Queensland Health

Fatigue risk management systems

Implementation guideline QH-GDL-401-3.3:2021

Queensland Government

Contents

1 Introduction

1.1 About this guideline

This guideline has been developed to support all Queensland Health workplaces to identify and manage fatigue risks. It draws on lessons learnt from over a decade of implementing fatigue risk management systems (FRMSs) in Queensland Hospital and Health Services (HHSs) and from proven approaches to safety risk management.

In Queensland, the *Work Health and Safety Act 2011* (WHS Act) is the instrument that regulates safety in workplaces. It imposes specific duties on a 'person conducting a business or undertaking' (PCBU) including a duty to ensure 'so far as reasonably practicable' that workers are not put at risk from work carried out by the business.

The WHS Act also imposes specific duties on a worker whilst at work. Workers must take 'reasonable care' for their own and others health and safety and comply so far as 'reasonably able' with any reasonable instruction given by the PCBU.

This guideline is designed to provide information to all levels of the organisation to empower everyone to champion fatigue management. It outlines procedures and processes to be developed by each accountability area to mitigate fatigue risk and to operationalise the Queensland Health Health safety and wellbeing management system (SMS).

Historical context

In January 2002, 10 year old Elise Neville attended a Queensland Health hospital emergency department with a head injury after having fallen from a bunkbed. She was examined by a doctor working the twentieth hour of a 24-hour shift and was subsequently sent home. Although it was not immediately identified, Elise had suffered an extradural haematoma and timely and appropriate treatment was not provided. Elise died some days later.

An investigation by the Queensland Ombudsman (2006) found that one of the contributing factors to Elise's death was fatigue caused by long hours of work. As a result, the Ombudsman recommended that actions be taken by Queensland Health to manage fatigue risks in its medical workforce.

In response Queensland Health embarked on a major project to address fatigue in the medical workforce. The "Alert Doctors Strategy" project undertook case studies of a number of individual departments and whole facilities leading to the implementation of fatigue risk management strategies suitable to each unique work environment. The case studies provided great organisational insights that informed the development of a resource pack and policy for managing fatigue in the medical workforce. The policy now applies to all employees and complements the overarching Queensland Health *Health safety and wellbeing management system*.

Principles for managing fatigue

- A shared approach between the organisation and workers
- A sound risk management approach through the application of the Defences in Depth model for fatigue risk management
- A systemic approach that is incorporated into core business operations
- An aware and informed workforce approach
- An integrated approach that achieves consistency with existing health, safety and wellbeing management systems

Adoption of the advice in this guideline will help to manage fatigue-related risk, improve worker health and well-being and reduce fatigue hazards and fatigue-related workplace incidents. It will also support regulatory compliance.

This guideline provides a basic framework and the core elements to assist in the design, implementation and ongoing evaluation of an FRMS. It provides guidance on the key elements of the system and suggests risk control measures.

The guideline applies the principles outlined in the Fatigue risk management policy – I1 (QH-POL-171) and supports integration with other safety systems, principally the Queensland Health *Health, safety and wellbeing management system* (SMS).

This guideline is designed to be used throughout Queensland Health to support implementation of local fatigue risk management systems.

Throughout this resource specific terms are used to describe aspects of fatigue and fatigue risk management systems. These terms are defined in section 10 of the guideline.

Additional sources of information and assistance

While this guideline provides the foundations to build and operate an FRMS, a range of other resources should be drawn upon for the day-to-day operation of an FRMS.

Scientific research continues to uncover new information not only about the impacts of fatigue, but also about control measures, work design factors and safety management and wellbeing in general.

In recent years, individual discipline-based journals have acknowledged fatigue as a factor that influences health, safety and wellbeing, workplace productivity and the delivery of quality health care.

Within Queensland Health a range of additional and interrelated resources and support is available. A comprehensive list is provided in section 9 of this guideline.

2 Defining fatigue

What is fatigue?

Fatigue is a state of impaired physical and/or mental performance and lowered alertness arising as a result or combination of physical and mental work, health and psychosocial factors or inadequate restorative sleep. (Schutte 2009)

It is a decreased capacity for physical and/or mental activity resulting from imbalances of the resources required to perform the activity (Aaronson et al. 1999).

Fatigue can result from shift work, travel, driving to remote locations, crises and disaster events as well as non-work-related situations. It does not discriminate and can impact everyone from senior executives through to junior clinical and non-clinical staff. In almost each situation fatigue results from long work hours and lack of quality sleep.

A body of scientific evidence has clearly demonstrated the relationship between fatigue and performance degradation including:

- a decrease in cognitive function and task performance
- increases in error and accident rates
- a reduction in safety.

Fatigue can lead to wide-ranging forms of impaired performance and can have negative impacts on both the delivery of health care and the health, safety and well-being of individuals.

Causes and consequences

Fatigue is a common and unavoidable by-product of 24-hour delivery of patient care. Working in shifts is heavily relied upon to deliver health services. Consequently, fatigue tends to impact shift-workers and is often perceived to be attributed only to shift work. This perception is founded because humans are diurnal in nature, meaning that they have evolved to be awake during the day and sleep during the night. This diurnal sleep-wake pattern is entrenched in our circadian rhythm, our 24-hour body clock. The very nature of shift work disrupts the circadian rhythm and effects a range of behaviours and conditions which in turn affect a person's physiological and psychological state. If not managed, this disruption can lead to accidents, injuries and chronic disease. The potential health impacts of shift work are depicted in Figure 1.

It is however important to note that many other work-related and personal factors can also contribute to fatigue (Figure 2). These include:

- workplace stressors such as demanding or high-pressure roles or tasks
- inadequate breaks between shifts
- medical conditions or illness
- non-work factors such as family commitments, lifestyle, diet, financial or relationship difficulties and some medications.

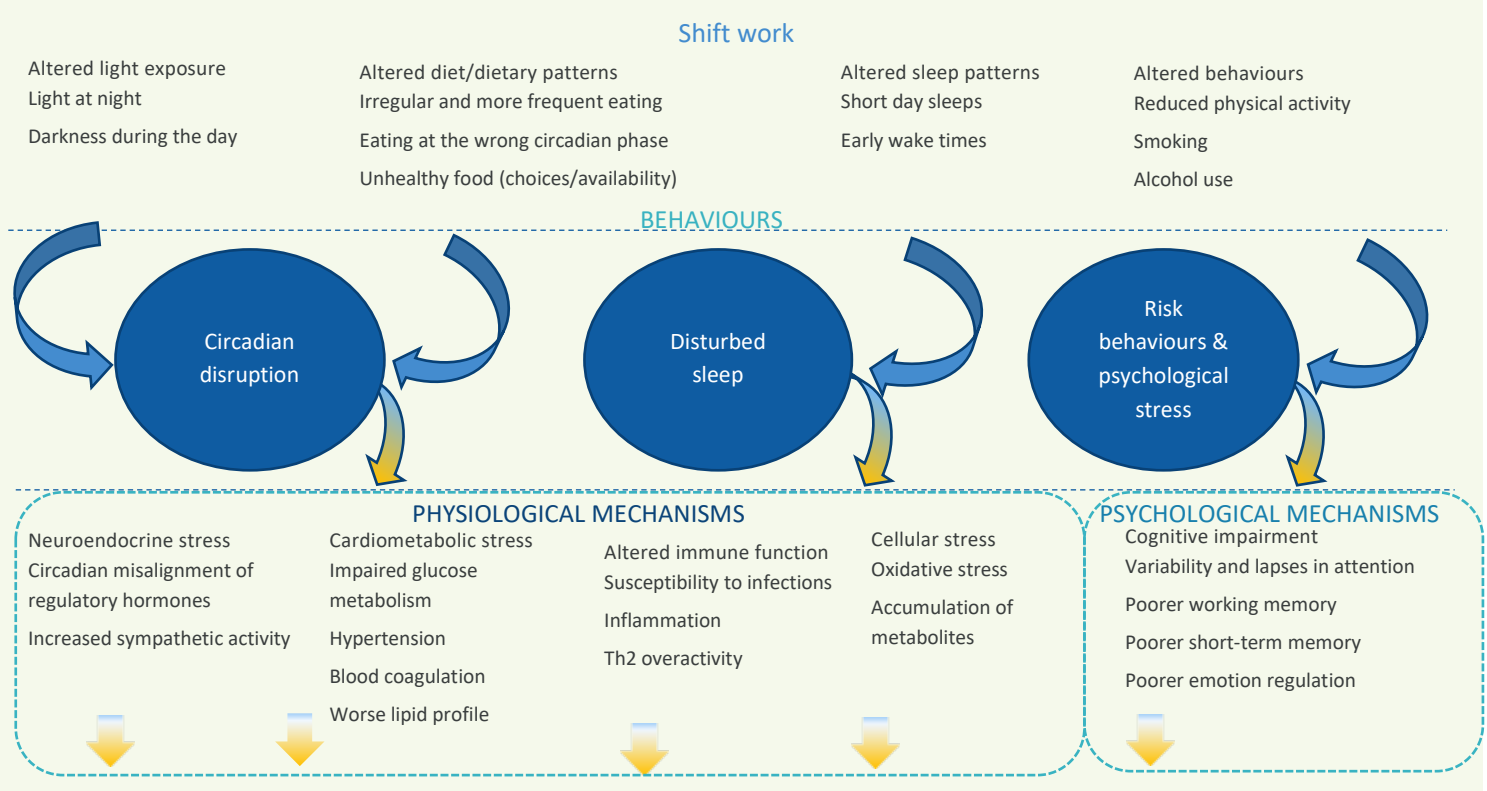

Figure 1: Pathways by which shift-work may increase illness and injury risk (adapted from Kecklund & Axelsson 2016)

Sleep and fatigue – meeting our basic physiological needs

Among our most basic needs is the need for rest. More specifically, sleep is a basic physiological need, alongside hydration, nutrition and other essential processes that support life. To highlight the detrimental effects of insufficient sleep, recent research indicates sleep is necessary to remove waste products from the brain and that a lack of sleep may be a risk factor for the development of Alzheimer's disease (Komaroff 2021).

Sleep is fundamental to health and wellbeing and disruption to our normal sleep requirements has both short term and long-term impacts.

All human adults require approximately seven to nine hours of sleep per night. Research has demonstrated that sleep disturbances whether due to work-related factors such as shift work or personal factors such as sleep apnoea, can result in impaired performance and loss of productivity (Rosekind et al. 2010).

Figure 2: Fatigue risk factors

3 Fatigue risk management elements

3.1 Overview

The FRMS is a framework and set of formal processes designed to systematically identify areas where fatigue poses a risk and effectively the risk through appropriate control measures. The FRMS tailors the principles of a systems-thinking approach typically applied in health safety and wellbeing management systems to fatigue risk management. Central to successful implementation of a risk management system is:

- planning
- commitment
- consultation
- clarity of roles and responsibilities
- documentation
- monitoring and evaluation
- review

Queensland Health's Health safety and wellbeing management system (SMS) consists of a policy and seven associated standards which give regard to these matters. Implementation of the standards is supported by guidelines and other resources. The standards outline the minimum requirements for each of the SMS elements.

Accountability areas across Queensland Health are responsible for developing local documentation, procedures and processes to ensure the requirements of the SMS are met.

FRMS system elements

The FRMS consists of six key elements that collectively are a means by which to monitor and manage fatigue-related risk based on data, operational knowledge and scientific evidence.

- Governance structure - Good governance requires commitment from a range of persons including the executive, directors, line managers and supervisors and the individual members of the workforce. The establishment of a local working group or similar (e.g. the accountability area's HSW committee) to oversee fatigue-related risk management is an important aspect of the governance structure.
- Planning – Planning for fatigue risk management takes into account criteria such as the context of the organisation, relevant stakeholders and how data and information can be gathered to identify areas of risk and assess the level of risk. Planning processes should consider also how best to integrate actions into existing business and processes.
- Fatigue risk management - Understanding where fatigue-related risks are present is central to the FRMS. The risk assessment process identifies where fatigue-related risk is highest by considering a range of factors including hours of work, the type of work and the number of people likely to be affected. The fatigue risk assessment also considers existing measures used to manage fatigue-related risks and whether they are adequate. Risk mitigation should be guided by the **Defences in**

depth model which is discussed in greater detail in section 4 of this guideline. The policies, practices and procedures both at a local level and system wide also are control measures at each level of the framework.

- Incident management – Reporting of and responding to incidents is important for understanding where risk may be emerging or to prompt risk reassessment or evaluation of existing control measures. It is also necessary to be able to investigate the cause and effect of the incident and implement additional or alternative risk mitigation measures.
- Monitoring and assurance - Monitoring the effectiveness of controls and the outcomes of fatigue risk management are important aspects of the FRMS and should be incorporated into each accountability area's safety assurance framework. Monitoring is usually data-driven and relies on accurate reporting systems and well-designed performance indicators (PIs). Monitoring also presents an opportunity for review and evaluation of controls and to consult with the workforce on the effectiveness of strategies implemented. This also assures workers that the PCBU regards that their safety and wellbeing is important. It also demonstrates that the organisation is meeting its health, safety and wellbeing obligations.
- Safety promotion – Consultation is essential for obtaining information about potential issues and suggestions for suitable risk treatments. Training, education and instruction are all important for communicating information about fatigue-related risks to workers and to keep them informed about management strategies and individual and organisational responsibilities. Training and education are also important control measures.

SMS framework	FRMS framework
Health, safety and wellbeing policy	Fatigue risk management policy
Governance standard	Governance structure
Planning standard	Planning for fatigue risk management
Risk management standard	Fatigue risk management
Incident response standard	Incident management
Monitoring, evaluation and performance review standard	Monitoring and assurance
Consultation standard	Safety promotion and planning for fatigue risk management

Table 1: Comparison of the SMS and FRMS frameworks

Key elements of the FRMS align with the SMS (Table 1) and development of local processes and associated documentation should give regard to the overarching SMS in place. Implementation of the FRMS framework supports compliance with the SMS framework.

4 Fatigue risk management system implementation

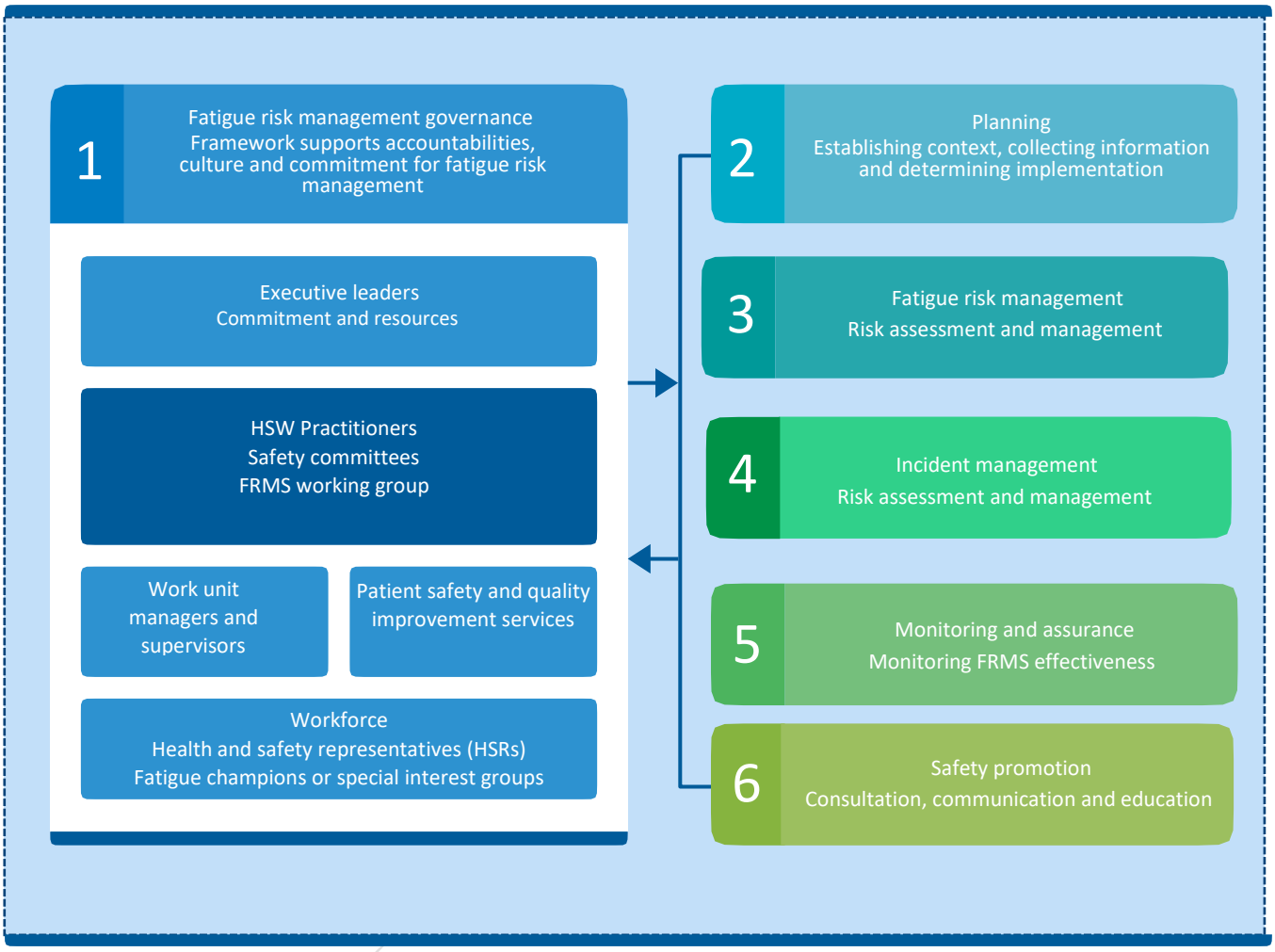

Figure 3: The FRMS framework

4.1 Governance

Accountability areas are responsible for ensuring that fatigue risks are effectively managed so as not to compromise the safety and wellbeing of workers, patients and others. The Fatigue risk management policy – I1 (QH-POL-171) sets out roles and responsibilities and auditable criteria for compliance with the policy.

Organisational level roles and responsibilities are outlined in the Health, safety and wellbeing governance standard QH-IMP-401-6:2021**.** The standard also sets out the governance framework for health, safety and wellbeing in the workplace. It provides for WHS committees and focus groups and associated reporting structures.

	• support the implementation of the FRMS • own fatigue risks and advise of barriers preventing risk reduction.
Health, safety and wellbeing plans	Under the Health, safety and wellbeing planning standard (QH-IMP-401-1:2020) there is a requirement to establish plans which detail the objectives and strategies for health, safety and wellbeing. The plans should be developed in consultation with workers and shared duty holders and communicated accordingly.
Understanding our business	This enables a targeted approach to risk assessment and risk management. An environmental scan of work units and occupations informs planning and decision making in fatigue risk management. Consider: • staffing arrangements/resourcing • worker demographics • occupational streams • geographical location • the nature of the service being delivered • political and public expectations • the physical work environment • irregularities in operations (on-call, shifts, overtime, emergency events) • the nature of tasks being performed • experience and capability of workers • data collection (e.g. incident and payroll reports).
Understanding the scientific principles of fatigue management	• The need for sleep • Sleep debt and recovery • Circadian effects on sleep and performance • The influence of shift work • The influence of workload • Impact of environmental conditions and tasks • Impact of stress and other psychological stressors.
Industrial instruments	Awards and enterprise agreements specify hours of work and other requirements that support fatigue management.
Fatigue risk management processes	• Hazard identification or situations or conditions that create or contribute to fatigue risk • Risk assessment • Risk mitigation through implementation of risk controls • Risk register to record findings, actions and outcomes.
Monitoring and assurance	Determine what is in place or available to assess the extent and effectiveness of FRMS implementation and risk mitigation strategies.

Safety promotion	Training, information and instruction to inform all parties of the FRMS, responsibilities, impacts of fatigue, management strategies and reporting requirements. The aim of safety promotion is to encourage a culture where all personnel apply the actions and behaviours that support fatigue risk reduction.

Table 2: Factors to consider when planning for fatigue risk management

4.3 Fatigue risk management

Fatigue risk management consists of:

- hazard identification
- risk assessment
- implementation of risk mitigation strategies
- review of effectiveness of control measures.

"If there is a fatigue related accident there is probably a series of causally related events that led up to that incident." *(Dawson 2019)*

In planning and developing the FRMS, an environmental scan of the business should already have been undertaken and areas where fatigue poses a risk identified. If this has not occurred, worker consultation and data analysis should take place to identify work areas in the accountability area where fatigue may be a risk.

Defences in depth

Queensland Health has adopted the **Defences in depth** model for fatigue hazard identification and risk mitigation (Figure 4). This model has been adopted because it guides the assessment of fatigue risk by looking at five circumstances that follow a trajectory that leads to a fatigue-related incident. At each level, related fatigue risk factors (from Figure 2) should be examined and corresponding control measures applied.

Each level falls into one of three types of processes:

- Predictive
- Proactive
- Reactive.

Implementing multiple interventions helps to limit the likelihood of fatigue.

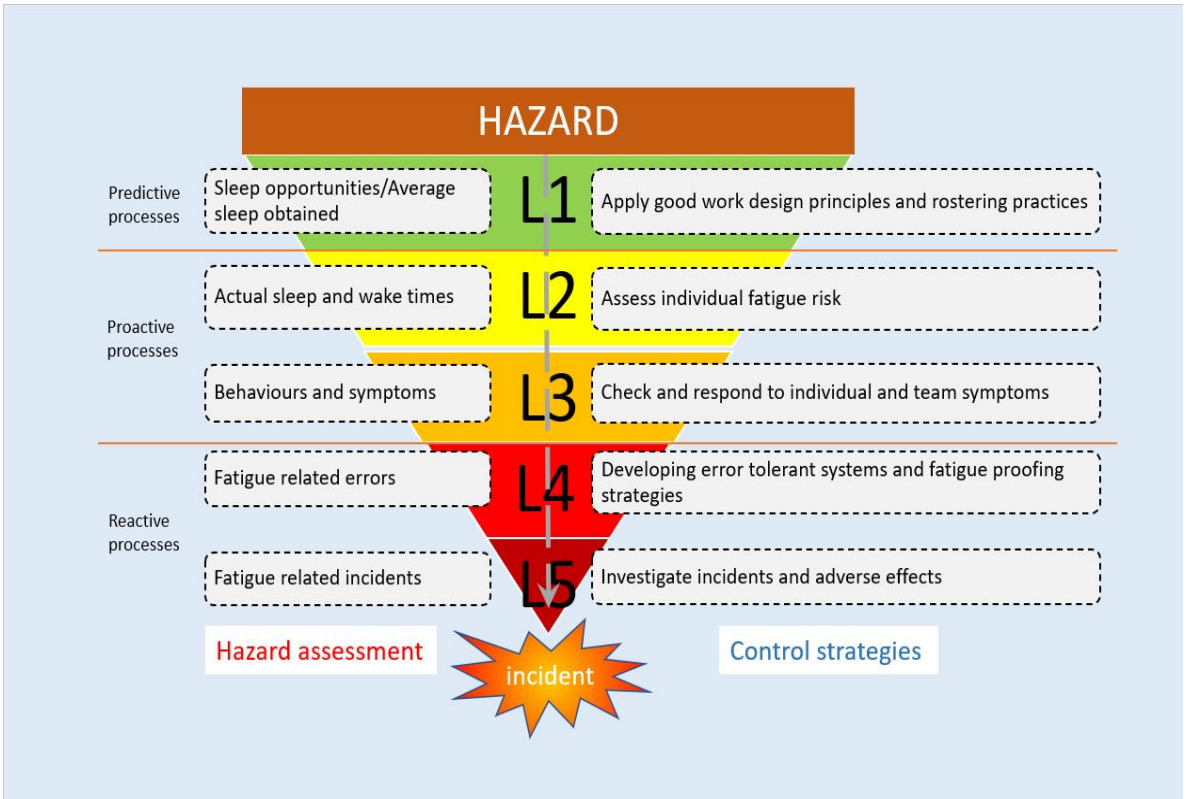

Figure 4: Defences in depth fatigue risk management model

Relationship to the hierarchy of controls

The *Work Health and Safety Regulation 2011* and *How to manage work health and safety risks Code of Practice 2021* require that risks to health and safety be eliminated to the extent that it is reasonably practicable to do so. Where elimination is not possible, other methods should be applied in order of effectiveness from the highest level of protection and reliability to the lowest, or in combination to minimise risk so far as reasonably practicable. The principles of the Hierarchy of control are similar to the Defence in depth model in that elimination of the hazard or risk is preferred but where this is not achievable, there is a range of control options that have a descending order of effectiveness. A comparison of the two models is depicted at Figure 5.

Understanding the differences in models and being able to explain the application of the Defences in depth model is important in the event that there is a need to demonstrate to a WHS regulator how fatigue risks are managed.

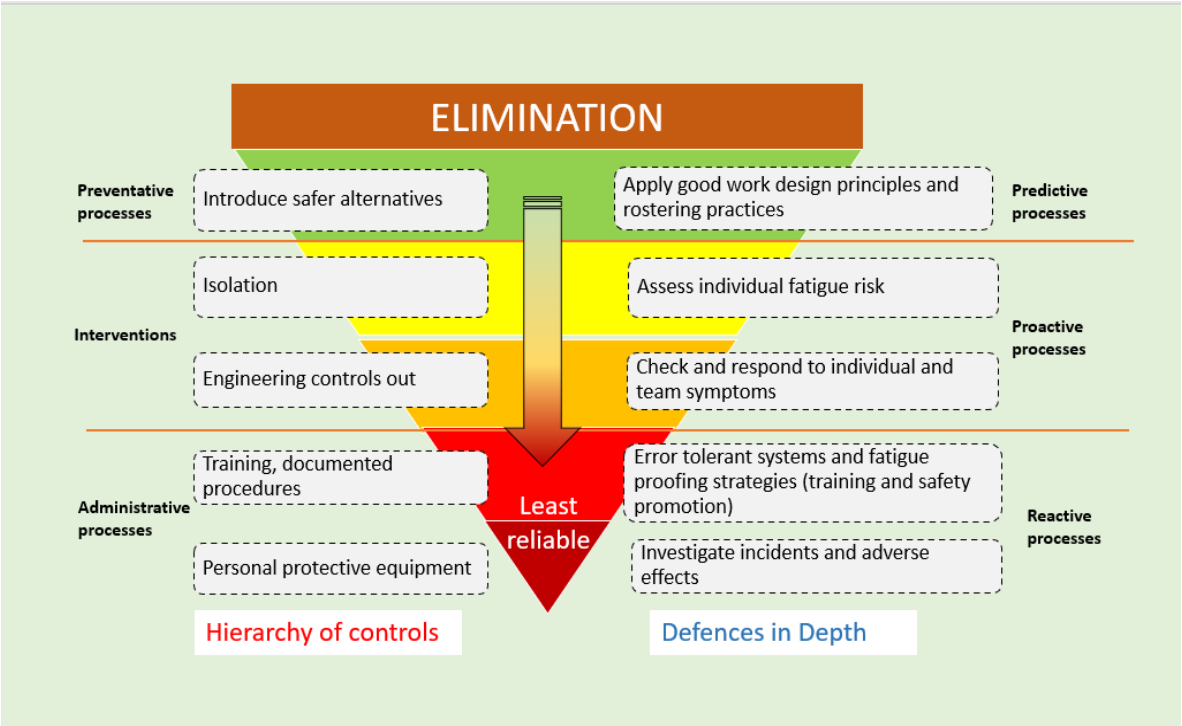

Figure 5: A comparison of the traditional hierarchy of controls and Defences in depth models of risk controls

The risk assessment process

Hazard identification

Fatigue is a hazard because it can cause harm to an individual. However, it is critical to recognise the factors that contribute to fatigue because this is the level at which measures to prevent fatigue can be implemented. Factors to be considered in fatigue hazard assessment are described in the Defences in depth model and are:

- Whether there are opportunities for adequate sleep
- Actual sleep and wake times versus rostered work time
- Identification of behaviours and symptoms that indicate an individual may be at risk of fatigue
- Whether fatigue has contributed to errors
- Whether there are fatigue related incidents or near misses

Risk assessment

Fatigue can impact our workers and our consumers in a variety of settings. Risk can be assessed by work unit, by occupational stream, at an individual level and through the identification of new or emerging hazards or risk factors introduced through changes to work design or the work environment. In all cases the tasks being undertaken by workers must also be taken into consideration.

Determining the level of risk is typically done using a risk matrix which assigns a risk rating based on the likelihood that an event will happen and the severity or consequences of the event. The impact of Fatigue may have multiple consequences. Potential consequences to consider when determining the level of risk posed by fatigue include:

- psychological harm (stress, burnout)
- patient harm resulting from errors caused by fatigue
- musculoskeletal and other physiological injuries
- damage to property such as vehicles or equipment.

Assessing fatigue risk can be challenging because as noted in Figure 2, there are numerous factors that contribute to fatigue, some of which are personal and not always obvious when workplace risk assessments are being carried out. Hence assessments should be carried out at both a work unit level and an individual level.

When undertaking the risk assessment, information about contributing factors and control measures currently in place should be gathered. Types of data and information that can inform the risk assessment are shown at Figure 6.

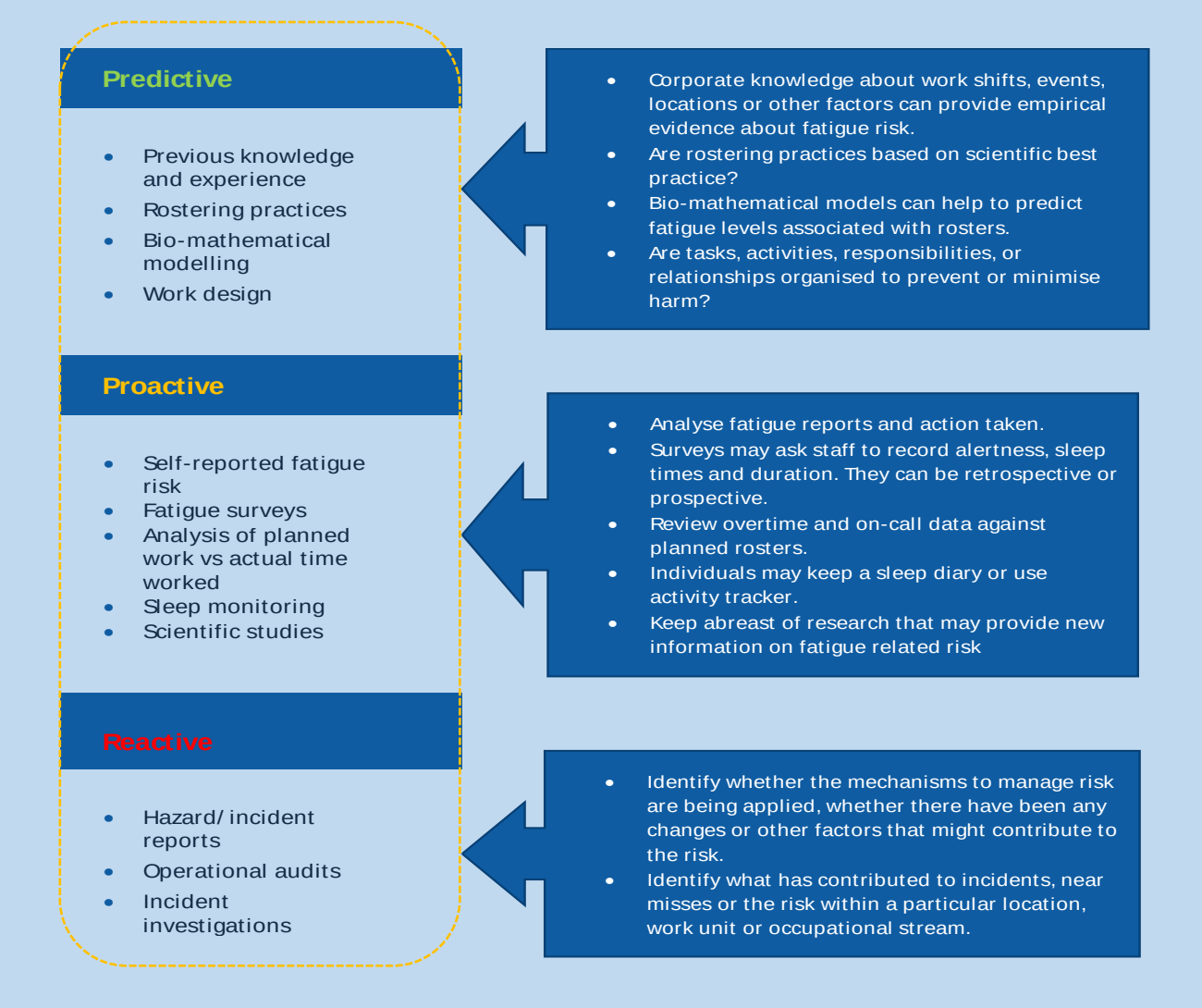

Figure 6: Data and information for fatigue risk-factors

Level 1 Predictive processes: work unit assessments

During the planning and hazard identification phases fatigue may have been identified as a likely workplace hazard for particular work units. Where this is the case, the risk assessment should focus on the work unit as a whole. This risk assessment should consider the information gathered during the planning and hazard identification phases.

Good work design and rostering is a key Level 1 control in the Defences in depth hierarchy and roster appraisal is an important aspect of the work unit assessment. Figure 7 shows a roster assessment tool. Rostering should apply evidence-based rostering practices proven to mitigate fatigue risks as well as any requirements specified in awards and industrial agreements and recommendations set out in relevant codes of practice.

Key rostering elements that should be considered are:

- rostered hours
- actual hours worked
- shift duration
- length of breaks between shifts
- rostered days off
- the number of night shifts
- on-call/recall shifts
- shift rotation.

Other shift-related factors that should also be evaluated include shift swaps and remote/phone-access on call shifts.

		Low (1 points)	Moderate (2 points)	High (3 points)	Points
1.	Rostered shift length	<10 hours/week	10 – 14 hours/week	>14 hours per week	
2.	Actual hours worked per week (including overtime)	<48 hours	48-55 hours	>55 hours	
3.	Time worked between breaks	<2 hours	<5 hours	≥5 hours	
4.	Night shift	None	<4 days/week	>4 days per week	
5.	Rostered days off	2 days per week	1 day per week	<1 day per week	
6.	Breaks between shifts	12 hours or more	10 hours or more	<10 hours	
7.	On-call/recall shifts	1 – 2 days per week	3 – 4 days per week	>4 day per week	
8.	Shift rotation	Forward/consistent	Forward/inconsistent	No consistency or direction	
				TOTAL RISK SCORE	
0 – 8: LOW RISK	**9 – 16: MODERATE RISK**	**> 16 POINTS: HIGH RISK**			

Figure 7: Roster risk assessment matrix

Biomathematical modelling tools may also helpful for predicting or estimating fatigue likelihood based on sleep-wake and work-rest data. Application of these may be useful in determining whether the fatigue risk levels of rostered work hours are tolerable.

Consideration should also be given to staffing levels, the types of occupational streams, tasks undertaken and environmental factors. Factors such as mental or physical intensity of a task, repetitive work and poor ventilation or lighting can all contribute to elevated fatigue risk.

Collectively this information can be used to assess the overall fatigue risk for the work unit. The risk matrix used to assess other health and safety risks can be applied to determine the fatigue risk rating for the work unit.

Levels 2 and 3 proactive processes: assessment of individuals

Assessment of proactive processes typically are aimed at fatigue risk that may be expected to occur during work operations. They are a more dynamic type of assessment which introduce the concept of shared responsibility and in part rely on individual workers to actively monitor, assess and self-report their own fatigue levels and fitness for work at commencement of and during their work shift.

The effectiveness of Level 2 and 3 processes is impacted by numerous factors including the level of workplace support, organisational priorities, organisational consequences for self-reporting fatigue, and the individual's willingness to participate and their personal circumstances.

Various tools can be used for individual fatigue risk assessment. These include:

- keeping a sleep wake diary
- completing a fatigue survey
- using a monitoring device such as a smart watch with a sleep monitoring feature
- using a fatigue app
- doing a self-assessment using an individual fatigue likelihood calculator tool.

Additionally, work unit supervisors and colleagues should also monitor other workers' behaviours and symptoms. One tool that can be used for this is the Samn-Perelli fatigue checklist (Figure 8).

The Samn-Perelli fatigue checklist is a subjective assessment that aims to identify fatigue symptoms that may occur despite appropriate rostering and sleep.

Relevant tools and templates are listed in Section 9 of this guideline and available on QHEPS.

LOW RISK	•Fully alert •Very lively
MODERATE RISK	•Feeling okay •A little tired
HIGH RISK	•Moderately tired •Extremely tired
EXTREME RISK	•Completely exhausted

Figure 8: Samn-Perelli fatigue checklist

Levels 4 and 5 reactive processes: assessment of incidents

This assessment occurs during or after an incident or event and is important for:

- determining whether existing risk management strategies are effective
- development of error tolerant systems of work
- informing work unit risk assessments
- monitoring and assurance requirements
- system reform.

An analysis of errors and incidents should consider whether fatigue was a causal or contributing factor. The following Queensland Health methodologies may be applied for incident analysis:

- The Patient Safety clinical incident analysis process
- The HSW incident investigation process.

Risk control strategies

Where a risk assessment has determined that the level of risk is unacceptable, appropriate control strategies need to be implemented. Often more than one strategy may be implemented to manage the identified risk. The Defences in depth model also supports two approaches for reducing fatigue related risk. These are:

- Fatigue reduction strategies which correspond to the controls that are applied from Levels 1 to 3 of the model.
- Fatigue proofing strategies which correspond to Level 4 controls.

A range of potential strategies are outlined in this section. However, they may not always be appropriate due to a range of factors including resourcing constraints, geographical location or acute and protracted emergency or disaster events. Staff should be consulted to tailor risk mitigation solutions that support both organisational and worker needs.

Defences in depth: Level 1 – predictive controls

Level 1 controls must aim at providing adequate sleep opportunity. The key control strategy is having a roster design that meets best practice rostering guidelines and any mandated requirements of industrial instruments. Dynamic variables that need to be considered include:

- Worker availability – workers may be unavailable due to illness, training requirements, leave or personal matters. Consider how often this happens and how long for and whether it is possible to fill the position without imposing additional hours on the existing staff. Accessing additional workers from a casual employee pool or agency staff may sometimes be required to appropriately fill a roster without imposing additional hours on permanent rostered staff.
- Shift swaps – informal shift swapping can inadvertently increase fatigue-related risk. A formal process to manage and approve shift swaps should be developed, implemented and monitored.
- On-call – Industrial instruments stipulate some requirements for the management of on-call and recall, however on-call shifts can present a unique set of challenges. Studies suggest that the most

significant impact of being on-call is the stress that is brought on by the anticipation of being called. Being on-call also places restrictions on what the individual is able to do during what would normally be a rest period. This can result in another layer of stress that contributes to the fatigue risk. The time of day that the on-call is scheduled for should also be considered. There is evidence that suggests that night-time on-call can create a greater fatigue risk than daytime on-call (Ziebertz et al. 2015). To manage this risk factor, consideration should be given to limiting the frequency of on-call shifts as well as the time of day that the shifts are scheduled for.

Bio-mathematical modelling can also be used to predict fatigue-related risk. Often this is based on prior work schedules.

Defences in depth: Level 2 and 3 – proactive controls

Proactive controls apply predominantly to individuals. Successful implementation of proactive controls at an organisational level relies strongly on promoting a safety culture where individuals feel confident that they can report their fitness for work without fear of reprisal.

The fatigue risk management system should include tools to support an individual's assessment of their fitness for work. Formal procedures must be implemented to support those individuals in situations where the risks associated with fatigue outweigh the risks associated with continuing to work.

When an individual has assessed their fatigue risk, control measures can be applied accordingly. Examples are provided in Table 3.

Prior wake time	Risk level	Controls
<12 hours	**Low**	**No specific controls necessary.** A 'business as usual' approach should take place. Normal monitoring should continue. Strategies include: • individual sleep wake assessment • monitoring for symptoms • monitoring for performance degradation.
12 – 14 hours	**Moderate**	**Initiate moderate fatigue mitigation actions** A moderate level of fatigue risk indicates a potential for fatigue to occur. Frequency of monitoring should be increased and fatigue countermeasures implemented. **Monitoring strategies** As for low risk **Countermeasures (Individual controls)** • napping • rest breaks • adequate hydration and appropriate nutrition • task rotation • perform light physical activity • take a break from repetitive tasks or screen intensive work.

Prior wake time	Risk level	Controls
14 – 16 hours	**High**	**Initiate moderate fatigue mitigation actions** A high level of fatigue risk indicates that fatigue is highly likely to occur. Risk mitigation strategies are critical to reduce the risk of harm. **Monitoring strategies** As for low risk **Countermeasures (Individual controls)** As for moderate risk **Team-based controls** • declaration of fatigue-risk to the team • task reallocation • increased team cross-checking • additional consultation on critical decisions or actions. This may include priority access to on-call facilities. • allocating another individual to take the lead on key tasks • deferring non-urgent tasks • increase supervision • use alternative systems that may be in place to deliver the necessary service where possible (e.g. Telehealth) • reallocate or reschedule tasks where possible • priority access to napping arrangements • access to safe commuting arrangements.
>16 hours	**Extreme**	**Risk is unacceptable. No individual to work beyond this threshold.** An extreme level of fatigue risk indicates that the risks associated with fatigue are critical and the potential for harm is such that work should not continue. Concessions should only be considered in exceptional circumstances and must be escalated to an executive leader(s) for approval. An escalation and approval process should be established clearly outlining requirements. **Monitoring strategies** As for moderate risk **Fatigue risk management decision process** • work must not continue unless there are exceptional circumstances where to discontinue work would result in more dire consequences. • decision to be made in consultation with the worker(s) and executive leaders. All viable alternatives must be explored. • decision must be documented as part of the incident reporting process. **Specific fatigue controls** • individual counter-measures as per moderate risk

Prior wake time	Risk level	Controls
		• team based controls as per high risk plus any additional controls developed by the work unit. Viable alternatives and additional controls should give due regard for the work undertaken by the workers and the unit and extenuating circumstances that may arise (e.g. disaster events, mass casualty incidents). Consider other plans such as business continuity plans, disaster plans and mass casualty incident plans.

Table 3: Examples of fatigue risk mitigation action

Defences in depth: Level 4 reactive controls

Level 4 controls relate to error tolerance and containment and consequentially must consider things such as:

- human factors
- user expectations
- safe work design
- management practices
- the work environment.

Level 4 controls depend on assessment of fatigue related errors in order that error-tolerant systems can be developed and implemented.

Error tolerance relates to built-in redundancies that decrease the likelihood that a fatigued individual will make an error which may have catastrophic consequences. It is the process of redesigning work systems to contain or be able to tolerate errors. Error tolerant systems feature:

- reporting systems that are open and transparent rather than blame focused
- automation in situations where routine or repetitive tasks may result in reduced vigilance or attention to detail
- systems that communicate lessons learnt
- observational audits of error management skills
- training in error identification, capture and management.

Often error tolerant strategies may already be implemented in work units. Implementation may have been informal and hence not always recognised or conveyed to all workers or across the organisation as being a fatigue-proofing strategy (FPS).

Where a formal strategy is in place it is possible that it was implemented for reasons other than to reduce fatigue-related risks, but nevertheless has the added benefit of being an FPS (Dawson, Chapman & Thomas 2012).

Developing fatigue-proofing or fatigue-containing strategies

- Identify error tolerant or error containment strategies that have been implemented within the work unit. Focus on their relevance to fatigue. This should be done in consultation with the work unit. It

should be noted that where informal strategies have been applied it may signal an elevated level of risk that has not been formally assessed, documented or communicated.

- Identify error tolerant or error containment strategies that have been implemented in other work units. Facilitate discussion as to whether they are suitable for the relevant work unit.
- Identify common fatigue-related errors by interrogating incident data and consider how existing strategies can be optimised or whether new strategies need to be developed, implemented and documented.
- Evaluate the proposed strategies to ensure that they will be effective and will not introduce any additional risks. For example: Some individuals may rely on playing loud music to stay awake while driving fatigued. However, this is not likely to be effective or safe and should not be formally endorsed as an FPS.

Level 5 reactive controls

Level 5 controls relate to mechanisms for incident analysis and are further discussed in section 5 of this guideline.

5 Incident management

Incidents are unplanned events that can result in injury, illness, damage or loss. Sometimes incidents are near-misses or identified hazards which although may not have resulted in actual harm, signal the risk of potential harm.

5.1 Hazard and incident reporting

As with any workplace related incident or identification of a hazard, workers should be encouraged to report fatigue via the organisation's incident management system or other relevant hazard or incident reporting channels.

Reporting of fatigue may constitute:

- work unit reporting where fatigue has been identified as a protracted issue (i.e. a hazard) that affects the overall unit
- an incident where fatigue has been identified as a contributing factor
- a situation where a worker has identified that they are suffering from fatigue due to work-related factors.

Reporting fatigue hazards and incidents supports ongoing risk management and fatigue monitoring and assurance processes. Reporting fatigue has the added benefit of highlighting potential psychosocial and physical risks. It will also assist any incident investigation that may be required. This includes investigations of clinical incidents.

Requirements for fatigue reporting should be captured in the accountability area's overarching HSW incident reporting procedures.

5.2 Incident response and investigation

Incident response and investigation must follow requirements set out in the **Health, safety and wellbeing incident response standard** (QH-IMP-401-7:2020).

Fatigue is known to impair performance and as such may be implicated as a contributing factor to an incident. To determine whether fatigue is a factor that contributed to an incident there must be an ability to determine whether the individual(s) was fatigued. This is reliant on evidence such as rostering information, actual hours worked, fatigue leave, fatigue self-assessment scores and reporting of fatigue hazards both at the individual and work unit level. The steps for investigating fatigue are depicted in Figure 9.

Findings from hazard and incident reports must inform prospective controls and fatigue management solutions. Where the recommended solution cannot be immediately implemented, interim measures should be applied until such time as the most suitable controls can be implemented.

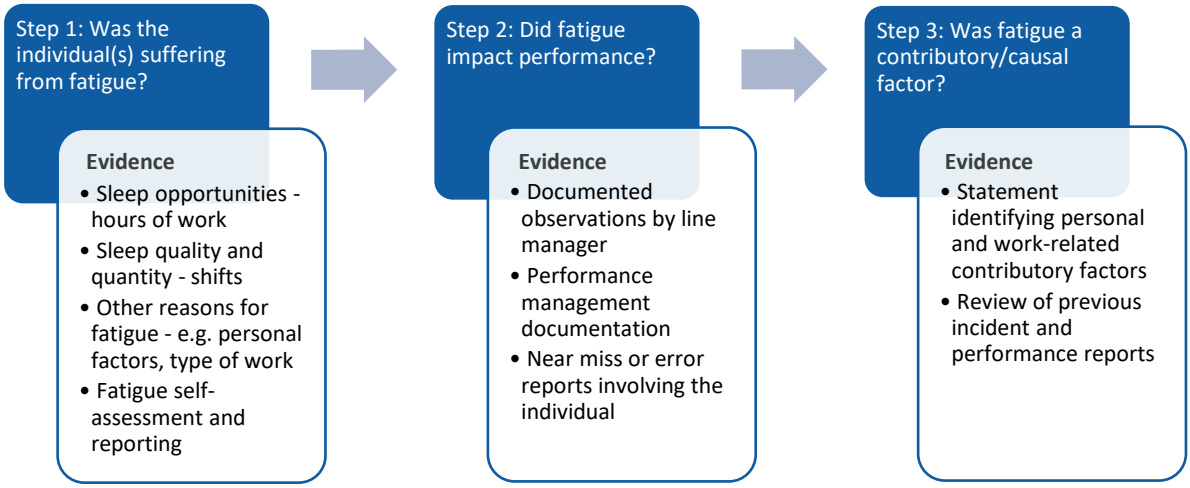

Figure 9: Fatigue investigation steps

6 Monitoring and assurance

Safety assurance processes can consist of:

- processes that monitor the level of implementation and effectiveness of the FRMS
- processes at an operational level that relate to hazard and risk factor identification, risk assessment and management and establishment of a risk register.

Safety assurance programs provide ongoing feedback to drive continuous improvement.

6.1 Performance indicators

Performance can be assessed by:

- monitoring of effectiveness of control measures
- fatigue risk management training compliance levels
- payroll data (fatigue leave and overtime accessed)
- analysing trends in hazard and incident reports and findings of incident investigations
- conducting audits/inspections and surveys.

Existing HSW monitoring and assurance frameworks should be utilised where possible to avoid duplication and to promote visibility of fatigue as a work health and safety related issue.

Typically, system level indicators relate to:

- work related injury, illness and incident profile
- notifiable incident rates and regulatory action (e.g. improvement notices)
- legislative compliance review
- Senior management review of the safety management system (provides an opportunity to inform the executive of the FRMS effectiveness and flag emerging issues)
- external third party SMS audits (undertaken biennially)
- the organisation's risk profile
- workers' compensation and workplace rehabilitation data.

Operational monitoring indicators include data and findings from:

- internal audits and inspections
- local risk registers
- payroll (overtime and fatigue leave)
- incidents and hazards reported in the incident management system
- enforcement action which mandates compliance with WHS laws
- Workers' compensation and workplace rehabilitation data.

Additional criteria that could be reviewed include:

- frequency of incident reports associated with a particular work unit, occupational stream or shift
- effectiveness of control measures
- number of calls during on-call periods
- rosters (e.g. examine number of consecutive on-call shifts allocated to each individual)
- fatigue-proofing strategies implemented.

6.2 Continuous improvement

Monitoring and assurance activities provide a means by which the FRMS can continually be improved upon (Figure 10).

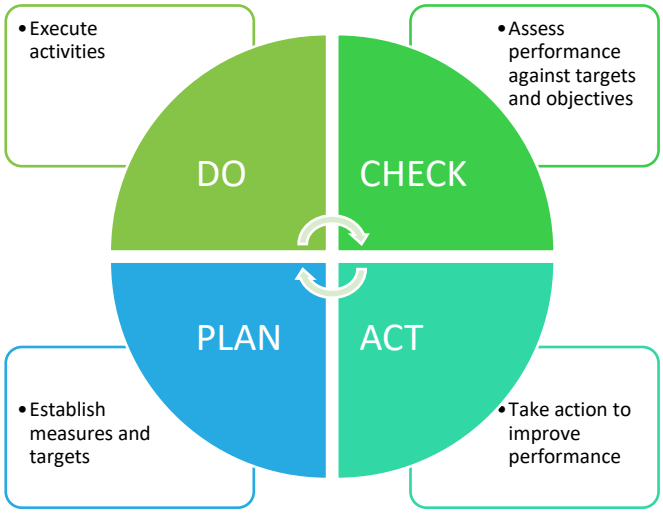

Figure 10: Monitoring and assurance continual improvement cycle

Monitoring and assurance can highlight situations where control measures may require modification. Activities also pave the way for routine evaluation of policies and procedures as well as work practices and design. Consequently, this also provides an opportunity to identify emerging issues and introduce new procedures and controls to mitigate risk.

7 Safety promotion

Successful implementation of the FRMS relies strongly on effective communication. Communication strategies should consider:

- the implementation of the FRMS,
- the training of relevant stakeholders so there is an understanding of the actions required of individuals to ensure the FRMS performs as intended
- reporting findings of monitoring and assurance activities.

7.1 Legislative obligations for consultation and training

Under the hierarchy of controls cited by the WHS legislation, training is regarded as a lower order control measure. Administrative control measures such documented records of procedures, training, job or task rotation arrangements and other activities associated with the FRMS are also regarded as lower order controls and support the provision of information and education. While these types of controls do not easily align with the Defences in depth model, they are nevertheless critical measures that must not be overlooked.

Who	Learning outcome					Assessment
	Basic fatigue science	Fatigue and safety	FRMS overview	FRM strategies	Rostering	
Staff at risk of fatigue	✓	✓	✓	✓		✓
HRS/fatigue champions	✓	✓	✓	✓		✓
Rostering staff	✓	✓	✓		✓	✓
Manager, supervisors, executives	✓	✓	✓	✓		

Figure 11: Example training matrix

Additionally, there is a legislative obligation to consult with workers in relation to hazard identification and the making of decisions about how associated risks can be managed. Consultation requirements for Queensland Health are described in **Health, safety and wellbeing consultation standard** (QH-IMP-401-2:2020).

Information, training and instruction provided to workers must have regard for:

- the nature of the work carried out
- the nature of the risks associated with the work
- the control measures implemented.

This means that where a work unit or an occupational stream has been identified at risk of fatigue, the training provided must consider the above criteria. A sample training matrix that can assist in meeting this requirement is shown in Figure 11.

7.2 Planning for communication of the FRMS

Ongoing communication about the performance of the FRMS and the importance of fatigue management help to drive a positive fatigue management culture in the workplace.

As well as formal reports communicated via committees and other reporting channels, consider promoting fatigue awareness through:

- toolbox talks or safety spotlights
- newsletters
- safety campaigns such as Safe Work Month and Mental Health Week
- involvement in or promotion of national and international events such as World Sleep Day and Sleep Down Under
- a dedicated fatigue webpage or placement of fatigue on your HSW web page
- periodic poster campaigns.

8 Legislation

- How to manage work health and safety risks Code of Practice 2021
- Managing the risk of work-related psychosocial hazards Code of Practice
- *Work health and safety Act 2011*
- Work health and safety consultation, cooperation and coordination Code of Practice 2021
- Work health and safety Regulation 2011

9 Supporting documents

- Best practice guide to clinical incident management (Queensland Health)
- Best practice rostering guidelines Queensland Health Nurses and Midwives
- Building, Engineering and Maintenance Services Employees (Queensland Government) Award – State 2016
- Enterprise risk management (FMPM Standard 2.1.1)
- Fatigue risk assessment tool
- Guideline on fatigue risk management in anaesthesia practice - ANZCA
- Health Practitioners and Dental Officers Award – State 2015
- Health Practitioners and Dental Officers (Queensland Health) Certified Agreement (No 3) 2019
- Hospital and Health Services General Employees (Queensland Health) Award – State 2015
- I1 (QH-POL-171) Fatigue risk management policy
- Individual fatigue likelihood calculator
- Medical Officers (Queensland Health) Award – State 2015
- Medical Officer (Queensland Health) Certified Agreement (No.5) 2018 (MOCA5)

- National Code of Practice – Hours of work, shiftwork and rostering for hospital doctors - AMA
- Nurses and Midwives (Queensland Health) Award – State 2015
- Nurses and Midwives (Queensland Health and Department of Education) Certified Agreement (EB10) 2018
- Preventing and managing fatigue-related risk in the workplace (Workplace Health and Safety Queensland)
- QH-GDL-401-1:2021 Health, safety and wellbeing planning guideline
- QH-GDL-401-2:2021 Health, safety and wellbeing consultation guideline
- QH-GDL-401-3-1:2021 Health, safety and wellbeing risk management guideline
- QH-GDL-401-4:2021 Health, safety and wellbeing monitoring, evaluation and performance review guideline
- QH-GDL-401-6:2020 Health, safety and wellbeing governance guideline
- QH-GDL-401-7:2021 Health, safety and wellbeing incident response guideline
- QH-IMP-401-1:2020 Health, safety and wellbeing planning standard
- QH-IMP-401-2:2020 Health, safety and wellbeing consultation standard
- QH-IMP-401-3:2020 Health, safety and wellbeing risk management standard
- QH-IMP-401-4:2020 Health, safety and wellbeing monitoring, evaluation and performance review standard
- QH-IMP-401-6:2020 Health, safety and wellbeing governance standard
- QH-IMP-401-7:2020 Health, safety and wellbeing incident response standard
- QH-POL-401:2020 Health, safety and wellbeing policy
- Queensland Public Service Officers and Other Employees Award – State 2015
- Queensland Health work health and safety data set
- Risk management policy (FMPM – 2.1)
- RiskMan Safety and wellbeing minimum data set
- Samn-Perelli fatigue checklist

10 Definitions

Term	Definition
Accountability areas	Department of Health divisions, agencies and each HHS are accountability areas within Queensland Health.

Defences in depth	Hazard identification and risk control model that applies a series of layered mechanisms to minimise the occurrence of fatigue related incidents.
Error tolerant system	Error tolerance refers to the ability of a system to function even after an error has occurred. In other words, an error-tolerant system is one in which the results of making errors are relatively harmless (CASA 2014, p. 12).
Executive leader	The most senior person of each accountability area and can include persons reporting to that position.
Fatigue	A state of impaired physical and/or mental performance and lowered alertness arising as a result or combination of physical and mental work, health and psychosocial factors or inadequate restorative sleep. It is a decreased capacity for physical and/or mental activity resulting from imbalances of the resources required to perform the activity.
Fatigue risk management system (FRMS)	An integrated set of management practices and procedures for monitoring and managing the risks posed to health, safety and wellbeing by fatigue.
Health and safety representative (HRS)	A person appointed as a health and safety representative for a worker means the health and safety representative elected under part 5 of the WHS Act, for the work group of which the worker is a member.
Person conducting a business or undertaking (PCBU)	Defined in section 5 of the WHS Act. The Department of Health and each of the HHSs are considered to be PCBUs.
Psychosocial hazards	Work factors in the design and/or management of work and/or the way people interact with each other at work that may increase the risk of work-related stress which can then lead to psychological or physical harm.
Worker	Defined in section 7 of the WHS Act as follows: A person is a worker if the person carries out work in any capacity for a person conducting a business or undertaking, including work as – a) An employee; or b) A contractor or subcontractor; or c) An employee of a contractor or subcontractor; or d) An employee of a labour hire company who has been assigned to work in the person's business or undertaking; or

e) An outworker; or

f) An apprentice or trainee; or

g) A volunteer; or

h) A person of a prescribed calls

The person conducting the business or undertaking is also a worker if the person is an individual who carries out work in that business or undertaking.

11 Version control

Version	Date	Comments
1.0	10/11/2021	Draft - New guideline to replace Fatigue Risk Management System Resource Pack December 2018 v.3.

12 References

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