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A web-based educational module increases burn prevention knowledge over time

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ABSTRACT

Unfortunately, burn prevention knowledge is low among nurses. Establishing efficient ways in which to increase burn prevention knowledge in nurses is warranted. The current multicenter study evaluated whether a web-based educational module was successful at increasing burn prevention immediately and whether the knowledge was retained over time. A valid, reliable burn prevention knowledge exam was administered to nurse at three time points (prior to receiving the educational module, immediately following receiving the educational module, and at least a minimum of two weeks after receiving the educational module). Generalized linear mixed effects modeling methods were used to evaluate whether scores on the burn prevention knowledge exam increased over time, while adjusting for traditional covariates (e.g., specialty area, years as a nurse, and years in current work area). Mean scores on the burn prevention knowledge exam increased over time ($p = 0.003$); establishing that the educational module significantly improves scores over time. Mean score prior to receiving the educational module was 82.3%; the mean score was 83.8% immediately following receiving the educational module, and 86.1% two weeks after receiving the educational module. The educational module developed by the authors (www.burnpreventionstudy.org) is an efficient way in which to increase burn prevention knowledge and is available at their convenience. This education module could be used as a training module with nurses involved in burn prevention outreach, and with nurse practitioners, physicians, and emergency responders involved in primary care across the life span.

1. Introduction

There is a body of work describing firemen's efforts in teaching burn prevention in schools, and the need to have health care providers teach burn prevention has been well established [1,2]. There has only been a paucity of research exploring the teaching habits of nurses concerning burn prevention.

In preliminary work by the Principal Investigator (PI), Lehna, an anonymous survey that included a 10-item burn prevention test was used to investigate nurses' perceived knowledge and ability to teach burn prevention, and their actual burn prevention knowledge [3]. Responding nurses ($n = 265$) described practicing in a variety of settings such as: pediatric settings (40.2%, $n = 105$); emergency departments (25.4%, $n = 86$); medical/surgical settings (8.4%, $n = 22$); and pediatric burn setting (4.1%, $n = 14$). Results from all specialty

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areas showed similar actual burn prevention knowledge ($p = 0.052$). Seventy-seven percent of the nurses said they never taught burn prevention ($n = 177$). The nurses' perceived knowledge of burn prevention and actual knowledge ($r = 0.124$, $p = 0.046$), as well as perceived knowledge and perceived ability were positively correlated ($r = 0.799$, $p < 0.001$). The significant predictors of actual knowledge were: years in practice (0.034); years in current area (0.003); perceived knowledge (0.042); and perceived ability (0.019). An interaction effect existed among specialty area and age ($p = 0.043$), as well as specialty area and perceived knowledge ($p = 0.049$). All nurses, regardless of specialty area showed poor burn prevention knowledge (average score of 52% correct responses), which was positively correlated with their perceived lack of knowledge of burn prevention. Additionally, a nurse's perceived burn knowledge and their perceived ability to teach burn prevention were effect modifiers of actual burn knowledge. The results indicated that nurses in emergency departments and pediatric settings fail to teach burn prevention to their patients; they perceive they do not have the knowledge or ability to teach on this topic; and their knowledge scores indicate they do not adequately understand burn prevention. Unfortunately, the instrument used to evaluate burn prevention knowledge performed poorly (Cronbachs alpha = 0.254). As a result, Lehna and Myers (Co-I) (2010) developed a novel instrument which more accurately measures burn prevention knowledge in nurses (Cronbach's alpha = 0.604) [3].

In an effort to improve the burn prevention knowledge test Lehna and Myers, supported by a University of Louisville Internal Research Initiative Grant, conducted a focus group, comprised of 22 American Burn Association (ABA) burn prevention committee members, which prioritized areas that individuals with increased burn prevention knowledge should be well informed about (i.e. scalds, gasoline elders, juvenile fire setters, abuse) [4]. Then the authors developed an instrument comprised of 39 questions that were developed to assess an individual's knowledge in these five priority areas, and then tested the instrument's reliability and validity. Factor analysis techniques were utilized to develop the final survey (15 questions, explaining 76% of the variance in responses) that was administered in a larger sample ($n = 113$), which achieved adequate power for the study. The final (15 question) survey was administered and tested in a group of pediatric, emergency department and clinic registered nurses for its reliability and validity. This final survey had moderate inter-rater reliability (Cohen's kappa = 0.611), high intra-rater reliability (ICC = 0.713), and good internal consistency (Cronbach's alpha = 0.604). In addition, the final survey was determined to have face validity as well as construct validity (five components had eigenvalues greater than 1.0) [4].

The same five priority areas used in the evaluation survey development guided burn prevention education module development. The first author and two ABA Burn Prevention Committee members revised three existing burn prevention campaigns from the ABA (e.g., scalds, gasoline, and elders) and developed modules for juvenile fire starters and abuse. These five modules were integrated into one web-based, 74-slide, PowerPoint module. Participants took anywhere from 45 min to 2 h to complete.

The survey and education module were then positioned to be used as a reliable, valid way to educate and assess an individual's burn prevention knowledge. The previous two studies have led to the present study which is a multi-center study to evaluate whether a web-based educational module was successful at increasing burn prevention immediately and whether the knowledge was retained over time.

2. Methods

2.1. Assessing actual burn prevention knowledge

The instrument used in the current study to evaluate an individual's burn prevention knowledge was validated and proven to be reliable by Lehna and Myers[x] previously. Initially each answer was scored as correct (1) or incorrect (0), and the percentage of correct responses (number of correct responses divided by 15) was calculated for each individual. A higher score on the instrument indicated better burn prevention knowledge. In addition, a threshold value of 80% correct responses was used to indicate sufficient burn prevention knowledge.

2.2. Statistical analysis

Initially, descriptive statistics for the sample population were calculated to describe the study sample. Subsequently, inferential analyses were performed to allow us to investigate if burn prevention knowledge could be increased (scores on the burn prevention knowledge instrument) via a web-based educational module. Results were stratified by nurse specialty: pediatric nurses, emergency nurses, and adult nurses. Differences in continuous explanatory variables among the three specialties were tested for by using analysis of variance (ANOVA) techniques, while differences in categorical explanatory variables were tested for by using traditional χ^2

Table 1 – Participants' demographics.

Variable	Overall results $n = 66$ (%)
Work area	
Emergency	26 (39.4)
Pediatrics	31 (46.9)
Adults	9 (13.6)
Role	
Staff nurse	46 (69.7)
Educator	6 (9.1)
Administrator	8 (12.1)
APRN	2 (3)
Other	4 (6.1)
Education level	
Diploma	2 (3)
Associate	14 (21.2)
Bachelor	39(59.1)
Master	11 (16.7)
Age	40.95 ± 10.67
Years of nursing practice	13.58 ± 11.59
Years in current area	7.55 ± 7.96
Test score (baseline)	81.92 ± 8.73
Test score (recall)	83.23 ± 8.29
Test score (retention)	85.45 ± 8.82