TRAUMATIC INJURY IS NO ACCIDENT

How often have you heard someone say "*It was just an accident*"?

This description is commonly applied to minor day to day events, incidents that cause minor injury, and in some situations major traumatic events.

But is it true?

What is an accident, and is accidental injury or "*personal injury by accident*" just that? Is there in fact an underlying cause for traumatic injury which supervenes the circumstances and results in some individuals suffering injury when others would not?

Let me first consider the term "*accident*". The Oxford English Dictionary notes that it comes from the Latin word "*accidens*" and the French verb "*accidere*" both meaning to fall towards. The Dictionary provides two basic descriptions of the word. The first is that it is an unfortunate incident that happens unexpectedly and unintentionally. The second description is that it is an event that happens by chance and that is without apparent or deliberate cause.

Unexpected…chance…without apparent cause; are these descriptions accurate?

There are many possible underlying reasons for injury causing events. Behavioural flaws, including stupidity, as well as drug and alcohol use all contribute. But underlying all of this, is there such a thing as "*accident proneness*"? Are there individuals who have an innate tendency to be involved in injury causing events?

Let us deal with stupidity first. Twenty five years of caring for patients who have suffered injury has given me plenty of exposure to these sorts of situations. The one *par excellence* was that reported in the NZ Herald at the time…..

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So were these series of events accidents, events happening by chance without apparent or deliberate cause, or predictable consequences of human actions? I think the latter.

So much for stupidity… what about drug and alcohol use?

It is widely known that alcohol use in particular contributes significantly to car crashes and the associated injuries. I won't repeat what is well known to this and other audiences, that alcohol impairs ones driving ability and increases ones possibility of injury causing events. What is less widely appreciated is that alcohol contributes significantly to a wide range of other injury circumstances particularly in the home.

The Trauma Service at Auckland City Hospital records information on all patients admitted to hospital after injury caused by some form of traumatic force. Approximately 1200 patients a year fall into this category and there are now nearly 20,000 records in the trauma registry. A number of those present here tonight will have had details of an injury causing event documented in the Trauma Service registry. Many patients have their blood alcohol measured on arrival. Seven % of admitted patients have suffered some form of interpersonal violence and half of this group had their blood alcohol measured. In nearly two thirds of those in whom it was measured, the blood alcohol level was over the legal driving limit of 17mmol/l, and in nearly a third of those or 24% of the group as a whole, the blood alcohol level was over 3 times the legal driving limit.

Turning now to traffic related injury, this affected 22% of patients and nearly half have had their blood alcohol measured. Thirty eight of those in whom it was measured were found to be above the legal driving limit. Injury in the home resulted in admission in a similar number of patients to those suffering road traffic crashes. Only 16% of these patients had their blood alcohol measured. However, nearly half were over the legal driving limit.

While there are clearly biases in terms of who gets their blood alcohol taken in either the violence, traffic-related and home environments, to consider alcohol only a problem for motor vehicle and interpersonal violence related trauma is clearly a mistake. Alcohol intoxication is a significant underlying factor in all three types of injury.

Inside the home there are a variety of situations where impaired judgement can result in an individual's perception of their physical strength, speed and intelligence being at considerable variance to reality. This perception-reality mismatch can result in some spectacularly poor decision-making, and again my experience in the Trauma Service has given me ample opportunity to see this poor decision-making in action.

Stupidity and drug and alcohol use are easily understood as underlying factors predisposing to injury-causing events. But are there individuals who are more likely to suffer potential injury causing events more often than others in the same circumstances? Are there people who are accident-prone?

The concept of accident-proneness has been subject to considerable controversy. Greenwood and Woods in 1919 were the first to observe that a relatively small proportion of workers in a British munitions factory had most of the accidents. They recognized that the propensity to suffer accidental injury was not random, but described by a skewed distribution curve and they suggested the personality make-up of the individuals was the cause. They futuristically proposed that it might ultimately be possible, if this tendency to injury proneness could be detected and susceptible persons indentified, to prevent such accidents occurring. A sort of cross between career guidance and role played by Tom Cruise in the movie *Minority Report*, in prosecuting "*pre-crime*" before it happened.

A more recent example of research into accident proneness was published in *Occupational Medicine* in 2006 by Gauchard and others. They performed a case-control study of accident proneness in railway workers employed by the French National Railway Company. Workers who had had at least one lost-time injury in a particular 12 month period were compared with workers who did not experience any injuries in the previous three year period. They recruited a sample of over 1000 people. Significantly, an increased risk of frequent injury was associated unsurprisingly with age under 30, relative inexperience, and those looking for a job change. More interestingly smoking, sleep disorders and lack of outdoor hobbies were all associated with relative risks more than double baseline.

However, a clear distinction needs to be made between accident liability, which refers to both personal and environmental factors, and accident-proneness which refers to personal factors alone. Accident-proneness is the tendency of an individual to experience more accidents than otherwise identical individuals (in terms of age gender, domicile etc) due to stable personality characteristics. Further evidence to suggest accident proneness as a personality feature originates from research among children and adolescents. While the environment and social deprivation are generally considered important factors in the aetiology of accidental injury, there are children living in unsafe environments who never experience an accident while others living in optimal conditions suffer repeatedly from accidents.

Mannheimer publishing in *Child Development* in 1967 studied over 8000 children and noted extraversion, daring and roughhousing as characteristics associated with increased risk of injury. He found that accident liability was greater in boys who were aggressive and hostile to parents, teachers and peers, show-offs who always needed to win, impulsive children who got angry when frustrated, and those who were careless and inattentive. The converse of these characteristics has never been reported to be associated with an increased injury risk.

In a twin study reported in the *Journal of Pediatrics* in 1979 by Matheny, 49 pairs of same sex twins, selected from a larger sample of twins participating in a longitudinal study, were evaluated. Behavioural observations were available for periods prior to accidents and it is clear that in some cases one twin experienced more accidental injury than the other. That twin noted to be more active, temperamental, and less attentive, suffered injury in 71 of the 89 instances in which injury occurred.

But can the personal characteristics of a child under 10 be described as a stable trait? Many would argue not. Among those who would argue against the relevance of injury-prone personality in children is John Langley, a well known injury prevention researcher in Dunedin. While not discounting the possibility of statistical significance in the reported studies the frequency of accident-repeaters is so low as to have minimal injury-prevention relevance.

So much for children under 10….is there any evidence of personal characteristics which are associated with accident-proneness in older children or adults?

Among the various traits that seem to be associated with an increased accident risk is that of left handedness. Work by Currie reported in *Injury Prevention* documented a case-control study of 6-18 year olds brought to the paediatric Emergency Department after suffering accidental injury. The incidence of injury in left-handers was 18% compared with 10.5% in right-handers. Among left-handers in both the trauma and the control group, some 20% had previously been hospitalized for injury compared with 12% of right-handers. Many similar studies exist. Aggleton and others reporting in the *Journal of Epidemiology* in 1993 under the title "*Evidence for longevity differences between left handed and right handed men*" noted that left handed men were more likely to die prematurely in accidents or in warfare. MacNiven writing in *Brain Injury* in 1994 noted an increased prevalence of left handedness in victims of brain trauma and Persson and Allebeck writing in *Epidemiology* in the same year noted that lefthanders were slightly more likely that right handers to die as a result of motor vehicle crashes. Many valid reasons for these differences, other than the character trait, have been proposed. Many in the audience will be left-handers and will be aware of right-hand bias. A right hand man is indispensable and no-one wants a dancing partner with two left feet. Apart from the terminology, the world is built for right-handers with equipment of all sorts defaulting to the right-handed user, possibly exposing the left-hander to increased risk. A large variety of tools, equipment and implements are designed for used by right-handers. Examples include scissors, gear shifts, rifles and a variety of power tools. Foot laterality may play a role in operating a motor vehicle. In addition, left-handers turning bias is opposite to right-handers and may predispose to collisions.

Although the applicability of animal studies to this human problem is dubious Collins published a paper in 1975 in *Science*, one of the top scientific journals, under the title "*When left handed mice live in a right handed world*". He found left-pawed mice had difficulty adapting to a right-oriented environment and *vice versa*. These studies raise the question as to whether handedness may serve as a neural marker for accident-proneness. However, whether the left-hander, exposed to environmental and character bias throughout their life, develops a personality which makes then more likely to suffer injury has not been proven.

So do accidents happen? I hope I have demonstrated that the vast majority of injury producing events is not accidental but the predictable consequence of either innate proneness or developed behavioural characteristics which lead to deliberate risk-taking and subsequent injury. All those aggressive left-handers out there who smoke, are without hobbies and who like to win and become angry when frustrated are in the group more likely to suffer injury.

Undoubtedly however, accidents do happen. Many will recall that around Christmas 2006 a 27 year old woman was on the deck of a boat off Slipper Island in the Coromandel. A bottle-nosed dolphin jumped up beside the boat and landed on her crushing her severely. Kelly James suffered severe chest injuries and had a cardiac arrest at the scene. Westpac paramedics decompressed her bilateral tension pneumothoraces and preformed CPR on her on the way to hospital. Fortunately she went on to make a full recovery.

The incident was described by marine mammal biologist Liz Slooten as "*extremely unusual*". The number of dolphins that injure a human would be one in a hundred years she said. Slooten, who has studied dolphins for more than 20 years put the odds of the accident as "*more than three million to one*" and "*way more rare that being struck by lightning*".

So despite all I have said, even accepting that most injury causing events are not unpredictable, by chance, and do not occur without apparent cause, accidents do happen.

"*The chapter of knowledge is very short, but the chapter of accidents is a very long one*" … so wrote Lord Chesterfield in a letter to Solomon Dayrolles on the 16th of February 1753. While disagreeing with Lord Chesterfield's use of the word accident, I have no doubt his sentiment is correct.