

RESEARCH



Nursing & Health Sciences Research Journal

Journal homepage: <https://scholarlycommons.baptisthealth.net/nhsrj/>

Computer-based Stroke Training Effects on Clinical Partner Knowledge Acquisition and Satisfaction

Simone Cheong

ABSTRACT

Introduction: Primary stroke center educational requirements necessitate education of those healthcare professionals coming in contact with patients who have suffered a stroke. Clinical partners (CPs) are integral team members who often assist these patients with activities of daily living. A potential method of education is computer-based training (CBT). The purpose of this study was to measure the efficacy of CBT and clinical partners' satisfaction with CBT as an educational tool.

Methods: CBT was implemented as a cost-effective and efficient method of providing CPs with the education necessary to care for patients suffering a stroke. Additionally, an evaluation research approach was used with a single group using a pre-post quasi-experimental design. Also, a survey assessing CPs satisfaction of the education tool was conducted.

Results: Twenty-six CPs completed the CBT training along with the pre- and post-knowledge tests. Data analysis, using a paired *t*-test, revealed the mean test score increased, from 77.6 ± 9.56 pre-test to 89.3 ± 7.09 post-test ($t = 2.10$, $df = 18$, $p = .00013$). For the secondary objective, 11 CPs completed the satisfaction survey which showed that only 3(27%) would have preferred a live session.

Conclusion: The study results suggest that CBT is an effective tool in the education of clinical partners on the care of the patient suffering a stroke. In addition, it was favored over a live session, suggesting that innovative tools such as e-learning should be considered when education is required in a busy clinical setting.

Keywords: *clinical partners, computer-based training, stroke education*

INTRODUCTION

Stroke is the fifth leading cause of death, the leading cause of disability, and the leading cause of preventable disability in the United States (Heart and Stroke Association, 2016). Considering the detrimental lasting impact a stroke can leave, the Joint Commission (TJC) partnered with the American Heart Association (AHA) and the American Stroke Association (ASA) in 2009 to develop and implement the stroke (STK) seven measure set as a core measure within the TJC's ORYX program (TJC, 2016). Within this TJC core measure are elements of performance for

certification requirements for primary stroke centers regarding annual education of staff appropriate to the healthcare providers' level of responsibility (TJC, 2013). This required education includes not only medical and nursing professionals, but also certified nursing assistants (CNAs).

According to the Florida Board of Nursing (2013), the practice of CNAs or clinical partners (CPs) includes the provision of care and assistance to residents with tasks related to the activities of daily living (ADLs). For patients who have suffered a stroke, CNAs' assistance in ADLs is essential. Smith and Parker (2014) stressed that a distinctive quality of any

discipline is the education of its present and future members, in which members learn methods of their practice. However, Ward, Stewart, Ford, McFarland Mullen, and Flynn Makic (2014), found that there is minimal evidence in the literature exploring the value of CNA continuing education that focuses on patient care-specific content (e.g., recognizing signs of a stroke), but that education is critical for both increasing knowledge and improving patient outcomes. Therefore, in order for CPs to have the knowledge to identify and care for a person with a stroke, education is paramount.

In today's cost-conscious healthcare environment, challenges loom as to providing needed education in a cost-efficient and effective way. Ward, Stewart, Ford, McFarland Mullen, and Flynn Makic (2014) stated that with current healthcare budgetary controls, a challenge in providing continuing education to assistive personnel is that this workforce may not be allotted paid time for additional training. Thus, the past 20 years have seen a rapid growth in the use of e-learning in the health professions for continuing education of health care workers (Dodds, 2011; Lahti, Hätönen, and Välimäki, 2014; Maloney et al., 2012). Computer-based training (CBT), also known as web-based training, computer-based education, or electronic-learning (e-learning), is one educational process that has seen growth as an alternative to face-to-face education delivery (Ballew et al., 2013; Dodds, 2011; Maloney et al., 2012; Pelayo-Alvarez, Perez-Hoyos, & Agra-Varela, 2013). Computer-based training is a time- and cost-efficient method of delivering education (Maloney et al., 2012; Pelayo-Alvarez, et al., 2013; Ballew et al., 2012; Saunder, 2012; Gjefle and Vikari, 2012; Jacobi & Ansbro, 2012; Lau, 2014; Dallinger, 2013; Lee, Hsieh, & Chen, 2013). It is also flexible and convenient, thus allowing for training or education to be provided or accessed at a time convenient to the learner (Pelayo-Alvarez, et al., 2013; Ballew et al., 2012; Saunder, 2012; Jacobi & Ansbro, 2012; Lau, 2014; Dallinger, 2013; Lee, et al., 2013). Learners experience challenges with the use of CBT including a lack of individualized attention, a lack of computer skills, and a lack of learner interaction (Ballew et al., 2013). Most notably, a lack of interpersonal interaction that accompanies asynchronous CBT is a significant challenge of e-learning for some learners (Ballew et al., 2013; Gjefle & Vikari, 2012; Lau, 2014; Dallinger, 2013).

Recognizing the lack of interpersonal interaction, it is important for educators to design CBT modules that will stimulate self-motivating behaviors for these learners (Gjefle & Vikari, 2012). Lee et al. (2013) reported that the more useful an e-learning experience is perceived, the more satisfied learners are with e-learning as a learning experience. A meta-analysis by

Means, Toyama, Murphy, and Baki (2013) showed positive findings for the effectiveness of online education. Whereas, Wagner, Garippo, and Lovaas (2011), in their longitudinal study of online versus traditional learning, found that both online and in-person instruction were effective. Furthermore, Lahti et al. (2014) revealed in their systematic review that e-learning was not superior to traditional learning methods with reference to learner satisfaction, but that e-learning can offer an alternative method of education that is just as effective as traditional learning methods. A three-year study by Cole, Shelley, and Swartz (2014) looking at satisfaction with online learning, online learning was rated as moderately satisfactory. Therefore, designing CBT modules addressing the learning needs of the target audience may lead to an increase in satisfaction with completing the module.

The primary purpose of this study was to assess the effectiveness of CBT as an educational tool on knowledge acquisition. The secondary purpose was to assess the satisfaction and recommendations of CPs with the CBT as an educational tool. The research questions proposed included: 1) In a group of clinical partners working on an inpatient stroke unit, what is the effect of computer-based training as a method of stroke care education on post-test scores compared to pre-test scores?; 2) How do clinical partners working on an inpatient stroke unit perceive their satisfaction level with computer-based training within a 2 week period of having taken the CBT module?; and 3) In a group of clinical partners working on an inpatient stroke unit, what are the recommendations proposed to improve CBT as an educational tool?

METHOD

An evaluation research approach was used with a single group pre-post quasi-experimental design along with a satisfaction assessment survey of the education tool. The study proposal was reviewed and deemed exempt – research involving the use of educational tests and surveys in which subjects are not identified – by the hospital's Institutional Review Board. The primary objective of the study included analysis of de-identified pre- and post- knowledge test scores which were obtained from the institution's learning management system personnel. The secondary objective included a post survey assessing the satisfaction and recommendations of CPs with the CBT as an educational tool. There was no coercion or sense of obligation as the survey was anonymous and the investigator left the room after the script was read. The cover letter to prospective participants explained that by completing the anonymous survey questionnaire they were consenting to participate in the study. One of the study team members was available to prospective

participants to answer questions related to the study.

The setting for the study was a 400-bed not-for-profit acute care primary stroke center hospital in South Florida which required inpatient stroke unit CPs to complete a 1-hour annual stroke education. In this center, there was a need for a more affordable, effective, and efficient learning opportunity to meet the stroke educational needs of CPs working in busy inpatient units. To meet this continued ongoing stroke training/education need, an evidence-based educational CBT module was created using a pre-existing evidence-based accredited computer module developed for nurses. The goal for the creation of the CBT module was for the module to be available electronically to all CPs through the organization’s learning management system. A total of 26 CPs on 2 units of the hospital were asked to take the CBT module. Participants had to sign in to the learning management system, access the module, complete a pre-test, complete the educational module, and then complete the post-test all in one sitting. The pre-/post-test scores data was a part of the educational module regardless of the research.

The pre-test and post-test consisted of the same questions. The multiple choice and true/false test questions were created by the researcher based on the material in the CBT module. There was no passing score for the pre-test, but rather it was used as a gauge for knowledge level prior to completing the CBT module. The passing score for the post-test was 80%, which translated to a minimum of 12 out of the 17 questions answered correctly. Content validation of the test questions was provided by the stroke coordinator.

For the evaluation research component of this study, regarding effectiveness of CBT as an educational tool on knowledge acquisition, the de-identified pre- and post-test score data were obtained from the learning management system. Using SPSS, descriptive statistics were performed on the pre- and post-test scores along with paired t-tests to compare mean knowledge scores. A paired t-test was chosen because the knowledge scores were matched pre and post for each CP.

The secondary objective of the study was to assess the satisfaction and recommendations of CPs with the CBT as an educational tool which was accomplished using a researcher-developed survey (see Table 1). In order to answer the second study question, the study questionnaire was designed to elicit the degree to which the CPs agreed or disagreed with statements related to the specific CBT module on stroke and CBT modules in general using a Likert scale yielding additional quantitative data. The goal of this questionnaire was to determine the CPs’ perceptions of knowledge gained and the benefits of CBT as a learning strategy. After approximately a two-week timeframe given for the CPs to complete the CBT module in the learning management system, the researcher approached the CPs on the primary and secondary inpatient stroke units with the researcher-developed survey. The CPs were asked to submit the anonymous survey to a drop box left in the staff lounge on each unit. Descriptive statistics were analyzed to assess the CPs’ satisfaction and recommendations.

Table 1

Anonymous survey questionnaire questions

	1= strongly disagree	2= disagree	3= neither agree or disagree	4= agree	5= strongly agree
<u>Survey question</u>					
I felt the module was easy to understand.					
I felt I learned after completing the module.					
I felt better able to care for stroke patients after completing the module.					
I felt that a computer-based educational module was an appropriate method to deliver this material.					
				<u>Yes</u>	<u>No</u>
I wish this educational material was delivered in a live class.					
What recommendations do you have to improve the educational module?					

RESULTS

All 26 CPs from both the primary and secondary stroke units completed the CBT module pre-test, educational module, and post-test resulting in a 100% attrition rate. The pass rate of the CPs on the pre-test was 77% and the pass rate on the post-test was 100%. Data analysis using a paired *t*-test revealed the mean test score increased from 77.6 ± 9.56 on the pre-test to 89.3 ± 7.09 on the post-test ($t = 2.10$, $df = 18$, $p = .00013$). The post-test scores were statistically significantly higher than the pre-test scores.

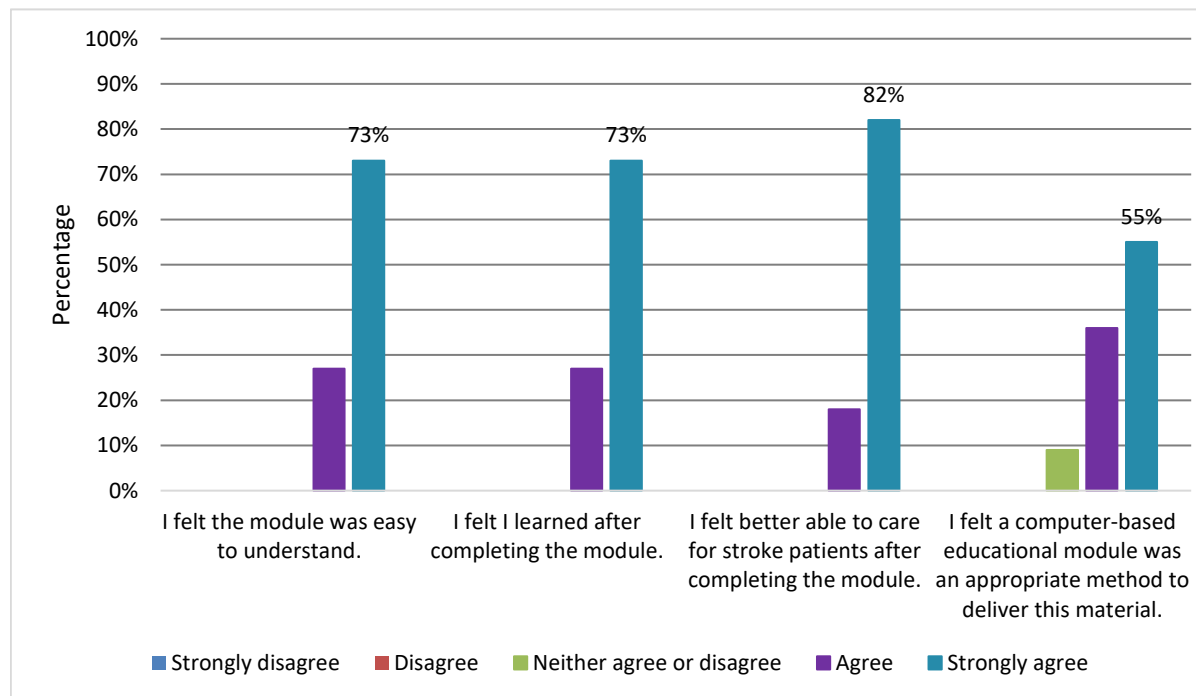
A total of 11 CPs from both the primary and secondary stroke units completed the post researcher-developed survey on satisfaction and recommendations for the CBT. Thus, there was a 36% response rate. The quantitative results are displayed in Figure 1. In the one yes/no question on the questionnaire, only 3(27%) of respondents stated they wished the educational material was delivered in a live class. There were no recommendations made to improve the educational module.

DISCUSSION

The ultimate purpose of the study was to determine if learning had occurred, and to what level of satisfaction, with the use of CBT as an educational tool in CPs learning about care of the person suffering a stroke in a primary stroke center. The initial results of the study illustrate that CBT was an effective educational tool. The results of this study are in agreement with findings. In the meta-analysis by Means, Toyama, Murphy, and Baki (2013) which aimed to yield a statistical synthesis of studies contrasting learning effects for either entirely online or blended learning circumstances with those of face-to-face classroom training, found that, on average, students in online learning situations did modestly better than those getting face-to-face instruction. This was also apparent in Lahti et al. (2014)'s study that found that e-learning is an alternative method of education that is just as effective as traditional methods, although not superior in terms of satisfaction. In the

Figure 1

Percentage of responses to survey questionnaire



present study, through the statistically significant difference between the pre- and post-test scores, it was determined that learning did occur with the implementation of CBT as a method to educate CPs on care of the patient suffering a stroke. Computer-based training has been shown to have a positive effect on CP knowledge acquisition. There was a high degree of satisfaction with CBT as an educational tool in the study. Cole, Shelley, and Swartz's (2014) study found a moderate level of satisfaction with online learning.

One study limitation was the small sample size for the survey portion of the study. However, although only 36% completed the satisfaction survey, all CPs from the two units were included in the knowledge assessment. Another limitation was the lack of validation for the tool used in the study. Due to time constraints, the tool to collect the participant responses was not validated. However the knowledge test's content was reviewed by the stroke coordinator.

CONCLUSION

Computer-based training has been shown to be an effective method to impart education through statistically significantly higher post-test scores. By not having the learners take extra time out of their schedules and without the use of an instructor (as with face-to-face teaching), CBT has been shown to be a cost-conscious alternative method of learning. Some learners have shown a high degree of satisfaction with CBT as a method of learning. In a health care system fraught with economic challenges, CBT has been shown to be a way to enable staff to learn in a fiscally responsible way. Implications for nursing education practice include the use of CBT as a viable and cost-efficient method of providing education to staff. Nurse educators, challenged with classroom space, learner availability, and time spent preparing and delivering education in live sessions, may find CBT a beneficial and effective alternative that saves both time and money. Recommendations for future nursing education research include addressing present study limitations: low survey return rate and lack of validation of response collection tool. Other recommendations include looking at comparing the effectiveness of CBT versus live lecture, using randomized samples of study participants, and addressing other variables—such as age, years of experience, and comfort level with computers—that may influence the effectiveness of CBT as an educational tool. Although further work is needed to gain a better understanding of other influences on knowledge acquisition, the initial findings support the current research of CBT as an effective and fiscally responsible educational tool.

DECLARATION OF INTEREST

The author report no conflicts of interest. The author alone is responsible for the content and writing of the paper.

AUTHOR

Simone Cheong, MSHSA, MSN, RN, CMSRN, Magnet Project Coordinator, West Kendall Baptist Hospital, Miami, FL, US. Correspondence regarding this paper can be directed at SimoneCh@baptisthealth.net.

ACKNOWLEDGMENTS

Many thanks to Ann Karborani M.S.N., R.N., CCRN, SCRN, Shakira Henderson D.N.P, Ph.D., M.S., M.P.H., RNC-NIC, IBCLC, and Tanya Cohn Ph.D., M.Ed., R.N. for their invaluable assistance and support.

REFERENCES

- Ballew, P., Castro, S., Claus, J., Kittur, N., Brennan, L., & Brownson, R. C. (2013). Developing web-based training for public health practitioners: What can we learn from a review of five disciplines? *Health Education Research*, 28(2), 276-287.
- Cole, M. T., Shelley, D. J., & Swartz, L. B. (2014). Online instruction, e-learning, and student satisfaction: A three year study. *The International Review of Research in Open and Distributed Learning*, 15(6). Retrieved from <http://www.irodl.org/index.php/irodl/article/view/1748/3123>
- Dallinger, T. (2013). E-learning, training needs analysis and return on investment. *Nursing & Residential Care*, 15(11), 751-753.
- Dodds, T. (2011). Open and distance learning for health: Supporting health workers through education and training. *Open Learning: The Journal of Open, Distance and e-Learning*, 26(2), 173-179.
- Florida Board of Nursing. (2013). *The 2013 Florida Statute Title XXXII: Regulation of professions and occupations: Chapter 464: Nursing*. Retrieved from <http://www.floridasnursing.gov/licensing/certified-nursing-assistant-examination/>
- Gjefle, A., & Vikari, V. (2012). Training to the rescue: First responders power up skills while cutting costs. *The Public Manager*, 41(3), 35-38.
- Heart and Stroke Association (2016). *Heart and Stroke Statistics*. Retrieved from http://www.heart.org/HEARTORG/General/Heart-and-Stroke-Association-Statistics_UCM_319064_SubHomePage.jsp
- Jacobi, J. A., & Ansbro, B. (2012). Mining the value of computer-based training. *Occupational Health and Safety*, 81(10), 72. Retrieved from <http://ohsonline.com/Articles/2012/10/01/Mining-the-Value-of-Computer-Based-Training.aspx>
- Lahti, M., Hätönen, H., & Välimäki, M. (2014). Impact of e-learning on nurses' and student nurses' knowledge,

- skills, and satisfaction: A systematic review and meta-analysis. *International Journal of Nursing Studies*, 51(1), 136-149.
- Lau, K. H. V., (2014). Computer-based teaching module design: principles derived from learning theories. *Medical Education*, 48(3), 247-254. doi:10.1111/medu.12357
- Lee, Y., Hsieh, Y., & Chen, Y. (2013). An investigation of employees' use of e-learning systems: Applying the technology acceptance model. *Behaviour & Information Technology*, 32(2), 173-189. doi: 10.1080/0144929X.2011.577190
- Maloney, S., Haas, R., Keating, J. L., Molloy, E., Jolly, B., Sims, J., . . . Haines, T. (2012). Breakeven, cost benefit, cost effectiveness, and willingness to pay for web-based versus face-to-face education delivery for health professionals. *Journal of Medical Internet Research*, 14(2), e47. doi: 10.2196/jmir.2040
- Means, B., Toyama, Y., Murphy, R., Baki, M. (2013). The effectiveness of online and blended learning: A meta-analysis of the empirical literature. *Teacher's College Record*, 15, 1-47
- Pelayo-Alvarez, M., Perez-Hoyos, S., & Agra-Varela, Y. (2013). Clinical effectiveness of online training in palliative care of primary care physicians. *Journal of Palliative Medicine*, 16(10), 1188-1196. doi: 10.1089/jpm.2013.0005
- Saunders, L. (2012). Developing an e-learning resource in clinical risk assessment. *Nursing Management*, 19(5), 26-29.
- Smith, M. C., & Parker, M. E. (2014). Nursing Theory and the discipline of nursing. In M. E. Parker & M. C. Smith (Eds.), *Nursing theories & nursing practice* (pp. 3-15). Philadelphia, PA: E. A. Davis Company.
- The Joint Commission. (2013). *Disease-specific care certification manual*. USA: The Joint Commission.
- The Joint Commission (2016). *Stroke*. Retrieved from: <https://www.jointcommission.org/stroke/>
- Wagner, S. C., Garippo, S. J., & Lovaas, P. (2011). A longitudinal comparison of online versus traditional instruction. *MERLOT Journal of Online Learning and Teaching*, 7(1), 68-73.
- Ward, S., Stewart, D., Ford, D., McFarland Mullen, A., & Flynn Makic, M.B. (2014). Educating Certified Nursing Assistants Educational Offerings on the Run and More. *Journal for Nurses in Professional Development*, 30(6), 296-302.