ORIGINAL RESEARCH

Methods of Instruction of the Incident Command System and Related Topics at US Veterinary Schools

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ABSTRACT

Objective: The Incident Command System (ICS) is an adaptable construct designed to streamline response efforts to a disaster or other incident. We aimed to examine the methods used to teach the ICS at US veterinary schools and to explore alternative and novel methods for instruction of this material.

Methods: A total of 29 US accredited veterinary schools (as of February 2012) were surveyed, and 18 of the 29 schools responded.

Results: The ICS and related topics were taught by both classroom methods and online instruction by most of the surveyed schools. Several of the schools used readily available Federal Emergency Management Agency and US Department of Agriculture resources to aid in instruction. Most schools used one course to teach the ICS, and some schools also used unique methods such as field exercises, drills, side-by-side training with disaster response teams, elective courses, extracurricular clubs, and externships to reinforce the ICS and related topics. Some of the surveyed institutions also utilized fourth-year clinical rotations and field deployments during actual disasters as a component of their ICS and emergency response curriculum.

Conclusion: The ICS is being taught at some form at a significant number of US veterinary schools. Additional research is needed to evaluate the efficacy of the teaching methods of the ICS in US veterinary schools. (*Disaster Med Public Health Preparedness*. 2014;8:505-510)

Key words: animal diseases, bioterrorism, disaster planning, emergency preparedness, education, public health professional

Since the events of 9/11 and Hurricane Katrina, planning and response measures to incidents of terrorism and natural disasters have become more important in the education of health care professionals. One of the most overlooked groups of health care professionals in this type of planning are veterinarians. Veterinarians possess many skills that could be useful in disaster planning and response measures.[1] Knowledge of population medicine, public health, food safety, epidemiology, and zoonotic diseases, among other areas of expertise, can be a valuable asset in assisting with disaster planning, preparedness, and response for matters of homeland security from the local to national levels. One of the bases of homeland security from a response and mitigation standpoint is the Incident Command System (ICS). The ICS is not a post-9/11 construct, having historically been developed in the 1970s as a tool for the fighting of wildfires. The ICS is an organized approach to assembling and controlling the highly reliable temporary organizations utilized by many disaster response professionals to manage diverse resources on the site of disasters and emergencies.[2]

The ICS identifies specific activities that are required during a disaster and assigns roles to the individuals responsible. These designations include the incident commander, command staff, and general staff.[3] The incident commander is responsible for the overall leadership of the event. The command staff is composed of a safety officer, a liaison officer, and a public information officer. The general staff includes four sections: operations, planning, logistics, and finance, with an individual chief assigned to each section.[4] In this capacity, the ICS is the functional field organization and management unit of the National Incident Management System (NIMS) and provides for the coordination of personnel, equipment, and other resources at the scene of a disaster or other event requiring an emergency response.[5] The ICS provides a simple and adaptable structure for incident management that can be expanded or contracted to meet the demands of a specific situation.[6] In this respect, the ICS could be applied to a small or large-scale natural disaster or an intentional act such as bioterrorism or agricultural terrorism. Although the ICS is not a veterinary-specific construct, it is essential that the

components of veterinary response to incidents involving threats to public health, animal agriculture, companion animals, and food safety are functional in the use of the ICS.

While most veterinarians are willing to be a part of incident response, preparedness may be perceived to be lacking in the veterinary community, especially in rural areas.[7] Regardless of the level of preparedness, an understanding of the ICS is critical to veterinary contributions to an incident or disaster. The objective of this survey was to identify and examine the methods used to teach the ICS and related topics in the core curricula of US veterinary medical schools as well as to explore alternative and novel methods for instruction of this material.

METHODS

The research described in this article was designed to provide an assessment of the methods and practices used to teach the ICS at US veterinary schools as well as to highlight unique methods of instruction of the ICS. Because some of the survey dealt with US government publications and policies, and US government-designed internet-based training, the survey focused on accredited continental US veterinary schools at the time of initiation of the survey (March 2012 to October 2012).

Instrument

The survey questions were developed on the basis of examination of the curricula of 2 veterinary schools and a literature review of topics related to homeland security, veterinary homeland security, and disaster response. Instructors were asked how many hours of lecture were used to teach the ICS, how many core courses incorporated the ICS, and how many lecture hours were devoted to coverage of the NIMS, National Response Plan (NRP), Homeland Security Presidential Directive (HSPD), and Emergency Support Function (ESF). Instructors were also asked if any of the Federal Emergency Management Agency (FEMA) or US Department of Agriculture (USDA) online modules were utilized for teaching, and if so, which ones and whether completion of the modules were required for the course. The survey also inquired whether any of the classroom activities were used to practice the material and whether any professionals outside of college faculty were used as a component of the training. The survey then asked whether any government publications or other unique methods were used to teach the ICS. The survey was collected between April 18 and October 24, 2012.

Protocol

The survey used was designed to be both broad and efficient. The survey was targeted to the dean of the college or school at each institution with instructions to be forwarded to the individual or individuals responsible for homeland security instruction of the core DVM curriculum. Where possible, those individuals were contacted directly from information gathered from the school Web site. Elective coursework was not comprehensively assessed by this survey but was included. The survey was conducted electronically via a Microsoft Word document sent by e-mail to the dean or identified instructor. The design of the survey was such to avoid survey fatigue by being brief, being completely anonymous regarding both the institution and the individual responding, and being convenient. Owing to faculty attrition, one school's survey was collected on campus in person. The survey and survey plan were reviewed and approved by the American Association of Veterinary Medical Colleges (AAVMC) and the Institutional Review Board of the Pennsylvania State University.

RESULTS

The data collected by this survey varied considerably among institutions. Of the 29 veterinary schools contacted concerning participation in the survey, a total of 18 schools responded.

First Survey Question: "How many hours of lecture (not credit-hours) are designated for the instruction of the ICS in the core DVM program of your school?"

The first question addressed the number of hours (rounded to the nearest whole hour) of lecture utilized for the instruction of the ICS at the surveyed school. Ten of the 18 surveyed schools (56%) included the ICS in their core curriculum, whereas 8 schools (44%) did not, although 2 of these 8 offered ICS training as an elective. The number of hours of lecture varied from 0 to 7 hours (mean, 1.38 hours; median, 1 hour). The average amount of time dedicated to the ICS in the schools that incorporated the ICS into their core DVM curriculum was 2 hours of lecture (mean, 2.5 hours; median, 2 hours). Twelve of the 18 surveyed schools included the ICS in some form, with 10 of these schools including the material as a component of the core curriculum and 2 offering it as a component of an elective course.

Second Survey Question: "How many core courses incorporate the ICS in the course content?"

The second question queried how many separate courses included the ICS in their content. Among the 10 surveyed schools that covered the ICS in their core curricula, the ICS was taught in 1 course by 8 of the 10 (80%) schools, in 2 courses by 1 school (10%), and in 3 courses by 1 school (10%). An additional school noted that a single elective course covered the ICS; this school did not include the ICS in the core curriculum. The majority of schools that covered the ICS used one course to do so.

Third Survey Question: "How many lecture hours are devoted for instruction of NIMS, NRP, HSPD, and ESF?"

The third question addressed how many hours of lecture were utilized for the instruction of the related topics of the ICS.

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Coverage of the supporting directives ranged from no coverage to 2 hours of lecture from all surveyed schools. Schools that covered the supporting topics averaged 1.375 hours of lecture (median, 1 hour). Ten of the 17 institutions surveyed (58.8%) did not cover the supporting topics in their core courses, although 2 of those 10 schools did cover the supporting topics in elective courses.

Fourth Survey Question: Use of FEMA/USDA Online Modules

The fourth survey question inquired as to the use of the FEMA/USDA online modules to teach the ICS and then identified which modules (ICS-100, ICS-200, ICS-700, ICS-800, other) were used (Table 1). This question also covered whether completion of any of these modules and subsequent certification were required. Among the institutions surveyed, 9 of the 18 (50%) utilized online training for the instruction of the ICS. For 5 of these 9 institutions (55.6%), this training was part of the core curriculum; for the other 4 institutions, this training was a component of elective coursework. All 9 of the schools that utilized online training used the online training module ICS-100 (Introduction to the ICS). Six schools (67%) also taught (as an elective course at 3 of the schools) ICS-200 (Basic ICS). Seven institutions incorporated ICS-700 (Introduction to the National Incident Management System). Five of the surveyed schools also included ICS-800 (Introduction to the National Response Plan) with 2 schools requiring the module for the core curriculum and 3 schools offering it in an elective.

In addition to the online ICS modules, 3 of the surveyed institutions used other government-sponsored online training methods as part of their curricula. Emerging and Exotic Diseases of Animals and Initial Accreditation Training (AAVMC & USDA: http://www.aavmc.org/Education/Emerging-and-Exotic-Diseases-of-Animals-and-USDA-Initial-Accreditation-Training.aspx), IS-10 Animals in Disasters: Awareness and Preparedness (FEMA: http://emilms.fema.gov/IS10A/index.htm), and IS-11 Animals in Disasters: Community Planning (FEMA: http://emilms.fema.gov/IS11A/index.htm) were all identified as other online training modules used to teach the ICS and related topics. Nine of the 18 surveyed institutions used various government-sponsored online modules as a component of teaching this material.

TABLE 1

Federal Emergency Management Agency Incident Command System Modules Utilized by Surveyed Schools[a]

Course	Core Requirement	Elective Requirement	Not Required
ICS-100	5	4	9
ICS-200	3	3	12
ICS-700	4	3	11
ICS-800	2	3	13

[a]Number represents the number of surveyed schools that incorporate the module in the left vertical column into the corresponding division.

Fifth Survey Question: Use of Out of the Classroom Activities

The fifth survey question addressed the use of activities outside the classroom as part of the instruction of this material. Eleven of the 18 institutions surveyed (61.1%) utilized activities outside the classroom to reinforce this material, with an additional 1 of the 18 offering this opportunity in an elective fashion. Of the 11 institutions that used out of the classroom activities, 7 institutions (63.6%) performed tabletop exercises, with 1 additional school offering a tabletop exercise as part of an elective course. Of the 11 schools that utilized out of the classroom activities 7 (63.6%) ran simulated field "drills" to expand upon the instruction of the ICS in a disaster response setting (an additional school offered an elective experience). Other methods reported to be used by institutions were labs involving field hospital setup, large animal rescue, PPE and decontamination, pet sheltering, field euthanasia, large animal triage, and safety issues in large animal disasters. Additional reported activities were guest speakers from the Federal Bureau of Investigation and USDA foreign animal disease exercises. As noted by several surveys, although the question addressed "out of the classroom activities," several schools utilized class time for tabletop exercises. Most of the surveyed institutions used some form of education aside from traditional lecture or online modules to reinforce the ICS and related topics.

Sixth Survey Question: "Are any other professionals outside of college faculty utilized to teach this material?"

The sixth survey question addressed the use of professionals in other fields for the instruction of this material. The question addressed professionals at 4 levels: representatives of local state animal response teams (SARTs), veterinary emergency response teams (VERTs), or county animal response teams (CARTs) agencies such as the local emergency management agency; local or state health departments; and other healthcare professionals. Eleven of the 18 institutions surveyed (61.1%) integrated other related professionals for the instruction of this material, with 2 additional schools using other professionals in their elective curricula. Seven of the 11 (63.6%) institutions that used other professionals as part of the core curriculum for this material involved representatives from local and regional response teams, as well as representatives from the local EMA and health departments. An additional 2 schools used these individuals for instruction in elective courses. Of the 11 schools that included other professionals, 5 (45.5%) involved other health care providers, with an additional 2 schools using other health care professionals for elective course education of this material. Other health care professionals involved MDs and emergency medical technicians, with one institution noting that this

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involvement varied on a year-to-year basis depending on speaker availability. Representatives from response teams (SART, CART, VERT, etc), emergency management agencies, and health departments were involved at 13 of the 18 surveyed institutions (72.2%) in either a core or elective course format. Other health-care professionals were used in 5 institutions (27.8%). Most of the surveyed schools utilized professionals from other fields to aid in instruction of the ICS and related response topics.

Seventh Survey Question: "Are any government publications used to teach this material?"

The seventh question inquired as to the use of any published government resources used to teach the course material and asked the surveyor to identify which resources were used. Six of the 18 institutions (33.3%) utilized government publications. Resources used included the Center for Food Safety and Public Health Web site and publications, the Federal Bureau of Investigation/Centers for Disease Control and Prevention/Food and Drug Administration agrosecurity publications, the FEMA planning guide for small business and industry, the NIMS manual, and the National Response Framework Manual. Although not a print publication, the FEMA Web site was mentioned in the answer to this question by 2 schools. Six of the 18 institutions (33.3%) utilized government publications for the instruction of the ICS and related material.

Eighth Survey Question: "Are there any other unique methods utilized by your institution to teach this material?"

This question inquired about other methods used with this material and allowed for short responses that could include fourth-year clinical rotations if warranted. Ten of the 18 surveyed institutions (55.6%) used other methods to teach this material. These methods ranged from participation in actual animal emergencies as a member of an institution-sponsored rescue team, large animal rescue wet labs, and additional training during core curriculum and fourth-year clinical rotations. Some noteworthy examples included the following:

- One institution staged an overnight deployment exercise coordinated with county animal control and state and national partners to include animal intake, decontamination, triage, and field medical work-up.
- One surveyed institution offered students the incentive of additional training in the form of rappelling off of the football stadium for participation in the course over the semester. The additional training in rappelling was considered a skill that could be useful in rescue situations. This incentive could have also appealed to the student demographic owing to the interest in rock climbing activities on college campuses.
- One school offered an elective fourth-year rotation in agricultural emergency response training that required completion of the ICS-100, 200, and 700 modules and was hosted at the FEMA Center for Domestic Preparedness.
- Another school included this material in a required "Government and Corporate" rotation that was required of all students.
- An extracurricular club at one school required students to complete ICS-100 and ICS-700 training once per year.
- One of the surveyed institutions developed an experiential training for animal disaster response that includes students, faculty, and staff as first responders. This program has worked with local and regional resource providers to improve response activities for several incidents, including Tropical Storm Allison (2001), Hurricanes Katrina and Rita (2005), Hurricanes Gustav and Ike (2008), and the Deep Water Horizon Gulf Oil Spill (2010).
- One school allowed their students to simultaneously participate in a Graduate Certificate in Veterinary Homeland Security program.
- Another surveyed institution deployed fourth-year students as members of their veterinary emergency team and required a fourth-year rotation in veterinary emergency response. This 2-week rotation includes a simulated disaster and utilizes Second Life simulations to place students in these situations.
- An additional institution offered government-based preceptorships, yearly training for SART at the state Veterinary Medical Association meeting, and potential summer employment to work on further development of education materials for these topics in addition to covering emergency response in the fourth-year shelter medicine rotation.

DISCUSSION

The emergency management cycle can be described in 4 phases: mitigation (phase 1), preparedness (phase 2), response (phase 3), and recovery (phase 4).[3] The ICS is a critical component of the administrative structure of the response effort during the third phase of the emergency management cycle.[3] Ten of the 18 surveyed institutions covered the ICS in their core curriculum. Obviously, this subject is a minor component of any professional veterinary curriculum, but any previous exposure to the ICS could be helpful to responders in the event of an incident requiring veterinary assistance. It has been argued that emergency preparedness is required of veterinarians to meet their responsibilities to both animals and people;[8] in that respect, educating veterinary students about the ICS could help to make practitioners who are better equipped for emergencies.

Eight of the 18 surveyed schools (44.4%) utilized online training from FEMA or USDA to reinforce instruction of the ICS. Several of the schools that utilized online training also required the additional modules IS-10 Animals in Disasters: Awareness and Preparedness (http://training.fema.gov/EMIWeb/IS/is10a.asp) and IS-11 Animals in Disasters:

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Community Planning (http://training.fema.gov/EMIWeb/IS/is11a.asp). These two courses are part of a series of online training offered by FEMA to help animal owners, caretakers, and animal industries plan for emergencies (IS-10) and learn how to incorporate needs for animals into a community disaster plan (IS-11). Rural veterinarians surveyed regarding their preparedness and response abilities for bioterrorism identified interest in obtaining more training, preferably in a self-paced format such as an online module.[7] Familiarizing veterinary students with online training at this point of their career could be an advantage for further training after graduation.

Tabletop exercises, field exercises, drills, and other activities can be utilized to complement a traditional lecture-based curriculum. Eleven of the 18 surveyed schools utilized some form of these to supplement their instruction of the ICS and related topics. Small-group workshops were the preferred method of bioterrorism response education among rural veterinarians compared with large-group presentations.[7] A tabletop exercise involving an avian influenza outbreak at several rural human hospitals in Texas observed that hospitals had insufficient staff for incident command and the need to further develop regional cooperation, among other issues. This tabletop exercise showed evidence of being a simple and acceptable tool for rural medical planners, because it could improve medical preparedness, analysis of weak spots, development of regional teamwork, and rapid response.[9] Field exercises, drills, and other simulations have additional benefits other than just reviewing the course material. Successful large-scale exercises help to improve the nature of trust between the participating individuals and organizations, changing the trust from a situational trust to a personal trust.[10] It is possible that improved trust could lead to improved performance in an emergency response situation that requires the ICS. Improved performance is crucial to the ICS, because every 5 minutes that a situation is allowed to develop without an ICS in place, it is estimated that it will take 30 more minutes to bring the incident under control once the ICS is implemented.[6] Activities outside the classroom may be beneficial in developing skills and relationships that would be important for the implementation of the ICS in a disaster or emergency.

TABLE 2

Use of Activities Outside the Classroom as Part of the Instruction of the Incident Command System and Related Material[a]

Exercise	Table Top Simulation	Drill	Other Simulation
Core Course Requirement	7	7	5
Elective Course Requirement	1	1	0
Total	8	8	5

[a]Number represents the number of surveyed schools that incorporate the activity in the left vertical column into the corresponding course division. Other simulated activities included field hospital setup, large animal rescue, PPE and decontamination labs, pet sheltering, field euthanasia, large animal triage, and safety issues in large animal disasters.

Eleven of the 18 surveyed schools utilized professionals other than college faculty for the instruction of this material. This is a potentially novel method for instruction, because in any incident that would require implementation of the ICS, multiple individuals from potentially multiple organizations will be present. A previous study of veterinary disaster preparedness in New York identified a barrier of veterinarians being unfamiliar with local health departments and related health professionals.[1] Introduction of veterinarians and veterinary students to other professionals in emergency and disaster response is a key component to emergency training. For example, veterinarians who volunteer and deploy with the National Veterinary Response Team would be working within an ICS for that situation that would include other veterinarians, animal health technicians, pharmacists, epidemiologists, safety officers, logisticians, communication specialists, and other support personnel when dealing with animal-related and public health disasters.[11] Familiarizing veterinary students with individuals from response teams, emergency management agencies, and health departments could aid the students later in their careers. Working with individuals from these organizations will present less of a hurdle to a former student who is already familiar with them.

Several schools had student organizations or clubs that were based on emergency or disaster response. These clubs, although not official components of the curriculum, also offered students opportunities for additional training and reinforcement of these topics. Studies addressing the role of extracurricular clubs in veterinary education are lacking. Although club involvement has been linked to higher graduation rates at the high school level,[12] more research is needed to understand the role that extracurricular clubs play in veterinary education.

As described in the literature, Several veterinary training programs include the ICS in their curricula. Purdue University offers a web-based Graduate Certificate in Veterinary Homeland Security. The program is a collaborative effort among the Purdue University School of Veterinary Medicine, the Purdue Homeland Security Institute, the Indiana State Board of Animal Health, the Indiana State Police, and others with the overall goal of increasing capacity and preparedness to manage animal-related emergencies.[13] ICS training and certification is required for successful completion of the program, and DVM students at Purdue can enroll in this program concurrently while pursuing a DVM degree. Also reported is the North Carolina State University Credentialed Veterinary Responder Program, in which third-year veterinary students are involved in a 2-week core program in collaboration with

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the North Carolina Department of Agriculture and Consumer Service, Emergency Programs, and the University of North Carolina at Chapel Hill School of Public Health. This program combines lecture, online material, experiential content, and group exercises to meet entry-level federal credentialing requirements.[14]

Limitations

Variation between the curricula and academic administration of institutions can create difficulty in assessing components of veterinary education. Because no database of instructors for this material exists, it is possible that some instructors at specific institutions may have been missed. Also, with some courses being team taught, it is possible that the individual surveyed was not aware of all aspects of the curriculum being surveyed. Limitations from the results of this survey are primarily due to the small number of institutions surveyed (18 of the 29 US veterinary schools at the time of the survey). Another potential bias with this survey could be from the nonresponding surveyed schools. It is possible that these schools did not respond because they do not incorporate the ICS into their curricula. This could cause the survey's percentage of schools that incorporate the ICS to be elevated with respect to the actual percentage at US veterinary schools. It was not the design of this study to evaluate the effectiveness of any particular method of instruction of the ICS.

CONCLUSIONS

The ICS is being taught at some form at a significant number of US veterinary schools. Although the ICS is not a uniform part of the core curriculum, most of the surveyed institutions incorporated the ICS in some form as part of their DVM training. The majority of the surveyed veterinary schools also used a part or all of the FEMA/USDA online courses for training. All but one of the surveyed schools that incorporated the ICS as part of the veterinary curriculum included an out of the classroom activity for additional reinforcement of the ICS and related topics. Some schools added additional professionals from related fields to help with this instruction. Several schools utilized unique and novel methods to teach the ICS and related materials to veterinary students. Additional research is needed to evaluate the efficacy of the teaching methods of the ICS in US veterinary schools.

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