ABSTRACT

Background: Evidence-based practice (EBP) is embraced internationally as an ideal approach to improve patient outcomes and provide cost-effective care. However, despite the support for and apparent benefits of evidence-based practice, it has been shown to be complex and difficult to incorporate into the clinical setting. Research exploring implementation of evidence-based practice has highlighted many internal and external barriers including clinicians' lack of knowledge and confidence to integrate EBP into their day-to-day work. Nurses in particular often feel ill-equipped with little confidence to find, appraise and implement evidence.

Aims: The following study aimed to undertake preliminary testing of the psychometric properties of tools that measure nurses' self-efficacy and outcome expectancy in regard to evidence-based practice.

Methods: A survey design was utilised in which nurses who had either completed an EBP unit or were randomly selected from a major tertiary referral hospital in Brisbane, Australia were sent two newly developed tools: 1) Self-efficacy in Evidence-Based Practice (SE-EBP) scale and 2) Outcome Expectancy for Evidence-Based Practice (OE-EBP) scale.

Results: Principal Axis Factoring found three factors with eigenvalues above one for the SE-EBP explaining 73% of the variance and one factor for the OE-EBP scale explaining 82% of the variance. Cronbach's alpha for SE-EBP, three SE-EBP factors and OE-EBP were all >.91 suggesting some item redundancy. The SE-EBP was able to distinguish between those with no prior exposure to EBP and those who completed an introductory EBP unit.

Conclusions: While further investigation of the validity of these tools is needed, preliminary testing indicates that the SE-EBP and OE-EBP scales are valid and reliable instruments for measuring health professionals' confidence in the process and the outcomes of basing their practice on evidence.

Keywords: Evidence-Based Practice, Self-efficacy, Outcome Expectancy, Instrument Validation

BACKGROUND

Evidenced-based practice (EBP) has been heralded internationally by policy-makers and researchers as an ideal problem-solving approach to improve patient outcomes and provide cost-effective care. However, despite this support, universal adoption of EBP into the clinical setting has not yet occurred. Considerable research has focused on barriers to the implementation of EBP and have highlighted a number of obstacles including individual-related barriers such as lack of knowledge, skills and motivation (Sherriff et al. 2007) as well as other barriers related to organisational issues including lack of time and resources (Melnyk et al. 2008). A key barrier identified in the literature is that many clinicians feel that they are not equipped to implement EBP into the clinical setting (Nagy et al. 2001).

McSherry et al. (2006) suggest that clinicians' ability to carry out EBP will depend on 3 primary factors: 1) attitude, 2) understanding and confidence as well as 3) support. Although there are still some nurses who have reported not hearing the term "evidence-based practice" (Mott et al. 2005; Pravikoff et al. 2005; Varnell et al. 2008), recent studies investigating attitudes, beliefs and knowledge of EBP by health care professionals found that although many see the benefit they do not believe that they have the skills or knowledge required to incorporate it into clinical settings (Nagy et al. 2001; McSherry et al. 2006; Sherriff et al. 2007; Melnyk et al. 2008).

One of the cornerstones of EBP is clinicians' ability to access and utilise evidence in their clinical practice, with clinicians requiring skills to locate, evaluate, interpret and then apply current evidence (Morris & Maynard 2007). Baseline data from an Australian study found that out of a sample of 57 nurses only 28% were confident to assess research articles and 40% of respondents felt they had the skills to locate relevant research articles (Sherriff et al. 2007). Larger studies from the UK and USA have also revealed similar results in which many of the health care professionals reported little confidence in their skills and knowledge to locate and interpret evidence (McKenna et al. 2004; Pravikoff et al. 2005).

Much of the focus on preparing nurses for basing their practice on evidence has been on the provision of knowledge of the associated processes. However, education of EBP should not only improve knowledge and skills but also improve attitudes and beliefs surrounding EBP to ensure individuals incorporate EBP into their practice (Varnell et al. 2008). Self-confidence in one's ability to implement EBP as well as confidence that practising in an evidence-based way will improve outcomes has been highlighted in the literature as important beliefs to ensure success of educational interventions (Salbach et al. 2007). This need for confidence to be able to instigate evidence-based practice is supported by Bandura's construct of Self-Efficacy.

Theoretical Framework

Self-efficacy is the belief in one's ability to perform a task or behaviour (Bandura 2006) and is at the core of Bandura's Social Cognitive Theory with the emphasis being on ways that individuals attain the beliefs and behaviours they need for their own lives (Murphy & Kraft 1993). Proponents believe the importance of self-efficacy is that people who judge themselves as being capable to perform a particular task will attempt and successfully complete it, in contrast to those who do not have this belief (Murphy & Kraft 1993). That is, individuals who perform unsuccessfully are likely to do so, not necessarily because they are deficient in the skills and knowledge, but because they lack the sense of confidence to use their skills effectively (Lauder et al. 2008). Bandura further argues that self-efficacy is situation specific and can not be universally applied to all aspects of an individual's life (Bandura 2006). For example, a woman may feel great self-efficacy in her paid employment, however, as a new mother she may not (Bandura 2006). Thus, being proficient in nursing practice does not mean that a nurse will be confident to undertake processes related to implementation of EBP into the clinical setting.

The construct of self-efficacy has been used extensively by health care researchers as it has been shown to predict a wide variety of behaviours (Schofield et al. 2006). Interventions to increase self-efficacy have been used successfully to help individuals with chronic diseases such as diabetes (Atak et al. 2008; Kott 2008) and heart disease (Hwang et al. 2008; Mildestvedt et

al. 2008) to better self-manage their condition. Self-efficacy has been used to promote healthy behaviours such as exercise participation (Sharpe et al. 2008; Dechamps et al. 2009) and smoking cessation (Berg et al. 2008; Li & Froelicher 2008; Patten et al. 2008). The role of self-efficacy in nursing has also been explored although not comprehensively. Previous nursing research has shown some links between competence and self-efficacy as well as its positive impact on academic motivation, learning, skill development and career progress (Lauder et al. 2008). Furthermore, nurses with higher self-efficacy beliefs have been found to display greater professional behaviour (Manojlovic 2005).

Both the difficulties in changing behaviour to be more aligned with EBP and the success of interventions based on Social Cognitive Theory in other areas of health have led to an increasing number of studies exploring confidence or self-efficacy and how it relates to EBP (Bonetti et al. 2006; Salbach et al. 2007; Sherriff et al. 2007). However, in 2007 at the time of instrument development (Chang et al. 2007) there was no tool that specifically focused on the measurement of self-efficacy or outcome expectations in regard to all components of EBP. Tools were found that incorporated items measuring confidence in some steps within the EBP process, which were combined with other constructs such as nurses' knowledge, beliefs, attitudes and barriers in relation to EBP (Nagy et al. 2001; McKenna et al. 2004). However, if self-efficacy is going to be used as the basis for an intervention to change individuals' EBP behaviour there needs to be a tool that comprehensively measures how efficacious an individual feels about the different processes as well as the outcomes of EBP.

In addition to self-efficacy, outcome expectancy is a construct from Bandura's Social Cognitive theory that has also been found important in changing behaviour of healthcare professionals (Cabana et al. 1999; Haagen et al. 2005; Michie et al. 2005; Bonetti et al. 2006). Outcome expectancy relates to an individual's belief that their behaviour will determine a specific outcome. In other words, in order to change or perform a particular behaviour an individual must believe that their actions will influence the outcome (Jordan & Farley

2008). For example a nurse must believe that their behaviour in regard to adherence to a clinical evidence-based guideline will actually improve patient outcomes before they will enact this behaviour. According to Bandura's theory, self-efficacy and outcome expectancy are related but independent constructs (Pajares 2002). The relationship between the two constructs may differ in direction and strength depending on the individual and the situation, however, in general those with high self-efficacy beliefs will have also have similarly high outcome expectancy beliefs (Pajares 2002). Further testing of this relationship necessitates the development of tools to measure both self-efficacy and outcome expectancy constructs.

Therefore in the current study two instruments were developed to measure EBP self-efficacy and EBP outcome expectancy.

METHODS

Instrument development

The development of the two instruments to measure self-efficacy and outcome expectancy was based on the need to develop a generic approach to training clinically based nurses/midwives in EBP. This focus is particularly relevant when staff initially need to learn about the general terms and processes used in EBP. In the reality of a busy clinical service, it is impractical and costly to develop courses regarding EBP for each of the different specialities, such as antenatal care, medical or surgical nursing. More general courses can be a valuable starting point for preparing staff to adopt EBP in their practice. The scales described below were pilot tested by 8 clinical nurses/midwives, resulting in minor changes to improve the readability and understanding of the scales.

Self-Efficacy in Evidence-Based Practice (SE-EBP) scale. This tool was developed to measure the level of confidence held by nurses in regard to evidence-based practice. Items for the Self-efficacy in Evidence-Based Practice (SE-EBP) Scale were developed based on the 5 steps of EBP (Sackett et al. 2000; Bradley & Herrin 2004; Green 2006). The number of

items for each of the five steps in the SE-EBP tool were: 1) identifying the clinical problem (5 items), 2) finding the evidence (8 items), 3) appraising the evidence (7 items), 4) applying the evidence (4 items), and 5) evaluating own practice (2 items), making a final total of 26 items (see Table 1). Completion of the SE-EBP was on an 11 point response scale with 0 = no confidence at all and 10 = extremely confident (Bandura 2006) with total possible scores ranging from 0 to 260.

Outcome Expectancy for Evidence-Based Practice (OE-EBP) scale. As with the SE-EBP, the development of the OE-EBP was based on the five steps of EBP (Sackett et al. 2000; Bradley & Herrin 2004; Green 2006). The items in this newly developed tool examined how confident respondents were that accomplishing each of the steps of EBP would lead to improved quality of patient care (see Table 1). The number of items in each of the five steps are: 1) identifying the clinical problem (2 items), 2) finding the evidence (1 item), 3) appraising the evidence (1 item), 4) applying the evidence (2 items), and 5) evaluating own practice (2 items), making a final total of 8 items. Completion of the OE-EBP was also on an 11 point scale with 0 = no confidence at all and 10 = extremely confident, with total possible scores ranging from 0 to 80.

Additional data collection tools

At the time of the study no instrument was found that objectively assessed generic knowledge of EBP in relation to all five steps in accessing and utilising evidence in the clinical setting (Sackett et al. 2000). Therefore, data on nurses' level of EBP knowledge was not collected by a validated instrument but an existing quiz used in the study hospital to assess EBP knowledge after attendance at a workshop. The content of this 6-item quiz focuses on generic knowledge about EBP as distinguished from the application of EBP knowledge in clinical speciality scenarios (Shaneyfelt et al. 2006). Furthermore, the focus of the quiz was to test knowledge objectively rather than self-reports of the extent of respondents' knowledge about various aspects of EBP (Upton 1999; Upton & Upton 2006). Previous literature (Gibbs & Gambrill 2002; Shaneyfelt et al. 2006) and existing questionnaires (Gennaro et al. 2001; Benefield 2003) were utilised to develop the quiz. The

six questions addressed the general concept of EBP: identifying a clinical problem, finding evidence, appraising the evidence, applying the evidence and evaluating the effects of using evidence. An example of one of the questions in the quiz is: "Which of these sources of information provides a comprehensive database of systematic reviews?" A multi-choice format was used for responses, with correct answers scored as 1 and incorrect as 0. Possible scores ranged from 0 to 6.

Demographic data. Information was collected on the respondents' age group; sex; length of time in practice and in current position; as well as previous courses in: evidence-based practice, computers, literature searching, and research design and analysis.

Table 1: Sample items for the SE-EBP and OE-EBP instruments

	Sample item 1	Sample item 2
SE-EBP	Identify a clinical problem needing evidence to guide nursing care?	Conduct a literature search bibliographic databases eg Medline and CINAHL?
OE-EBP	Identifying and having a clear definition of the clinical problem requiring evidence will make it easier for me to search for evidence	Understanding of the levels of evidence will improve my use of evidence in nursing/midwifery care

Data Collection Procedure

Questionnaires were mailed to 600 randomly selected nurses/midwives employed in a metropolitan hospital in Queensland, Australia in July 2007. Additionally nurses/midwives were also invited to participate after attending an existing one-day EBP workshop at the study hospital. Participants received an information letter explaining the study and assuring them of the anonymity of their involvement. Return of completed questionnaires was taken as consent to participate in the study. Permission to conduct this study was obtained from the hospital and as this study was deemed to be research with negligible risk it was exempt from further review (National Health and Medical Research Council et al. 2007).

Statistical Procedures

Descriptive statistics were used to summarise nurses' characteristics. Means and standard deviations (SD) were used to summarise continuous data. Categorical data were summarised using frequencies and percentages. Construct validity was examined using Exploratory Factor Analysis (EFA) rather than Confirmatory Factor Analysis, as although the five steps of EBP have been widely discussed in the literature these EBP steps have never been tested to ensure that there are indeed five distinct factors. Although Principal Components Analysis (PCA) has been used to undertake EFA, Principal Axis Factoring (PAF) was chosen as the aim of this study was to identify the number of latent constructs and the underlying factor structure rather than data reduction (Costello & Osborne 2005). Prior to conducting PAF, the favourability of conducting the analysis was checked using the Kaiser-Meyer-Oklin (KMO) value and Bartlett's Test of Sphericity. An oblique rotation was used as the variables were found to be correlated (Tabachnick & Fidell 2007). Both the eigenvalues and the scree plot were examined to determine which factors were to be retained. Total and factor scores, where applicable, for each instrument were summarised using means and standard deviations (SD) The known groups method for determining construct validity (Portney & Watkins 2000) was applied using unpaired t-test, with Bonferonni correction for multiple comparisons, for examining differences between the groups regarding whether they received EBP education or not. Pearson's correlation coefficient was used to further examine construct validity by determining the convergence between the similar constructs of SE-EBP and OE-EBP and discrimination between different constructs namely the EBP knowledge quiz compared to SE-EBP and OE-EBP (Portney & Watkins 2000) scales. The reliability of the instruments was tested by Cronbach's alpha coefficient. SPSS Version 16 was used for all statistical analysis.

RESULTS

Sample Characteristics

A total of 174 registered nurses/midwives returned completed questionnaires with 134 (77%) from the random sample and 40 (23%) who had attended the EBP workshop. The majority (96%) were female, working as a first level RN or RM and aged between 20 and 49 years. Only 33% (n=57) had previously attended any type of course on EBP, while over 60% had undertaken training in the use of computers and in literature searching (see Table 2).

Table 2. Sample characteristics (174 participants)

	N	%
Sex:**		
Female	166	95.4
Male	6	3.5
Age group:		
20-29 years	44	25.3
30-39 years	39	22.4
40-49 years	59	33.9
50-59 years	29	16.7
60-69 years	3	1.7
Current position:		
Registered Nurse/Registered Midwife	130	77.8
Clinical Nurse	20	11.6
Clinical Nurse Consultant	4	2.4
Nurse Educator	6	3.6
Nurse Unit Manager	7	4.1
Other	6	3.5
Previous education (> 1 course could be included):		
Use of computers*	121	69.5
EBP course***	57	33.3
Literature searching*	106	60.9
Research design/analysis*****	84	48.3

Missing data: * 1 case; ** 2 cases; *** 3 cases; ***** 5 cases;

Content Validity

Content validity of the newly developed SE-EBP and OE-EBP scales was established through asking an expert panel of three nurse researchers trained and experienced in teaching and participating in EBP activities, as well as a researcher experienced in self-efficacy and outcome expectancy tool development, to review the scales. Suggestions from the expert panel on the

comprehensiveness and content of the tools were incorporated into the final version. The use of the widely endorsed five steps of EBP (Sackett et al. 2000; Bradley & Herrin 2004; Green 2006) also ensured content validity of each item in the SE-EBP and OE-EBP scales.

Construct validity

Factor analysis

The data were appropriate for factor analysis with a KMO value of 0.94, well above the accepted cut-off of 0.6 (Kaiser 1970; Kaiser 1974) with Bartlett's Test of Sphericity (Bartlett 1954) reaching statistical significance. While the SE-EBP scale had been developed based on the widely accepted five distinct steps in EBP, exploratory factor analysis using Principal Axis Factoring (PAF) on the 165 cases with complete data did not support these five steps, finding three factors with eigenvalues exceeding 1. The scree plot of eigenvalues showed a break between the 2nd and 3rd factor suggesting a two-factor solution. However, comparison of the item distribution in the two-factor and 3-factor solutions pointed to three factors better explaining the factor structure (Costello & Osborne 2005; Henson & Roberts 2006). The total variance explained by the three factors was 73.01% with each factor explaining 58.7%, 8.5%, and 5.8% of the variance, respectively.

To aid in the interpretation of the analysis a Promax rotation was performed in which a cut-off of 0.4 or greater was used. This rotated solution showed a number of strong loadings with all items loading into one of the three factors. Factors were labelled in accord with the nature of the items. The first factor labelled "identifying the clinical problem" contained the same 5 items as in step one of Sackett's EBM steps. The second factor labelled "searching for evidence" contained 9 items including 8 items from step 2 of the SE-EBP based on Sackett's EBM steps, with the addition of one item from step 3. The third factor, entitled "implementing evidence into practice", comprised 12 of the 13 items that had been developed to reflect three of Sackett's EBM steps: appraising the evidence; applying the evidence and evaluating the evidence. Thus, one item from step 3 of the SE-EBP scale referring to systematic

reviews was found to be more aligned to searching for evidence rather than to implementing evidence (see Table 3).

Table 3. Factor analysis of Self-Efficacy in Evidence-Based Practice scale

		Factor Score
	Identifying the clinical problem	
1	Problem identification	.850
2	Question generation	.834
3	Gaps in knowledge	.866
4	Clinical problem	.819
5	Determine what I know	.785
	Searching for evidence	
6	Computer searches	.749
7	Key terms	.707
8	Information located	.901
9	Bibliographic literature search	1.096
10	Literature search using other sources	.913
11	Locate guidelines	.791
12	Seek assistance	.570
13	Retrieve and organise search information	.755
14	Systematic reviews	.559
	Implementing evidence into practice	
15	Appraise evidence	.583
16	Assess applicability	.443
17	Assess impact	.493
18	Determine levels	.786
19	Distinguish between research opinion	.923
20	Recognise gaps	.888
21	Incorporate evidence	.690
22	Incorporate evidence into policies	.914
23	Develop guidelines	.841
24	Sharing with colleagues	.406
25	Evaluate impact of practice	.568
26	Evaluate efficacy and efficiency	.670

Exploratory factor analysis was also conducted on the OE-EBP instrument using Principal Axis Factoring (PAF). Although the eight items comprising the OE-EBP were based on the five steps in EBP, oblimin rotation of 171 cases with complete data found only one factor with an eigenvalue of 6.5 which explained 81.7% of the variance.

Known groups method

Significantly higher scores were found in overall SE-EBP, SE-EBP factors of "searching for evidence", and "implementing evidence into practice" and for EBP knowledge quiz for nurses reporting prior exposure to EBP compared to those who had reported receiving no EBP training. There was no significant difference according to previous EBP course for EBP outcome expectancies or for the SE-EBP factor of "identifying the clinical problem" (see Table 4).

Table 4. Differences in Total Self-Efficacy in Evidence-Based Practice scale and subscale scores according to previous Evidence-Based Practice course

	Introductory course on EBP (N = 57)		No Introductory course on EBP (N = 105)		
	M	SD	M	SD	t test (sig.)
Total Self-Efficacy in EBP (26 items)	159.82	44.71	135.86	44.80	3.23**
Identifying the clinical problem	6.52	1.91	6.32	1.77	.93NS
Searching for evidence	5.64	1.60	4.55	1.82	3.35***
Implementing evidence into practice	5.90	1.95	5.04	1.90	3.13**
Total Outcome Expectancy for EBP	56.37	17.18	53.04	16.56	1.21NS
Total EBP Knowledge	4.08	1.06	3.25	1.31	4.25***

** p < .01; *** p < .001. NS = not significant.

Convergent validity

Significant and high correlations were found between the similar constructs of EBP self-efficacy as well as EBP outcome expectancy (convergence). However, the correlations between these two tools and EBP knowledge were low suggesting knowledge is a different construct to that of EBP self-efficacy and EBP outcome expectancy (divergence) (see Table 5).

Table 5. Correlations among Evidence-Based Self-Efficacy scale and subscale scores, Evidence-Based Outcome Expectancy and Evidence-Based Knowledge scores

	EBPSE	EBPSE F1	EBPSE F2	EBPSE F3	EBPOE
Evidence-Based Self-Efficacy	--				
EBPSE Factor 1	.75**	--			
EBPSE Factor 2	.92**	.54 **	--		
EBPSE Factor 3	.95**	.65**	.78**	--	
Evidence-Based Outcome Expectancy	.72**	.59 **	.56**	.65**	--
Evidence-based Knowledge	.18*	-.07^{NS}	.25**	.18*	.19*

** p < .01; *** p < .001. NS = not significant.

Reliability of tools

The results of both the SE-EBP (α= .97) and the OE-EBP (α= .97) demonstrated both scales have very high internal consistency. Furthermore, the SE-EBP subscales of Identifying problem (α=.91); Searching for the evidence (α= .96); and Implementing the evidence (α=.0.96) also demonstrated high reliability.

Mean Levels of Evidence Based Practice Self-efficacy, Outcome Expectations and Knowledge

Self-Efficacy in Evidence-Based Practice

The mean total SE-EBP score was 151.68 (SD=47.54) out of a possible 260, indicating a moderate level of self-efficacy in this sample of registered nurses working in a tertiary hospital. The total scores ranged from the highest score of 249 to the lowest score of 27. Nine cases had missing data for the total SE-EBP.

The means for the 3 factors of the SE-EBP tool are presented as means of factor scores due to the different number of items per subscale. Given the possible mean total scores for all subscales range from 0 to 10, the subscale with the highest mean score of 6.45 (SD=1.83) was “identifying the clinical problem” indicating a moderate level of self-efficacy. The subscales of “searching for

evidence" and "implementing evidence into practice" had lower mean levels of self-efficacy (see Table 6).

Outcome Expectancy for Evidence-Based Practice

The mean level for outcome expectancy of evidence based practice was 54.40 (SD=16.80) out of a possible score of 80, indicating a moderate level of outcome expectations held by the nurses participating in the study. The total scores ranged from 0 to 80 (see Table 6) and there were 4 cases of missing data.

Evidence-Based Practice Knowledge

The mean level of 3.52 out of a possible score of 6, with scores ranging from 1 to 6, indicated a moderate level of knowledge held by nurses in this study (see Table 6), with missing data for 17 cases.

Table 6. Mean Levels of Self-Efficacy and Outcome Expectancy in Evidence-Based Practice

	N	Mean	SD
Self-Efficacy in Evidence-Based Practice	165	151.68	47.54
Identifying the clinical problem	172	6.45	1.82
Searching for evidence	171	5.98	2.19
Implementing evidence into practice	170	5.50	1.93
Outcome Expectancy for Evidence Based Practice	170	54.40	16.80
Evidence Based Practice Knowledge	157	3.52	1.29

Discussion

The preliminary findings of this study indicate that the newly developed SE-EBP and OE-EBP scales were valid and reliable instruments for measuring evidence-based self-efficacy and outcome expectancy. However further studies are needed to confirm the validity of these tools in measuring EBP self-efficacy and outcome expectancy in nurses/midwives and also to test the use of these instruments in other populations.

Exploratory factor analysis (EFA) revealed three factors despite the items for the SE-EBP scale being based on the five steps of EBM. Items developed for the first two steps of Sackett's five steps formed the first two factors as expected, however, items that were developed to reflect "appraising the evidence"; "applying the evidence"; and "evaluating the evidence" actually reflected only one construct in this study. The three steps being represented by one factor may be the result of clinicians in this study not seeing these as distinct processes. Clinicians may not focus on "appraising the evidence" and "evaluating the evidence" if they lack skills in these processes or if they do not recognise the importance of doing so. Furthermore, due to an organisational push for evidence-based policies or guidelines, clinicians may also have had greater focus on getting any evidence for practice rather than ensuring the quality of evidence and evaluating how implementation of this evidence might change practice and outcomes. Lastly, the number of items developed for the fifth EBP step of evaluation was only two in the SE-EBP, which is less than recommended minimum number of three items for each subscale (Costello & Osborne 2005). In the beta version of the SE-EBP additional items have been added to the EBP step of evaluation. Further studies using confirmatory factor analysis would need to be undertaken to confirm the three factors found in this study.

The construct validity of the SE-EBP was further demonstrated by the scale's ability to distinguish between those who had no prior exposure to EBP and those who completed an introductory EBP unit. However, the lack of difference between those having received or not received prior EBP training for the first factor of "identifying the clinical problem" indicates that the items for this factor were unable to distinguish between these two groups. An alternative explanation may be that the EBP training had not equipped them to identify a clinical problem which according to Sackett et al. (2000) and Fineout-Overholt & Johnston (2005) is the most difficult activity in the process of EBP.

There was partial support for the EBP Outcome Expectancy scale's construct validity. Factor analysis of the OE-EBP confirmed that there was only one

construct measured by the scale. However, there were no significant differences according to whether participants had prior EBP training or not. This lack of difference between the two groups for EBP outcome expectancy may be due to a general underlying belief in the benefits of EBP by the nursing profession even when they do not have confidence in using evidence in their clinical practice. Clinicians' recognition of the benefits of EBP despite lack of understanding or knowledge have been reported previously (Melnyk et al. 2004; Sherriff et al. 2007). Alternatively, it may be that the sample size was insufficient to detect a difference between groups in outcome expectancy, which could be remedied by using a larger sample size in future studies.

The knowledge quiz utilised in this study was able to identify those who had previously attended an EBP course and those who had not; however, a strong association between knowledge and the constructs of self-efficacy and outcome expectancy was not demonstrated. As the knowledge quiz was not a validated instrument the lack of association between knowledge and the two newly developed instruments may simply be a result of the tool not comprehensively measuring EBP knowledge. However, the low correlations may also be explained by the greater objectivity of the knowledge quiz in contrast to the more subjective nature of the self-efficacy and outcome expectancy measures. Furthermore, low correlations between knowledge and the two instruments may also be explained by the absence of a linear relationship between knowledge and self-efficacy or between knowledge and outcome expectancy. According to Bandura (1993) the ability to answer knowledge questions as in an EBP quiz, is not only dependent on knowing the correct answers but also on having the self-efficacy beliefs that they can complete the quiz. Individuals with the same degree of knowledge may perform poorly, adequately or well depending of their self-efficacy and outcome expectancy beliefs (Bandura, 1993). Therefore the low associations between knowledge and the other two constructs in this study may have been the result of individuals performing variably based on their own beliefs.

Furthermore, convergent validity was demonstrated by the high correlations between the similar constructs of SE-EBP, SE-EBP factors, and OE-EBP.

However, the low correlation between the knowledge quiz and the SE-EBP, SE-EBP factors, and OE-EBP scales is more indicative of discriminant validity demonstrating that knowledge is a different construct to self-efficacy and outcome expectancy.

The internal consistency of items within each of the instruments and sub-scales were predominately very high with Cronbach's alpha values over .95 for all but one subscale. This finding suggests that although the instruments measure each of the domains in a reproducible manner there is some degree of item redundancy. Therefore, item deletion will need to be considered in future testing of the instruments.

Since the development of these tools, several other instruments have been developed and published to measure, comprehensively or in part, individuals' EBP confidence or self-efficacy beliefs. However, most of these instruments refer to discipline specific EBP in medicine and physical therapy (Salbach et al. 2007; Kok et al. 2008) or measure broad beliefs in regard to EBP (Melnyk et al. 2008). Only one tool (Tucker et al. 2009) was found to have explored EBP self-efficacy and nurses but this tool was published after the completion of the testing of our SE-EBP. However, it may be of benefit in future testing and validation of the SE-EBP scale.

The development of tools to measure self-efficacy and outcome expectancy in relation to EBP are required to enable measurement of these constructs for use in research and evaluation of education interventions that target individual self-efficacy. Provision of knowledge itself is not enough to understand how best to prepare nurses to actively participate in EBP. In accord with Bandura's theory of self-efficacy greater focus would be needed for promoting staff self-efficacy in their evidence-based practice skills as well as confidence that such practice will result in improved care and patient outcomes.

There were several limitations of this study. Firstly, the knowledge quiz has not undergone rigorous development or psychometric testing. Accordingly, comparisons between the newly developed scales and the knowledge test

need to be interpreted with caution. Secondly, this study was unable to test the stability of the instruments over time as a repeated survey was not conducted. Thirdly, lack of available instruments at the time of testing for use as an external criterion to establish criterion-related validity also hindered the psychometric testing of the tools. Furthermore, the sample may not have been representative due to the self-selection of the randomly selected participants with the potential for those with greater interest in EBP mailing back the surveys. Additionally, a high percentage of the study sample contained first level nurses/midwives, which limits the generalisability to other levels of nurses/midwives.

Implications for Education and Research

The main educational implication relates to the availability of specific tools for educators to test the effectiveness of education programs aiming to promote health professionals' confidence to adopt EBP and their expectation that doing so will be beneficial in improving care and patient outcomes. These expand the scope for evaluation of programs preparing health professionals to base their practice on evidence beyond a prior focus on knowledge and beliefs. Recognition of the importance of self-efficacy and outcome expectations necessitates the development of programs promoting EBP based on the information sources proposed by Bandura (1997; 2004) to increase participants' self-efficacy and expectations that positive benefits will accrue from evidence-based practice.

The implications for research are twofold, relating to further psychometric testing as well as use of the tools in studies testing the effectiveness of EBP education programs. Further testing of the beta version of the SE-EBP and the OE-EBP is currently underway to confirm the validity and reliability in different groups of nurses and in other health professionals. Further research using other measures of evidence-based practice self-efficacy and outcome expectation may enable testing of criterion validity of the new tools reported in this paper. While construct validity of the SE-EBP and OE-EBP has mainly been supported in the current study, further testing of the concurrent and

predictive validity of these tools is needed. The focus of these tools' ability to predict relates to Bandura's self-efficacy construct which posits that improvements in self-efficacy and outcome expectations will increase the likelihood of the adoption of the behaviour in question, which in this case is evidence-based practice.

Conclusion

Validity and reliability of the initial versions of the SE-EBP and OE-EBP tools for measuring nurses' self-efficacy in carrying out evidence based practice and outcome expectations of basing their practice on evidence has been established. The SE-EBP and OE-EBP scales extend the array of tools available for testing the effectiveness of EBP programs for promoting confidence in evidence based practice and the expectation that such practice is beneficial.

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