

**Submission SafeWork Australia
Fatigue Draft Document**

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Introduction

Well done SafeWork Australia (SWA) on creating a draft document that addresses a great range of information related to Fatigue and what needs to be done to manage this risk.

The SWA draft document has a great deal on what to do or how to manage those who are fatigued. We acknowledge this is vital.

This submission is about a process and rationale for prevention of fatigue.

It is written through the lens of my post-graduate work on Environmental Physiology, combined with my Doctoral work (PhD) on biochemistry - both linked to performance. Special mention in this submission about hydration levels and food consumption.

We wish to highlight some of the early indicators of fatigue within the workplace and considerations as to how these can be managed.

We acknowledge that this submission could fit into several of the headings/sub-headings within the SWA draft document.

Our work has shown us just how different individuals can be and how differently they respond to interventions and situations. This presents a challenge if we only follow the textbooks to manage vital risks within the workforce. Single track thinking may also present a challenge in

attempting to mitigate the risk associated with fatigue. There are many factors to consider and thinking differently about issues is encouraged. The submission acknowledges that SWA's Draft does mention individual differences and we would like to highlight some more specific individual differences and how they impact workforces.

This submission is about hydration levels and preventing fatigue. It is also about how food choice can impact fatigue and performance.

Evidence

Hydration

Within the exercise physiology literature there is significant evidence that any reduction in body weight (due to dehydration), has a detrimental impact on humans and their performance. The literature shows us

- a 1% reduction in body weight will impair physical performance. It also indicates the commencement of cognition deterioration. Such weight loss within a short period of time at work can only be related to fluid imbalance.
- 2% reduction in body weight brings with it severe changes to performance and cognition. It relates to a 10% decrease in work output.
- 5% reduction brings 30% reduction in work output.

Dehydration prior to performance (at work) precedes an overall deterioration in cognition, strength and mood. It also sets off a cascading effect to a raft of health issues like CVD, stroke etc.

Working whilst in a dehydrated state exacerbates the signs and symptoms of fatigue and is basically unsafe.

Example: it means that a 100kg individual reporting for work only needs to weigh 99kgs and the negative impact of the dehydration has started. That individual is effectively 1 litre of water short of hydration balance and optimum performance.

We know it takes 20-60 minutes for complete absorption of water to take place and start to reverse the process of dehydration. So, it will not take too long to restore fluid balance.

Interventions

Dehydration is a major fatigue risk factor and it can be mitigated by using simple interventions.

- ***Weigh ins***
A simple weigh in process at the end and start of shifts will identify and subsequent dictate what action (and how much to drink) that needs to be considered.

Example: It is akin to jockeys having to weigh in at the conclusion of a race so that "correct weight" can be declared. Meaning their declared weight and recorded weight

need to be the same – or within 1 kilogram. We think it is worth considering pre and post shift weigh ins for workers – particularly in the hotter environments.

- **Climates**

Another element that should be considered is the impact of the macro (physical environment measures) and micro (clothing composition and environment) climates of individuals.

Environmental readings could include measurements like wet bulb and dry bulb temperatures. It could also include projected sweat rates. Insensible perspiration is another factor that contributes to fluid loss and needs to be considered in addition to the physical work itself.

- **Specific gravity Tests**

One could also run some specific gravity tests on urine to see the level of dehydration linked to fatigue of the systems.

- **Sweat Rates**

Sweat rates also need to be considered as this directly impacts on the fluids and salt being lost. High sweat rates, high fluid loss, high salt loss (visible salt tracks) will exacerbate fatigue.

- **Acclimatisation**

The rate of acclimatisation should also be considered as this directly impacts the body's ability to retain salt and thereby enhance performance as distinct from losing salt and impacting negatively on performance.

Example: A case study we were involved in before the Beijing Olympics with the Australian women's field hockey side had an individual recording maximum heart rate while standing still. She was in a climatic chamber where elements being assessed included protective clothing (this was a field hockey goalie), radiant ambient temperature °C, humidity levels and performance.

- **Other risk factors**

When dehydration is combined with other risk factors that are identified in the SWA draft document there begins a potential negative multiplier impact on fatigue.

- **Food/Drink**

Food choice as well as lack of food have been linked to fatigue and mood. Everyone's physiology associated with metabolism of food is different, and a fatigue policy needs to articulate the impact of high carbohydrate food on the body and performance and its potential to induce a hypoglycaemic attack.

Some individuals will burn carbohydrate (CHO) more readily than fat. Conversely, some individuals will naturally burn more fat than CHO. This means some workers will need

to be constantly eating while others could survive for longer as they are predominately fat burning individuals.

Water should be the go-to fluid to replenish fluid balance. The draft document does highlight that pure stimulants are not always the best method to replace fluids and mitigate fatigue.

There needs to be consideration given to how best to use commercially available sports drinks. They need to be diluted significantly thereby assisting in the rehydration process. “Full strength” stimulant drinks have limited benefit except in increasing heart rate and blood sugar levels.

- **Body and skin temperatures**

Core temperature in isolation is another indicator that comes into the prevention bucket. Again, the individual differences in our ability to work with an increased body core temperature is highlighted in research from the Comrades Marathon (2 marathons run back-to-back) in South Africa where 8 of the top 10 finishes had a core body temperature well above medical “safe levels”. They were fine. These individuals have a physiology like no other.

The gradient between skin and core temperatures also needs to be considered. Maintaining this gradient improves how individuals manage work, in particularly in the hotter environments. This dictates fluid demands, sweat rates and acclimatisation levels.

- **Risk Baselines**

When looking at sleep patterns (quality and quantity of sleep), mood patterns (depression, anxiety and stress), heart health (basic physiology) and other risk factors – there needs to be consideration given to establishing benchmarks for individuals, businesses and industries...as all these risk factors impact fatigue levels.

The baseline data across these elements will allow true management of this significant risk factor – fatigue.

It will provide a path to manage the many potential causes of fatigue. It will provide management with data to assist actioning any/all interventions specific to their workforce. It will also continue to encourage a focus on prevention of fatigue.

Consideration could be given to include these baseline data collections in any induction, on boarding or sign-on process. These data collection processes need to be repeated at set intervals so that management is receiving data on their workforce in real time and how the workforce in managing fatigue levels.

Hydration (along with other risks factors) are so critical in our WA environment that policy needs to consider how best to develop and support a fully hydrated workforce - daily.

There are online profiles that can be conducted to give greater insights into those risk elements that the draft SWA document covers – sleep, mood, health indicators etc that impact optimum performance.

This submission is about increasing the consider on prevention of fatigue, what could be done to reduce fatigue and ultimately develop better management techniques and approaches.

Prevention is the best long-term solution. All prevention can be supported with education, intervention, rewards and most importantly it will present a safer and less fatigued workforce.

Thank you for the opportunity to contribute to this vital topic.

Dr Graeme Wright

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