Tenth International Conference on Managing Fatigue: Abstract for Review

Research into fitness for duty checks and predicting the likelihood of experiencing fatigue

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Problem [100 words]

GB rail specific national regulations mean that management and frontline staff have a shared responsibility for ensuring those in safety critical roles are fit for duty. Fitness-for-duty assessments are a genuine challenge for both parties because it is difficult to predict how fatigued a person will perform in the future based on how they look or feel now. People can also underestimate their risk of becoming tired and the effect that this might have on their performance.

Method [250 words]

The methods used in this research involved developing evaluation criteria, identifying potential decision aids and evaluating potential decision aids against the agreed criteria.

An industry workshop and 17 telephone interviews were conducted to understand what is required by industry from a decision aid and the context it could be used within. This information was analysed to develop a list of criteria that any potential tool could be evaluated against.

A comprehensive online search was carried out to identify any existing tools. Additionally, industry representatives from rail and other industries were contacted to request information about their existing fatigue risk management, procedures and any existing decision aids involved in this process.

Further information was requested from suppliers of potential tools identified.

Evaluation workshops were conducted with over 170 industry representatives to evaluate the suitability of potential tools identified.

Data was systematically analysed, using statistical analysis where appropriate.

Results [250 words]

The workshop and telephone interviews were semi-structured in order to generate discussion and gather information on specific topics. These included:

- current fatigue-risk related procedures specific to participants' organisations
- qualities that would make a tool easy or difficult to use, understand and implement
- criteria that would render a tool impracticable and unpopular
- booking on processes, to further understand the different contexts decision aids could be used within (if used at the start of a person's shift)

Data was reviewed systematically to group similar or related criteria and draw out common themes. This process identified 14 criteria to evaluate potential decision aids against.

Table 1 Evaluation criteria

Criteria	
1	Utilise sleep/wake data
2	Predict fatigue levels over entire shift duration (including journey time)
3	Quick and simple to use with some variety
4	Effective in conjunction with all booking-on methods
5	Include a form of objective measurement
6	Utilise shift pattern information
7	Not be considered intrusive
8	Enable access to results for frontline staff and management
9	Educational
10	Sufficient level of validity and accuracy
11	Accessible whenever the user requires
12	Integrate with existing procedures
13	Cost-effective
14	Account for other fatigue risk factors

Over 80 tools were identified and this was reduced to 7, based on the essential

requirements for tools to be included in the evaluation which were criteria 1 and 2 in Table 1. Tools were also excluded if they could not produce a person-specific result e.g. if they were specific to a shift, not a person, or if they were not accessible for evaluation e.g. not at market maturity or not available in Great Britain.

No single tool was found to meet all of the criteria or to be ready for application in the GB rail industry. Results indicated users did not want tools that required them to perform mathematical calculations and apps were the most popular format. Wearable technology divided opinion and less than half of participants reported that they would use technology of this nature citing intrusiveness as a reason.

Discussion [250 words]

Many sleep tracking devices in the form of wearable technology and applications for smart devices were identified initially. The majority of these however, did not translate sleep data into current or future *fatigue levels* and therefore were not taken forward for further evaluation. These tools could potentially be used in conjunction with decision aids but their accuracy would first need to be determined.

Detailed assessment of the accuracy or validity of potential decisions aids was beyond the scope of this project. However, it is clear from reviewing information that is publicly available and documents provided by suppliers, that further work is required to determine the validity and accuracy of the models potential tools are based on.

Tools outputs should either be shown in an hourly display of fatigue levels over time or as a definitive time when users will cross the threshold. It is important for users to be able to understand what response is required based on particular results. This would need to be considered when implementing a tool within the framework of a specific organisation.

It is important to consider the cultural concerns that were raised by participants during this project which could influence the uptake of potential tools. Many staff had concerns that they may be penalised for declaring themselves unfit for duty due to fatigue. If a decision aid is to be successful, it is imperative that managers and staff understand clearly the appropriate response to outputs and equally, that a person's own judgement around their fitness-for-duty decision is not superseded by the output of a tool.

Summary [150 words]

This project provided valuable insight into what industry wants from a tool of this nature, improved understanding about which elements are popular and why, and highlighted design and implementation approaches which are more likely to be successful. This could form the basis of future work to develop an existing tool or form the basis of the creation of a new tool which is suitable for assessing fatigue levels in relation to fitness for duty within the rail industry.

Key cultural barriers have been identified which could threaten the effective implementation of a potential tool. Awareness of these risks will help organisations to increase the likelihood of a smooth, efficient roll-out, wide-spread uptake and sustained use of a tool of this nature. In doing so this would improve the consistence of fitness for duty checks in relation to fatigue and provide safety benefits across all sectors of industry currently managing the risk of fatigue.