[2] Yet, as we saw in Chapter 8, a recent study found that only 1 in 5 Canadian workers received safety training in their first year on a job.[3] In practice, then, employers often don't provide safety information to workers and this employer decision (or, less charitably, this employer strategy) cannot help but hamstring workers' ability to participate and refuse.

Second, the employer controls what information it gives workers and can use this power to highlight (or downplay) certain hazards and control measures. For example, an employer has an interest in focusing attention on hazards that are within the workers' control or that can be controlled by worker vigilance (such as physical hazards) because these hazards are relatively cheap to control. Using this same logic, an employer also has an interest in downplaying hazards that require the employer to take action to control (e.g., workload and shift work, chemical hazards) because these controls are relatively expensive or difficult or challenge their authority to manage. While it is often said that knowledge is power, in OHS, the distribution of knowledge appears to mean that knowledge most often increases employers' power.[4] While unions can counter the employer monopoly on information, union membership is in a slow decline. Further, unions are virtually absent in growing industries, which also happen to employ large numbers of precarious workers.

Right to Participate

The right to participate gives workers a process for addressing safety issues, usually via a JHSC. While JHSCs can be effective at improving safety outcomes, not every worker has access to a JHSC.[5] In most jurisdictions, only employers with more than 10 or 20 employees are required to have JHSCs— meaning about a third of workers have no access to JHSCs—and Alberta and the Territories do not require any employer to have JHSCs. Even if an employer voluntarily creates a JHSC, there are no requirements for equal participation by workers, appropriate investigative powers, or even regular meetings. What this means is that workers at smaller employers, which tend to both employ more vulnerable workers and have higher rates of incidents and injuries, have basically no right to participate.

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1. Walter, V., & Haines, T. (1988). Workers' perceptions, knowledge and responses regarding occupational health and safety: A report on a Canadian study. Social Science & Medicine, 27(11), 1189–1196.

2. Vinodkumar, M., & Bhasib, M. (2010). Safety management practices and safety behaviour: Assessing the mediating role of safety knowledge and motivation. Accident Analysis & Prevention, 42(6), 2082–2093.

3. Smith, P., & Mustard, C. (2007). How many employees receive safety training in their first year of a new job? Injury Prevention, 13, 37–41.

4. Sass, R. (1992). The limits of workplace health and safety reforms in liberal economics. New Solutions, 3(1), 31–40.

5. Lewchuk, W., Robb, L., & Walters, V. (1996). The effectiveness of Bill 70 and Joint Health and Safety Committees in reducing injuries in the workplace: The case of Ontario. Canadian Public Policy, 22(3), 225–243.

In workplaces with JHSCs, the committees often struggle with employers ignoring recommendations, agendas dominated by minutiae and pro forma processes, lack of safety knowledge among committee members, inadequate resources (both time and money), and, not surprisingly, worker disengagement. Non-functioning JHSCs fundamentally limit the right to participate. As we saw in Chapter 2, there are ways workers can improve the effectiveness of JHSCs. These efforts are most likely to be successful in unionized workplaces where the union can train and empower workers. Yet even with the support of a union, workers' efforts to increase the effectiveness of JHSCs can face profound limits if the employer resists and the state refuses to regulate.[6] Even the most effective JHSCs have no ability to compel employers to address unsafe workplaces. Leaving it up to the employer to decide whether and how to address hazards reinforces the greater power of employers in the workplace. Rather than provide workers with a platform from which to assert their rights, JHSCs become a means to channel worker discontent around safety issues into a process that employers can manage and control. Further, some critics of the IRS argue that the creation of a formal structure and location for airing safety grievances delegitimizes other informal forms of worker expression (e.g., on the shop floor, at union meetings) and thus undermines the ability of workers to act outside of the internal responsibility system.[7]

Many recent employer safety initiatives are designed to bypass the traditional IRS processes—particularly in large workplaces. **Safety management systems** are programs that construct goals and performance measures related to safety, often with the assistance of an outside consultant. These systems may engage workers at a rhetorical level (e.g., by involving them in the creation of "value" statements), but mostly they further concentrate control over safety in the hands of employers who set and measure safety targets. Some employers also create workplace wellness systems that promote forms of wellness that financially benefit employers (see Box 11.2). In this way, the growing professionalization of safety also undermines workers' right to participate.

Workplace Wellness Programs

Workplace wellness programs (WWPs) are health and well-being services provided by or through an employer that focus on health promotion and illness prevention. The range of services might include gym memberships, organized physical activities, flu vaccinations, yoga classes, healthy snack food, financial and retirement advice, and health screening. Some

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6. Milgate, M., Innes, E., & O'Loughlin, K. (2002). Examining the effectiveness of health and safety committees and representatives: A review. Work: A Journal of Prevention, Assessment and Rehabilitation, 19(3), 281–290; Walters, D. (1996). Trade unions and the effectiveness of worker representation in health and safety in Britain. International Journal of Health Services, 26(4), 625–641.

7. Barnetson, B. (2010). The political economy of workplace injury in Canada. Edmonton: Athabasca University Press.

employers also include in WWPs the services found in employee assistance programs (EAPs). As we read in Chapter 10, EAPs include employer-sponsored psychological counselling services for employees and their family members experiencing personal or mental health issues. WWPs have gained popularity in recent years.

WWPs are not subject to any government regulations. Employers are often motivated to implement a comprehensive WWP in order "to reduce health insurance claims, increase their bottom-line and increase productivity."[8] Other reasons include improving corporate image, employee recruitment and retention, and employee engagement. The logic underlying a WWP is that improving the overall health of employees means the rates of illness, absenteeism, and presenteeism (i.e., being present but not productive) will decline, triggering a reduction in benefit plan premiums and an increase in productivity. There is a strong evidence that WWPs improve productivity and generate cost savings through reduced absenteeism and lower health insurance costs.[9] WWPs are also linked to increased job satisfaction and employee engagement.[10] Some employers and WWP providers also argue that WWPs increase workplace safety by drawing attention to issues of health. There is little data to support the position that WWPs lead to fewer incidents and injuries in the workplace.

The benefits for a WWP for workers are less clear. Employers make no effort to track the health outcomes of workers through these programs, so data suggesting that participants experience less stress and better health is not reliable.[11] Most workers simply do not participate in WWPs. Research suggests that low participation rates reflect that WWPs do not offer the services that workers desire. Indeed, some researchers suggest organizations would be better off improving supervisory practices and employee treatment—changes that would substantively benefit workers- than offering flu shots or yoga classes.[12]

WWPs are another example of how employers have sought to increase their influence in OHS and thereby subvert the joint nature of the IRS. In WWPs, employers tend to encourage activities

8. Morrison, E., & MacKinnon, N. (2008). Workplace wellness programs in Canada: An exploration of key issues. Healthcare Management Forum, 21(1), 26–32.

9. Baicker, K., Cutler, D., & Song, Z. (2010). Workplace wellness programs can generate savings. Health Affairs, 29(2), 304–311; Mattke, S., et al. (2013). Workplace Wellness Programs Study: Final Report. Pittsburgh: Rand Corporation.

10. Parks, K., & Steelman, L. (2008). Organizational wellness programs: A metaanalysis. Journal of Occupational Health Psychology, 13(1), 58–68.

11. McCarthy, G., Almeida, S., & Ahrens, J. (2011). Understanding employ wellbeing practices in Australian organizations. International Journal of Health, Wellness and Society, 1(1), 181–197.

12. Spence, G. (2015). Workplace wellbeing programs: If you build it they may NOT come. . . .because it's not what they really need! International Journal of Wellbeing, 5(2), 109–124.

that focus on changing workers' personal behaviour. While these changes are likely positive, this focus reinforces the notion that health and safety begins (and ends) with workers. It is also an extension of the cost-benefit model of health and safety, as WWPs are justified mostly on the grounds of profit and productivity.

Right to Refuse

The right to refuse at first seems to be the strongest worker safety right. Indeed, the right to refuse represents one of the few times when a worker can legally disobey his or her employer (by refusing to perform dangerous work). In practice, though, refusing unsafe work has turned out to be a weak right. Three factors have undermined the power of the right to refuse. First, most legislation and its interpretation have narrowed the instances when workers can legally refuse. They cannot refuse simply because a hazard exists. There must be some degree of immediacy to the risk of injury, which effectively precludes refusing work on the basis that the work puts the worker at risk of occupational disease. Also, the danger must not be "normal" for the worker's occupation. These restrictions make refusing unsafe work difficult for many workers.

Second, the rules around the right to refuse only require the employer to investigate the refusal and preclude the employer from punishing the worker for their refusal. No other action is required. Employers are allowed to assign a different worker to perform the same task. Or the employer can make minor changes to reduce the risk just enough that the worker will agree to do the task. Or they can do nothing at all and say everything is fine. If the worker continues to refuse, the resolution process is lengthy and legalistic. Further, pursuing the matter requires the worker to confront their employer, possibly over a period of weeks, in a direct manner that can be intimidating for many and, as Andrea MacPhee-Lay found out, can end in termination.

As a result, workers rarely invoke the right to refuse. One of the few studies examining the frequency of refusals found that only 1% of Ontario workers used their legislative right to refuse.[13] Workers are more likely to refuse in a unionized setting, where additional protections from employer retaliation are present. In most workplaces, instead of formally refusing unsafe work, workers are more likely to adopt informal methods to avoid dangerous situations, including quietly altering the work process or pace of work, refusing overtime, calling in sick, or requesting a transfer.[14] Workers' reluctance to engage in a direct confrontation with their employer over safety matters reflects the third factor undermining the right to refuse: employment

13. Walters, V., & Haines, T. (1988). Workers' use and knowledge of the internal responsibility system: Limits to participation in occupational health and safety. *Canadian Public Policy, 14*(4), 411–423.

14. Gray, G. (2002). A socio-legal ethnography of the right to refuse dangerous work. *Studies in Law, Politics and Society, 24*, 133–169.

is a relationship of power, and workers' three safety rights do not adequately mitigate employers' greater power in the workplace such that workers can protect themselves. A recent study found that one third of Ontario workers expected that raising a health and safety concern would have a negative affect their future employment. The percentage was even higher among racialized workers and among workers facing a high degree of precarity.[15]

This discussion suggests the IRS is not very effective at protecting workers' safety. This conclusion is consistent with the large number of workplace injuries in Canada each year. Some workers are able to increase the effectiveness of the IRS via unionization, but the most vulnerable workers (such as women, racialized workers, youth and precarious workers—groups whose memberships often overlap) are less unionized and thus receive little (or no) protection from the IRS.

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15. Lewchuk, W. (2013). The limits of voice: Are workers afraid to express their health and safety rights? Osgoode Hall Law Journal, 50, 789–812.

11.4 ENFORCEMENT

Photo by an unknown creator, CC0

The other cornerstone of the modern OHS regime is government regulation and enforcement. Government legislation is intended to complement the IRS by establishing safety standards and practices and intervening in cases when employers fail to meet them. Essentially, state enforcement is designed to address instances where the IRS system fails to result in safe workplaces. In practice, OHS enforcement has evolved to reinforce the employer-dominated IRS rather than regulate its operation.

Governments mostly rely upon **complaint-driven enforcement** wherein workplace inspections are triggered by individual complaints or in response to incidents (i.e., a serious injury or fatality). Complaint-based investigations may at times be supplemented by **targeted inspections** of specific industries (e.g., residential construction) or working situations (e.g., employers of migrant workers). Complaint-based enforcement has been adopted due to the limited resources allocated to OHS inspections relative to the

number of employers in the jurisdiction. For example, in 2008, Alberta had 84 OHS inspectors to cover 144,000 employers.[1]

The primary goal of workplace inspections is to achieve compliance with the OHS legislation. When a violation is found, a compliance order is normally issued that requires the employer to remedy the violation within a set timeline. (One exception to this norm is that stop-work orders are sometimes issued if the violation poses imminent danger of harm.) Given the limited budgets allocated to OHS inspection, a follow-up inspection may occur weeks later or not at all.

Research finds that inspections are up to 10 times more likely to occur in industrial and other so-called traditionally dangerous worksites (e.g., manufacturing, construction, mining) than other industries (e.g., education, health care, office environments). Forestry workers are 20 times more likely to be the subject of an inspection than nurses, despite the significant hazards faced by nurses (e.g., physical hazards associated with lifting, violence, exposure to biological hazards).[2] Further, the vast majority of inspections are conducted during regular business hours (Monday to Friday, 9 to 5).[3]

An important consequence of the lack of resources, use of compliance orders, and the tendency to prioritize inspections of male-dominated, blue-collar workplaces is that OHS enforcement in Canada is both uneven and scarce. The vast majority of workplaces are never inspected. Even workplaces known for non-compliance are likely to be inspected no more than once or twice a year. In practical terms, employers face almost no risk of being caught violating OHS laws and, if they do, they face almost no risk of being punished. In this way, OHS enforcement allows employers significant opportunity to violate OHS rules, rather than pressuring employers to address safety issues through IRS. The present approach to enforcement also ignores the changing nature of work by continuing to focus on traditional workplaces. Workers in the service industries or working non-traditional hours are largely ignored. These workers are more likely to be women, racialized workers, youth, and precarious workers. They are also more likely to be working for small employers. The present regulatory structure was not built with these workers, workplaces, or working conditions in mind and, not surprisingly, does a poor job regulating them.

While OHS enforcement has changed over time, most of these changes have eroded the effectiveness of the system. In comparison to today, OHS enforcement in the 1970s and 1980s was more active: governments

1. Government of Alberta. (2008). Report to the Minister of Justice and Attorney General: Public Fatality Inquiry. Okotoks: Justice and Attorney General.
2. Barnetson, B. (2010).
3. Ibid.

conducted more inspections, laid more charges, and achieved more convictions than they do today.[4] The move away from active enforcement was caused by pushback from employers, who were unhappy with practices such as unannounced inspections, prosecutions, increased workers' compensation premiums, and a growing list of **prescriptive regulations**, which stipulated specific requirements an employer must meet (e.g., standards for fall protection equipment).

In response, governments changed the roles that government, employers, and workers play in enforcement. While the details of this shift differ between jurisdictions, there is a clear pattern across Canada away from enforcement and toward education and collaboration. Governments conduct fewer unannounced inspections, implement intermediary steps before issuing compliance orders, and conduct fewer inspections and prosecutions overall. Employer groups have been given a larger role in drafting of regulations, which has shifted OHS from prescriptive regulations toward **performance-based regulation**, which identifies desired outcomes and leaves the specifics of how to achieve them to the employer.

Industry safety associations (ISAs), bodies formed by employers in an industry to deliver safety services and advocate on behalf of the employers on safety issues, have also achieved greater influence. ISAs have become more involved in establishing regulatory standards and delivering training and education to workers. In some jurisdictions, ISAs have been authorized to conduct **workplace safety audits** to determine eligibility for safety incentives, such as workers' compensation premium reductions. Audits differ from inspections in that they do not identify hazards or non-compliance with regulations. Instead, audits assess whether a workplace has an appropriate safety system in place to deal with safety matters. They evaluate the quality of paper flows and communications systems, the presence of training and safety manuals, and whether appropriate paperwork is completed. Employers prefer audits to inspections, as audits are educative in nature rather than punitive.

Proponents of this shift (including employers, industry associations, safety professionals, and right-wing governments) assert that cooperation is a more effective way to achieve employer compliance. This assertion sits uncomfortably with the actual result of the partnership approach: employers have increased their control over safety in their workplaces and increased their influence over government policy. Research has shown that so-called **tripartite consultations**, which involve government, employers, and labour as equal partners at a table to discuss OHS issues, reproduce power imbalances and provide a structural advantage to employers in determining the shape of new safety regulations.[5] The partnerships model of OHS works in concert with the professionalization of OHS to remove safety issues from the work floor, where workers are active agents, and place them in boardrooms, where workers become passive recipients of negotiated agreements between employers and governments.

4. Tucker, E. (2003). Diverging trends in worker health and safety protection and participation in Canada, 1985–2000. Relations Industrielles/ Industrial Relations, 58(3), 395–426.

5. Foster, J. (2011). Talking ourselves to death? The prospects for social dialogue in North America—Lessons from Alberta. Labor Studies Journal, 36(2), 288–306.

The two sawmill explosions in British Columbia in 2012 (detailed in Chapters 1 and 9) help us understand the perils (for workers) of overly close relations between employers and the state. Shortly after the Babine sawmill blew up, an internal WorkSafeBC memo identified expected employer pushback as a reason to delay additional enforcement focused on reducing the risk of wood dust explosions:

- *Industry sensitivity to the issue given the recent event and limited clarity around what constitutes an explosion could lead to push back if an enforcement strategy is pursued at this time.*[6]

Roughly 20 days later, the Lakeland mill exploded—due to wood dust accumulation. In effect, government concern about employer interests delayed enforcement action that might have saved workers' lives. Box 11.3 examines how Alberta's shift toward a partnership model set the stage for the regulatory capture of provincial OHS enforcement by employers. Overall, government decisions to shift away from active OHS enforcement in favour of collaborating with employers have profoundly undermined an important bulwark for workers against the power of the employers in the workplaces and further weakened the IRS.

OHS partnerships and the risk of regulatory capture

In the mid-1990s, the province of Alberta was the first jurisdiction to move away from a more active approach to OHS enforcement to a collaborative, self-enforcement model. A 1997 strategic plan laid out the core elements of Alberta's so-called Partnerships approach to OHS and repudiates an active regulation and enforcement model:
Partnerships is based on the premise that more can be achieved through a cooperative, collaborative approach than by a one-sided, dictatorial or interventionist approach. Partnerships strives to promote a culture of increased proactive health and safety attitudes and behaviour in the workplace. These cannot be legislated![7]

The framework emphasizes government and industry "working in harmony with one another to ensure continuity."[8] The role of government is to facilitate "dialogue and consensus building amongst Partners." The framework also shifts the nature of enforcement, indicating the government "enforces regulatory standards through voluntary compliance."[9] Workers are not

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6. Neilsen, M. (2015, October 15). WorkSafeBC memo a reason for inquiry into sawmill blasts, union says. Prince George Citizen. http://www.princegeorgecitizen.com/news/local-news/worksafebc- memo-a-reason-for-inquiry-into-sawmill-blasts-union-says-1.2082588

7. Government of Alberta. (1997). Partnerships Strategic Plan. Edmonton: Alberta Labour, p. 1.

8. Ibid., p. 7.

9. Ibid., p. 9.

identified as one of the partners, and the role of unions in the framework is to "collaborate" with employers, government, and other partners. At the heart of this approach is a government commitment to not proceed with policy changes without the agreement of employers.

Some critics suggest that the partnership model has, over time, contributed to Alberta's OHS system being "captured" by employer interests. Regulatory capture occurs when a state agency designed to act in the public interest instead acts to advance the interests of an important stakeholder group in the sector that its regulates. Under a situation of regulatory capture, the dominant stakeholder group can use the captured regulator to impose costs on other stakeholders, even if such costs are contrary to the public interest. Captured regulators may see themselves as partners of the captors they are supposed to regulate and may even find themselves financed by that group.[10]

There is ample evidence to suggest that regulatory capture occurred in Alberta's OHS system under the Partnerships framework. The evidence includes the government:

- ineffectively regulating workplace safety
- being reliant on employer funding of regulatory activity (through workers' compensation premiums)
- allowing employers preferential access to policy making
- enacting policies that reward the appearance of safety rather than safety itself (through the Certificate of Recognition program that awards WCB premium rebates based on safety audits)
- promulgating a narrative that blames another stakeholder (i.e., workers) for workplace injuries[11]

While the framework has shifted slightly over the years, the core principles remain operative and Partnerships still guides the Alberta government's approach to OHS. In particular, the COR remains a central feature of the framework and regulatory change is created through consensus of the partners.

10. Shapiro, S. (2012). The complexity of regulatory capture: Diagnosis, causality and remediation. Roger Williams University Law Review, 17(1), 221–257.

11. Barnetson, B. (2015). Worker safety in Alberta: Trading health for profit. In M. Shrivastava & L. Stefanick (Eds.), Alberta oil and the decline of democracy in Canada (pp. 225–248). Edmonton: Athabasca University Press.

How to get things done

Given the above discussion, one might be forgiven for being pessimistic about the prospects for safer and healthier workplaces. The shortcomings of the current OHS system are significant. Nevertheless, we should not lose sight of the fact that workplaces today are, in some ways, safer than they were 40 years ago and there is a higher degree of awareness of safety issues in the workplace. This suggests that it is possible for committed individuals (and groups of individuals) to make positive change in workplaces and in policy—even if the extent and speed of those changes is constrained by unfavourable circumstances.

Historically, workers made advances in health and safety when, armed with information, they mobilized collectively and politically.[12] While this mobilization was not sustained when OHS energies were channelled into the structures and processes of the IRS regime, this history is informative. Specifically, it identifies the components of effective OHS advocacy, for workers, OHS activists, and safety professionals:

1. **Education and information**: Research has shown that, when workers are armed with information about the hazards they face and options for controlling them, they act upon this knowledge to the degree to which they are able.

2. **Increasing power**: Power in the workplace is essential to ensuring accurate and complete information is available and that workers can meaningfully act upon it. By recognizing the importance of power in OHS, we acknowledge that OHS advocacy must extend beyond technical arguments about safety and requires political action to create power.

3. **Using the IRS**: While the IRS has many shortcomings, effective advocates learn how to work within the IRS system as it exists and then supplement those actions with pressure from outside the system (e.g., via government enforcement, outside expertise, mobilization of workers)

Alan Hall and his colleagues have studied what makes worker representatives effective in OHS matters.[13] Their research has identified three types of OHS activists:

1. **Technical-legal representatives** are well-informed workers who immerse themselves in the technical and legal aspects of OHS and perform those functions well. These workers typically act as if OHS is divorced from other labour-management issues and see their job as working with the employer to achieve solutions cooperatively.

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12. Storey, R., & Tucker, E. (2005). All that is solid melts into air: Worker participation in health and safety regulation in Ontario, 1970–2000. In V. Mogensen (Ed.), Worker safety under siege: Labor capital, and the politics of workplace safety in a deregulated world (pp. 157–186). Armonk, NY: M. E. Sharpe.

13. Hall, A., Forrest A., Sears, A., & Carlan, N. (2006). Making a difference: Knowledge activism and worker representation in joint OHS committees. Relations Industrielle/Industrial Relations, 61(3), 408–436.

2. **Politically-active representatives**, by contrast, understand well the power relations at work and see OHS as just another field of conflict with the employer. These workers tend to dismiss the importance of research and accurate information. As a result, while they are willing to engage the employer on OHS issues, they do not bring an independent source of information to their argument.

3. **Knowledge-active representatives** are thought to be the most effective activists because they recognize the political nature of OHS but also actively pursue independent and autonomous information to bolster both their legitimacy and their capacity to challenge the employer. They are also likely to equally divide their time between IRS-related activities (i.e., attending JHSC meetings, conducting inspections) and political activities (i.e., educating and mobilizing workers, engaging government enforcement).[14] Box 11.4 provides a more detailed description of knowledge-active representatives.

> ### *Qualities of a knowledge-active OHS representative*
>
> Hall and his collaborators have found the effective knowledge-active representatives tend to display the following qualities and behaviours:
>
> - Actively seek out independent knowledge about OHS through personal research, often on their own time.
> - Use the knowledge to strategically and tactically achieve change.
> - Actively spread their knowledge by training and teaching other workers.
> - Recognize that effectiveness depends upon being known as a reliable "knower" of health and safety issues.
> - Recognize that not all hazards are self-evident or easily recognized.
> - Present management with alternative solutions.
> - Recognize that change can and must be achieved outside the formal IRS structures, but that they must also work within those structures to increase effectiveness.
> - Work on both small and big issues. Believe that technical and legal issues cannot be ignored, but that real change occurs when advocates push for larger-scale change in the workplace.
>
> The significance of this research is that being effective in advocating for health and safety change

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14. Hall, A., Oudyk, J., King, A., Naqvi, S. & Lewchuk, W. (2015). Identifying knowledge activism in worker health and safety representation: A cluster analysis. American Journal of Industrial Medicine (Online First, July 23). doi: 10.1002/ajim.22520

requires a high degree of knowledge, strategy, tactics, and determination. This may seem like a daunting task, but workers have historically exhibited those qualities—both in the workplace and in their everyday lives.

This analysis suggests some practical ways in which a person (or group) can increase the effectiveness of OHS efforts. Workers who have access to a JHSC (or other OHS venue in their workplace) can improve safety by ensuring the worker representatives are informed and engaged. Safety practitioners and managers can improve JHSCs effectiveness by ensuring employer representatives are senior enough to have influence over how the organization responds to safety concerns. In addition, all actors can ensure there are clear meeting agendas, minutes, and timelines that are communicated to all workers, ongoing training of JHSC members, and that the members of the JHSC get out of the meeting room and regularly inspect the workplace and interact with workers.[15]

Increasing workers' input into (or autonomy over) training enhances workers' knowledge of workplace hazards and control strategies. This undermines the employer's ability to shape hazard identification and control through limiting what workers know. Allowing worker involvement may also result in training that is more engaging to participants and recognizes the varied motives workers have for participating in it. Worker-oriented training might also draw attention to psycho-social hazards in the workplace or the health effects of employment practices.

While OHS legislation and regulation have value, workers' experience with the IRS is that it is not adequate to protect them or guarantee safe and healthy workplaces. One strategy for building upon the IRS is to entrench stronger levels of OHS protections in collective agreements and company policies. These protections might include enhanced participation rights, greater protection for refusals, and protection from reprisals. Similarly, OHS rights and obligations—such as conducting and publishing hazard assessments every time work processes change—can be incorporated into work routines. As part of this process, workers might encourage (or pressure) their employer to adopt the precautionary principle. For example, they might create an expectation that no new chemicals or processes will be introduced until the employer can demonstrate that the chemicals or processes do not create a hazard.

Workers, OHS activists, and safety practitioners also need to take steps to generate power.

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15. Workers' Health and Safety Centre. (1998). *Occupational Health and Safety: A Training Manual* (3rd ed.). Toronto: Author.

Power can come from one's position. For example, an employer can delegate responsibility for safety to a safety professional and workers can elect a safety representative. Power can also come from knowledge and expertise. Moral authority—the capacity to convince others of the rightness (or wrongness) of certain decisions—can also be a source of power that can be derived from compelling arguments and a past record of principled behaviour.

Finally, workers and OHS activists can draw upon political and economic power derived from collective action. We usually think of unions as the vehicle by which workers act collectively. For some workers, joining a union may well be a pathway to healthier and safer workplaces. Yet workers should be mindful of the history of OHS wherein change has come from groups of workers acting outside of established organizations—engaging in political lobbying, public demonstrations, and wildcat strikes. While trade unions can be a source of valuable resources, access to those resources often comes with an expectation that workers will act within the IRS. Given the limitations of the IRS, gaining union support may reduce the capacity of some workers to effect health and safety change.

Workers who cannot or do not want to join a union may rely on legal challenges to seek legislation that better protects their right to health. This right is found both within the *Canadian Charter of Rights and Freedoms* and the *International Covenant on Economic, Social and Cultural Rights* (which itself builds upon a more general right articulated in the *Universal Declaration of Human Rights*: "Everyone has the right to work, to just and favourable conditions of work and to protection against unemployment").[16] Such legal strategies, while appealing, move conflict into the courts—yet another venue dominated by the employers and governments.

In the end, workers and OHS activists may well end up back where they began—cooperating with one another by sharing information, pooling resources, and politically agitating for safer workplaces. This is a lonely and dangerous path because, in capitalist economies, there is no necessary link between the interests of workers and employers around occupational health and safety. Defying the will of the employer and the state is risky. Yet perhaps better this risk (with its prospect of safer and healthier workplaces) than the certain risk of allowing employers to organize work as it suits their interests.

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16. United Nations. (1948). Universal Declaration of Human Rights. Geneva: United Nations; United Nations. (1966). International Covenant on Economic, Social and Cultural Rights. Geneva: United Nations.

11.5 SUMMARY

The irony of Alison MacPhee-Lay's case discussed at the beginning of the chapter is that she might have won her complaint had she waited until the grill proposal was implemented. If customers were in the room and she was required to use it, she may have been able to invoke her right to refuse— although no one can be sure whether that hazard would have been deemed an "imminent danger." This case highlights one of the shortcomings of Canada's health and safety system: it prioritizes procedural issues (i.e., did the worker refuse correctly) over substantive ones (i.e., was there a legitimate OHS hazard).

The current OHS regime was intended to empower workers to advocate for their own health and safety. Instead, it has entrenched employer power to control the work process. Workers do advocate for their own interests, but they often do it in spite of the system rather than because of it. The system has become highly technical and specialized, separating the issues from the people who are most affected by them—workers. The evolution of the system is best understood within a context of capitalism and the ways in which employers under capitalism act to further their interests.

Nevertheless, change is always possible in any system. Existing processes and structures in the safety regime can be utilized to make change. Advocates must also step outside the formal structures to force change from the outside. It is the combination of strategic engagement with the structures and mobilization of workers that will ultimately make workers safer.

Discussion Questions

1. How does the practice of OHS differ from the intention of its designers in the 1970s? Why?
2. What features of IRS have led to the reproduction of the power imbalance in the workplace?
3. What factors led to changes in how governments enforce OHS regulations in Canada
4. What are the key features of an effective OHS advocate?

Exercises

1. Reread the case of 15-year-old Andrew James at the beginning of Chapter 3 and write 150-word answers to the following questions:

    - What hazards were present at the worksite?
    - How would you prioritize the identified hazards?
    - What controls should have been implemented?

1. Compare your answers to those you wrote when you did the exercise at the end of Chapter 3. How have your answers changed after reading the rest of the textbook? What practical steps would you take to try to implement change at that workplace?
2. Consider your workplace, or a workplace you are familiar with, and write 150-word answers to the following questions:

- Which aspects of IRS are functioning properly?
- Where are areas for improvement?
- Identify five ways in which you would improve the practice of health and safety at that workplace.

CHAPTER 12: WHMIS 2015

<div style="border">

Chapter Outline

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12.0 LEARNING OBJECTIVES

Learning Objectives

1. Explain the three elements that make up WHMIS 2015
2. Identify the pictograms associated with product labels
3. Describe the difference between a workplace label and a supplier label

12.1 AN INTRODUCTION TO WHMIS 2015

As part of the workplace safety program, employers are responsible for ensuring their workers are protected from hazardous products, previously referred to as controlled products. WHMIS, or the Workplace Hazardous Materials Information System, is designed to protect workers from the health effects of exposure to hazardous products.

Globally, there has been a move to align all hazardous product legislation to create uniformity. As such, the GHS, or the Globally Harmonized System of Classification and Labelling of Chemicals, was created to support such uniformity. In 2015, Canada updated its WHMIS legislation to what is known as WHMIS 2015 to align with GHS. Throughout this chapter, we will review the three elements of WHMIS 2015, look at hazard classification and the transportation of dangerous goods. Take the time to complete this activity that highlights the transition to WHMIS 2015.

GHS and Transition to WHMIS 2015

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://ecampusontario.pressbooks.pub/cdnhealthsafetyworkplacefundamentals/?p=1690#h5p-11

12.2 HAZARDS GROUPS, CLASSES AND CATEGORIES

Within WHMIS 2015, there are two types of hazard groups; physical and health hazards. Additionally, these two hazard groups are further broken down into hazard classes and hazard categories.

Hazard Classes

Within each group, there are classes which are essentially groupings of like chemicals. There are 19 classes of chemicals within the physical hazards group and 12 classes of chemicals within the health hazard group. Review the Hazard Class provided by the Canadian Centre of Occupational Health and Safety.

Hazard Categories

Each hazard class contains a hazard category. A **hazard category** identifies the severity of hazard and tells us just how hazardous the product is. Although each hazard class contains a minimum of one hazard category, it is possible for a hazard class to contain numerous hazard categories.

Hazard Groups Drag-the-Words Activity

An interactive H5P element has been excluded from this version of the text. You can view it online here:

https://ecampusontario.pressbooks.pub/cdnhealthsafetyworkplacefundamentals/?p=1692#h5p-6

12.3 THE THREE ELEMENTS OF WHMIS 2015

There are three essential elements that make up WHMIS 2015.

      (a) Labels

      (b) Safety Data Sheets

      (c) Education and Training

Let's explore each of these elements individually to fully understand their importance for your workplace safety program.

Labels

The first element of WHMIS 2015 focuses on the label attached to a hazardous product. There are two types of labels in WHMIS 2015. The supplier label is affixed to the hazardous product by the supplier prior to the product arriving at the workplace. The workplace label is affixed to the hazardous product if the original supplier label falls off, or if a worker decants the product into a new container.

See the poster by the Canadian Centre for Occupational Health and Safety to review the required content of a supplier label and a workplace label. In addition, below you will find a WHMIS label activity you can complete to assist with your understanding of hazardous product labels.

Workplace Label Drag the Words Activity

An interactive H5P element has been excluded from this version of the text. You can view it online here:

https://ecampusontario.pressbooks.pub/cdnhealthsafetyworkplacefundamentals/?p=1694#h5p-7

Pictograms are graphics that help the worker to instantly recognize the type of hazardous product they are working with and the immediate hazard, such as a corrosive material. Pictograms can be found on the safety data sheet, or on the supplier label attached to the hazardous product.

WHMIS 2015 consists of 10 pictograms. Review the pictogram poster from the Canadian Centre for Occupational Health and Safety as it highlights all 10 pictograms every worker needs to be familiar with.

Signal Words

Every label is to contain a Signal Word.

- "Danger " and "Warning" are the two signal words used to emphasize hazards.
- The appropriate signal word, "Warning" or "Danger", is determined based on the hazard classification of the product."[1]

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1. Health Canada.(2016, June 29). Information Elements Required on a WHMIS 2015 Label.https://www.canada.ca/en/health-canada/services/environmental-workplace-health/occupational-health-safety/workplace-hazardous-materials-information-system/whmis-2015/labelling-chemicals-workplace-chemicals/new-hazardous-products-regulations-requirements/information-elements-required-whmis-2015-label-health-canada.html

Safety Data Sheets (SDS)

The second element of WHMIS 2015 focuses on Safety Data Sheets. Before a supplier ships a hazardous product to a workplace, they are responsible for attaching a Safety Data Sheet. Once received by the workplace, the employer must make the new data sheet available to all workers 24 hours a day, 7 days a week, in an accessible area. This might include a hard copy of the data sheet in a binder and/or an electronic copy of the data sheet on an accessible computer.

Each safety data sheet consists of 16 sections, and in Canada, the safety data sheet must be available to workers in both English and French. Review the handout from the Canadian Centre for Occupational Health and Safety which details the 16 sections of the safety data sheet.

Education and Training

"Education and Training" by rawpixel.com, CC0

The third element of WHMIS 2015 is education and training. Whether it is an existing employee or a new hire, everyone must have WHMIS 2015 training. Equally important is the training record. Every employer must

ensure they can quickly and easily access training records for all safety training programs, including WHMIS 2015. These records may be required by a court, a government agency, workers compensation, an inspector, or the joint health and safety committee to name a few.

During the WHMIS 2015 training session, it is important to instruct workers on the location of the Safety Data Sheets (SDS), and how to read the data sheet as it contains important first aid, usage and storage instructions. In addition, workers need to know how to read a workplace and a supplier label. Should an employee decant a hazardous product from a labelled container into a new container, the individual must immediately advise their supervisor so a workplace label can be created and attached to the new container. Lastly, every worker must understand the WHMIS 2015 pictograms so they can recognize the type of risk they are handling.

12.4 ROUTES OF ENTRY

Workers may not think about the ways in which a hazardous product could enter their body. There are four routes of entry: inhalation, ingestion, absorption and injection. Review the information provided by the Canadian Centre for Occupational Health and Safety (CCOHS) on the 4 routes of entry.

How Chemicals Enter The Body

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://ecampusontario.pressbooks.pub/cdnhealthsafetyworkplacefundamentals/?p=1696#h5p-10

12.5 ROLES AND RESPONSIBILITIES

In WHMIS 2015, the supplier, the employer and the employee each have specific roles and responsibilities that support keeping workers safe while handling a hazardous product. Let's review each role individually as it is meant to support the Internal Responsibility System.

The Supplier

The supplier is responsible for correctly categorizing the product they supply to the customer, and if it is found to be a hazardous material, the supplier must attach a supplier label to the product and provide the customer with a Safety Data Sheet (SDS).

The Employer

As with most safety legislation, the employer has specific requirements under WHMIS 2015. If a hazardous product is used in the workplace, the employer is required to:

- Educate and train workers on the hazards and safe use of products.
- Ensure that hazardous products are properly labelled.
- Prepare workplace labels, as needed.
- Prepare SDSs, as necessary (e.g., if an employer manufactures a hazardous product that is used on-site).
- Provide access to up-to-date SDSs to workers.
- Ensure appropriate control measures are in place to protect the health and safety of workers.[1]

The Employee

As workers are part of the Internal Responsibility System (IRS), they have responsibilities under WHMIS 2015. Some of the workers responsibilities include participating in training sessions, wearing the provided personal protective equipment when working with hazardous products and reporting any containers that are missing labels to their supervisor.

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1. WHMIS 2015 - General, OSH Answers Fact Sheets, Canadian Centre for Occupational Health and Safety (CCOHS).

12.6 TRANSPORTATION OF DANGEROUS GOODS

While WHMIS 2015 addresses the handling of hazardous products in the workplace, it does not cover the transportation of dangerous goods. Specific legislation, know as the *Transportation of Dangerous Goods Act* is designed to address the movement of dangerous goods from one location to another. As stated by the Canadian Centre for Occupational Health and Safety (CCOHS), "The purpose of the Transportation of

Dangerous Goods (TDG) Act and Regulations is to promote public safety when dangerous goods are being handled, offered for transport or transported by road, rail, air, or water (marine)." [1]

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1. Transportation of Dangerous Goods (TDG) - Overview, OSH Answers Fact Sheets , Canadian Centre for Occupational Health and Safety (CCOHS).

12.7 SUMMARY

If an employer is to ensure an employee's "right to know" as describe in occupational health and safety legislation, WHMIS 2015 knowledge is an important part of that responsibility. An employee must be informed of the hazardous products they are working with, how to handle them, the PPE to be worn around them, how to store them, and the first aid to be administered in case of a workplace incident. WHMIS 2015 must be a part of every new employee onboarding session and part of every employee's ongoing safety training.

KNOWLEDGE CHECK

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://ecampusontario.pressbooks.pub/cdnhealthsafetyworkplacefundamentals/?p=1702#h5p-9

Discussion Questions

1. What is the difference between a workplace label and a supplier label?
2. Explain the three elements that make up WHMIS 2015.
3. What are the four routes of entry for a hazardous product to enter your body?
4. What is the responsibility of the employer and the employee under WHMIS 2015?

5. What does GHS stand for and why did Canada update their WHMIS legislation to include GHS?

Exercise

1. Imagine you have 3 new hires starting work next week. Create an outline for your new hire safety orientation training session that includes everything a new worker needs to know about WHMIS 2015.

GLOSSARY

Acoustic trauma

Negative health effects caused by short, intense exposure to noise, usually of high frequency.

Act

Law passed by the federal Parliament or a provincial or territorial legislature.

Acute (or short-term) fatigue

Fatigue caused by failure to get adequate sleep in the period before a work shift.

Acute stressors

Time-specific events of high-intensity, short duration and infrequent occurrence, such as a performance review, a car accident or unexpected encounter.

Acute toxicity

The immediate harm caused by exposure to a chemical substance.

Administrative controls

A form of hazard control that entails changes to work process, policies, training, or rules designed to reduce exposure to hazards.

Alcohol testing

Measuring the amount of alcohol in a worker's breath or blood to determine impairment.

Area monitoring

Measuring the level of a hazard in a geographic space.

arises-and-occurs test

A test used by a workers' compensation board to assess whether an injury claim is compensable. To meet this test, an injury must arise from and occur during the course of a worker's employment.

Bacteria

Microscopic organisms that live in soil, water, organic matter, or the bodies of plants and animals.

Balance of probabilities test

A standard of proof wherein a proposition is deemed to be true if is it more likely to be true than not based upon the evidence at hand.

behaviour based safety

An approach to OHS that views the workplace as a venue of measurable behaviour that can be shaped via feedback to prevent injuries.

Behaviour-based safety

An approach to OHS that views the workplace as a venue of measurable behaviour that can be shaped via feedback to prevent injuries.

Behaviourism

A learning theory that asserts that attaching rewards and punishments to specific worker actions can shape how workers behave.

Biological hazards

Workplace hazards potentially giving rise to injuries caused by organisms—such as bacteria, molds, funguses—or the products of organisms that harm human health.

bona fide occupational requirement

A rule or requirement necessary for the proper performance of a job, which can prevail even if it causes otherwise prohibited discrimination.

Bullying

Repeated actions or verbal comments that lead to mental harm, isolation, or humiliation of a worker (or group), often with the intent to wield power over them.

Catastrophic stressors

A subset of acute stress, but differing in their intensity, threatening life, safety, or property.

chemical hazards

Workplace hazards potentially giving rise to injuries caused by a chemical substance that harms human tissue or interferes with normal physiological functioning.

Chronic fatigue syndrome

An ongoing, severe feeling of tiredness not relieved by sleep.

Chronic toxicity

Harm caused by exposure to a substance that manifests itself over a longer period of time.

Circadian rhythms

The daily (24-hour) cycles our body follows to ensure high activity during the day and low activity at night.

Collective liability

One of the Meredith principles underlying workers' compensation, stating that the cost of injury is shared among all employers in an industry.

complaint-driven enforcement

A policy wherein workplace inspections are triggered by individual complaints or in response to incidents (i.e., a serious injury or fatality).

compressed workweeks

An arrangement wherein workers work longer each day to reduce the number of days per week (or month) that they are required to work.

Consequences

The severity of injury/ill health that will result from an incident.

Control along the path

An approach to hazard control that addresses the hazard at some point between its source and when workers encounter the hazard.

Control at the source

An approach to hazard control that prevents the hazard from entering the workplace via elimination, substitution, or some type of engineering controls.

Control at the worker

An approach to hazard control that controls the hazard only after it reaches the worker.

cost-benefit approach

An approach to injury prevention that compares the cost of an injury with the cost of injury prevention.

dermatitis

Irritation of the skin that often begins with a rash and can lead to severe itching, burning, flaking, cracking, blistering, and bleeding.

disability

The condition of being unable to perform a function or task as a consequence of a physical or mental impairment.

disability insurance

Private insurance benefits providing wage-loss replacement for workers who require a longer period of time away from work than can be accommodated under sick leave provisions and that is required for reasons other than a work-related injury.

Disability management

A set of employer practices designed to prevent or reduce workplace disability and help workers to recover normal functioning as quickly and to the maximum degree possible.

domino theory

An accident analysis model premised on five factors (background, personal defects, unsafe acts and conditions, incident, and injury), the elimination of any one resulting in the prevention of an incident.

dose

The amount of a chemical that enters the body.

Due diligence

Standard of conduct wherein employers take every reasonable precaution to ensure safety.

Duration

The length of time a worker is exposed to a phenomenon.

duty to accommodate

Employers' legal obligation to alter work, work practices, or the workplace to the point of undue hardship in order to allow workers with disabilities to perform meaningful work.

Elimination

A form of hazard control that removes the hazard from the worksite.

Emergencies

A sudden event that poses a hazard to workers' health and safety and requires immediate action.

emotional-labour

Work requiring workers to regulate their emotions to meet organizationally defined rules and to display the required emotions to customers.

employee assistance program

Employer-funded access to short-term psychological counselling to help employees to cope with personal problems.

employment standards

An act that sets out minimum terms and conditions of employment for a jurisdiction, such as maximum hours of work and required rest breaks. Sometimes called labour standards.

Employment Strain Model

A holistic model of how employment uncertainty, effort, and support affect precarious workers' health.

Employment Strain Model (ESM)

A holistic model of how employment uncertainty, effort, and support affect precarious workers' health.

Engineering controls

A form of hazard control that entails modifications to the workplace, equipment, materials, or work processes that reduce workers' exposure to hazards.

epidemiologist

Scientists who study the patterns and causes of illness and disease in the population.

Episodic (or daily) stressors

Events similar to acute stressors, but occurring more frequently, having a longer duration, and often of lower intensity.

Ergonomic hazards

Workplace hazards potentially giving rise to injuries caused by the interaction of work design and the human body.

Ergonomics

The study of how workers and the work environment interact.

Exposure

How often or regularly workers come in contact with the hazard.

Extended work hours

Hour of work beyond 8 or 12 in a single day.

false negatives

Concluding that no difference or relationship exists when it does.

fatality benefits

Benefits paid by a workers' compensation board to the dependents of a worker who has died. These can include funeral costs and wage-loss benefits.

Fatigue

The state of feeling tired, weary, or sleepy caused by insufficient sleep, prolonged mental or physical work, or extended periods of stress or anxiety.

flexible work arrangements

Altering the normal hours of work in order to accommodate the needs of workers.

Frequency

The vibration of the medium through which energy moves.

gaming

Behaviour whereby an employer maximizes the return it receives from the experience-rating system by means other than improving safety.

hand-arm vibration

A form of segmental vibration affecting a worker's hands and arms, often caused by gripping power tools.

hazard

is anything that might harm, damage, or adversely affect any person or thing under certain conditions at work.

hazard assessment

The process of determining which of identified hazards need to be addressed most urgently.

hazard category

identifies the severity of hazard and tells us just how hazardous the product is.

hazard control

Implementing corrective measures to eliminate or mitigate the effect of a hazard.

Hazard recognition

The systematic act of identifying all hazards present, or potentially present, in a workplace.

Hazard Recognition, Assessment and Control

The process of identifying, prioritizing, and eliminating or mitigating workplace hazards.

Hazard recognition, assessment, and contro

The process of identifying, prioritizing, and eliminating or mitigating workplace hazards.

heat stroke

A health effect caused by a body becoming too hot.

human rights legislation

An act prohibiting discrimination on the basis of protected grounds (e.g., disability, age, gender, race).

hypothermia

A health effect caused by a body becoming too cold.

impairment

A cognitive or physical difference that, in a specific context, may give rise to a disability.

Incident investigations

The process of determining what caused an incident and identifying ways of preventing its recurrence.

incident report

A written document outlining the findings of an incident investigation, including recommendations for preventing future incidents.

index case

The first case that indicates the outbreak of a disease.

Industry safety associations

Bodies formed by employers in an industry to deliver safety services and advocate on behalf of the employers on safety issues.

Instructional Design

The process of systematically developing training to meet particular goals and objectives.

internal responsibility system

System of shared responsibility for occupational health and safety.

investigation kit

A collection of materials, including a process, forms, and recording equipment designed to assist in an incident investigation.

Ionizing radiation

Radiation with enough strength to remove electrons from a molecule as it passes through, such as x-rays, gamma rays, alpha particles, and neutrons.

Job design

Decisions employers make about what tasks will be performed by workers and how that work will be performed.

job sharing

An arrangement wherein two workers share a single position, each working some portion of the otherwise full-time job.

Joint health and safety committees

Committees comprising both worker and management representatives responsible for enhancing workplace health and safety.

jurisdictions

Geographic district or industry sector which is subject to the authority of the federal Parliament or a provincial or territorial legislature.

latency period

The time between exposure and the development of symptoms from that exposure.

Learning

The process of acquiring knowledge and skills that can lead to behavioural change.

learning theories

Conceptual frameworks that describe how learners absorb, process, and retain information.

lethal concentration

The amount of a substance in the air or water required to cause death.

lethal dose

The amount of a substance required to cause death upon ingestion, thereby quantifying a substance's acute toxicity and allowing us to compare the toxicity of substances.

lethal-concentration

The amount of a substance in the air or water required to cause death.

Local toxicity

Reaction to a toxic substance reaction at the point of contact.

location of the control

An approach to hazard control focusing on where and when the hazard is controlled in the context of where the worker is in the production process.

Loudness

The amount of energy that is being transported through the medium.

management rights

The right of an employer to manage and direct the operation of a business bound only by limits set out in law and contract.

Medical benefits

Benefits paid by a workers' compensation board to cover the costs of treating an injury, thereby relieving workers and the taxpayer-funded health care system of these costs.

medical monitoring

Measuring the presence of a chemical or its metabolic residue in a worker's blood, body fluids, or tissues.

modified work

An altered set of duties and responsibilities that a worker is able to perform despite an injury or disability.

needs assessment

A process to determine what kind of training is required to meet organizational goals.

Negative reinforcement

Removing undesirable stimulus when a worker demonstrates a desired behaviour, in order to elicit further instances of the desired behaviour.

No fault

One of the Meredith principles underlying workers' compensation, stating that who caused the injury is not a factor in the awarding of compensation.

Noise

Sound energy transmitted by small air-pressure changes caused by the vibration of molecules.

Non-ionizing radiation

Radiation without enough strength to remove electrons from a molecule as it passes through but which may cause other effects, and includes microwaves, radio waves and ultraviolet, visible, and infrared light.

Organizational goals

The outcome(s) an organization expects to realize from training.

Pandemics

performance-based regulation

Regulations that identify desired outcomes and leave the specifics of how to achieve them to the employer.

personal monitoring

Measuring the dose experienced by a worker.

Personal protective equipment

A form of hazard control that comprises equipment worn by workers designed to protect the workers should they come into contact with a hazard.

physical hazard

Workplace hazards potentially giving rise to injuries typically (but not always) caused by a transfer of energy that result in an injury.

Physical hazards

Workplace hazards potentially giving rise to injuries typically (but not always) caused by a transfer of energy that result in an injury.

political-economy approach

A way of looking at workplace injury that emphasizes issues of power and financial gain.

Positive reinforcement

Rewarding a worker when the worker demonstrates a desired behaviour, in order to elicit further instances of the desired behaviour.

post-traumatic stress disorder

Ill health typically brought on by a terrifying event, with symptoms including flashbacks, severe anxiety, and uncontrollable thoughts about the event.

Precarious employment

Paid work characterized by limited social benefits and statutory entitlements, job insecurity, and low wages and associated with a high risk of ill health.

precautionary principle

The position that responsibility to establish that the activity will not (or is very unlikely to) cause harm falls to the proponent.

prescriptive regulations

Regulations that stipulate specific requirements an employer must meet (e.g., standards for fall protection equipment).

Pressures, Disorganization and Regulatory Failure (PDR) model

A model that explains the increased health and safety risks associated with precarious employment as the result of precarity's effects on the workplace structure and practice.

presumptive status

Instances where a workers' injury is assumed to have arisen and occurred in the course of work unless proven otherwise.

Probability

The likelihood that the hazard will result in an incident.

production process

The steps required to complete work.

prosecute

Court proceedings regarding the violation of a law.

Proximate cause

The event that is immediately responsible for the injury.

Psycho-social hazards

Workplace hazards potentially giving rise to injuries caused by the social environment and psychological factors in the workplace.

Radiation

Energy emitted from a source, including heat, light, x-rays, microwaves, and other waves and particles.

re-enactment

Recreating the events of an incident to provide a deeper understanding of what happened and why it happened.

reasonably practicable

Precautions that are not only possible but are also suitable or rational, given the particular situation.

regulation

A rule made by a federal, provincial, or territorial cabinet, cabinet minister, or other public body under the authority of an act and having the force of law.

rem

A standard measure of radiation.

return to work

Programs designed to reintegrate injured workers into the workplace via practices such as modified work.

return-to-work

Programs designed to reintegrate injured workers into the workplace via practices such as modified work.

Right to know

Workers' right to be apprised of workplace hazards under the internal responsibility system.

Right to participate

Workers' right to engage in workplace health and safety activities (often through joint health and safety committees) under the internal responsibility system.

Right to refuse

Workers' right to decline to undertake unsafe work under the internal responsibility system.

Risk

Likelihood that a hazard will result in injury/ill health.

risk assessment

Quantifying the likelihood of injury/ill health by assessing the probability, consequences, and exposure posed by the hazards.

Root cause

The ultimate or "real" cause of an injury.

routes of entry

The four ways chemicals can get into a workers' body: inhalation, ingestion, skin absorption, and skin penetration.

safety data sheets

Information about hazardous material handling that employers must provide under the Workplace Hazardous Materials Information System.

Safety management systems

Programs that construct goals and performance measures related to safety, often with the assistance of an outside consultant.

safety orientations

Training for new workers that addresses workplace hazards, emergency procedures, PPE training, policies, and job-specific OHS

Segmental vibration

When part of a worker's body experiences shaking due to contact with the vibration.

sick leave

Paid leave designed to help workers recover from short-term illness or injury.

Social Cognition theory

A learning theory that asserts that learning occurs through observation and imitation and thus through formal and informal interactions with others.

standard employment relationship (SER)

Employment characterized by full-time permanent employment with a single employer.

stop-work order

An order made by a government occupational health and safety inspector that requires work to stop until a workplace hazard is remediated.

Substitution

A form of hazard control that involves replacing something that produces a hazard with something that does not.

Swiss cheese model

A variation of the domino theory of accident analysis which identifies four subfactors (organizational influences, local working conditions, unsafe acts, and defences, barriers, and safeguards) that influence whether an incident occurs or not.

synergistically

An increase in an effect (e.g., toxicity) caused by two chemicals interacting.

Systemic toxicity

Reaction to a toxic substance at a point in the body other than the point of contact.

targeted inspections

Identifying specific industries (e.g., residential construction) or working situations (e.g., employers of migrant workers) for additional inspection activity.

task analysis

Mapping out the flow of work to allow for a systematic examination of how a job is supposed to be conducted.

technical approach

A way of looking at workplace injury that emphasizes the mechanism(s) of injury.

temperature homeostasis

Maintaining a core body temperature at about 37 degrees Celsius.

thermal comfort

The condition in which a person wearing normal clothing feels neither too cold nor too warm.

thermal stress

Stress produced when temperature extremes prevent our bodies from properly self-regulating to maintain temperature homeostasis.

time-loss injuries

Accepted workers' compensation claims where a worker could not report to work due to the injury.

Time-weighted average

A measure of loudness that factors in the frequency of the noise.

Toxic workplaces

Workplaces characterized by relentless demands, extreme pressure, and brutal ruthlessness and representing the extreme of stressful workplace environments.

toxicity

The ability of a substance to cause injury.

Training

Teaching a worker knowledge, skills, or behaviours with the expectation that the worker will apply that training in ways that reduce the risk of a workplace injury.

training methods

The strategies and techniques used to meet training objectives.

Training objectives

What the worker is expected to know or be able to do or how they will act as a consequence of the training, often expressed as some level of acceptable post-training performance.

tripartite consultations

Policy discussions involving representatives of government, employers, and labour.

undue hardship

The point at which an accommodation is economically unsustainable, interferes with a legitimate operational requirement, or poses a health-and-safety threat.

vaccinations

An administrative control that can reduce worker susceptibility to viruses through inoculation.

Validity

The results of a scientific experiment or observation accurately reflect the real world.

Vibration

The oscillating movement of a particle around its stationary reference position.

Vocational rehabilitation benefits

Programs and other benefits provided by a workers' compensation board to increase the probability of an injured worker returning to employment.

Wage-loss benefits

Benefits paid by a workers' compensation board to workers whose income is reduced by an injury.

walk-through

A preliminary step in an incident investigation designed to provide a basic overview of the incident and assist investigators to determine what future investigative steps are appropriate.

web of rules

The interlocking set of laws that limit employers' right to manage.

Whole-body vibration

When a worker's entire body experiences shaking due to contact with the vibration.

Work hardening

Providing a worker with the opportunity to gradually return to work (via increasing hours and work demands) in order to build stamina.

workers' compensation

The system within a jurisdiction providing injured workers with wage-loss, vocational rehabilitation, medical, and fatality benefits.

workers' compensation boards

A government agency established by the legislature of a province or territory that operates that jurisdiction's workers' compensation system.

Working alone

A situation where a worker is performing tasks out of contact with persons capable of offering assistance in case of emergency.

Workplace harassment

Behaviour aimed at an individual (or group) that is belittling or threatening in nature.

workplace hazard

Any source of potential injury or illness in a workplace, including objects, processes, contexts, people, or sets of circumstances.

Workplace Hazardous Materials Information System

A national system that requires the labelling of hazardous materials.

workplace injury

Any form of ill health—such as a physical or mental injury or illness—that arises due to a worker's employment.

workplace modifications

Alterations to work processes or the workplace in order to accommodate a worker's disabilities.

workplace safety audits

An assessment of whether a workplace has an appropriate safety system in place to deal with safety matters.

Workplace violence

Any act in which a person is abused, threatened, intimidated, or assaulted in his or her employment.

workplace wellness programs

Health and well-being services provided by or through the employer that focus on health promotion and illness prevention.

worksite inspections

An examination of a worksite by a government inspector to ensure compliance with occupational health and safety requirements.

VERSIONING HISTORY

This page provides a record of edits and changes made to this book since its initial publication. Whenever edits or updates are made in the text, we provide a record and description of those changes here. If the change is minor, the version number increases by 0.1. If the edits involve a number of changes, the version number increases to the next full number.

The files posted alongside this book always reflect the most recent version.

Version	Date	Change	Affected Web Page
1.0	14 June 2022	First Publication	N/A