InterDynamics
Navigating complexity. Delivering clarity.

A Discussion of Fatigue and Risk management

Dr Adam Fletcher, Centre for Sleep Research, University of South Australia.

Disclaimer: The following document is not intended as specific advice but rather as a general informal discussion around points of interest.

Introduction

The following discussion is offered to clarify a number of issues relating to both the work-related fatigue model known as FAID® - Fatigue Assessment Tool and the use of risk management processes. Specifically, it endeavours to clarify exactly what factors FAID does and does not account for and therefore what it can and can't be used for. Similarly, it endeavours to clarify what a framework like the Australian Standard for Risk Management (AS/NZS ISO 31000:2009) is potentially used for and what factors it can and can't account for.

In brief, the FAID software helps manage the work-related fatigue associated with hours of work. Risk management allows organisations to account for local and job-specific factors that can impact on work-related fatigue on top of hours of work. The two processes work together to manage work-related fatigue from both hours-of-work and job-specific perspectives.

Factors that the FAID system accounts for

The FAID program assesses potential or actual hours of work to determine a level of work-related fatigue. The program should not be used as an overriding rule but rather as a tool to support decisions about rosters and hours of work. There are certain factors that FAID accounts for. Specifically, these factors are:

Length of shifts and breaks.

How long a shift is relates to the work-related fatigue associated with that shift. Similarly, how long a break is relates to the opportunity an individual has to obtain recovery sleep, which will reverse the effects of fatigue.

Time of day.

Fatigue accumulates faster at certain times of day than others. As a general rule, fatigue accumulates fastest at the times that we would naturally choose to sleep and fastest in the hours of 0300 to 0500h. Similarly, breaks from work have greater potential fatigue recovery value at certain times of day. This is because of both biological and societal reasons. As a general rule, sleep is easiest to obtain in the hours between 2200h and 0800h.

Prior seven-day work history.

The hours that an individual has worked in the past seven days will contribute to their current fatigue state. The most recent days will obviously have the greatest impact. That is, what an individual worked yesterday has a large impact on their fatigue state today. What they worked two days ago has a fairly high impact but not as much as yesterday. What they worked six or

seven days ago has a little impact but very little compared to yesterday. Days back further than seven days do not have any measurable impact.

Biological limitations on sleep.

Humans cannot bank sleep up. For example, if a person has a week of night shifts coming up they cannot decide to sleep for 30 hours straight to offset the sleep they feel they will lose during the week ahead. Similarly, if an individual has just worked a week of night shifts they can generally not catch up on all of the sleep they missed out of in a single 30-hour sleep.

The FAID scoring system

By analysing a theoretical or actual set of work hours using the FAID system, a score is produced. This score is not a percentage but a number and can range from zero up to more than 140.

The results of a range of theoretical, laboratory and simulator studies indicate that an individual with a score in the 80 to 100 range will be as impaired as if they were intoxicated with alcohol to a level of 0.05% Blood Alcohol Concentration (BAC) or greater. The exact score that equates to 0.05% does differ depending on how sensitive a particular test is to impairment to fatigue and alcohol. However, as mentioned, a score of 80-100 has been consistently shown to be comparable to impairment equivalent to 0.05% or greater.

Australian regulators such as the Civil Aviation Safety Authority (CASA) for example have decided (pending the results of further research) on 80 as an interim score for management of work-related fatigue in some sectors of aviation. The validations that lead to this conclusion have been published in international peer-reviewed journals. Some of the work was also a part of a Ph.D. thesis that was completed in 1999 at the University of South Australia. This thesis and the journal papers are available from the Centre for Sleep Research at the University of South Australia on request. (www.unisa.edu.au/sleep/)

The model does not account for individual differences and it is unlikely that any model ever could. Similarly, the law relating to the 0.05% BAC alcohol limit on the roads does not account for individual differences in tolerance to alcohol.

The FAID system also does not account for differences in specific tasks of the job that someone is doing. For example, possible differences might include different aircraft types and the associated levels of noise and vibration. A practical method for accounting for such differences is by using a risk management approach such as such as AS/NZS ISO 31000:2009.

Risk management using the Australian Standard AS/NZS ISO 31000:2009

As discussed above, the FAID model helps manage the work-related fatigue associated with hours of work. At a functional level, FAID is more powerful when coupled with tailored maximum fatigue thresholds for specific tasks or jobs within a particular operation. This tailoring can be performed by using a framework such as AS/NZS ISO 31000:2009.

The impact of virtually all job-specific factors can be accounted for using such a framework. This risk management can not be done by a regulator such as CASA since there are often unique local factors, procedures, equipment, requirements, training and experience within every organisation.

Relevant factors are taken into consideration by determining their relative importance using a step-by-step procedure. This procedure involves a group of employees assigning a score from one to five to: 1) the likelihood, and 2) the consequence of all possible incidents and accidents. The one-to-five scale uses very specific definitions of likelihood and consequence that are provided within AS/NZS ISO 31000:2009.

Once likelihood and consequence scores have been assigned then a risk group is assigned according to a table in AS/NZS ISO 31000:2009. The risk groups are 'low', 'moderate', 'high' and 'extreme'. Therefore, at the end of the risk management assessment each task or job that an employee may be required to do will have been assigned as being either 'low', 'moderate', 'high' and 'extreme'.

The definition of a job or task does not effect the accumulation of fatigue points within FAID. However, it is likely that the maximum level of fatigue that you would except for a task assigned as 'high' risk would be lower than for a task assigned as a 'low' risk. For example, if someone were required to be in the office photocopying training manuals, a 'low' risk task, then a maximum fatigue score of 80 points would be acceptable. However, if a person were required to be flying a recognizance aircraft at low altitude then a lower maximum threshold of fatigue such as 65 may apply.

In summary, this is the goal of the risk management process with regards to fatigue management; to determine acceptable thresholds of maximum FAID scores by taking into account all of the work tasks and factors that might impact on a person's capacity to do a job safely.