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ABSTRACT. The agricultural industry poses specific hazards and risks to its workers. Since the 1970s, the University of Iowa has been establishing programs to educate rural health care and safety professionals who in turn provide education and occupational health and safety services to farm families and farm workers. This program has been well established in the state of Iowa as a program of Iowa's Center for Agricultural Safety and Health (I-CASH). However, the National 1989 Agriculture at Risk Report indicated there was a great need for agricultural medicine training beyond Iowa's borders. In order to help meet this need, Building Capacity: A National Resource of Agricultural Medicine Professionals was initiated as a project of the National Institute for Occupational Safety and Health (NIOSH)-funded Great Plains Center for Agricultural Health in 2006. Before the first phase of this project, a consensus process was conducted with a group of safety and health professionals to determine topics and learning objectives for the course. Over 300 students attended and matriculated the agricultural medicine course during first phase of the project (2007–2010). Beginning the second phase of the project (2012–2016), an expanded advisory committee (38 internationally recognized health and safety professionals) was convened to review the progress of the first phase, make recommendations for revisions to the required topics and competencies, and discuss updates to the second edition of the course textbook (*Agricultural Medicine: Occupational and Environmental Health for the Health Professions*). A formal consensus process was held and included an online survey and also a face-to-face meeting. The group was charged with the responsibility of developing the next version of this course by establishing best practices and setting an agenda with the long-term goal of developing a national course in agricultural medicine.

KEYWORDS. Agriculture, education, medicine, occupational health, safety

BACKGROUND

Illnesses and injuries from farm and ranch occupational exposures are an important component of the overall health of a large sector of the rural population. However, training in agricultural health and safety for rural practicing health care and safety professionals has been unavailable to large portions of the United States.[1] Therefore, the University of Iowa began the Building Capacity program in 2006 to increase the capacity of training in agricultural health and safety by facilitating new, sustainable training programs around the country. Funded by the National Institute for Occupational Safety and Health (NIOSH) Great Plains Center for

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Agricultural Health, objectives were to create a consensus curriculum for a national core course in agricultural medicine and to recruit and train local professionals to organize, manage, and teach components of the agricultural medicine course *Agricultural Medicine: Occupational and Environmental Health for Rural Health Professionals—the Core Course* (AMCC). The topics, objectives, and format for the course were developed with input from 13 agricultural safety and health professionals via a consensus process in 2006. This consensus process also provided guidelines for the textbook that was written for the course, *Agricultural Medicine: Occupational and Environmental Health for the Health Professions*.[2] Since 2007, the AMCC has been held 23 times in nine states and two international sites and has been attended by nearly 500 persons.

Funding for the second phase of the Building Capacity program began in October 2012. A second consensus process involving 38 agricultural safety and health specialists, known as the Building Capacity Advisory Committee, was held in November of 2012. The goal of this consensus process was to ensure that appropriate updates and revisions were made to the course, as well as the course textbook. The 2012 Building Capacity Advisory Committee was charged with the following aims:

1. To develop recommendations on topics, objectives, and format for the 2nd edition of the textbook to help assure the quality assurance and consistency for national/international course.
2. To establish consensus on topics and objectives for a national/international core (essential to production agriculture) course relevant to modern industrialized countries, with a focus on North America.
3. To establish the core course as a relevant, multidisciplinary agricultural medicine training.
4. To determine and develop a library of recorded distance learning sessions to supplement sites where content experts are not available.
5. To discuss an oversight body that would review course offerings as a "certificate course" in the specialty area of agricultural safety and health.
6. To consider the core curriculum as a basis for an ongoing professional improvement course for the membership of the International Society for Agricultural Safety and Health (ISASH).
7. To consider topics for training of health and safety professionals who would serve large-scale agriculture and agribusinesses (as considered in the discussions within the Agricultural Safety and Health Council of America [ASHCA]).
8. To consider additional texts to round out an academic curriculum in agricultural safety and health.

METHODS/PROCESS

The consensus process was composed of two parts, an electronic survey and a face-to-face meeting. A consensus-driven decision-making process works to establish agreement among a group of stakeholders towards an issues or topic.[3] In this case, an international, interdisciplinary group of agricultural safety and health professional were called together to guide the next phase of the Building Capacity program. Advantages of group work over individual work include (1) groups do things better—a group brings broader more balanced ideas, allows for critical evaluation, and builds community; (2) in order to truly understand society, one must solicit the experiences of actors (group participants), not rely on literature to adequately reflect reality; and (3) complex issues are more easily addressed by pooled intelligence.[4]

The 2012 consensus process invited 38 health and safety professionals derived from one or more of the following categories:

1. Member of the 2006 consensus group
2. Attended a prior AMCC
3. Organized/hosted an AMCC
4. Showed interest in establishing a AMCC local/regional program
5. Taught in an AMCC
6. Member of either the North American Agromedicine Consortium (NAAC), the

Agricultural Safety and Health Council of America (ASHCA), the International Society for Agricultural Safety and Health (ISASH), or the AgriSafe Network
7. Member of a NIOSH Agricultural Safety and Health Center
8. Member of a geographically underrepresented area relative to AMCC training
9. Been an active, nationally/internationally recognized agricultural health and safety professional

The survey was designed and sent via the Internet using SurveyMonkey. Of the 38 safety and health professionals contacted, 30 responded, yielding a 79% response rate. The electronic survey collected respondent demographic information, inquired about important topics within agricultural safety and health to be included in the AMCC curriculum, and identified the course's main objectives.

Moore (1994) identified three types of group work: nominal group technique (NGT), idea writing, and interpretive structural modeling (ISM). The nominal group technique is structured for small groups, allows the free flow of ideas and opinions, and is highly effective in establishing priorities.[4] The second step of the Building Capacity consensus process aligns with the nominal group technique and included a face-to-face meeting.

The meeting was held in conjunction with the Midwest Regional Agricultural Safety and Health Conference (MRASH) in Cedar Rapids, Iowa, on November 13, 2012. All members invited to participate in the survey ($N = 38$) were also invited to the face-to-face meeting. Eighteen (47%) of the invited committee members participated in the face-to-face meeting. The agenda included committee member introductions, discussing survey results, and establishing a work plan for the future.

RESULTS

The electronic survey inquired about respondents' professional background. A variety of occupational groups were represented including nurses, nurse practitioners, physicians, Extension personnel, safety workers, and veterinarians.

TABLE 1. Building Capacity Advisory Committee Member Professional Representation

Profession	% Representation
Medical doctor	21
Registered nurse	14
Safety	14
Extension	11
PhD	7
Nurse practitioner	7
Social work	7
Doctor of veterinary medicine	7
Student, MD	4
Occupational therapist	4
Psychologist	4

FIGURE 1. Consensus process online survey and face-to-face participant locations (not shown: Australia, Turkey).

Primary institutions represented were universities ($n = 16$), hospitals ($n = 4$), and government organizations ($n = 4$) (Table 1 and Figure 1). Of the 30 survey respondents, 23 had attended the full 40-hour AMCC and 18 had taken and passed the two examinations required for course certification. In addition, 24 respondents had been involved with the planning or provided lectures in a previous course.

1. To develop recommendations on topics, objectives, and format for the 2nd edition of the textbook to help assure the quality assurance and consistency for national/international course.

In the survey, Building Capacity Advisory Committee members were asked to rate the

TABLE 2. Core Characteristics of the AMCC Course as Identified by the Building Capacity Advisory Committee

Characteristic	Strongly disagree	Disagree	No opinion	Agree	Strongly agree	Mean rating
Practical/experienced-based information additional to research-based information.	0% (0)	0% (0)	0% (0)	22.2% (6)	77.8% (21)	4.78
A positive but evidence-based reflection and concern for agriculture generally and its operators, family, and workers.	0% (0)	0% (0)	0% (0)	23.1% (6)	76.9% (20)	4.77
A multidisciplinary targeted audience.	0% (0)	3.7% (1)	0% (0)	25.9% (7)	70.4% (19)	4.63

Note. Scale: 1 = Strongly disagree, 5 = Strongly agree.

core characteristics of the course by indicating their level of agreement with each statement (Table 2). The group also determined the primary learning objectives for the course and topics to include within the curriculum.

Respondents agreed that the course should include experience-based information in addition to research-based information, recognizing the value of course presenters' practical experiences.

2. To establish consensus on topics and objectives for a national/international core (essential to production agriculture) course relevant to modern industrialized countries, with a focus on North America.

To identify the AMCC learning objectives, the Building Capacity Advisory Committee was asked to rate a series of learning outcomes on a Likert scale, indicating whether they agreed that the objective was applicable to the course. All presented objectives obtained an average rating of at least 4.0 (5 = Strongly agree, 1 = Strongly disagree) (Table 3).

In addition to identifying the core learning objectives, respondents to the survey were asked to classify the important subtopics within each topic of the course. Fourteen topics were presented and each included three to nine subtopics. As a whole, the group agreed that the topics and subtopics being taught were relevant and should remain in the course curriculum. Respondents commented that prevention should be emphasized, known carcinogens should be discussed, and the US Environmental Protection Agency (EPA) regulations should be presented. Previous students also commented that some of the zoonotic and emerging infectious disease information was presented in too much detail for the course audience.

Below is a list of course topics the Building Capacity Advisory Committee suggested including in the core course:

- Overview of available intervention programs
- Climate variability and impact
- Oral health
- Telemedicine
- History of agriculture and relevance to contemporary agriculture
- Risk management in agriculture
- Geriatric issues
- Complementary and alternative medicine

3. To establish the core course as a relevant, multidisciplinary agricultural medicine training.

Building Capacity Advisory Committee members who responded to the survey identified the primary characteristics of the course. Members agreed that the course should be multidisciplinary, similar to the audience they believe should be the target market (Figure 2).

Survey respondents were asked to rate, using a Likert scale, the target audience for the agricultural medicine course.

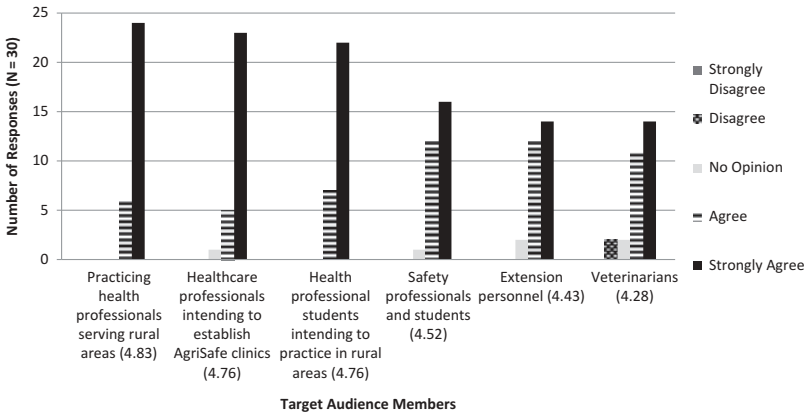
Three respondents commented that mental health care providers should also be included in the target audience, and two respondents suggested health department personnel.

TABLE 3. General Core Learning Objectives in an AMCC Curriculum as Identified by the Building Capacity Advisory Committee

Objective	Mean rating
Attain functional information literacy of the field and basic competencies in agricultural safety and health.	4.73
To enable the student to anticipate, recognize, diagnose, and prevent occupational, environmental, and community health problems unique to the rural and agricultural populations.	4.65
Discuss at least three agriculturally related specific health/safety problems resulting from the following exposures, affecting the following organ systems, or resulting in the following conditions: agricultural chemicals, acute trauma, respiratory, skin, neoplasms, general environment, musculoskeletal, noise, vibration, heat, cold, behavioral health, veterinary pharmaceuticals, zoonotic infections.	4.64
List the general health characteristics and health and safety hazards of at least three special risk rural/agricultural subpopulations.	4.56
Describe the basic demographic characteristics of the rural and agricultural populations generally for the United States.	4.54
Discuss evidence-based theory and methods of health and safety promotion in agricultural populations.	4.48
Describe unique problems of healthcare delivery in rural areas.	4.48
Describe major differences in health status between urban and rural populations, and between the farming and general population.	4.46
To enable the student to propose methods to mobilize multidisciplinary and community oriented solutions to rural/agricultural health and safety problems.	4.44
Discuss methods for selection, fitting, and proper maintenance of appropriate personal protection equipment.	4.44
List major US and international professional organizations and their role in promoting rural health and agricultural medicine.	4.24
Discuss considerations needed to initiate and manage an agricultural occupational health clinic generally, and specifically an AgriSafe clinic and a Certified Safe Farm program, among other comprehensive prevention programs.	4.24
Discuss the objectives of the following programs and how they can be utilized as a resource for farmers and health and safety professionals: AgriAbility Program, AgriWellness, Farm Safety 4 Just Kids, AgriSafe, and Certified Safe Farm.	4.16
The student will be able to review a series of case scenarios of agricultural illnesses and injuries, and demonstrate appropriate occupational history anamnesis, diagnostic analyses, and therapy regimens for these cases.	4.08

Note. Scale: 1 = Strongly disagree, 5 = Strongly agree.

FIGURE 2. Target audience members for AMCC as identified by the Building Capacity Advisory Group.



4. To determine and develop a library of recorded distance learning sessions to supplement sites where content experts are not available.

The consensus committee agreed that face-to-face meetings are preferred; however, they understand that distance learning will be a part of several sites' programs. The committee agreed that a dual system of both face-to-face session(s) and distance learning should be incorporated. The face-to-face sessions should be at key points of the program, such as 1 or 2 days at the beginning to achieve "socialization of the cohort" and at the end of the course to accomplish case discussions, PPE selection and fitting, and farm visits. In regard to the distance methods, the strong preference is to have a system of display (such as Adobe Connect or Elluminate Live!) in conjunction with a course management program (such as Blackboard or Moodle). Distance learning sessions should include not only the PowerPoint presentation but also pre and post quizzes, case studies, and synchronous live sessions for questions and discussion. If distance sessions are offered asynchronously, then live interactive discussion/problem-solving sessions following the presentation should be incorporated.

The top six topics recommended for distance learning sessions included (1) Special Populations, (2) Pesticides, (3) Psychosocial Issues, (4) Physical Factors (noise, heat, and vibration), (5) Zoonotic Infections, and (6) Skin Diseases. As of December of 2013, distance learning presentations for Physical Factors (noise, heat, and vibration) and Agricultural Cancers had been created. The remaining presentations will be developed with a target date of completion of early 2015.

5. To discuss an oversight body that would review course offerings as a "certificate course" in this specialty area of agricultural safety and health.

When asked about retaining a subset of the Building Capacity Advisory Committee, 96.4% of respondents were in favor of retaining a group to review future content and quality of regional courses for the purpose of approving a certificate course. Additionally, 69.5% ($n = 16$) of online survey respondents thought the subset should remain independent, as opposed to being affiliated with an agricultural safety and health organization (NAAC, ISASH, or AgriSafe).

6. To consider the core curriculum as a basis for an ongoing professional improvement course for the membership of the International Society for Agricultural Safety and Health (ISASH).

Considerable discussion on this topic resulted in a consensus that many of the ISASH members were more aligned with safety; therefore, there would need for additional safety modules to be added. Since the consensus meeting, a draft of a program has been developed that contains the core elements identified by the consensus committee but refined to meet the needs of an audience with higher safety interest. This professional improvement course would span 3 days (24 hours) as opposed to the current 5-day (40-hour) format. This has been proposed to the Professional Improvement Committee of ISASH, which in turn recommended it to the ISASH Board. With board approval, the first session will be offered at the 2015 ISASH conference.

7. To consider topics for training of health and safety professionals who would serve large-scale agriculture and agribusinesses (as considered in the discussions within the Agricultural Safety and Health Council of America [ASHCA]).

This topic is under continuing discussion. It was a common discussion at the 2013 ASHCA meeting in Minneapolis, Minnesota. Insurance companies, NIOSH, and large-scale agricultural operators are aware of the public's concern about sustainable agriculture, which includes the health and safety of workers. Specific education is needed for owners/operators/managers of these larger operations, as prevention in their operations differs from smaller, family operations. In response, an additional Certified

Safe Farm (http://www.publichealth.uiowa.edu/icash/programs/CSF/index.html) consortium group has been active in adapting the proven program to address larger-scale operations, and Occupational Safety and Health Administration (OSHA) regulations within given states where appropriate.

8. To consider additional texts to round out an academic curriculum in agricultural safety and health.

In addition to a 2nd edition of the textbook *Agricultural Medicine: Occupational and Environmental Health for the Health Professions*, there was consensus to proceed with adding two additional texts (integrated with the former) in agricultural health and safety. An ad hoc group has been meeting on this subject that includes Robin Tutor, Annette Grier, and Rickey Langley of North Carolina, Dennis Murphy of Pennsylvania, and Kelley Donham of Iowa. These text would include (1) *Safety in Agriculture, Forestry, and Fishing* and (2) *Emerging Issues in Occupational and Environmental Health in Agriculture*. Further, there was discussion regarding modifying the title of the core textbook (*Agricultural Medicine*) to ensure it does not deter potential safety-oriented attendees.

CONCLUSIONS/FUTURE RECOMMEDATIONS

The consensus process was an effective strategy in identifying key changes to the core curriculum, objectives, and overarching course goals. The international committee of seasoned safety and health professionals worked successfully to identify future avenues to expand the course beyond the confines of a classroom, such as developing it into a professional development course for ISASH and modifying the course for agribusiness personnel. This was the second consensus process for this course, and as opportunities for the course expand and modifications to the core curriculum necessary, the process can and should be repeated.

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