Impact of On-line Video Teaching on Utilization of Web-Based and Non-Web-Based Learning in Disaster Medicine in Taiwan

Tzong-Luen Wang, MD, PhD

Abstract

To understand the utilization of e-learning in disaster medicine, we surveyed the situation of utilization of e-learning and traditional education in disaster medicine in recent half year. Taiwan Society of Disaster Medicine has implemented e-learning program including continuing medical education (CME) into its official website in Jan 2004. We prospectively studied the numbers of members and non-members attending web-based and traditional training programs since then. Because of advances in e-learning, generalization of disaster medicine education should take various modes of e-learning as the method. A new on-line video teaching program has been implemented in June 2005. The study period A was from July 1 2004 to October 31 2004, and the study period B was from July 1 2005 to October 31 2005. During the study period A, there were totally 112 participants attending 144 times of training courses whereas there were 136 participants attending 172 times of training courses during the study period B. At phase A, 84 (75%) of the participants attended traditional DMAT training and 28 (25%) take part in web-based learning. Of 144 individual courses, 115 (80%) belonged to traditional learning and 29 (20%) were e-learning. At phase B, there were 80 students attending e-learning that was significantly higher than the ratio at phase A (50% vs. 25%, $P<0.05$). In addition, there were 88 individual courses belonging to e-learning that was also significantly higher than the ratio at phase A (51% vs. 20%, $P<0.01$). Student satisfaction has also significantly been improved after the video-assisted e-learning has been implemented (satisfaction scores 22 ± 4 points vs. 15 ± 5 points, $P<0.01$). In conclusion, this report demonstrated that the e-learning of disaster medicine has significantly increased web-based learning and CME certification by both members and non-members. Consistent improvement of quality in e-learning should be the priority in the future.*(Ann Disaster Med. 2006;4:66-71)*

Key words: Disaster Medicine; E-learning; Training; Education

Introduction

E-learning has become the most popular topic in medical education with the advance of medical informatics. Driven by the communi-

cation and information technologies there is structural change from all of the related fields. In the era of information, students have to face floods of data of which the relevant information has to be selected and applied. The internet and the new media are major players in this process. More and more physicians unravel e-learning as a new tool and as attractive adjunct to the traditional face-to-face teaching in medicine. Therefore, many people think that we are currently witnessed of another paradigm permutation in medicine: a paradigm which sets the internet and the new media in the center of interest. In some specific fields of application, as emergency and disaster medicine, where the interaction between the student and the teacher, even if of great importance, are difficult to obtain in a quiet setting and have a lot of organizing, technical and economic troubles, e-learning approach could be an excellent application.[1,2]

How to share experience and resources among learners is becoming one of the hottest topics in the field of E-Learning collaborative techniques. In response to the need to standardize learning across multiple clinical sites, create a community environment for geographically disbursed learners and faculty, and provide opportunities for students to learn about and practice disaster medicine, Taiwan Society of Disaster Medicine has implemented e-learning program including continuing medical education (CME) into its official website in Jan 2004. A new on-line video teaching program has been implemented in June 2005.[3] While a lot of research has been pursued to provide collaborative learning environments for geographically dispersed learner groups, such as web-based lectures allow instructors and learners to share information and ideas with the entire class,

supplemented by multimedia resources, electronic mailing lists and digital video links, this teacher-centered learning mode bears inherent limitations such as learner passiveness and lack of interaction.[4,5]

To understand the utilization of e-learning in disaster medicine, we designed the following study to survey the situation of utilization of e-learning and traditional education in disaster medicine in recent half year.

Methods
On-line web-based learning
In response to the need to standardize learning across multiple clinical sites, create a community environment for geographically disbursed learners and faculty, and provide opportunities for students to learn about and practice disaster medicine, Taiwan Society of Disaster Medicine has implemented e-learning program including continuing medical education (CME) into its official website in Jan 2004. The initial program consisted of powerpoint slide teaching and post-learning on-line test. The powerpoint files included:

Basic disaster medicine training included

1. Introduction to National Disaster Medical System (NDMS)
2. Introduction of DMAT
3. Incident Command System (ICS)
4. Mass casualty incident (MCI) management
5. Principles of logistics
6. Field evaluation
7. Principles of public health
8. Refugee's care

Advanced disaster medicine training included:

1. Blast injury
2. Crushing syndrome
3. Compartment syndrome

4. Traumatic asphyxia
5. Particulate health problem
6. Post-traumatic stress disorder (PTSD)
7. Personal protective equipment (PPE) and decontamination

In June 2005, we have implemented a new on-line video learning module to promote the interactivity of e-learning.

Survey protocol

E-learning should provide rapid correction and addition of teaching content; explorative learning; ubiquitous access, time and place independency; individual adaptation to foreknowledge of students; enrichment of traditional teaching modes by multimedia-based preparation of contents; and improved interaction possibilities compared to traditional distance learning media. We thus explored that if our official disaster medicine-related e-learning websites can provide such requirements.

The study period has been divided into two phases: the study period A was from July 1 2004 to October 31 2004, and the study period B was from July 1 2005 to October 31 2005. The participants and total attending times of training courses were recorded and compared. The relative distribution of web-based and non-web-based learning were also compared during two different study period. In addition, satisfaction feedback rate from the participants were also recorded and analyzed.

The satisfaction questionnaire was simply designed as follows:

1. How were you satisfied with our registration procedure?
2. Were these lessons important to your concern in the specialist field?
3. Were you satisfied with the time you

waited for your certification to be confirmed?
4. Did you find training course interactive?
5. Would you recommend this course to your colleague?

The grading of each question has been categorized to 5 grades, from 5 for very important to 1 for least important. The highest total score would be 25 and the lowest score be 5.

Statistical analysis

Demographic data were analyzed by *t* test and chi-square test where appropriate. The comparative results were presented as point estimate and interval estimate (eg, the difference of the proportions, means, and 95% confidence interval [CI] for difference). The statistic was used for calculating the degree of agreement in selecting high-risk ED discharged patients between the reviewers. All data were abstracted from records and keyed into and analyzed in Excel 2000 (Microsoft Co., Redmond, WA, USA). A *P* value less than 0.05 was considered as statistically significant.

Results
Relative distribution of web-based and traditional learning

During the study period A, there were totally 112 participants attending 144 times of training courses whereas there were 136 participants attending 172 times of training courses during the study period B. At phase A, 84 (75%) of the participants attended traditional DMAT training and 28 (25%) take part in web-based learning. Of 144 individual courses, 115 (80%) belonged to traditional learning and 29 (20%) were e-learning. At phase B, there were 80 students attending e-learning that was significantly

higher than the ratio at phase A (50% vs. 25%, $P<0.05$). Accordingly, there was significantly lower portion of participants attending traditional DMAT training (50% vs. 75%, $P<0.05$). In addition, there were 88 individual courses belonging to e-learning that was also significantly higher than the ratio at phase A (51% vs. 20%, $P<0.01$) whereas there was proportional decrease in use of traditional lessons (49% vs. 80%, $P<0.05$).

Evolution of student satisfaction

Student satisfaction has also significantly been improved after the video-assisted e-learning has been implemented (satisfaction scores 22 ± 4 points vs. 15 ± 5 points, $P<0.01$). As to individual components, there was greatest advancement in the questions "Did you find training course interactive ?" (4.8 ± 0.6 points vs. 3.0 ± 1.2 points, $P<0.05$) and "Would you recommend this course to your colleague ?" (4.5 ± 0.5 points vs. 2.9 ± 1.1 points, $P<0.05$) There were no differences in other 3 categories of satisfaction. In detail, the satisfaction scores as to question 1 were 4.2 ± 0.5 points at phase 1 vs. 3.9 ± 0.7 points at phase B (P=NS), those as to question 2 4.2 ± 0.5 points and 3.6 ± 0.8 points (P=NS), and those as to question 3 4.0 ± 0.6 points and 3.5 ± 0.6 points (P=NS).

Discussion

This study demonstrated that the e-learning of disaster medicine has significantly increased web-based learning and CME certification by both members and non-members. Consistent improvement of quality in e-learning should be the priority in the future.

Internet technology has enabled students

to have access to a web-based learning environment, which provides students and teachers with unprecedented flexibility and convenience. On the other hand, it also creates many lonely learners, which mean those who cannot share their opinions with their classmates or teachers like in traditional classroom-based education. Interactivity and humanistic e-environment have become one of the hottest topics that should be urged in promoting the quality of e-learning.

On the other hand, Due to the distributed and dynamic characteristics of e-learners, multi-agent mechanism has usually been adopted to provide collaborative-learning.[6] A model of multi-disciplinary quality assurance (or so-called "cocktail learning"), consisting of a Video Recording combined with the other recording instruments, combined with the detailed checklist, and quick mutual feedback may be considered in promotion of e-learning. An online video learning or even V-cam communication may be some of the alternative choices.

As stated above, it is necessary for the participants to note a number of advantages of online learning. Although there are only rare examples in the literature of online courses on communication skills for medical professionals or students,[7] this study does add to the growing literature in medicine and in fields outside of medicine,[8-10] suggesting the effectiveness of internet-based distance education. Previous studies generally show that Internet-based instruction is at least as effective as conventional methods.[11-13] and in some cases superior.[14-16] A recent meta-analysis of Web-based learning in medical education, however, did acknowledge that studies are needed that better compare instructional methods rather than compar-

ing instructional media although it still did not find this method superior to conventional methods.[17] A carefully-designed, instructed, and evaluated online course may effect better learning outcomes than face to face instruction.[18] Evidence suggests that most learners will ultimately be successful online learners.[19]

Although there were many different methods to establish the learning objectives in e-learning disaster medicine, we may consider the competencies for healthcare workers as the candidate. The first goal is to make the student recognize a potential critical event and implement initial actions. They also have the ability to apply the principles of critical event management, to demonstrate critical event safety principles, to understand the institutional emergency operations plan, to demonstrate effective critical event communications, to understand the incident command system and their roles, and to demonstrate the knowledge and skills needed to fulfill their role during an emergency event.[20] Although healthcare worker training has long been accepted as an integral part of disaster preparedness, traditional training has not been systematically developed, rigorously examined or objectively tested. We consider a good opportunity to complete all of these goals by providing a good e-learning environment.

In order to deal with the experience and resources sharing among learners, a dynamic organization model based on multi-agent mechanism, which can group learners with similar preferences and capabilities, should be well utilized. In order to make the search progress more efficient, the future work should be the improved award and exchange schemas with evaluation and preference track records to raise the performance of this algorithm. The description of agent capability, the matchmaking process, the definition of evaluation and preference track records, the rules of award and exchange schemas of the self-organization process are all discussed in this paper. Meanwhile, a prototype was built to verify the validity and efficiency of the algorithm. Experiments from real learner data showed that this mechanism could organize learners properly and efficiently; and that the agents' search success rate could be increased dramatically and search time could be much less.

In conclusion, this report demonstrated that the e-learning of disaster medicine has significantly increased web-based learning and CME certification by both members and non-members. Consistent improvement of quality in e-learning should be the priority in the future.

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