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Prevention of Agricultural Injuries Among Children and Adolescents
Committee on Injury and Poison Prevention and Committee on Community Health
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AMERICAN ACADEMY OF PEDIATRICS

Committee on Injury and Poison Prevention and Committee on Community Health Services

Prevention of Agricultural Injuries Among Children and Adolescents

ABSTRACT. Although the annual number of farm deaths to children and adolescents has decreased since publication of the 1988 American Academy of Pediatrics statement, "Rural Injuries," the rate of nonfatal farm injuries has increased. Approximately 100 unintentional injury deaths occur annually to children and adolescents on US farms, and an additional 22 000 injuries to children younger than 20 years occur on farms. Relatively few adolescents are employed on farms compared with other types of industry, yet the proportion of fatalities in agriculture is higher than that for any other type of adolescent employment. The high mortality and severe morbidity associated with farm injuries require continuing and improved injury-control strategies. This statement provides recommendations for pediatricians regarding patient and community education as well as public advocacy related to agricultural injury prevention in childhood and adolescence.

ABBREVIATIONS. ED, emergency department; AAP, American Academy of Pediatrics; ATV, all-terrain vehicle; ROPS, rollover protective structures; NIOSH, National Institute for Occupational Safety and Health.

INTRODUCTION

Although "agriculture," "farm," and "rural" are not interchangeable terms, many of the risk factors are similar for injuries in each of these settings. Present data collection systems do not always allow clear distinctions among these injury categories; therefore, for purposes of this statement, only unintentional agricultural injuries will be considered. Migrant farmworker children are also not well represented in available data. Although this statement includes much that is generally applicable to any farm child, it emphasizes family farms and does not deal in full with patterns of exposure and injury specific to migrant farmworker children. Not all rural people live on farms, but most farms are in rural areas. In 1991, 923 000 children younger than 15 years and 346 000 adolescents 15 through 19 years of age resided on US farms and ranches.¹ There are no good estimates of the population of migrant farmworker children, but it is known that at least 600 000 school-aged children are enrolled in migrant education programs.² Thus, it is estimated that almost 2 million children live on, work on, or visit farms annually.

The recommendations in this statement do not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate. PEDIATRICS (ISSN 0031 4005). Copyright © 2001 by the American Academy of Pediatrics.

FARM FATALITIES

From 1991 to 1993, an annual average of 104 deaths of children younger than 20 years occurred on US farms and ranches.³ Based on the estimated 1 298 000 children and adolescents younger than 20 years living on farms in 1991, the overall annual farm death rate was 8.0 per 100 000 child and adolescent farm residents. This is a 39% reduction compared with the 1979 to 1981 rate in the same data set.⁴ However, the actual number of farm-related deaths is probably underestimated, because these data do not include deaths on public roadways, even if a farm vehicle was involved (motor vehicle crashes are the leading cause of death for farm children younger than 18 years, as they are for all other children younger than 18 years).⁵ Also, surveillance using only death certificates at the state level has been found to miss 18% of actual agricultural fatalities.⁶ The lack of a national agricultural injury surveillance system does not permit better estimates than these.

Death rates from unintentional agricultural injuries increase with age,⁷ with a slight dip in the 5- to 9-year age group.³ Death rates for boys and girls have declined equally since the 1979 to 1981 study⁴; however, fatality rates among males were 5.6 times higher when compared with those for females overall and nearly 10 times higher than rates for females among those 15 to 19 years of age. Head injuries occurred in 64% of the fatalities.^{3,4}

Each year, farming ranks among the most dangerous occupations in the country for adult and adolescent workers.⁸ When using estimates of actual hours worked, the rate of adolescent injury exceeds the rate for adult workers.⁹ A study of 670 occupationally related deaths from 1980 to 1989 among 16- and 17-year-olds found that one third of the 354 victims with known industry of employment worked in agriculture (for the other 316 victims, industry was unknown).⁹ Machinery accounted for 105 of the 670 deaths, and 68% of deaths caused by machinery were related to agriculture. Tractor-related injuries, often rollovers, account for 30% to 50% of fatal injuries.¹⁰⁻¹³

In a study of pediatric farm fatalities, almost 72% of victims died before ever reaching a hospital⁴; however, more recent data show a decrease to 52%.³ This decrease may be related to expanded emergency medical services in rural areas and to increased pediatric training of prehospital providers through the Emergency Medical Services for Children program.

NONFATAL FARM INJURIES

On average, an additional 22 288 children younger than 20 years who live on farms and ranches are

injured severely enough to be seen in an emergency department (ED) each year.³ The total childhood farm injury toll has been estimated at greater than 100 000 annually (Fig 1).¹⁴

Although fatality rates and the number of farm injuries have decreased since publication of the previous American Academy of Pediatrics (AAP) statement,¹⁵ in light of a shrinking farm population, the rate of nonfatal farm injuries has risen 10.7%.^{3,4} Significant long-term disability occurred in 41% of 88 people with farm-related injuries who were brought to a Minnesota ED, and 13% required reconstructive surgical procedures.¹⁶ In New York State, permanent disability rates exceeded temporary disability (1.17:1) in agriculture, to a greater degree than in any other industry.¹⁷

Many studies have examined the most common causes of agricultural injury.^{3,4,6,7,9-11,16-26} Tractor-related injuries and other farm machinery are a major source of morbidity.^{3,4,6,7,10-13,17-23,26} Livestock, other farm machinery (including power take-offs), falls from structures, chemical burns and poisonings, and wound infections accounted for most of the remaining morbidity.^{3,4,6,7,11-13,16,18,20,24-26} High school students with active involvement in farm work have been found to have audiometric evidence of early noise-induced hearing loss. As in adults, this loss was most marked in the ear turned closest to the tractor engine while driving.²⁷ A 4-year intervention program designed to protect hearing by promoting use of hearing protection devices was found to be successful.²⁸ Other environmental or health hazards experienced by adult workers, such as exposure to pesticides, fuel, toxic gases, infections, and stress, also affect children.

Among 1- to 16-year-old children brought to the ED for a farm injury, 84% were boys and 16% were girls.¹⁶ Several studies suggest a bimodal age distribution for agricultural injuries, the first peak occurring at 3 to 4 years of age and the second at 13 to 14 years of age.^{16,18} The first age peak is attributable to increased mobility, exploration, and the need for both supervision and separation of play areas from the rest of the farm. Poisonings from pesticides and alkali agents in the toddler age group can result from storage in containers that are not childproof and those that resemble drink containers.^{24,25}

The second age peak at 13 to 14 years of age appears to be attributable to involvement of adolescents in farm work. Multiple factors may contribute

to this peak, including the hazardous nature of the work and use of large machinery, coupled with inexperience and, in some cases, risk-taking behaviors. Among adolescents working on farms, nearly three fourths reported being injured during work.¹⁹ In a review of workers' compensation awards to New York State youth from 1980 to 1987, only 3% of employed youth worked in agriculture, yet agriculture was the second most hazardous industry employing youth overall, and with the highest injury rates, was the most hazardous for 16- and 17-year-old workers.¹⁷ Most of these injured adolescents were employed as farm workers (64%), gardeners and groundskeepers (14%), and animal caretakers (5%). Seasonal variation in pediatric agricultural injury has been observed, with several studies noting increases during the summer in addition to peaks occurring at planting and harvest time.^{11,16,18}

RECOMMENDATIONS

The lethality of farm injuries, the implications for long-term disability of those injured, and the impact on families warrant continuing injury-control efforts on the part of pediatricians. The entire injury-control spectrum, including prevention, timely acute medical care delivered by professionals trained in the care of children, and age-appropriate rehabilitation, should be addressed by pediatricians with the support of the AAP. Several articles and publications have stressed the need for injury prevention education to farm families as well as the very important role of physicians in both prevention and treatment.²⁹⁻³³ In 1996, the National Committee for Childhood Agriculture Injury Prevention, a multidisciplinary consensus group, recommended action steps to reduce unintentional agricultural injuries to children younger than 18 years.²⁹ The AAP supports these recommendations and makes the following recommendations to pediatricians who care for children living on or visiting farms:

1. Parents and patients should be asked about farm residence, farm work involving children, and visits to relatives on farms and should be informed about the risks of agricultural injury and effective preventive measures. Strategies for prevention might include the following:
 - Separating young children from farm hazards by fencing in a play area
 - Providing child care to assist farm families and farm workers or pooling family child care, especially at planting and harvesting times
 - Prohibiting extra riders on tractors, mowers, and all-terrain vehicles (ATVs)³⁴
 - Ensuring that there are rollover protective structures (ROPS) and seat belts on tractors and other farm equipment and that these are used at all times
 - Limiting young children's access to large animals
 - Properly storing farm chemicals and cleaning agents
 - Providing children who work on farms with



Fig 1. Estimated annual childhood farm injury toll.¹²

- personal hearing-protection equipment and training them on how to use it properly.
2. Parents should be educated about normal growth and development in adolescence and should be encouraged to consider the physical and emotional readiness of the child for work. Parents need to recognize that small adolescents on adult-sized machinery and large adolescents with immature cognitive and judgment skills are at high risk for farm injury. Consensus guidelines have been developed by the North American Guidelines for Children's Agricultural Tasks project.³⁵ These guidelines discuss skill sets for discrete tasks and skill acquisition necessary before advancing to a new task. They are available on the Internet³⁵ to physicians, parents, and youth and may be helpful for counseling about developmentally and age-appropriate agricultural work for children 7 to 16 years old.
 3. For any farm machinery work, parental supervision, task-specific education, and initial experiences in good weather on level terrain with visual contact by parents or other adults should be supported. Children should be taught to get help from adults if any difficulties are encountered. These behaviors should be supported not only for individual families but also in the schools and as community norms.
 4. Pediatric training programs should increase teaching about the importance of childhood and adolescent agricultural health and safety issues, including regional epidemiology and effective prevention strategies. Pediatricians should then ensure that this information is shared with the community and schools. Community farm safety organizations such as 4-H, National FFA, and Farm Safety 4 Just Kids, as well as county extension agents taking leadership roles in agricultural health and safety, should be supported. Also, community-based pediatric injury prevention organizations, such as SAFE KIDS coalitions and Safe Communities, should be encouraged to include education about prevention of agricultural injury in their rural-related activities. Especially where none of these efforts exist, rural pediatricians should themselves consider leading farm injury prevention efforts with local support and resources.
 5. The emergency medical services system should be improved to provide the best possible emergency care, medical assessment, and access to tertiary care for children and adolescents residing in rural areas.
 6. A national data system for childhood agricultural injury epidemiology and prevention should be maintained. The National Institute for Occupational Safety and Health (NIOSH) has been designated the lead agency in this effort. The purpose of this national system is to collect and analyze data, establish policy, promote and evaluate research, and link agencies with related purposes. Mandatory coding to identify external cause-of-injury for nonfatal agricultural injuries would greatly assist in providing an epidemiologic profile of these injuries as the first step in prevention.³⁶
 7. Voluntary or legislated safety standards should be promoted, including the following:
 - Improved safety standards for farm equipment. All tractors should be equipped with seat belts and ROPS, and individuals younger than 18 years should be restricted from operating any tractor not so equipped.
 - Children younger than 16 years should not operate any farm vehicles, including ATVs.³⁴ Individuals between 16 and 18 years of age should have a valid motor vehicle license and should also be a certified graduate of a state-approved tractor and farm vehicle safety training program, if available, to operate a farm vehicle on a public road. Such courses need to be developed, standardized, and evaluated.
 - Children and adolescents should be restricted from riding on or in areas of machinery or motorized vehicles not approved for passengers (including the racks of ATVs, fenders of tractors, and cargo areas of pickup trucks³⁷).
 - Safety and environmental guidelines to protect bystander children from agricultural hazards should be established.
 - Child labor laws, including hazard orders, should be amended to apply uniformly to machinery and exposures in other settings and on farms to provide equal protection for all children.³⁸
 8. Manufacturers of farm equipment and farm chemicals should be encouraged to apply existing technologies and invest research funds in the development of new technologies to decrease the number of agricultural injuries and poisonings.

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