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ORIGINAL PAPER

From the Horse Worker's Mouth: A Detailed Account of Injuries Experienced by Latino Horse Workers

Jennifer E. Swanberg[1] · Jessica Miller Clouser[2] · Ashley Bush[2] · Susan Westneat[2]

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Abstract Horse breeding farms are hazardous. Yet, little is known about the injuries of Latino horse workers. This study assesses Latino horse workers' injury prevalence, describes their injuries, and analyzes differences between injuries receiving medical versus those receiving first aid care. Data were gathered from 225 Latino thoroughbred workers via a community-based purposive sampling strategy. Questions included injury experiences in the past year and details about each person's two most severe injuries. Univariate and bivariate analyses were conducted. Nearly half of workers experienced an injury in the past year, often involving a horse. Bruises and sprains/strains were most common, as were injuries to upper/lower appendages. Head/face injuries more often resulted in medical care. The injury burden in this Latino worker population is high. Personal protective equipment (PPE) and training is advised due to the high prevalence of horse-related injuries. Future research should investigate aspects of the work environment that may influence injury risk.

Keywords Occupational safety and health · Latino farmworkers · Occupational injury · Equine · Latino worker health

✉ Jessica Miller Clouser
jess.clouser@uky.edu

[1] University of Maryland School of Social Work, 525 West Redwood Rd, Baltimore, MD 21201, USA

[2] College of Public Health, University of Kentucky, 151 Washington Ave, 346 Bowman Hall, Lexington, KY 40506, USA

Background

Agriculture is one of the most dangerous industries for occupational health and safety, with the highest fatal injury rate [1]. Animal production workers, involved in the housing, grazing, breeding and/or feeding of animals [2], experience the highest nonfatal injury rate across all agricultural industries [3]. A sector within animal production about which little is known is horse breeding. This is troubling given the fact that Latino workers are highly prevalent in the horse breeding industry [4, 5] and experience fatality rates among the highest of all racial and ethnic groups [1, 6].

Much of what we know about horse-related injuries comes from trauma records [7–11] or employer-based injury reporting [12–14]. Both have limitations on the inferences that can be drawn regarding horse worker health, but help to explain the risks of interacting with horses.

Studies examining large animal injuries at trauma centers found over half of injuries were horse-related [7, 15]. These injuries resulted from being kicked, crushed, thrown, or falling from a horse [7–10]. Common diagnoses for horse-related injuries found through trauma and hospital records include contusions, fractures, abrasions and/or lacerations [9]. However, such records cannot always distinguish between recreational and occupational exposures. One study that did so found significant differences in the nature of these injuries; specifically, recreational injuries most often occurred while mounted, whereas work-related injuries more often occurred to un-mounted persons [10]. The latter were chiefly due to being kicked or crushed—causing facial and abdominal injuries—whereas mounted persons sustained more chest and lower extremity injuries due to being thrown or falling from the horse. Because occupational data may not always be available for trauma records, it may be more difficult to determine injuries that have resulted from

other hazards of horse farm work, such as exposure to toxic medicines [16, 17], heavy loads [18], or farm equipment [14]. Finally, only very serious injuries are included in a review of trauma records, which does not adequately cover the breadth of injuries experienced by workers.

Another source of data about occupational injuries experienced by horse workers is employer-based research. Through an analysis of employer injury logs and interviews with farm representatives, Swanberg et al. [13] found a wide range of injury experiences and hazards experienced by thoroughbred workers including musculoskeletal injury, horse kicks, and horse bites. Employer records also revealed that thoroughbred horse workers experienced general injuries; strains, sprains, or tears; and injuries to the upper limbs and extremities [4].

Employer-based injury data pose limitations as individual workers were not interviewed, and often the only injuries that are recorded are those involving medical attention. Because numerous factors may affect a farmworker's decision whether to seek treatment—including the desire to continue work, the presence of a coworker, the presence of blood, the involvement of chemicals or pesticides [19, 20], healthcare access and costs [21], and a preference for self-treatment [22, 23]—studies that define injury as one in which medical care was received (such as BLS data)[1] likely fall short in describing the injury burden in this population [24].

Employer-based injury data is also vulnerable to underreporting due to barriers at the employer, management, and individual levels [24–26]. One study examining BLS injury reporting found injuries and illnesses to be underreported by nearly three times the actual amount [25]. Employers may underreport for many reasons: incentive programs for no injuries [24], to reduce the chance of OSHA inspection, lower worker compensation premiums, or improve public relations [27].

At the individual level, workers may also resist reporting injuries/illnesses to supervisors for many reasons including insecure immigration status, precarious work situations, minimal/no sick leave, management practices (e.g., zero injury incentive programs), language barriers, and poor access to healthcare [24, 26, 28, 29]. Further, underreporting may be more prevalent in industries where immigrants are highly represented, like agriculture [26] and horse breeding specifically [4, 5]. A recent study of injury logs on horse farms also revealed that Latinos were less likely than non-Latino workers to report injuries overall—though it was not clear if this was a consequence of experiencing fewer injuries or workers not reporting them to management [4].

To further understand the injuries experienced by Latino thoroughbred workers—a large proportion of thoroughbred workers whose experiences may be hidden—this study seeks to: (1) identify the prevalence of medical and first aid only injuries experienced by Latino thoroughbred farmworkers; (2) describe the injuries experienced, and (3) determine if any differences exist between injuries receiving medical attention and those receiving first aid only.

Methods

These data were from a cross-sectional survey of Latino thoroughbred farmworkers conducted in the central region of a southeastern state from December 2013 to April 2014. This survey was part of a larger employer- and community-engaged research project, *Thoroughbred Worker Safety and Health Study* or *Proyecto de Salud y Seguridad del Trabajador Equino* [4, 14, 30] designed to improve the occupational safety and health of thoroughbred farmworkers. This study included the close involvement of a community advisory council and an industry advisory council.[2]

Participant

Participants (N = 225) were recruited through a community-based purposive sampling strategy using study fliers, word-of-mouth, and a local Spanish radio station popular among farmworkers. A random sampling strategy was not feasible for the following reasons. First, no list of workers in the area exists. Second, site-based sampling by residence was rejected because labor camps are not common in the region and workers live in dispersed locations, including the farm. Site-based sampling by workplace was rejected because the survey contained sensitive questions about participants' jobs and workers may have felt their jobs would be at risk if they answered honestly. Eligibility was based on three criteria: (1) self-identifying as Latino; (2) being at least 18 years old; and, (3) being currently employed at a thoroughbred farm where he/she had worked for at least nine of the past 12 months. Participants were given a study fact sheet and were informed of the study's procedures, risks, and benefits before oral consent was obtained. Documentation of informed consent was waived due to the potentially vulnerable status of the workers. Interviews were conducted in either English or Spanish

[1] BLS data defines an injury as an event meeting one of the following criteria: medical treatment beyond first aid, loss of consciousness, days away from work, or restricted work activity or job transfer.

[2] The industry council is comprised of representatives and key stakeholders from organizations that serve the thoroughbred industry, including the region's Thoroughbred Association and Farm Managers' Club, an organization that provides services to thoroughbred farm, as well as farm owners, workers, and human resource personnel.

based on the worker's preference. Wal-Mart gift cards ($15) were given for participation. All methods were approved by the University of Kentucky's Institutional Review Board.

Data Collection

The questionnaire consisted of 462 potential items[3] examining demographics, general health information, job tasks, perceived hazards, injuries experienced in the past 12 months, and details about the two most severe injuries in the past 12 months. It took 1–1.5 h to complete. The questionnaire was developed in English and translated into Spanish by a native Spanish-speaking translator, then reviewed by a second native Spanish-speaker. In addition, all four interviewers—all of whom were native Spanish speakers—reviewed the instrument for clarity. Modifications were made based on their feedback. Many of the items used in the questionnaire had been previously translated and validated with Latino farmworkers.

Interviewer Training

Four lay health promoters were employed to collect the survey data via a face-to-face interview. Interviewers were trained in the study's purpose, human subjects' protection, survey administration, and question-by-question details of the survey. Interviewers performed five observed pilot interviews to ensure the language was understandable, the meaning of the questions was clear, and that the survey flowed. The survey was then revised as needed. Throughout the data collection process, the project manager held weekly 1:1 meetings with interviewers and she and the statistician reviewed all surveys. Halfway through data collection, an additional interview was observed to ensure continued fidelity to the instrument.

Measures

Demographic Characteristics

Most demographic questions were modified from the National Agricultural Workers Survey (NAWS) [31]. The question tapping *educational attainment* came from the Farmworkers and Visual Impairment Instrument [32] which uses grade levels common in Mexico, from which the majority of farmworkers in the US originate [33].

[3] Due to skip patterns, not all participants may have completed all questions.

Employment Characteristics

Questions assessing *job tenure* (e.g., "How long have you worked at this farm?") and *job schedule* (e.g., "How many days a week do you typically work on this farm?") were developed by the team. *Farm size* (e.g., "How many other workers are there in total at the farm you are describing?") came from the NAWS [34].

Injury prevalence data was collected on two types of injuries experienced in the past year: those receiving medical attention and those receiving first aid only. The former was adapted from the BLS [35]: "Thinking about your current job on the horse farm, in the past 12 months have you had a work-related injury that required medical attention?" The latter was included to capture less severe injuries because this worker group is known to delay and/or avoid seeking treatment [19]: "Thinking about your current job at the horse farm, in the past 12 months have you had a work-related injury that did not require medical attention, but that required you to stop working for a few minutes to care for yourself or recover (administer first aid?)." If the participant answered yes to either type of injury, he/she was asked to report how many of each were experienced over the past year.

Injury details were collected on participants' two most severe injuries in the past 12 months (n = 137) using a modified version of the Onsite Aquaculture Safety and Health Interview [36] with the aid of the Nordic Safety Climate Questionnaire body map [37]. Workers were asked specifically about the *site* (body part) and *diagnosis* of injury (e.g., bruise, sprain, fracture) and then were asked via an open-ended question to describe how the injury happened and what task was being performed. Open-ended responses were coded by a researcher into detailed injury *mechanisms* (cause of injury) and *job tasks* leading to injury. Open-ended responses were further honed and collapsed through review with another researcher and members of the industry advisory council. Data were also gathered on *missed work* resulting from the injury (yes/no), how many days were missed, and on the *time of day* (e.g., morning, afternoon or night) and *month* the injury occurred [36].

Analysis

Data were entered into SPSS [38] and analyzed using SAS [39]. Overall prevalence of injuries receiving medical attention and those receiving first aid only was calculated using univariate statistics. Chi square and Fisher's exact tests were performed on the subsample of injuries about which detailed information was gathered (n = 137) to determine if there were differences between injuries entailing medical attention or first aid only.

Results

Sample Description: Demographic and Employment Characteristics

Workers in the sample were predominantly male, in their mid-thirties, married, Mexican-born, and had little formal education (see Table 1). The most dominant language spoken was Spanish, with few workers being most comfortable speaking both Spanish and English (1 %), or English (4 %). Workers' tenure on horse farms ranged from 9 months to 39 years (mean 10.5 years). On average, participants worked 12 months a year, 6 days a week, and just over 8 h a day. Farm size varied greatly (2–200 coworkers) with a median of 12 coworkers.

Injury Prevalence

Forty-three percent of the total sample of 225 workers experienced any type of injury in the last year. Eighteen percent of all workers experienced an injury that received medical attention, with an annual mean of 1.2 injuries (±0.5) per person. A third (34 %) of workers experienced an injury that received first aid, with an annual mean of 1.7 injuries (±1.03) per person.

Table 1 Participants' personal characteristics: thoroughbred farmworkers (N = 225)

Personal characteristics	% (N)
Male	85.8 (193)
Age (mean, SD)[a]	35.4 (9.62)
Married/living as married	67.6 (152)
Farmworker is a parent	64.0 (144)
No. children ≤18 years old (mean, SD)	2.2 (1.09)
Education	
None	2.7 (6)
Elementary/middle school (1–9)[b]	72.9 (164)
High school (10–12) or GED	20.0 (45)
At least some college	4.4 (10)
Years resident in US (mean, SD)	14.5 (8.44)
Country of origin	
Mexico	84.4 (190)
Guatemala	11.6 (26)
US	0.9 (2)
Other[c]	3.1 (7)
Dominant language[d]	
English	4.0 (9)
Spanish	95.1 (213)
Both English and Spanish	0.9 (2)

[a] Data missing on two cases

[b] Grades match those most common in Mexico

[c] Included Argentina, Chile, Columbia, Honduras, Nicaragua, Peru and Venezuela

[d] Data missing on one case

Injury Details

Detailed information was gathered on each worker's two most severe injuries in the past year (as perceived by the worker) which totaled 137 injuries. In 30 % (n = 41) of the injury cases, workers sought medical care and in 70 % of the cases workers reported receiving first aid only. The top three diagnoses for all these injuries were bruises (45 %), sprains (24 %), and cuts (10 %) (see Table 2). The top three diagnoses for medical-related injuries were sprains (32 %), bruises (22 %), and fractures (22 %), while the top three diagnoses for injuries receiving first aid were bruises (54 %), sprains (21 %), and punctures (12 %). Fractures more often received medical care ($p = .0003$), whereas bruises ($p = .0006$) and punctures ($p = .0337$) most frequently received first-aid care only.

Among all injuries, the top three sites were wrists and hands (26 %), feet (18 %), and back (12 %) (see Table 3). Among injuries receiving medical care, most were sustained to the wrist and hands (27 %), back (17 %), shoulders (15 %), and the head (12 %) whereas injuries receiving first aid only were most often at the wrist and hands (25 %), feet (24 %), and legs (13 %). Head injuries most often received medical attention ($p = .0252$), while injuries to the feet and ankles ($p = .0229$) most often received first aid only.

Over three-quarters of all injuries occurred while performing tasks directly involving horses (87 %) (data not shown). Taking horses out to and in from pastures or stables, grooming horses, and walking or leading horses were the top three job tasks leading to all injuries, as well as those receiving medical attention and first aid only (see Table 4). No statistically significant differences were found between medical and first-aid injuries based on tasks performed.

Across all injuries, workers were most likely to be hurt via a horse kick; jerking, pulling, or twisting a body part; and a horse bite (see Table 5). This pattern of injury mechanism was the same for those workers with injuries needing medical attention and first aid only (see Table 5). No significant differences for injury mechanisms were found between medical injuries and first-aid injuries.

Among injuries for which medical treatment was sought, most received care from the emergency room (58.5 %) (see Table 6). Among first aid only injuries reasons for not seeking medical treatment most often included that the injury was not serious (72 %) (see Table 6). One quarter of all injuries (27 %) required workers to miss work time. In all, 80 % of medical injuries and 4 % of first-aid injuries resulted in missed work time ranging from a few hours to 150 days (data not shown).

Table 2 Injury diagnosis overall and by type of care received

Injury diagnosis[a]	Total diagnosis (n = 137) % (N)	Number of diagnoses, medical (n = 41) % (N)	Number of diagnoses, first aid (n = 96) % (N)
Bruise***	44.53 (61)	21.95 (9)	54.17 (52)
Sprain	24.09 (33)	31.71 (13)	20.83 (20)
Cut^	10.22 (14)	17.07 (7)	7.29 (7)
Fracture***	8.03 (11)	21.95 (9)	2.08 (2)
Puncture*	8.03 (11)	0.00 (0)	11.46 (11)
Dermal	5.11 (7)	2.44 (1)	6.25 (6)
Other[b]	1.46 (2)	4.88 (2)	0.00 (0)
Unknown[c]	9.49 (13)	4.88 (2)	11.46 (11)

* $p < .05$; ** $p < .01$; *** $p < .001$; ^ $p < .08$

[a] Note that multiple diagnoses may have been recorded per injury

[b] Other diagnosis included dislocation and hernia

[c] Lacked adequate information to classify

Table 3 Injury site overall and by type of care received

Site of injury[a]	Total injuries (n = 137) % (N)	Medical injuries (n = 41) % (N)	First aid injuries (n = 96) % (N)
Wrist/hand	25.55 (35)	26.83 (11)	25.00 (24)
Foot/ankle*	17.52 (26)	7.32 (3)	23.96 (23)
Back	11.68 (16)	17.07 (7)	9.38 (9)
Leg	10.95 (15)	7.32 (3)	12.50 (12)
Face	8.76 (12)	4.88 (2)	10.42 (10)
Shoulder	8.76 (12)	14.63 (6)	7.29 (7)
Arms	8.76 (12)	4.88 (2)	10.42 (10)
Knee^	6.57 (9)	0.00 (0)	9.38 (9)
Head*	5.11 (7)	12.20 (5)	2.08 (2)
Abdomen	4.38 (6)	2.44 (1)	5.21 (5)
Chest/torso	4.38 (6)	4.88 (2)	4.17 (4)
Hip	0.73 (1)	2.44 (1)	0.00 (0)

^ $p < .08$; * $p < .05$

[a] Multiple sites may have been recorded per injury

Discussion

This study identifies the overall prevalence of injuries experienced by Latino horse workers, offers information surrounding these injuries, and examines differences between injuries receiving medical attention or first aid. Our analysis revealed several findings.

First, nearly half of workers in our sample experienced an injury in the past year, with nearly a fifth experiencing an injury receiving medical attention. This is much higher than what has been found in other studies of Latino workers in hazardous industries such as poultry processing [28, 40], horse, and crop work [11], and backstretch workers [41] that have also gathered injury data from employees. Although this finding clearly shows that horse work is dangerous, it also raises a question about injury definitions. Quandt et al. [28], Grzywacz et al. [40], and Swanberg et al. [4] each asked workers if they had been injured in the past year, but did not distinguish between whether an injury received medical attention or not. Casteñada et al. [41] found that nearly a third of backstretch workers had experienced a serious injury in the past 5 years, most of which were traumatic head injuries. The present study captured data on injuries that involved medical care and first aid care separately. The fact that the proportion of workers in our sample experiencing any injury was much greater than other samples suggests that without prompts this worker group may define an injury as a severe event resulting in medical attention. Indeed, the tendency to delay seeking treatment and minimize injury or

Table 4 Job task leading to injury overall and by type of care received

Job task	Total injuries (n = 137) % (N)	Medical injuries (n = 41) % (N)	First aid injuries (n = 94) % (N)
Taking out/in to pasture or stables	18.25 (25)	24.39 (10)	15.96 (15)
Grooming	18.25 (25)	19.51 (8)	18.09 (17)
Walking/leading	16.79 (23)	12.20 (5)	19.15 (18)
Feeding	8.76 (12)	12.20 (5)	7.45 (7)
Maintenance/landscaping	7.29 (10)	12.20 (5)	5.32 (5)
Horse care (direct handling)	6.57 (9)	4.88 (2)	7.45 (7)
Picking feet	5.84 (8)	4.88 (2)	6.38 (6)
Loading on/off trailer	3.65 (5)	0.00 (0)	5.32 (5)
Assisting veterinarian/blacksmith	3.65 (5)	2.44 (1)	4.26 (4)
Mucking stalls	2.92 (4)	2.44 (1)	3.19 (3)
Training/riding	2.92 (4)	0.00 (0)	4.26 (4)
Others[a]	5.11 (7)	4.88 (2)	5.32 (5)
Unknown[b]	1.46 (2)	–	–

[a] Includes handling hay and other tasks

[b] Lacked adequate information to classify

Table 5 Injury mechanism overall and by type of care received

Injury mechanism	Total injuries (n = 117) % (N)	Medical injuries (n = 36) % (N)	First aid injuries (n = 81) % (N)
Kick	25.64 (30)	27.78 (10)	24.69 (20)
Jerk/pull/twist[a]	19.66 (23)	16.67 (6)	20.99 (17)
Bite	14.53 (17)	16.67 (6)	13.58 (11)
Struck-by horse	11.97 (14)	13.89 (5)	11.11 (9)
Stepped on	10.26 (12)	5.56 (2)	12.35 (10)
Contact w/equipment/tool[b]	5.98 (7)	2.78 (1)	7.41 (6)
Contact w/foreign object[c]	5.98 (7)	5.56 (2)	6.17 (5)
Others[d]	5.98 (7)	11.11 (4)	3.70 (3)

[a] Injuries in which a horse pulled or jerked the worker; one required the worker to contort one's body away from the horse

[b] Includes trailers, reins, crowbars, carts, scissors, hammers, and leads

[c] Includes tree branches, grass, hay, wood, roofing, and nails

[d] Includes overexertion, lifting, fall from horse, fall from structure, and crush

pain has been well documented among immigrant workers [19–26]. Future research should clearly define "injury" to ensure that the full injury burden of the population is accurately assessed.

A second finding is that the most common tasks and mechanisms leading to injury in our sample were horse-related. Specific mechanisms were similar to those found in the literature: led by kicks [4, 7–12, 16], jerks, pulls, and twists [17], and bites [4, 12, 42]. Furthermore, the tasks most often reported as leading to injury were routine ones, like walking/leading horses or transitioning them (i.e., "taking out") to pastures or stables. That un-mounted, routine tasks were most commonly cited by workers as leading to injuries matches the risk perceptions of thoroughbred managers [14] who also cited routine horse tasks as being among the most hazardous on the farm. Despite this perception, however, helmets and padded vests were infrequently provided for these tasks among management representatives in the aforementioned study [14]. Indeed, helmets and padded vests are most frequently viewed as the gear of riders [10, 43, 44], and workers in the breeding shed [14]. However, a recent review of trauma records found that all three fatalities occurring due to horses in a 4-year period occurred to un-mounted persons [10]. Findings from employer-derived injury data [4] found that Latino workers were more likely to report horse-related injuries than non-Latinos, which suggests that Latinos are more highly represented in jobs directly involving the horse—which account for most injuries. Our findings support recommendations by other researchers that horse-related PPE

Table 6 Other details surrounding recent injuries

Injury details	% (N)
Time of year (n = 135)[a]	
September	19.3 (26)
August	17.0 (23)
October	11.9 (16)
Time of day[b] (n = 136)	
Morning: 6 a.m. to 12 p.m.	66.9 (91)
Afternoon: 12 p.m. to 4 p.m.	31.6 (43)
Evening: 4 p.m. to 9 p.m.	1.5 (2)
Why medical treatment was not sought (n = 96)	
Injury was not serious	71.9 (69)
Had no money/insurance	9.4 (9)
Worked through pain	6.3 (6)
Worker accustomed to being injured	3.1 (3)
Manager didn't think it was necessary	3.1 (3)
Other[c]	6.3 (6)
Where medical treatment was sought (n = 41)[d]	
Emergency room	58.5 (24)
Urgent treatment center	17.1 (7)
Doctor's office	14.6 (6)
Clinic	12.2 (5)
Farm nurse	2.4 (1)

[a] Only top three months are shown

[b] No injuries were reported between 9 p.m. and 6 a.m.

[c] Includes not liking to report, being too busy, fearing job loss, disliking doctors, and not knowing where to go

[d] Two workers went to both the ER and a clinic

should be provided to un-mounted horse workers [9, 10, 43, 45], particularly given drastic reductions in the severity of equestrian injuries that their use has allowed [11, 44]. In addition, workers' attitudes toward and perceived availability of PPE should be the subject of future research.

A third finding pertains to the site of injuries. Most injuries, regardless of the treatment received, occurred to the wrists/hands and back, with other upper and lower appendages next most frequent. These findings are comparable to other studies that have found injuries involving horses to commonly affect the hands/wrists [4, 9, 46], feet/ankles [4, 9, 10], and legs [9, 10, 47], indicating that upper and lower extremities are particularly vulnerable in horse work compared to other agricultural work [48]. Furthermore, while hand/wrist injuries were just as likely to receive medical care as not suggests that these injuries range in severity, from minor (e.g., a bruise) to major (e.g., broken bones). While protective equipment to guard against horse-related injuries to the upper limbs and wrists is lacking, its need has been recognized [10, 44, 49]. This study's findings support this endorsement.

Head injuries comprised a higher proportion of horse-related injuries in samples derived from hospital, clinic, and employer injury reports [4, 9, 10, 46] than in the present study. This distinction may be due to this study's inclusion of injuries representing a range of severity rather than only those which were reported to a supervisor or for which medical care was sought. Though less common, any head injury is serious due to the potential for extreme severity and fatality [9], especially given the relatively low provision of helmets for horse workers not engaged in breeding or riding activities reported by farm management [13].

Another notable finding is that injury diagnoses were similar to other thoroughbred worker groups who experienced bruises [9, 47], and sprains, strains, or tears [4, 41]. However, they were different in that fractures comprised a large proportion (23–46 %) of horse-related injuries to thoroughbred workers in studies accessing hospitalization [9] or workers' compensation data [47], yet they comprised only 8 % of injuries in this sample and 10 % of injuries that were reported by employers in the same study region [4]. This distinction, again, may owe itself to the tendency of hospitalization and workers' compensation data to skew towards more severe injuries.

Lastly, our results indicated that the emergency room was most often where workers went for care. This is expensive for the party paying for care and may be due to injury severity, because workers are not aware of other resources, or both. However, this finding, coupled with the finding that workers did not seek medical treatment mainly because they did not see it as being serious enough may suggest that workers minimize injuries and wait until an injury is severe before seeking medical treatment [50, 51]. Future research should assess the resources available to workers if ill or injured at work.

Limitations

This study has limitations that should be considered when interpreting its results. First, data were gathered through a community-based, non-random sampling strategy, which, despite its strengths for accessing a hard-to-reach worker group [52] limits the generalizability of its findings. Second, we only examined Latino thoroughbred horse workers who were employed for at least 9 months, thereby excluding workers who may be temporary, migrant, or new to the farm. However, because an ultimate goal of the study was to associate work practices with occupational health outcomes, it was desirable that workers have accumulated exposure to the work environment on horse farms. Future research should investigate occupational injury among workers excluded from this study to assess their injury

burden. Third, whether medical care was received was not indicative of whether it was necessary. Other studies have found that farmworkers may only seek treatment when injuries are so debilitating that they could not continue working [19]. Consequently, future research could gather more objective measures of injury severity, worker coping mechanisms, and available resources. Finally, this study only examined the primary mechanism of injury, though multiple mechanisms may have contributed to injuries [11].

Conclusions

The study offers Latino worker perspectives on injuries on thoroughbred horse farms, which fills a knowledge gap existing in employer-based injury surveillance [24]. Findings reveal that injuries are common among this worker group, confirming that horse work is dangerous. These findings also reveal the importance of defining injuries with a worker group that may accept risks and minimize injuries. Bruises were the most common type of injury, followed by sprains/strains. Upper and lower appendages are at particular risk for this worker group, though back and head/face injuries also merit attention. Because the horse and horse-related tasks comprised the vast majority of mechanisms and tasks leading to injury, PPE and trainings should target horse-related activities and the latter should be linguistically and culturally appropriate given the high proportion of Latino/immigrant workers. Future research should also examine job specific (e.g., tasks, exposures) and other workplace factors (e.g., resources, safety climate, supervisor relations, and social support) that may contribute to or protect against injury.

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Compliance with Ethical Standards

Conflict of interest Authors do not have any conflicts of interest associated with this paper.

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