I would like to submit information about unruptured Intracranial Aneurysms, as this condition was not addressed in the consultation report or in the draft revised Standard undertaken this year.

**Risks associated with Intracranial Aneurysm (IA)**

Intracranial (cerebral) aneurysm is may potentially be diagnosed in 3-5% of the general population1,2,3. Additionally, the rate of incidental diagnosis of an unruptured IA is growing, as the number of imaging facilities grows4. Once formed, an IA can remain stable, grow, or rupture. Determining the evolution of an IA is almost impossible, and very complex. Even if the large majority of IAs will never rupture, it is critical to try to determine which IA might be at risk of rupture.

The PHASES score was developed as a practical risk score to predict a patient’s 5-year risk of aneurysm rupture rate based on a set of routinely assessed patient and aneurysm characteristics and published online in late 20135. The PHASES Score predicts this risk utilising the following criteria:

* Population (with Finnish or Japanese descent having higher risk)
* Presence of hypertension
* Age above or below 70 years
* Size of aneurysm: <7.0mm, 7-9.9mm, 10-19.9mm, and > or = 20mm
* Earlier subarachnoid haemorrhage from another aneurysm
* Site of aneurysm: Internal Carotid Artery having lowest risk, through Middle Cerebral Artery, to Anterior Cerebral Artery, posterior circulation with the highest risk.

Using the lowest risk criteria from above will yield a score of 0 and 0.4% risk over 5 years. Using the highest risk criteria will yield a score of 22 and 17.8% risk over 5 years. These results have a wide range. And therein lies the problem. The National Standard makes no mention of different risk levels for rupture of an IA.

In the National Standard, cardiac risk is determined by use of a cardiac risk level calculator. Results are graded from Probability >25% in 5 years, down to Probability <5% in 5 years, with the lowest risk worker then being classed as Fit for Duty or Fit for Duty Subject to Review. As I’m sure you are aware, heart attack can progress very rapidly to cardiac arrest, requiring immediate and intensive CPR for any chance of survival. There are also all sorts of criteria for cardiac related conditions in determining whether a worker is Fit for Duty or otherwise. Even aortic aneurysms have grades assigned to them.

In considering the lowest cardiac risk of <5%, I would like to point out that the lowest risk for aneurysm rupture is 0.4% over 5 years, which is considerably less than the lowest risk for a cardiac episode.

Also in the National Standard is the consideration of Diabetes. The Clark hypoglycaemia awareness survey is used, as well as HbA1c testing, and again grading is applied to assess fitness for duty for Safety Rail Work. Epilepsy also has a grading system to determine fitness for duty.

There seems to be no scale for intracranial aneurysms – there is no consideration of risk of rupture, and rail worker employers seem to adopt a blanket Unfit for Duty if an (unruptured) aneurysm is detected.

I am pleading with the review team of the National Standard for Health Assessment of Rail Safety Workers to consider and incorporate into the Standard the PHASES Score for risk of Intracranial Aneurysm rupture. Please also develop a grading system for assessing fitness for duty for Category 1 and 2 Rail Safety Workers that have diagnosed, unruptured IAs that is on par with other grading systems throughout the Standard. For the lowest risk category, a PHASES Score of zero with 0.4% risk is incredibly low. All the risk categories need to be considered separately from each other to represent a true picture of risk.

**References:**

1. Vlak MH, Algra A, Brandenburg R, Rinkel GJ. Prevalence of unruptured intracranial aneurysms, with emphasis on sex, age, comorbidity, country, and time period: a systematic review and meta-analysis. *Lancet Neurology* 2011; 10:626-636.
2. Etminan N, Rinkel GJ. Unruptured intracranial aneurysms: development, rupture and preventive management. *National Review of Neurology* 2016; 12:699–713.
3. de Rooij NK, Linn FH, van der Plas JA, Algra A, Rinkel GJ. Incidence of subarachnoid haemorrhage: a systematic review with emphasis on region, age, gender and time trends. *Journal of Neurology Neurosurgery and Psychiatry* 2007; 78:1365–1372.
4. Gabriel RA, Kim H, Sidney S, McCulloch CE, Singh V, Johnston SC, et al. Ten-year detection rate of brain arteriovenous malformations in a large, multiethnic, defined population. *Stroke* 2010; 41:21–26.
5. Greving JP, Wermer MJH, Brown RD Jr, Monta A, Juvela S, Yonekura M, Ishibashi T, Torner JC, Nakayama T, Rinkel GJE, Algra A. Development of the PHASES score for prediction of risk of rupture of intracranial aneurysms: a pooled analysis of six prospective cohort studies. *Lancet Neurology* 2014; 13(1):59-66.