Title:
Evolving CPR Training Through Improved Technology: An Unexpected Research
Program

Marilyn Oermann, PhD, MSN, BSN
School of Nursing, Duke University School of Nursing, Durham, NC, USA
Carrie Westmoreland Miller, PhD
College of Nursing, Seattle University College of Nursing, Seattle, WA, USA

Session Title:
The Evolution of CPR Training Using Technology, Multisite Studies, Industry, and
Military Partners
Slot:
D 19: Sunday, 29 October 2017: 2:45 PM-4:00 PM
Scheduled Time:
2:45 PM

Keywords:
CPR, deliberate practice and spaced learning

References:
Oermann, M., Kardong-Edgren, S., Odom-Maryon, T. (2012). Competence in
CPR. *American Journal of Nursing, 112(*5), 38-41.

Oermann, M., Kardong-Edgren, S., Odom-Maryon, T. (2011). Effects of brief monthly
practice on nursing student's CPR psychomotor skill performance. *Resuscitation, 82*,
447-453. Doi: 10.1016/j.resuscitation.2010.11.022

Abstract Summary:
This presentation will explain a 10-year partnership between academics, industry and
the military, as they developed new ways to learn and maintain CPR skills.
Improvements in learning based on our research in deliberate practice and spaced
learning will be explained. Implications for nursing education will be discussed.

Learning Activity:

LEARNING OBJECTIVES	EXPANDED CONTENT OUTLINE
1. Summarize the history, theories used and findings of two large CPR studies.	Deliberate practice, spaced learning- well known in sports/music/psychology. - automated consistent feedback coupled with computer software and hands on practice decreases cognitive load. -

	development of standardized consistent system in first round of studies. Overlaid visual feedback and Just In Time learning along with auditory coaching in updated program. Practice at bed height/headphones. Summarize findings- Brief consistent practice with feedback for high risk low occurrence skills is effective. Students competitive and want to beat the machine. Low drop out rate in the study. Small subset really struggles with attaining and retaining CPR skills.
2. Describe study implications for nurses in practice and education.	Study implications for educators- learn fast- forget fast OR massed practice is less effective than distributed practice. Gaming theory is effective with university age learners. Removing idiosyncratic teaching decreases cognitive load for learners.

Abstract Text:

It is well documented that CPR skills decay shortly after taught, if they are not used. In an effort to ameliorate this finding, a research team was formed to conduct testing of a new CPR Voice Advisory Manikin (VAM) with refresher training and retention testing. VAMS provide accurate verbal non-biased feedback during compressions and ventilations such as "compress a little faster" or "bag more slowly". Six hundred six nursing students from 10 prelicensure programs around the country were divided into an experimental and control group, which did not practice. The experimental group used the new VAM manikin program by practicing 6 minutes a month (2 minutes compressions, 2 minutes bag, valve, mask, and 2 minutes of single rescuer CPR.) Twenty percent of students in both groups were randomly tested and dropped from the study every 3 months over a year. At the one-year point, the remaining 20% of students completed a second CPR course and were tested once again with the VAM. Findings indicated that students in the experimental group who completed brief deliberate practice (6 minutes a month) performed statistically better than those in the control group, in all measures.

A second study using an enhanced CPR training system was developed based on findings from the first study. The investigators were invited to lead a second multisite study, testing an algorithm developed by the USAF that predicted skill decay rates. This enhanced system included visual feedback on a laptop computer in addition to the VAM CPR manikin tested previously. In this second 10 site study, two schools and site coordinators from our previous study participated again in addition to 8 new programs. Students were randomized twice, once to training time (once a day for 4 days in a row,

once a week for 4 weeks in arrow, once a month for 4 months in arrow, or once a quarter for quarters in a row). Students were then randomized into retention testing times (at 3 months X 4 visits, 6 months X 2 visits, or a performance predictor optimizer (PPO) group that used the USAF algorithm. Students might be asked to come back 6 times over the next year. Based on prior student training performance, the algorithm predicted when the students' skills would decay and when a student needed to return for training. Training and retention visits were performed in the same manner. Students performed one minute of compressions and one minute of bag valve mask without feedback. They then viewed brief refresher videos on proper compression and ventilation skills. Students completed a final round of one minute each of compression and ventilations with no feedback. Results indicated the prediction models for the 3 and 6 month groups were accurate. Initial data indicated that the PPO prediction algorithm was not stable. Some students were not consistent in their skill retention. Modifications to the protocol were added at the one year point of the study, because of these findings. Students in the PPO group with inconsistent skills, as determined by the manikin software, were provided up to an additional 4 practice visits.

Implications for nurses in practice and education include: skill decay is inevitable for rarely used skills such as CPR. Brief spaced practice with consistent computer based feedback is effective in refreshing and maintaining CPR skills. These findings may be generalizable to other psychomotor skills. Further research is warranted.