

# Agricultural Injuries in Children & Youth

## Introduction

This edition of the Alberta Centre for Injury Control & Research's (ACICR) *Injury Examiner* addresses agricultural injury prevention in children and youth, providing injury prevention stakeholders with background information depicting the problem in Alberta followed by summaries of research related to evaluations of safety interventions. The research presented comes primarily from systematic reviews and from research articles published in peer reviewed journals.

## The Issue

- When comparing the death rates in all age groups, children (0 – 14 years) had the highest increase in rates from 1990 – 2009 with an average annual percentage increase of 6 per cent. This rate increase can be explained by the consistent number of deaths occurring each year (an average of 4 per year) while there has been a significant decrease in the reported child agriculture population.<sup>1</sup>
- Of all deaths from 1990 - 2009, children of farm owners/operators represented the second highest group of victims at 23 per cent. The highest group of victims was farm owners/operators (47 per cent). The third highest group of victims was hired workers (9 per cent).<sup>1</sup>
- Run-overs were the leading cause of agriculture-related deaths in children 0 - 14 years of age from 1990 - 2009 (21 out of 69 deaths). The majority were as a result of the child being a passenger on a piece of equipment (n = 12). The remaining deaths (n = 9) occurred when the child was a bystander. The most common piece of equipment was a tractor (n = 11) followed by a motor vehicle (n = 5).<sup>1</sup>
- Drowning was the second leading cause of agriculture-related deaths in Alberta children with 14 deaths from 1990 - 2009. Dugouts accounted for 57 per cent of the drowning deaths.<sup>1</sup>
- Animal-related injuries (ridden and not ridden) were the leading cause of hospital admissions from 1990 - 2001 and the leading cause of severe trauma from 2001 - 2010.<sup>2</sup>
- Falls from heights (48 per cent from hay bales and 22 per cent from fences) were the second leading cause of hospital admissions from 1990 - 2001 and off-road vehicles (primarily ATVs) were the second leading cause of severe trauma from 2001 - 2010.<sup>2</sup>

## Injury risk factors for children and youth include:

- Young children under 6 years of age are curious, relatively uncoordinated and engage in magical thinking.<sup>3</sup> Having young children on the work site increases their risk for injury even under adult supervision. A study of pediatric farm injuries showed that nearly 80 per cent of young children were injured while under adult supervision. Furthermore, nearly 60 per cent of the injuries occurred when the child was within the adult's reach. The ability to attend to a hazardous task and a child's safety at the same time is a fallacy.<sup>4</sup>
- While school age children may be eager to help and show competence to parents, they lack the judgment and problem-solving skills required to do hazardous work. Furthermore, their smaller size and limited strength limits their field of vision and ability to reach and manage controls.<sup>3</sup>
- Youth may be larger in size and stronger; however, they have less impulse control and engage in more risk taking behaviour with their sense of immortality.<sup>3</sup>
- Parents may believe that their children who observed and engaged in farm work from a young age are well aware and able to handle hazardous tasks even without any formal safety instruction.<sup>5,6</sup>
- Parents may not role model, supply or enforce the use of protective equipment.<sup>5</sup>
- Parents may assign developmentally inappropriate agricultural tasks to children/youth.<sup>6,7</sup>
- Parents may hold traditional familial and/or cultural views where benefits gained by family farm work such as a good work ethic, responsibility, knowledge and skills, cooperation and teamwork as well as family cohesion outweigh potential risks for injury.<sup>5,6,8,9</sup>

### **Injury risk factors for children and youth (cont.)**

- Parents may not supply or lack access to ergonomically engineered farm machinery/equipment available for younger operators or for parents to effectively guard children from hazards.<sup>5,10</sup>
- There are no regulations to protect the safety of children and youth (family or hired workers) working on farms. Farming and ranching operations are not required to abide by Alberta's Occupational Health and Safety Act.<sup>11</sup>

### **Reviewed Interventions**

Overall, studies evaluating the effectiveness of interventions aimed at preventing farm-related injuries to children and youth have had weak research designs lacking control groups, having low response rates, lacking baseline measures and relying on self-reporting. Most evaluations published are educational strategies having measurements that are limited to short-term self-reported behaviour change and knowledge acquisition rather than measuring injury risks and incidents.<sup>12,13</sup> Consequently, it is difficult to interpret findings and make definitive statements about best practice approaches to facilitating the reduction of agricultural injuries in children and youth.

#### ***School-based Programs***

Evaluations of education programs delivered in schools have demonstrated gains in knowledge and positive changes in attitudes toward farm safety. These outcomes were even more pronounced with active, hands-on participation. All increases in knowledge and positive attitudes reported were short-term.<sup>12</sup>

#### ***Farm Safety Day Camps***

Evaluations of two farm safety camps included in a systematic review was limited to showing short- and long-term gains in knowledge of participants.<sup>12</sup> Another evaluation which compared camp participants with non-participants (not all participants lived on a farm or were exposed regularly to a farm environment) over a year showed improved safety knowledge and self-reported safe behavior scores in camp and non-camp participants. However, there were greater increases in safety day participants.<sup>14</sup> Baker et al.<sup>15</sup> conducted a qualitative assessment of farm safety camps and made the following recommendations to increase the potential for behaviour change:

- Divide participants into age groups with similar stages of development, and have accurate and appropriate curricula, activities and resources for the specific age groups (for example a PTO entanglement demonstration may not be appropriate for some age groups as it may incite more curiosity than aversive behaviours);
- Invite session leaders from local community organizations and businesses and ensure that they present accurate and age-appropriate curricula;
- Increase parental involvement to encourage mentoring and enforcing of safety behaviour and purchasing of necessary safety equipment;
- Because it is hard to change behaviour in one day, address safety issues throughout the year to reinforce behaviours learned in programs.

#### ***North American Guidelines for Children's Agricultural Tasks***

The North American Guidelines for Children's Agricultural Tasks (NAGCAT) were developed to assist parents in assigning developmentally appropriate farm work to children 7 – 16 years of age. Agricultural tasks are described in terms of steps to accomplish the job, developmental skills required and major hazards that put a child at risk for disease or injury. Suggestions are provided for adult supervision, personal protective equipment and other factors influencing job assignments. NAGCAT have been translated into several languages and adopted for culturally relevant use in different countries with application to regional agriculture.<sup>16</sup>

Evidence indicates that NAGCAT has the potential to prevent serious injuries to working children aged 7-16 years.<sup>7,17</sup> To increase their potential to reduce injuries, Marlena et al.<sup>17</sup> made the following recommendations:

- Develop and implement a marketing and dissemination plan for the guidelines that includes innovative partnerships with agricultural producers, agribusiness and farm organizations to promote the use of NAGCAT.

### ***North American Guidelines for Children's Agricultural Tasks (Cont.)***

- Because voluntary, educational strategies alone are not sufficient to protect children working on farms, implement environmental and incentive-based strategies to minimize risk and legislated alternatives that provide equal protections for the youth workforce.
- Update guidelines to incorporate the latest empirical evidence on child development for high-risk jobs like driving tractors and lifting heavy objects.
- Conduct research to understand and define optimal supervision for working children.
- Develop intervention strategies to address injuries and fatalities among children ages 1 - 6 years.

### **Recommendations for Protecting Young Children**

Based on injury data and child development knowledge, Morrongiello et al.<sup>4</sup> and Pickett et al.<sup>18</sup> have devised recommendations to protect children 0 - 6 years of age:

- Ensure that children are supervised by an adult off the work site.
- Implement physical barriers for children around hazards like dugouts, animals, haylofts (heights) as well as proper storage of tires, cabinets and water troughs to prevent crushing and storage of tools and sharps to prevent lacerations.
- Build an outdoor designated play space that is fenced.
- Participate in a formal safety and supervision program which includes basic training in first aid and cardiopulmonary resuscitation.

### **General Recommendations for Interventions**

Upon examination of 26 studies evaluating the effectiveness of various interventions, Gallagher<sup>13</sup> has made a number of recommendations including:

- Segment the target audience by work status (working on own farm or another's farm, for example) and by ages that more closely align with child development.
- Often the individual child is the focus of prevention interventions which results in poor long-term results. The intervention should include children's direct influencers like peers, parents, teachers and healthcare providers in addition to indirect influencers like agricultural community organizations and businesses.
- Reflect concepts presented in behaviour change theories. Know your target audience, their influencers and their environment. For example, your audience will not adopt prescribed behaviours if they seem unattainable (i.e., financial or physical barriers) or not the community norm or if the audience does not see itself as being at risk.
- Use and encourage development of farm tools and equipment that are more compatible with youths' stature, development and strength (i.e., shovels, wheelbarrows, feed bins, carts for feedbags, etc.) The author notes that the intent is not to modify equipment in order to encourage youth to engage in developmentally inappropriate tasks.
- Utilize methods such as enclosed play spaces that separate children from hazards.
- Implement and enforce policies that protect children and youth. Koné et al<sup>19</sup> explain that injury prevention policy can range from government legislation to internal policies of organizations. They can address safety behaviour (e.g., requiring helmet use) or make safer environments, equipment or structures (e.g., safe play areas<sup>20</sup>). A policy example in Alberta is 4-H Alberta's equine helmet requirements for specific competitions (4-H Alberta, 2013).<sup>21</sup>

### **Conclusion**

Reducing agriculture-related injury and death in children and youth requires a comprehensive approach incorporating multiple levels of influence. This means working in partnerships with community, organizations, municipal districts, schools, media, business, etc.

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