Prevalence:

By 2020 traumatic brain injury (TBI) will become the third leading cause of death and disability across the lifespan, according to World Health Organisation estimates. Globally the rates are increasing, largely due to increasing numbers of motor vehicles and associated vehicular trauma, in developing countries [1].

In high income countries, TBI is the leading cause of mortality and disability in young children [2]. Across the lifespan TBI is most prevalent in young adults aged between 15 – 24 years. Males are twice as likely to sustain a TBI than females; commonly attributed to a greater propensity engage in high risk behaviour or being under the influence of substances [3, 4]. A second peak occurs in the first five years of life and in the elderly; commonly due to accidents involving falls [5, 6].

The exact rates of TBI in Australia are not well known. Due to not all individuals that present to emergency will be admitted, some will consult their GP instead of visiting their emergency department, and some will not consult medical services at all. However it is known that injuries classified as mild, account for 80% of injuries.

Due to the young age of occurrence, TBI is the leading cause of death and disability of adults in their most productive years, with considerable lost earning potential and costs associated with providing long-term care. An access economics report estimated the total Australian costs of TBI in 2008 to be 8.6 billion dollars per year, with a lifetime cost of 2.5 million and 4.8 million per case of moderate and severe TBI respectively [7].

Unfortunately, TBI is considered a hidden disability due to poor awareness by the public and many clinicians. Furthermore research funding lags behind. Within the US funding is eight times less for TBI than its most comparably prevalent disease [8].

Cognitive impairment:

For survivors, cognitive impairment after TBI is frequently reported as the most common and debilitating residual symptom experienced. It is one of the most frequent complaints and a major contributor to an individual’s level of personal disability [5]. TBI can impact all areas of cognition. Most commonly affected are an individual’s, attention, working memory, processing speed, learning, memory and executive functions. Injuries associated with the functions of the frontal lobe are common due to the internal architecture of the cranium. Executive deficits impacting upon individual’s ability to plan and complete goal directed behaviour post-injury is associated with the individual’s level of disability post injury.

Cognitive deficits typically resolve in 80-85% of cases of uncomplicated mild TBI within 3-6 months. However for moderate to severe TBI survivors approximately 65% report long-term problems with cognitive functioning [9]. Although sensory and motor defects do occur post TBI, cognitive and behavioural problems are typically most closely associated with long-term disability.
Furthermore, beyond basic demographic information such as age, previous level of education obtained and estimated cognitive ability prior to injury, the best early clinical prognostic indicators such as: admission pupil response, classification of neuroimaging scans, depth of coma at the time of admission and serum glucose, show limited predictive ability for long-term cognitive prognosis [10].

Additionally debilitating for individuals the experience of post concussive symptoms (PCS). These are defined as transient symptoms after brain trauma. They including: fatigue, headache, dizziness, tinnitus, concentration and memory problems, sensitivity to noise or light, sleep disturbances, irritability, mental slowing and emotional liability [11, 12]. For the majority, a full recovery will occur within 3-6 months. However many individuals report the experience of consistent PCS at 3, 6 and 12 months post injury [13]. Of all the residual post concussive symptoms, cognitive complains were the most common and persistent concern.

Future predictors

In recent decades, there has been an explosion of research into the role biological markers of injury or ‘biomarkers’ may contribute to diagnosis and predicting outcome including of neuropsychological / cognitive deficits [2, 14]. With exception of the brain, biomarkers are utilised to quantify, assess and define pathology in almost every organ in the body as a part of clinical care [15, 16]. Biomarkers have revolutionised cardiology, AIDS, breast and prostate cancer therapies, it is hoped that multiple brain biomarkers termed a biomarker profile, may play a similarly revolutionary role in diagnosing and providing vital clinical information about a patient’s likely outcome. Highly accurate information, available early would assist doctors planning and ability provide the best care, as well as and provide essential severity and likely outcome information crucial to family members at a time of great uncertainty.

References: