Development and Evaluation of a Basic First Aid Curriculum for Spanish-Speaking Dairy Workers

A. Meyerhoff, P. J. Tinc, E. E. Scott, S. Wyckoff

ABSTRACT. *Over the past decade, the New York State dairy industry has grown substantially, resulting in an increase in immigrant workers who speak languages other than English. Estimates suggest that over 50% of workers on large New York dairies are Spanish-speaking individuals who immigrated to the U.S. from Guatemala, Mexico, and other Latin American countries. With a growing population of Spanish-speaking workers, safety concerns on farms have become a prominent issue. This article reviews the development and evaluation of a basic dairy first aid curriculum, which is intended to educate Spanish-speaking immigrant dairy workers on emergency response and first aid. The materials developed are culturally relevant and can be easily understood by low-literacy, non-English-speaking workers. In evaluation of the materials using pre- and post-testing, a significant knowledge gain was identified in workers who participated in the training.*

Keywords. *Dairy farm workers, First aid, Hispanic farm workers.*

Agriculture is one of the most dangerous industries in the U.S. According to the Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI), the farmer, rancher, and agricultural manager fatality rate was 26.7 deaths per 100,000 full-time equivalent (FTE) workers in 2014 (BLS, 2015). This starkly contrasts with the 2014 all-worker fatal injury rate of 3.4 deaths per 100,000 workers. CFOI data also indicate that Hispanic workers suffer from high injury rates in all occupations, especially agriculture and other high-risk industries (Schenker, 2011). These data specifically demonstrate that 18% of occupational fatalities in 2013 occurred among Hispanic workers, and that two-thirds of those occurred within the foreign-born subset (BLS, 2015). In prior years, statistics related to fatal injuries among Hispanic workers have been similar (Schenker, 2011; BLS, 2015).

Since 1990, the proportion of Mexican immigrants working in the U.S. has grown significantly (Jenkins et al., 2009). In New York State, many of these workers, along with other Hispanic immigrants, are employed on dairy farms. The dairy industry in New York has experienced drastic increases in labor demand over the last several decades, partially due to the state's expanding Greek yogurt production and the rising number of milk plants (Dudley, 2014). Immigrant workers who speak languages other than English have become an important part of the workforce, and this has created significant safety challenges in this high-risk industry (Arcury et al., 2010).

A longitudinal study conducted from 2002 to 2005 by Jenkins et al. (2009) demonstrated

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a steady rise in the number of northeastern dairy farms employing at least one Hispanic worker, as well as the proportion of Spanish-speaking workers on each farm. Jenkins et al. (2009) estimated that within five years nearly all large dairies in the northeast (95.1%) would employ Hispanic workers, and over 50% of workers on these dairies would be Spanish-speaking; small farms would show similar upward trends. Spanish-speaking dairy workers in New York State are typically recent immigrants with low literacy levels. Most of this workforce has emigrated from either Mexico (~75%) or Guatemala (~25%), with some also coming to the U.S. from other Latin American countries (NCFH, 2014).

As suggested by injury statistics, farms are intrinsically dangerous places with many hazards. These dangers include heavy equipment, large animals, pesticides and chemicals, weather, and other hazards. Farms are rural and may be isolated from immediate emergency care; in some rural communities, it can take over 20 minutes for emergency responders to arrive on scene (PSU, 2015). Various studies have examined response times and the time it takes to arrive at a hospital after an emergency, finding that both are higher in rural communities than in urban areas (Grossman, 1997; Gonzalez et al., 2009). This is due, in part, to the nature of rural emergency services. Delays occur when volunteers first need to travel to their stations and then to the scene (Grossman et al., 1997), and delays are also due to long distances between rural locations (Grossman et al., 1997; Carr et al., 2006).

Adding to these issues is the fact that many immigrant workers are fearful of using services, including medical facilities (Cavazos-Rehg et al., 2007; Hacker et al., 2011; Maldonado et al., 2013). This fear can stem from the need to provide personal information to medical professionals, which workers believe could put them at risk of deportation (Cavazos-Rehg et al., 2007; Hacker et al., 2011; Maldonado et al., 2013). This fear has been cited as a reason for immigrants to avoid or delay care, including emergency care (Maldonado et al., 2013). In addition to fear of consequences related to immigration status, including deportation, some workers face stressors related to their employment situations. These workers are often afraid that reporting problems will lead to being fired or otherwise exploited by their employers (Cavazos-Rehg et al., 2011).

Finally, indigenous populations add another layer of complexity. In this population of workers, languages other than Spanish and English are spoken, making communication even more difficult (Guild, 2012). In addition, these populations tend to have differing views of medicine, often rooted in spiritual healing, that do not fit well into western medicine (Guild, 2012). In Mexico and the U.S., such populations face discrimination and racism by non-indigenous Mexicans (Donlan and Lee, 2010; Guild, 2012). As a result, such workers tend to be fearful of mainstream institutions in the U.S., including medical services, which could lead to further discrimination (Donlan and Lee, 2010).

As a result of the distance, the first people on the scene of agricultural injuries are usually workers, family, and community members (Carruth et al., 2010). In an emergency, every moment counts and initiating first aid treatment prior to emergency crews arriving can increase the chance of survival, reduce recovery time, and reduce the risk of permanent disability (Hensel, 2000).

In 2008, the New York Center for Agricultural Medicine and Health (NYCAMH) began the Farm Emergency Response Program (FERP), with the goal of delivering basic training to New York farmers, farm workers, and farm family members on how to respond to emergency situations if they should find themselves to be the first on the scene. Generally, first aid classes are not offered in the agricultural workplace; transportation issues and the time commitment to attend an off-farm course do not make it feasible for workers. The FERP

program has addressed this concern by providing on-farm training at the convenience of farm owners and employees.

The FERP program was initially envisioned as providing bilingual Heartsaver CPR and first aid certification to farmers, workers, and families through the American Heart Association (AHA). However, this certification is time-consuming, and the injury topics covered are not specific to agriculture, thus leaving out important information for safely responding to farm emergencies.

In addition to being inconvenient for farm workers to attend, the AHA course uses technical and advanced terms in its materials, making it more difficult to follow. The level of course materials for even the basic Heartsaver classes can be challenging for workers with limited educational attainment. For example, the AHA Heartsaver student workbook is 126 pages long (AHA, 2011), making the issue of complexity more prominent for low-literacy individuals.

There was a need for shorter, more relevant training for farm workers, specifically immigrant dairy workers, delivered in easy-to-understand language. As Arcury et al. (2010) noted, "the diversity of language, culture, and education of agricultural workers requires that creative approaches to safety and health training be employed." This article discusses the process used to develop, test, and implement a basic dairy first aid curriculum that follows this mindset.

Methods

Material Development

Using a community-based approach a new basic dairy first aid curriculum was developed for use with Spanish-speaking dairy workers in New York State. NYCAMH partnered with the Opportunities for Oswego outreach team in Oswego, Jefferson, and Lewis counties in northern New York and attended migrant coalition meetings that included staff members from various dairy worker-serving agencies. Attending these meetings allowed for a more comprehensive understanding of the issues relevant to the local dairy worker population, including an emphasis on scene safety, worker awareness of location, and first aid knowledge. In addition to these discussions, onsite focus groups were conducted with dairy farmers and workers to learn about their experiences with farm injuries and safety.

During the meetings and focus groups, which were attended by migrant coalition members, outreach workers, educators, farmers, and immigrant dairy workers, two main concerns were identified: (1) response to farm emergencies and (2) the ability of Hispanic dairy workers to provide key information, including farm location, to emergency personnel. In addition, many felt that common injury emergencies such as bleeding and burns should be discussed in the training, as well as first aid for choking victims. This request was based on the presence of worker families and children in local communities.

Based on feedback from the focus groups and meetings, existing emergency and first aid training was revised. The new curriculum aimed to efficiently convey emergency and first aid information that was culturally and linguistically appropriate and specific to the dairy workplace.

Concerns discussed in the focus groups and meetings were integrated into the training modules, which contained information on various injury topics. Training content was determined by injury data collected from an agricultural injury surveillance study conducted by the Northeast Center for Occupational Health and Safety in Agriculture, Forestry, and

Fishing (NEC) (Earle-Richardson et al., 2011). The injury events that occurred most frequently were included in the training program. These topics included:

- Struck by equipment
- Animal-related events
- Tractor rollovers
- Falls from farm structures
- Machinery entanglements
- Tractor and equipment runovers.

Course information was presented in two parts: (1) general background information on agricultural hazards and discussion of the basic steps of emergency preparedness and first aid and (2) role-playing of what to do in specific types of emergencies (table 1).

During the first part of the training, the "check, call, care" process (American Red Cross, 2007) was presented (table 2). This strategy stresses scene safety so workers do not harm themselves while trying to help others. During the second part of the training, workers were provided with a number of emergency scenarios and were asked to role-play as if they were responding to a true emergency. This method of education is more interactive than the video-based AHA Heartsaver training, allowing the workers to think and talk about what they would do in an emergency so that they feel better prepared.

The basic dairy first aid training curriculum was developed using Microsoft PowerPoint. To ensure that participants of all educational levels would be able to understand, the presentation included images and minimal text.

To complement the training, handouts were developed. One of these handouts was a portable wallet card with spaces for farm information and emergency contacts, written in a low literacy format. The intention was for workers to have help filling in information to ensure accuracy in case of an emergency. Based on requests from migrant coalition members and local clinic suggestions, in later versions of the cards, space to fill in health information, such as allergies or medications, was also included.

In addition to the low-literacy wallet card handouts, English and Spanish farm emergency information cards were distributed for farmers to post by telephones. These cards

Table 1. Course agenda and topics.

Part 1: Introduction	Part 2: "What would you do if…"
Instructors review each topic: • Goals of the training • Brief overview of agricultural hazards (rollovers, runovers, machinery, hydraulics, highway incidents, fire, unsafe work habits, etc.) • Brief discussion of safe work habits • Preparedness • Checking the scene • Calling for help • Helping the victim (hygiene, what to check, importance of not moving victims unless necessary)	Students discuss what to do in each scenario: • Impaled by object • Bleeding, amputations • Falls, crushed under falling object • Broken bones and splinting • Tractor overturns • Machinery entanglements • Non-responsive victims that are breathing • Animal safety • Burns, fire, fire extinguishers • Chemical emergencies • Choking

Table 2. "Check, call, care" process for emergency response.

Step	Action
Check	Check the scene for hazards such as fire, chemicals, power lines, etc.
Call	Call 911 and the farm owner for help. Provide details about the emergency and location.
Care	Care for the victim. Stay calm, and do not move the victim unless they are in danger.

included a space for adding pertinent information, such as contact information and the address of and directions to the farm. These cards were also used by migrant education English as a Second Language (ESL) tutors as a first lesson with new farm worker students.

A focus group was organized with five immigrant dairy workers to obtain feedback on the newly developed training materials. Based on comments from the dairy workers, edits were made to better reinforce the take-home messages of the basic dairy first aid training, and some images were replaced to garner more of a response. Generally, workers were more responsive to graphic images, such as real hydraulic burns, than to cartoon images. In addition, materials were updated to remind workers that although they may not perform a particular task, such as operating machinery, they may need to help during an emergency involving such equipment. Additional reminders to call 911 during an emergency were also added. Finally, the number of slides and amount of text were reduced to ensure that the training could be completed in a reasonable amount of time (one hour or less).

Pre- and Post-Test Development

Pre- and post-tests were created to evaluate the appropriateness and effectiveness of the training. The first versions of the tests collected basic demographic information (name, age, and nationality) and used a combination of true/false questions and multiple choice. Two NEC outreach staff members collaborated to develop pre- and post-test questions that would indicate each worker's level of understanding. Questions were meant to ensure understanding of key messages presented throughout the training. To pilot test the pre- and post-tests, a local outreach worker facilitated visits to worker housing. During these visits, pilot training was provided to a total of 20 immigrant dairy workers; this training included completion of the pre- and post-tests. The pre- and post-tests were evaluated to ensure appropriate literacy levels, consistency, and proper length. In administering the tests, the facilitator read each question aloud twice and had participants write their answers. In some cases, more literate workers were able to read and answer the questions without assistance.

During the pilot testing, workers tended to have trouble writing their answers, incorrectly filled out information, and were confused by some portions of the tests. Overall, it was determined that the pre- and post-tests were too long and required an unreasonable amount of time. Longer questions and the need to have questions read aloud, multiple times, by the facilitator contributed to this issue. Because of these problems, some workers missed questions or were unable to finish the post-test before it was time to go back to work. It was determined that most workers would only have one hour to participate in the training and complete the pre- and post-tests. The training modules and tests were updated to reflect this time constraint and address the issues with worker confusion.

Changes to the test were made based on what was learned during these sessions (a copy of the survey can be obtained by contacting the authors). The true/false questions were converted to multiple choice for consistency and clarity. Questions and answers were rephrased to be shorter. In addition, because of some confusion with word choice, multiple words for some terms were incorporated into the tests. For example, while most workers understood the word for "ointment" as "ungüento," others needed to hear "pomada" or "crema antibiótica." To ensure maximum understanding, all three options were included in the updated version; questions with similar problems were also revised.

The revised pre- and post-tests, along with the newly developed training materials, were subsequently used in training sessions with immigrant dairy workers in New York.

Results

Over the four-year period from March 2011 through February 2015, a total of 64 training sessions with 409 dairy workers were conducted in 14 New York counties (fig. 1). Figure 2 shows the ages and nationalities of the workers who participated in the training. This information was provided on pre- and post-tests that were used in our analyses. During 15 sessions, pre- and post-tests were used to reinforce key components of the training and evaluate its effectiveness. Data analysis was completed for 13 of these sessions and indicated an average improved score of 13.5 points on the post-test (paired t-test analysis, $n = 35$, $t = 5.71$, $p < 0.0001$). Data analysis was not conducted for the remaining two sessions because older versions of the tests were used and were not comparable. Six individuals were excluded from the analyses because they did not complete both tests. Results of the pre- and post-tests are listed in table 3.

In reviewing responses to specific questions on the post-test, it became clear that in some cases, the "norms" needed to be addressed in greater detail. For example, when asked about proper clothing for working on the farm, only about half of participants (18/23, pre/post) selected the correct answer, "close-fitting clothes." The remaining individuals largely opted for "comfortable, loose clothing." Throughout this segment of the training, it was emphasized that, despite the increased range of motion required for twisting, bending, and reaching allowed by loose clothing, close-fitting clothing should be worn to reduce the risk of machinery entanglements. Because many of the workers who participated in the training were assigned to tasks such as cow-pushing and milking, as opposed to machinery-related tasks, it is likely that the norm (wearing comfortable clothing) combined with discussion of improved mobility in loose clothing, led to the incorrect responses.

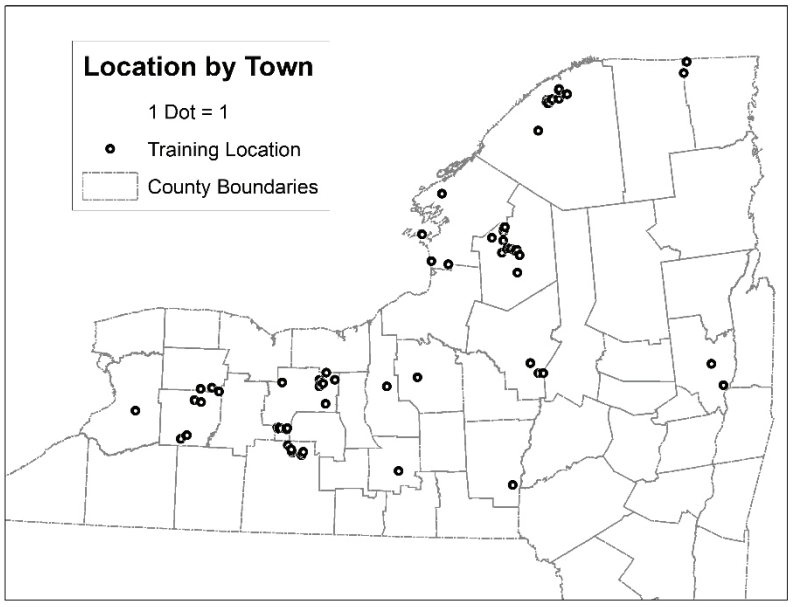

Figure 1. Locations of dairy first aid training sessions in New York State.

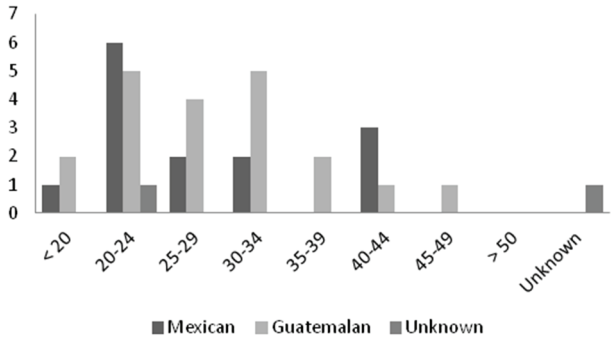

Figure 2. Age and country of origin of workers participating in training.

Table 3. Results of the pre- and post-tests.[a]

Question	No. of Correct Responses (n = 35) Pre-Test	Post-Test	Improvement (%)
What is the first thing you should do in an emergency?	11	16	45.5%
When you work on the farm, you should wear:	18	23	27.8%
If there is an emergency and you don't know how to help the victim, you should:	24	27	12.5%
The best thing to treat a burn is:	10[b]	28	180%
If you get splashed with a chemical, what should you do?	32	34	6.25%
If you can't put out a fire with an extinguisher:	10	22[c]	120%
If someone is injured by a bull or cow, what should you do?	30	28	-6.7%

[a] The response rates for each question were 100%, with the exception of those noted. The response rates exclude six individuals who did not complete both the pre- and post-tests.
[b] The response rate for this question was 94%.
[c] The response rate for this question was 97%.

Similarly, for two questions, "what is the first thing you should do in an emergency" and "if you can't put a fire out with an extinguisher," many respondents opted for "look for your supervisor" (18/11, pre/post) and "run away as fast as you can" (15/9, pre/post), respectively. It is most likely that these responses were selected because they are the most instinctive answers, and they (1) quickly remove the individual from danger (McDougall, 1999) and (2) defer to authority (Maloney, 2005).

When asking workers about treating burns, cultural differences became apparent. While the correct response, "cool water and clean dressings," was largely chosen in the post-test (28 out of 35 responses), many individuals were resistant to this method and expressed strong beliefs to the trainers that more culturally relevant options such as egg whites, toothpaste, tomatoes, aloe, and various ointments were most effective in treating burns. Similar findings have also been reported in the literature (Perez-Escamilla et al., 2010).

Although most questions had higher numbers of correct responses in the post-test, one question, "if someone was injured by a bull or cow, what should you do," resulted in fewer correct answers in the post-test (28 correct responses, versus 30 in the pre-test). Workers are aware that yelling or waving can make the animal move away; however, the training emphasized getting help and staying calm and quiet to avoid agitating the animal. Due to the common situation of workers handling animals alone, this may present a challenge. In

future training, the animal handling section will be revised and expanded to allow more discussion of these issues.

Although some issues were identified through the pre- and post-tests, the improvement between the two was largely positive. Once the effectiveness of the training was established, the pre- and post-tests were discontinued. This was done to reduce the time requirement for workers. Although the evaluation was discontinued, trainers continue to use feedback from workers to update and enhance the training materials. The training continues to be offered along with other bilingual farm safety training.

Discussion

Developing effective first aid training for immigrant dairy workers requires a substantial understanding of the community and lifestyle. Typically, immigrant dairy workers have limited English proficiency, as well as varying levels of educational attainment. In addition, the workers on a farm may come from different countries or regions and have different beliefs about medical treatment, which can make group training more complicated. As shown through the process described in this article, it is important to capture multiple views when creating safety training for this population. This may involve phrasing information in multiple ways during each training session, developing information at low literacy levels (with room for individuals to delve deeper), and being flexible in the ways in which individual workers participate in the training. During the development of this program, farm safety educators worked closely with outreach workers to learn about the backgrounds of the individual dairy workers who would be participating. In this way, the educator was able to adjust the training as needed. This advantage is not always available to farm safety educators, so they must be willing to learn and adapt as training occurs.

In addition to the considerations related to the demographics of the immigrant populations, it is also imperative that migrant educators keep work schedules in mind while planning training. This again requires flexibility on the part of the person conducting the training. Because workers have varying hours and limited break times, the educator may be required to conduct multiple training sessions for different shifts of workers, or conduct early morning or late night training at worker housing. In addition, workers typically have a limited amount of time that they can spend in training (usually less than one hour). The participants in this study were volunteers and requested a first aid class because they wanted to learn what to do in an emergency. The workers were not required by their employer to participate in the training, nor were they compensated for their time.

Although the short-term effects of the dairy first aid program were evaluated, it would be useful in the future to re-evaluate workers after a longer period of time to determine their information retention and the long-term effectiveness of the training.

Limitations

This study was conducted with two main limitations. First, all training sessions were conducted based on the needs and wants of dairy farmers and workers. For this reason, it was not possible to obtain a random sample of farms. Because of this, the participating workers could have been more motivated to learn the material than others who did not request the training. This could have contributed to a greater change in the pre- and post-tests scores because workers were more focused on learning the material. In addition, because pre- and post-tests were only conducted on a subset of the workers, it is possible that that the mean difference in scores demonstrated a greater or lesser gain in knowledge than

what occurred in other groups. Because of time constraints, conducting pre- and post-tests during each session was not possible; however, after significant content changes, it may be necessary to conduct similar trials.

Conclusion

A community-based approach facilitates research to practice by creating specific solutions for occupational health problems in agricultural settings. The NYCAMH basic dairy first aid curriculum could be replicated in other regions to provide efficient and appropriate emergency response training to the agricultural community. New York is currently experiencing growth in the dairy industry to meet the demands for yogurt production, which can directly impact labor supply and increase workloads (Dudley, 2014). In this situation, especially, safety awareness and preparedness are a paramount concern.

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