Evaluation of a Critical Appraisal Program for Clinical Nurses: A Controlled Before-and-After Study

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Critical appraisal of the relevant published literature is an essential competence for nurses and is regarded by medical professionals as the standard for health care (Bernardo, Matthews, Kaufmann, & Yang, 2008). It is believed that the practice of evidence-based medicine would help health professionals to improve the quality of health care. The program conducted by the National Health Research Institutes of Taiwan, which includes information, resource support, and multifaceted campaigns, has had a positive effect, increasing knowledge and skills in evidence-based practice and accelerating the dissemination of evidence-based practice in regional hospitals in Taiwan (Chiu, Weng, Lo, Shih, et al., 2010). Many health care institutions in Taiwan have recognized the importance of evidence-based practice and have implemented information systems to support physicians who practice evidence-based medicine (Hung, Ku, & Chien, 2012). However, Chiu, Weng, Lo, Shih, et al. (2010) found that many nurses reported that less support by health care administrators would be a barrier to their access to educational programs on evidence-based practice.

Background: Evidence-based practice is important to clinical health care professionals. Clinical nurses can make informed decisions by applying the best evidence to their care. However, standardized curricula on evidence-based medicine are lacking in nursing education programs. This study evaluated a critical appraisal education program and assessed its value in increasing nurses’ knowledge of critical appraisal and confidence in their critical appraisal skills.

Methods: A controlled before-and-after study design was used. The education program integrated lectures, practice, and group discussion. A questionnaire was used to evaluate participants’ knowledge and confidence in critical appraisal pre- and postintervention.

Results: Participants’ knowledge and confidence in critical appraisal improved significantly postintervention (both $p < .001$).

Conclusion: A 1-day, small group discussion education program can effectively improve nurses’ knowledge and confidence in critical appraisal. Educators and administrators may replicate this education program to improve the quality of nursing care.

Evidence-based practice is highly recommended in the nursing literature. However, many nurses lack confidence in their own appraisal skills to evaluate evidence and determine what could be implemented in practice, mainly because of the lack of evidence-based nursing training in clinical practice (Tagney & Haines, 2009). Chiu, Weng, Lo, Hsu, et al. (2010) found that significant discrepancies exist between physicians and nurses in their awareness of, attitude toward, knowledge of, skills in, behavior toward, and barriers regarding evidence-based practice in Taiwan (Chiu, Weng, Lo, Hsu, et al., 2010). Even nurses who underwent a research course might still lack skills in appraising the value of research (Duffy, 2005). Therefore, developing objective and structured guidelines for critical appraisal is important to influence clinical decision making. By developing such appraisal skills, nurses can access and evaluate the most up-to-date resources and make appropriate clinical decisions according to the validity of the research. Skills and knowledge in critical appraisal are important aspects of implementing evidence into clinical practice (Milne, Krishnasamy, Johnston, & Aranda, 2007).

Inconsistencies have been found in the amount and quality of different teaching approaches, and the lack of evidence supporting the approaches affects the usefulness of such training (Harewood & Hendrick, 2010). Therefore, well-designed continuing education programs for the appraisal and use of research are needed to improve nurses’ knowledge and skills and enhance their use of evidence in clinical practice.

This study was undertaken to develop and conduct a critical appraisal education program for nurses, based on social learning theory, and to assess the improvement in nurses’ knowledge and confidence in critical appraisal after completion of the education program.

METHODS
This study and the questionnaires used were approved by the Evidence-Based Practice Committee of Changhua Christian Hospital, Changhua, Taiwan. Participants were recruited voluntarily after the research was announced. Before the program was started, the content and purpose of the pre- and postintervention were described to participants. To protect the rights of participants, the pre- and postintervention questionnaires were processed anonymously and no personal information was collected.

Research Setting and Study Design
This study was conducted in a 1,676-bed medical center located in central Taiwan. A controlled before-and-after study design was used. The participants were clinical nurses at all levels of the clinical nursing ladder who were interested in evidence-based nursing. The clinical nursing ladder system refers to a hierarchical structure proposed by the Taiwan Nurses Association that divides nurses into four levels according to their clinical abilities and proficiency (Leu, Liao, Chang, & Su, 2009). A description of the program was distributed by the Evidence-Based Nursing Working Team. The head nurse of every nursing unit recommended a voluntary participant for the program. The difference in the total score of knowledge test of matched pairs (pre- to postintervention) is normally distributed. If the true difference in the mean response of matched pairs is 1.5, with a standard deviation of 2.0, then at least 36 subjects must be included in the study. The type II error (power) is 0.85 and the type I error probability is 0.05. To allow for a 10% dropout rate, the actual minimal sample size is 40. A total of 49 participants were enrolled in the study, and all 49 completed the education program. Participants’ knowledge of critical appraisal and confidence in their appraisal skills were evaluated pre- and postintervention.

Educational Intervention
The critical appraisal educational program consisted of three sessions. Each session included three parts and lasted for 2.5 hours. This 1-day education program was designed by the Evidence-Based Nursing Working Team of Changhua Christian Hospital and included a small group discussion. The participants were assigned to read three papers and other materials that were distributed before the program. They were also expected to be fully prepared to take part in the small group discussions.

First, the lecturer introduced the topic for that session. All lectures were delivered by the same speaker, a physician who had experience in evidence-based practice and was qualified by the Taiwan Evidence-Based Medicine Association. Each lecture was followed by a small group discussion to reinforce the information. A tutor, who helped guide the small group discussion, was assigned to each group by the Evidence-Based Nursing Working Team. Each group was assigned to read three different types of clinical research papers: treatment studies, systematic reviews, and clinical practice guidelines. After the participants read and appraised an article by themselves, each group held a 50-minute discussion using the critical appraisal users’ guidelines and an appraisal instrument. Participants shared their appraisals of the paper with the other members of the small group. Finally, in a 40-minute session, the lecturer assisted the participants in reaching a consensus on the format of a larger group review of the critical appraisal users’ guide-
lines and the appraisal instrument for the guidelines. Before the first session, participants were asked to complete the preintervention evidence-based nursing questionnaire on critical appraisal. They were also asked to complete the immediate postintervention questionnaire at the end of the education program.

**Instruments**

An evidence-based nursing questionnaire was developed by the research team, based on the literature (Cullum, 2000, 2001; Guyatt & Rennie, 2008) and the critical appraisal users’ guidelines to assess the effectiveness of the education program, including participants’ knowledge of critical appraisal and their perceived confidence in appraising evidence.

The questionnaire included three major sections: (1) basic demographic information; (2) evaluation of basic knowledge of critical appraisal; and (3) self-evaluation of confidence in appraisal (appraisal of literature on treatment and intervention, systematic reviews, and clinical practice guidelines). The knowledge scale consisted of 8 multiple-choice questions, such as “Please arrange the levels of evidence of the results of ‘treatment’ studies from high to low”; and 12 true-or-false questions, such as “If the 95% confidence interval of relative risk includes 0, it indicates that the treatment results are not statistically significant” and “The number needed to treat refers to the number of patients who must be treated to prevent one adverse result (i.e., to promote good results).” The confidence scale consisted of 27 statements, such as “Is the research literature randomized?” and “This systematic review stated a specific clinical question clearly.” In knowledge questions, correct responses were scored as 1 and incorrect responses were scored as 0. The knowledge scores were then summed and ranged from 0 to 20. Internal consistency reliability, measured by Kuder-Richardson Formula 20, was 0.5 for dichotomous choice items.

Confidence statements were scored on a five-point Likert scale, with a score of 5 representing “strongly confident,” or a positive confidence statement, and a score of 1 representing “strongly not confident,” or a negative confidence statement. The number of confidence statements was 9 (scored 9 to 45), 10 (scored 10 to 50), and 8 (scored 8 to 40). Cronbach’s alpha coefficient values of the scales were 0.94, 0.95, and 0.95.

**RESULTS**

All participants were female. The characteristics of the 49 study participants are shown in Table 1. Table 2 summarizes and compares the differences in the scores of the pre- and postintervention questionnaires for the 49 participants, including four sections: knowledge test, confidence in appraisal of the treatment study, confidence in appraisal of the systematic review, and confidence in appraisal of the clinical practice guidelines. Postintervention scores for all sections were increased compared with preintervention scores (all \( p \) values < .001) (Table 2).

Before the education program, the participants achieved a mean score of 14.0 (\( SD = 2.0 \)). The postintervention mean score increased to 15.8 (\( SD = 1.4 \)), showing a significant improvement in participants’ knowledge of appraisal and confidence in their appraisal skills. On the postintervention questionnaire, participants rated their confidence in appraisal of the treatment study as moderate (\( M = 32.4, SD = 5.8 \)) and rated their confidence in appraisal of the systematic review (\( M = 33.9, SD = 6.6 \)) and the clinical practice guidelines (\( M = 27.1, SD = 4.8 \)) as lower.

Participants’ motivations for attending the appraisal education program appeared to affect the pre- and postprogram results. Repeated measure analysis of variance
shows that the total score on the knowledge test might be associated with participants’ motivation for attending the education program. The changes in the total scores on the knowledge test from pre- to postintervention according to motivation are shown in the Figure. The participants who were recommended to attend the education program showed a significant improvement (pre-intervention 13.4 ± 2.0 vs. postintervention 15.8 ± 1.2, \( p < .001 \)) in their knowledge of critical appraisal. However, no significant effects were found on confidence in appraisal skills by the types of motivation. Participants’ age, education, and level on the clinical nursing ladder did not influence their mean knowledge or confidence scores.

**DISCUSSION**

Nurses who had been recommended to take the education program showed greater improvement in knowledge and confidence scores than those who took the education program because of their own interest in appraisal or because they believed that they needed appraisal skills for work. Those recommended to take the education program may have been given the responsibility to implement evidence-based nursing in their wards or to serve as tutors in hospital-led education programs, and this may have motivated them to expend greater effort and to learn more effectively during the program.

The intent of the appraisal education program reported in this study was to increase nurses’ knowledge of critical appraisal as well as to increase their confidence in their appraisal skills. The most effective appraisal education programs integrate lectures, practice, and small group discussion, which enhance the appraisal competencies of nurses (Bernardo et al., 2008; Bradley et al., 2005; Brancato, 2006).

Therefore, this education program included lectures, practice sessions, and small group discussion that focused on critical appraisal of treatment studies, systematic reviews, and clinical practice guidelines.

A review of the literature found that perceived lack of time is the main barrier for nurses to access information and apply evidence-based approaches in their clinical practice.
Critical Appraisal Program

1. Critical appraisal of relevant published literature is an essential competence for nurses and is regarded as the standard of health care by medical professionals.

2. A well-designed critical appraisal education program combines lectures, practice sessions, and group discussions focused on critical appraisal of treatment studies, systematic reviews, and clinical practice guidelines.

3. A 1-day, small-group discussion education program can effectively improve nurses’ knowledge of critical appraisal and confidence in their critical appraisal skills.

CONCLUSION
A 1-day education program was an efficient and effective way to improve nurses’ knowledge of critical appraisal and confidence in their critical appraisal skills. Education programs may help and encourage nurses to engage in evidence-based nursing practice and help clinical professionals to overcome commonly reported barriers to applying evidence-based practice. Administrators can provide evidence-based practice education programs specifically designed for nurses instead of those designed for physicians. A comprehensive education program can be included in the advanced curriculum of continuing nursing education. Clinicians who have critical appraisal skills will be able to determine the importance of research studies and improve their clinical decision making.

REFERENCES


Bradley, P., Nordheim, L., Innvær, S., & Thompson, C. (2005). A systematic review of qualitative literature on educational interventions...


