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BRIEF REPORT

An Exploratory Pilot Study of Childhood Injuries on Cattle Farms in Jalisco, Mexico

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ABSTRACT. Childhood agricultural injuries have been a concern in the United States for many years. Much research has been performed on the cause and prevention of such injuries. The North American Guidelines for Children's Agricultural Tasks (NAGCAT) have been developed in the United States to address the common agricultural tasks and injuries sustained by children. Data are lacking concerning the common agricultural tasks and injuries of children working on Mexican farms. The goal of the study was to determine if the NAGCAT guidelines developed for the United States may be applicable to children in Jalisco, Mexico. Interviews of local physicians were performed regarding their perception of common childhood agricultural injuries. Interviews about common childhood agricultural tasks and injuries were performed at 27 farms through the help of a local cooperative. Work practices at these farms were also observed. Emergency department records were reviewed for childhood agricultural injuries. Surveys of local cattle farms revealed the most common childhood agricultural tasks were feeding animals, milking cows, and cleaning corrals. Through the same cattle farm interviews, the most common childhood agricultural injuries included being kicked by an animal, scorpion bites, cuts, and falls. Physician interviews revealed machinery, poisonings, cuts, and lacerations as the most common injuries. Due to the lack of adequate

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documentation, the emergency department medical record review was not useful. The NAGCAT guidelines address many of the common tasks and injuries in the Tepatitlán area, including animal care, operating machinery, and cleaning corrals. There are other common injuries in the Tepatitlán area such as scorpion bites for which no NAGCAT guidelines currently exist but for which guidelines could be developed. Once translated to Spanish and adjusted for cultural relevancy, the NAGCAT guidelines would address many of the common agricultural tasks and injuries of children in Jalisco, Mexico.

KEYWORDS. Agriculture, children, injury, Mexico

INTRODUCTION

Childhood agricultural injuries have been a concern for public health officials in the United States for many years due to their particularly dangerous nature. Between 1992 and 2002 agriculture represented 7.1% of the childhood workforce (ages 15 to 19) but accounted for 15.8% of work-related fatalities in the same age group.[1] In addition, 79% of all work-related deaths in children less than 10 years occurred in the agricultural sector.[1]

In response, Marshfield Clinic, located in central Wisconsin, in cooperation with the National Children's Center for Rural and Agricultural Health and Safety, developed the North American Guidelines for Children's Agricultural Tasks.[2] These guidelines are designed to help parents and those who care for minors in agricultural settings make informed decisions about appropriate tasks that youth and children can perform safely based on their age and developmental level.

The most common causes of nonfatal farm-related injuries in youth working in agricultural settings in the United States are falls, animals, and vehicles.[3] The most common injuries youth experienced are fractures, cuts, and ligamentous/tendinous injuries.[4] The most common locations for these injuries are the arm, followed by the hand, wrist, and finger and then the foot, ankle, and toe.[4]

Whereas research exists in the United Sates regarding children working in agricultural settings, very little research has been performed on occupational risks for youth working on farms in Mexico.[5] Data exist for minority-operated farms in the United Sates that may give some insight into farms in Mexico, although there are many differences between the settings. According to some research, injuries in youth working on minority-operated farms in the United States do not significantly differ from the general population. Some minority-operated farms report 12.2 injuries per 1000 household youth per year, which is not significantly different than the 18.7 reported by the general farm population.[5] These data would suggest that farming in Mexico may have a quantitatively similar amount of injuries. However, there remains a lack of data from actual farms in Mexico.

As a result of the aforementioned lack of data, this pilot study carried out in the state of Jalisco, Mexico, aims to (1) identify the types of agricultural work conducted by children; (2) determine the most common agricultural-related injuries among child workers; and (3) determine if the North American Guidelines for Children's Agricultural Tasks may be applicable in this area of Mexico.

MATERIALS AND METHODS

A 5-week exploratory, qualitative study was performed during May and June 2008 in Jalisco, Mexico, which includes the cities of Tepatitlán, Acatic, and Tizapan. This area was chosen as the research site because of the many agricultural industries and the good student exchange relationship between the Centro Universitario de los Altos (CUALTOS; the University in Tepatitlán) and the University of Wisconsin–Madison. Study components included (1) interviews with health providers at regional hospitals and rural outpatient clinics; (2) a medical record review of emergency department (ED) records at the regional hospital looking for childhood injuries related to agricultural work; and (3) interviews and observations at worksites and family farms. No identifying information was gathered throughout the course of this

study. Human subjects' protection was reviewed with the University of Wisconsin–Madison Institutional Review Board and determined that the pilot study met exemption criteria.

Health Care Provider Interviews

Emergency room physicians, pediatricians, and general practitioners were interviewed at the Regional Hospital in Tepatitlán, the Hospital de Instituto Mexicano de Seguridad Social (IMSS) in Tepatitlán, the PROLEA Clinic outside Tepatitlán, and the Centro de Salud in Tizapán. Interviews were conducted to assess provider perceptions regarding the most common childhood agricultural injuries. The same series of open- and closed-ended questions were asked at each interview and included questions regarding the most common injuries seen in farm children and the causes of injuries. Specific injury-related questions were asked regarding whether or not they have seen scorpion bites, fractures, lacerations, or poisonings in child agricultural workers. All of the interviews were conducted in Spanish and were set up by the CUALTOS University. All health care providers participated voluntarily in this study.

Medical Record Review

Medical records were to be reviewed for 1 year from emergency room physicians; however, this was shortened to 2 months (March–April 2008) for reasons discussed in Results. The records were reviewed at the Regional Hospital in Tepatitlán looking for childhood agricultural injuries. The following information was recorded: sex and age of the patient, the date the injury occurred, the type and cause of injury, treatment, and results. Epidemiologic data such as most common cause of morbidity for age groups in different geographical areas were obtained from the IMSS epidemiologist.

Farm Visits and Interviews

A sample of 26 farms associated with PROLEA (Productores de Leche de Acatic), a local cooperative of dairy farmers, were visited. The farms were selected by the PROLEA administration and were eligible if they had children working on the farm. The farms selected were located relatively close to Acatic and were selected out of a total of over 400 farms. A CUALTOS veterinary student who is a PROLEA member assisted the authors in facilitating communication with PROLEA administration and other members. PROLEA also provided the authors with one of their members, a recent high school graduate, who introduced the authors to each farmer, helping bridge the social, ethnic, and cultural barriers. PROLEA and their members participated voluntarily in this study and generously welcomed the authors onto their farms. The farm conditions and the adult and child workers were observed. The owners of the farms and adult workers were interviewed. Questions were asked regarding past injuries to children on the farm, the cause of such injuries, the types of tasks performed by children, pesticide handling, lifting form, hygiene, vehicle types and use, animal handling, harvesting techniques, and more.

To gain an understanding of the demographics of the farms that were visited within the PROLEA cooperative, sums were taken of the number of children living on the farms, the number of children working and their sexes, the number of milk-producing cows, the number of acres that are farmed, and the type of crop farmed. The mean and median were calculated for the following: ages of children living and working on farms, number of acres farmed, and number of milk-producing cows. The number of children performing different agricultural tasks and the most common injuries and accidents were recorded according to the interviews.

RESULTS

Health Care Provider Interviews

Interviews were performed with pediatricians, emergency room physicians, and general practitioners to gauge what they felt were the most common childhood agricultural injuries (Table 1). A total of seven physicians were interviewed over the investigation period, six in the Tepatitlán area and one in Tizapán. Three of seven physicians thought that agricultural machinery, poisonings, cuts, and lacerations of the hand and feet were the most common accidents among children working in an agricultural

TABLE 1. Most Common Agricultural Injuries in Children Reported Through Physician Interviews

Responses	Physician 1	Physician 2	Physician 3	Physician 4	Physician 5	Physician 6	Physician 7	Totals
Cuts				X	X	X		3
Agricultural machinery	X			X	X			3
Laceration of the hand or foot			X			X	X	3
Poisonings		X				X	X	3
Fractures				X		X		2
Injury by a coa	X							1
Animal kicks	X							1
Snake bites		X						1
Contusions					X			1
Falls					X			1
Cacti spine injury						X		1

Note. Laceration: a wound with a torn and ragged edge. Cut: a wound with a sharp, clearly demarcated edge. Coa: tool used to cut agave. May have blunt trauma, a cut, or a laceration.

setting. Two physicians agreed that fractures were a common injury among child workers. Only one physician mentioned a coa injury (tool used to cut agave), animal kicks, snake bites, contusions, falls, and cacti spine injuries as common causes of childhood agricultural injuries.

Epidemiologic Data and Medical Record Review

A 2-month review, March and April 2008, of the emergency room medical records at the Regional Hospital in Tepatitlán did not yield significant data relating to farm injuries in children. This lack of data was due to the absence of documentation of the cause of injury in the medical record. The majority of the physicians' notes will specify the injury (fractures, lacerations, cuts, burns, poisonings, insect bites) but will not say where the child was when he was injured or what he was doing. Although 1 year of records were to be reviewed, the lack of documentation resulted in premature termination of the medical record review. Of the 466 medical records from children 18 years old and younger from April 2008, only 2 records stated the child was on a farm and zero records recorded if the child was working or not. The two injuries that occurred were a 15-year-old female received a scorpion bite on a farm and a 10-year-old male who accidently pushed a cow got kicked in the neck. There were several other possible farm injuries that happened but lack of specific documentation made them difficult to discern. Of the 574 medical records reviewed for March 2008, 3 definitely happened on a farm but not necessarily while the child was working: a 5-year-old female fractured her left arm after falling from a donkey, a 12-year-old male received a severe occipital wound after falling from a horse and hitting his head on a rock, and a 15-year-old male experienced craniofacial trauma after falling off a horse. There were also several possible farm injuries in March that cannot be defined because of lack of documentation of cause of the injury and location where the injury occurred.

Injury data are kept at all regional and IMSS hospitals. The first part of the investigation period was spent attempting to discover whether or not there was any current epidemiologic data on farm injuries for children or adults. Throughout all the locales visited and interviews performed, it was discovered that in the Tepatitlán region there were no such data on farm injuries. Data were found that categorized injuries by age group or type of injury, but no data were found that addressed the cause of the injury. For example, a total of 24 children aged 0–1 suffered an injury along with 215 aged 1–4, 277 aged 5–9, 276 aged 10–14, and 267 aged 15–19.

Discharge diagnosis data from the region of Acatic, which is a largely rural area, identified the most common cause of injury in the area for

TABLE 2. Injury and Illness, Residents of Tepatitlan, IMSS Database Tepatitlán Hospital, 2007

Type of injury	Cases
Scorpion bite	94
Mild malnutrition	56
Asthma	18
Animal-related	17
Animal bite	11
Burn	6
Moderate malnutrition	4
Severe malnutrition	1
Mild accidents	0
Pesticide/herbicide	0
Severe accidents	0

all age groups (Table 2). By far the most common causes of injury is the scorpion bite, which is true in almost all areas of Jalisco, Mexico. The next most common cause of hospital/clinic visits is malnutrition, followed by asthma, injuries related to animals, and animal bites. Burns were also a cause of injury, with six cases in 2007.

Farm Visits and Interviews

A total of 26 PROLEA farms were visited. Twenty-five of the 26 farms were dairy producers, whereas 1 of the farms raised beef cattle. The average size of the dairy farms was 52.5 cows, the smallest being 6, and the largest 186. The median was 36. The majority, 24, grew corn, whereas some farms also diversified to agave, beans, chia, tomatoes, oats, and wheat. The average acreage of the farms was 56 and the median was 30.

A total of 71 children were living on the 26 farms visited. Fifty-nine children, 35 males and 17 females, were performing some type of agricultural task; the sex of the remaining 7 was not disclosed. The youngest child found to be working was 4 years old. The average age of child workers was 13.4 years and the median 14. Of the 59 children performing agricultural tasks, 23 were reported to feed the animals, 22 milk the cows, 21 clean the corrals, 13 plant/harvest crops, 12 drive a truck, 11 drive a tractor, 11 clean milking equipment, and 7 apply pesticides (Table 3).

TABLE 3. Agricultural Tasks Most Common in Children Under 18 Years Old on Small Cattle Farms, Acatic, 2008, $n = 59$ Children Performing Agricultural Tasks

Tasks	Number of farms
Feed animals	23
Milk cows	22
Clean corrals	21
Plant/harvest crops	13
Drive a truck	12
Drive a tractor	11
Clean dairy equipment	11
Apply pesticides	7

TABLE 4. Most Common Reported Agricultural Injuries in Children (<18 Years) on Small Cattle Farms, Acatic, 2008, $n = 59$ Children Performing Agricultural Tasks

Tasks	Number of farms
Kicked or pinned by a cow	16
Scorpion bites	10
Cuts or lacerations	2
Falls	2
Broken bones	2
Dog bite	1
Back problem	1
Mushroom poisoning	1
Other	2
Drowning	0

The most common injuries to children reported by adult interviewees were as follows: 16 reported being kicked or pinned against an object by a cow, 10 reported scorpion bites, 2 reported cuts or lacerations, 2 falls, 2 broken bones, 1 dog bite, 1 back problem, 1 mushroom poisoning, 2 other, and 0 drowning (Table 4).

Working conditions and workers were observed during farm visits. One observation made was many youth were lifting feed bags weighing 40 kg (88 lbs) with poor technique that put unnecessary strain on their backs. Many of the adults working on the farms complained of having back issues. Another hazard observed was the lack of protection used by many workers. Many workers, including youth, do not wear gloves, facemasks, or back guards when

applying pesticides, which can result in preventable intoxication either through inhalation or transdermal absorption. Furthermore, the storage of chemicals was typically in unmarked containers, sometimes in soda bottles or other drinking containers. These containers were often easily accessible to small children, as they were on the ground or a low shelf. Operating agricultural machinery poses further hazards for children helping with agricultural tasks. Many youth were observed operating all-terrain vehicles (ATVs), tractors, and trucks. A final observation was that many of the farms had slippery and uneven steps, cluttered work floors, and cords and pipes across walkways, creating dangerous conditions that may lead to preventable injuries. Also, many of the farms had unprotected, used syringes lying around following animal vaccinations.

DISCUSSION

There are existing NAGCAT guidelines for many of the common agricultural tasks children are performing in the state of Jalisco, Mexico.[2] As revealed in this study, performing animal care, cleaning animal areas, and planting/harvesting were common chores performed by youth working on farms in Mexico. NAGCAT guidelines already exist for many of these tasks, including cleaning service alley, feeding milk to calves, leading/grooming animals, milking cows, working with large animals, feeding of silages or corn to cattle, and feeding hay to cows (square bales).[2] While performing many of these animal care tasks, youth were observed using improper lifting technique that may contribute to future back problems. NAGCAT guidelines also exist for proper bending and lifting techniques. Another task youth were observed doing was operating agricultural machinery. Although youth have the ability to operate machinery, they need to be taught the correct technique, safety measures, and demonstrate they are at an appropriate developmental level to safely handle the machinery. Supervision is also important. There are NAGCAT guidelines available for tractor fundamentals, farming with an ATV, and implement operations (using an auger wagon, spreading solid manure, etc.).[2] This study shows that existing preventative guidelines address many of the agricultural tasks children are currently performing in Mexico.

Based on data from farm visit interviews, the most common agricultural injuries in children in Jalisco, Mexico, were being kicked or pinned by a cow, scorpion bites, cuts/lacerations, and falls. NAGCAT guidelines exist that may help prevent some of these injuries. There are guidelines on performing safe animal care that may decrease the number of children being kicked or pinned by a cow.[2] There are also guidelines on manual labor, including harvesting and pruning, that may help prevent some cuts and lacerations.[2] Unsafe working conditions were observed at many of the farms, as noted in Results. The simple task of cleaning up walkways and improving the stairs may prevent unnecessary injuries. Proper disposal of used syringes may also prevent unnecessary needle sticks. NAGCAT guidelines do not exist for scorpion bites, which are a common cause of injury in this part of Mexico. This may be due to the fact that the NAGCAT guidelines were developed for children working in agricultural settings in the United States where scorpions are not as common. A set of guidelines could be developed for preventing insect bites when working on the farm. Simple interventions such as wearing thick gloves could prevent many of the scorpion bites that occur while removing rocks from fields or picking vegetables.

Future projects that are feasible for the area include education and further investigations. PROLEA is willing to host education sessions based on the aforementioned topics and they have also reviewed the NAGCAT guidelines and pointed out areas they think would be beneficial for their members. PROLEA is also willing to have teams of health care workers or students perform education sessions at the cooperative headquarters or in the surrounding communities. NAGCAT programs could also be implemented in the rural primary schools to instill safety training at an early age. Secondary schools would not be an appropriate option because many students only

attend through primary school. Another education option would be through participating in a public TV/radio broadcast. While in Tepatitlán the authors participated in a public TV broadcast about animal-human contact and the diseases and risks it presents. A similar broadcast could be presented about farm safety. Finally, medical groups could participate in a campaign to mark soda bottles filled with pesticides with poison labels.

LIMITATIONS

Although interviewees were openly receptive, it is plausible that injuries were underreported. In Mexico it is illegal for children to be working under the age of 15 and many of the physicians said that families do not report injuries on farms as occupational injuries but as injuries while playing. Physicians said that many injuries go untreated for fear that the government would take away the children. This may have also inhibited disclosure in interviews, since many parents may have been apprehensive about providing child injury data for fear they were jeopardizing their child's ability to remain at home.

The researchers are from the United States and are native English speakers, producing both a language and cultural barrier that may have prevented optimal data collection. All interviews were conducted in Spanish and if something was not understood an explanation was asked for from the interviewee. The chaperone and staff at the PROLEA cooperative were helpful in bridging the cultural barriers.

CONCLUSION

Many of the NAGCAT guidelines address most of the common tasks and injuries sustained by children working in agriculture in Jalisco, Mexico. Once translated to Spanish and adjusted to be culturally relevant, these guidelines may prove to be a powerful tool in preventing childhood agricultural injuries. In addition to the existing guidelines, additional guidelines could be developed to address scorpion bites, as these are a common cause of injury in Jalisco, Mexico.

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