Sporting injuries amongst children in Australia: a review of the literature

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ABSTRACT

Objective
Sports and recreation promotes health benefits to the child's wellbeing but can also expose him or her to injury risks. Literature that explores sporting injuries amongst children in Australia with discussions about the paediatric nursing role is reviewed.

Setting
Prevalence of sporting injuries within the Australian paediatric population.

Sample
The search utilized medical search terms of 'Sporting injuries' 'Children' 'Pediatric/paediatric Nurses' in health related databases to locate literature published from 2007 until present. Australian based studies were preferable but not exclusive. Relevant sources through hand selection helped to develop a potential relationship between the frequency of sports injuries occurrences and the types of injuries being treated in hospital.

Primary argument
Of the twenty-five papers chosen, nineteen were related to sports injuries while a further thirteen focussed specifically on children involved in sports and recreation. Data concerning children sustaining sports related injuries, particularly in Australia, is scarce and inconsistent with no literature found relating to the role of paediatric nurses. With a particular focus on spinal injuries sustained through sports and recreation, how the paediatric nurse is involved is identified.

Conclusion
Further analysis on sporting injuries in children in Australia will help to gauge its health burden to the country to better understand this contemporary child safety concern.

INTRODUCTION

Physical activity is essential in the healthy wellbeing of children as it brings a wide range of health benefits to support their growth and development (Richards 2015a). Sports are a popular form of physical activity that children engage in where involvement from a young age teaches them the importance of maintaining fitness that continues well into adulthood (Rossler et al 2014). However, participation in sports has its risks and raises concerns for the safety of the child, as it is a leading cause of injuries within the paediatric population (Richards 2015b). Sporting injuries are a major risk factor that deters families from allowing their children to be involved in certain sports with evidence suggesting that approximately 50% of incidents are preventable (Minuzzo et al 2009). While most injuries are minor, some are so severe they require immediate medical attention and extensive rehabilitation to overcome. Some sporting injuries potentially result in lifelong disabilities or even death. This paper will therefore review relevant literature on sporting injuries as a contemporary safety issue for children and address its impact on the child and family as well as community. The role of the paediatric nurse in caring for patients injured in sports is explored with particular focus on those who have sustained spine injuries.

Participating in sports extends beyond keeping children physically fit, it also helps develop social skills, to work as a team, aids in the regulation of emotions to perform under pressure and enhances self-esteem along with other health benefits (Loprinzi et al 2012). The Australia Bureau of Statistics (2013) states that in 2012, 1.7 million of the 2.8 million children aged 5-14 years old were involved in organised sports outside of school making up 60% of the population for that age range. In addition adolescents aged 15-17 years old are reported to have the highest participation rate in sports and recreation of 74% (Australian Bureau of Statistics 2015). Children participate in a variety of different sporting activities including basketball, rugby, equestrian and road motor sports but the most popular sports are swimming and soccer (Roy Morgan Research 2015). Keeping children active from a young age enables the pursuit of a healthy lifestyle that ultimately produces better health outcomes (Minuzzo et al 2009). Encouraging children to play sports is even a government initiative to help overcome childhood obesity, which is a growing epidemic in Australia (Commonwealth of Australia, 2010). Although children who engage in sporting activities have advantages in relation to their health, the risks involved should not be ignored because it poses a threat to their safety.

Children are potentially at a vulnerable risk of sporting injuries due to their physical and physiological processes of growth and development (Caine et al 2014). For example, in comparison to mature adult bones, children's developing bones are more cartilaginous resulting in injuries unique to their age group such as growth plate fractures and greenstick fractures (Shanmugam and Maffulli 2008). Studies have also highlighted that during the pubescent period, the occurrence of injuries increases (Caine et al 2014). This is because the rate at which certain muscles strengthen is not the same as other muscles leading to imbalance and instability. For example, anterior cruciate ligament tears are often seen in the adolescent female population. Children also participate in sport categorised by chronological age rather than weight divisions thus their structure, function, and performance can differ significantly. As a result, late maturing young athletes are at a disadvantage against their physically larger, yet of the same age, opponents. Furthermore due to their immature and underdeveloped coordination, skill, and perception, children's risk of sporting injuries may also increase (Schwebel and Brezusek 2014).

METHODOLOGY

For the purposes of obtaining relevant literature on the topic Medical Subject Heading (MeSH) terms were employed with CINAHL, Medline, Pubmed & Informit chosen as the preferred databases for this review. Using Boolean search types, literature searches of the databases were conducted in three parts. The initial search

conducted utilised the MeSH terms of 'Sporting injuries' 'Children' 'Peadiatric Nurses'. Results were then limited to a time frame of 2007 onwards to achieve more contemporary information. Studies from Australia were considered to gain more knowledge on the country's understanding of sporting injuries amongst the paediatric population. The overall number of journals was poor due to the lack of literature exploring the role of paediatric nurses. As a result, literature used in this review was hand selected based upon relevance to the topic, highlighting potential for links to be made between children involved in sporting injuries and the role of paediatric nurses.

Using MeSH terms 'sporting injuries', 'children' and 'pediatric/paediatric nursing' to locate literature in databases of choice was unsuccessful. Instead the literature used for analysis was not exclusive to sporting injuries in children but had relevance to the topic. Of the twenty-five papers selected and reviewed, nineteen are about sporting injuries, while thirteen focused on children involved in sports and recreation. Through thorough examination of databases, few studies relating to the epidemiology of sporting injuries amongst the paediatric population in Australia exist.

DISCUSSION

Inconsistencies between the published literature makes it difficult to attain definite and clear figures to understand how much of an issue sporting injuries are to the safety of children. While 4.3% of individuals aged 18 years and younger visit the emergency department for sport related injuries in the United States of America each year, Australia does not have similar data to compare (Safe Kids Worldwide 2015). Reported injury rates varied between different studies due to the discrepancies in definition but also in the method of collecting and measuring injuries (Spinks and McClure 2007). It is acknowledged that different mechanisms of injuries usually took precedence over sports being the primary cause, which ultimately alters information ascertained for analysis. One study carried out in 2011 in Victorian hospitals highlights that poor documentation is also a contributing factor where the activity engaged at the time of injury is unspecified in 59% of cases presented to emergency departments (Clapperton 2012), though when it was written down, sports became the most commonly recorded activity. Updated statistics have replaced activity and place of injury with 'setting' where 9.3% in injuries are from sport settings. However again, it fails to clearly represent how often the cause of an injury is related to sports because children could have been at school, home or other locations while engaged in some form of sporting activity (Hayman et al 2017). While it is evident that sporting injuries do make up a proportion of presentations to emergency departments, facts and figures remain unclear. In response, determining its prevalence, particularly with children and how this impacts the Australian healthcare costs is difficult (Finch 2014).

Although children under the age of 15 are not included in the survey published by the Australian Institute of Health and Welfare in 2011-2012, it does provide some relevant information to better understand sporting injuries in this country. Based on the report, the number of individuals aged 15-17 years old who required hospitalisation as a result of sporting injuries was 5,770 (Kreisfeld et al 2014). It is found that most injuries sustained are from football of all codes; that is soccer, Aussie rules, rugby and touch football. Rather than suggesting how dangerous this type of sport is, it is a reflection of its popularity amongst the Australian population (Johnson 2014). While the number of those injured in wheeled motor sports was not as significant as football incidents, the proportion of injury to participant was the highest in comparison to the different sports people are involved in with a reported 3,500 hospitalisation for every 100,000 participants. Furthermore, in conjunction with cycling and equestrian sports, wheeled motor sports have higher proportions of severe injuries (Kreisfeld et al 2014. Given the fact that the data collection for this survey is only those children requiring hospitalisation and not including presentations to emergency departments or visits to a general

practitioner, the number of sporting injuries occurring is not represented as accurate and is most likely a gross underestimation.

The age of the child should also be taken into consideration when understanding sporting injuries. While sports participation often peaks among children and adolescents, certain injury risks are also associated with different age groups (Pointer 2014). For example, falls from playground equipment and drowning in swimming pools pose significant dangers to younger children whereas falls from skateboards accounted for 15% hospital admissions in children aged 10-14 years. The location, severity and diagnosis of sport injury also differ from age groups (Stracciloni et al 2013). The study found injuries affecting the upper extremities, namely fractures, were common amongst young children aged 5-12 years while older children (13 -17 years) tended to injure their chest, pelvis and spine more with soft tissue damage as a result of overuse as the root of cause.

Examining the incidences of children sustaining injuries from sports through accuracy and consistency in data collection is crucial. It helps to reflect on the effectiveness of current practices in protecting the paediatric population and raises public awareness (Finch and Clapperton 2012). One recent study from Victoria attempted to examine the burden of sporting injuries in children comparing the incidents to road traumas (Finch et al 2014). Findings concluded that within the 2004-2010 period, there was a significant increase in the frequency of children requiring hospital treatment as a result of sports while those involved in road accidents decreased. The health burden is also larger with more direct hospital costs, more admissions as well as longer years lived with disabilities. Similarly there has been a marked increase in the hospitalisation of children for sports related injuries in Canada (Fridman et al 2013). These results demonstrate that the burden of sporting injuries in children is growing in numbers and cost internationally. Nevertheless it also provides incentives to prioritise the need to implement sports injury preventative measures for the paediatric population.

Sporting injuries vary in severity. They can range from scrapes and bruises to head trauma and spinal cord injuries (Dunkin 2016). Common injuries often seen in the emergency departments include fractures and soft tissue injuries (Kreisfeld et al 2014; Fridman et al 2013). For those who require hospitalisation it is imperative that their injuries are managed appropriately to reduce long-term complications. A severe yet rare example is children with spinal cord injuries caused by sporting activities. The spine is central to the skeletal system supporting the head and surrounding the spinal cord which contains millions of nerve fibres used for communication between the brain and the rest of the body (Sansbury and Wilson 2015; Spinal Injuries Australia 2015). As the spinal cord lies within the vertebrae and is well protected, a considerable amount of trauma is required to cause injury. Therefore the mechanisms of injury in sports tend to be from collisions in rugby tackles, or a high fall off a motor cross bike. Trauma to the vertebral column includes fractures, dislocations and subluxations (Hung 2015). Such injuries to the vertebral column prevent correct alignment making the spine unstable. Further unguarded movement on the unstable spine can affect the spinal canal causing compression or overstretching of neural tissue within. This potentially leads to permanent damage to sensory or motor function. As a result suspected spine injuries are to be taken very seriously (Sydney Children's Hospital Network, 2012).

Certain areas of the vertebral column are less stable making them more susceptible to injury from severe flexion and twisting (Sansbury and Wilson 2015). The cervical vertebrae, which is the highest segment of the spine, is fractured most often and injury at this level causes extensive paralysis. The immediate response to spinal cord injury is known as diaschisis or spinal shock (Hung 2015). It is characterised by flaccid paralysis with tendon reflex losses below injury level, absence of somatic and visceral sensation and autonomic dysfunction

manifesting in hypotension, abnormal thermoregulation and loss of control over bladder and bowel. For the paediatric patient and family members a spinal cord injury is a life-changing event because in an instant the once full functioning and athletic child has become dependent and relies on mechanical ventilation to breathe. Providing emotional support for the family is detrimental as they may experience a sense of grief or loss during this time. However it is also important to remind families that this is only the initial stage where the extent and severity of damage cannot be established at first and improved function takes weeks or even months to occur when spinal shock resolves (Evans 2015).

THE ROLE OF THE PAEDIATRIC NURSE

Improvement in the management of children with spinal cord injuries is a result of enhanced technology and surgical interventions as well as more extensive research into the complexity of the spinal cord and its neurological components (Sansbury and Wilson 2015). Paediatric nurses play a vital role when caring for a child who has sustained a spinal injury from sports. During the acute phase their primary role is to prevent further insult to the damaged spinal cord (Sydney Children's Hospital Network, 2012). Spinal precautions where the child requires a rigid neck collar must lie in supine position at all times and log rolled when transferred are essential to immobilise and stabilise the spine for optimal healing. Ensuring airway patency, preventing complications and maintaining function are priorities (Evans 2015). Furthermore, evaluating the extent of neurological damage early to establish a baseline helps to monitor the patient's neurological status. This entails Glasgow coma scale, assessing limb strength, neurovascular observations, and pupil response. Spinal cord injury has the potential to cause multiple impairments that reduces an individual's level of activity, participation and quality of life (Withers et al 2014). As nurses, it is therefore important to find a balance between instilling hope and helping the patient and family come to terms with reality when caring and communicating with them. While working within the multidisciplinary team, paediatric nurses liaise closely with different health professionals such as the occupational therapist, physiotherapist, social worker, psychologist and dietician to address the different aspects of the patient's life during their rehabilitation.

When the degree of damage is confirmed the goals become maximising motor function and minimising disabling effects of the pathological condition (Sansbury and Wilson 2015). The role of the paediatric nurse is to assist and educate family members in caring for their child independently in preparation for discharge back into the home environment. Progress may be slow at first, as the initial weeks require thorough explanation and demonstrations on performing tasks specifically to protect the spine. The following weeks involve supervising the caregiver- namely parents, in looking after their child appropriately. In the cases of adolescents who are deemed cognitively competent, self-care is promoted (Sydney Children's Hospital Network 2014). Supporting the child and family emotionally is just as crucial where an altered perception of body image as a result of their injury may occur and thus the paediatric nurse should acknowledge their frustration and openly discuss their situation. Eventually the aid of the paediatric nurse will become less over time as the family and the child builds confidence to perform tasks such as transferring, showering and pressure area care in a safe manner. When technique is assessed as correct and no concerns are raised after review from the treating team, the child will return home temporarily beginning with a few hours and gradually upgrading to staying overnight. The purpose of temporary leave from hospital care is to ease the transition back into everyday life with alterations made to the home to accommodate for the disabled child.

CONCLUSION

In conclusion, sports and recreation is recognised to help children maintain a level of physical activity that will benefit their growth and development in a number of different ways. However the risks, namely sporting

injuries, compromise the safety of the child and adolescent. Injuries from sporting activities fall onto a spectrum of scrapes and bruises that have little effect on the child to extreme though rare cases of traumatic brain injury and spinal cord injuries, which result in lifelong disabilities or even fatality. Review of relevant literature concerning sporting injuries in children found there is a paucity of data in determining the prevalence of injuries or the impact on the individual, family and community. While injuries are the leading cause of disability and mortality amongst the paediatric population, more academic studies to address this issue are necessary to better understand the mechanism of injury. This will also raise public awareness to seek improvements on a local, state and even national level to keep children safe while participating in sports. Currently, paediatric nurses are treating children who have sustained sporting injuries rather than preventing them. With better surveillance of this safety issue, more can be done to reduce the risks and ease its health burden in Australia.

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