

Profil des sources de connaissance préférées par le personnel infirmier canadien dans le domaine de la pratique clinique

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Des chercheurs et des chercheuses ont examiné les sources de connaissance utilisées par le personnel infirmier dans le contexte de l'utilisation de la recherche, mais les conclusions de l'étude sont ambiguës. Parmi les problèmes les plus communs, on retrouve le manque de reproduction, la présence de résultats contradictoires, la généralisabilité limitée des résultats et l'absence d'implications claires relativement à la pratique. Les objectifs de cette étude ont été : (a) de décrire les sources de connaissance et la fréquence de leur utilisation par le personnel infirmier de sept unités de chirurgie; (b) de comparer les tendances dans l'utilisation des sources par les sept unités; (c) de déterminer si la préférence pour certaines sources de connaissance a un lien avec le taux d'utilisation de la recherche; et (d) d'établir le profil historique des tendances quant à l'utilisation des sources par les infirmières et les infirmiers généraux. L'étude comprend un sondage autoadministré auquel ont participé 230 infirmières et infirmiers œuvrant dans cinq unités chirurgicales pour adultes et deux unités pour enfants dans quatre hôpitaux situés dans les provinces canadiennes de l'Alberta et de l'Ontario. En comparant les résultats de ce sondage à ceux des études antérieures, les auteurs ont constaté, dans les sept unités, une similarité en ce qui a trait aux préférences du personnel infirmier pour certaines sources de connaissance, sans égard à leur éducation, ni au taux d'utilisation de la recherche. Dans toutes les unités, les infirmières et les infirmiers préfèrent utiliser des connaissances acquises à travers des expériences personnelles et des interactions avec des collègues de travail et des patients, plutôt que d'avoir recours à des articles de revues ou à des manuels. Cette conclusion est compatible avec la comparaison longitudinale des deux études antérieures. À la différence du personnel infirmier clinicien, les chercheurs et les chercheuses ont tendance à attacher plus de valeur aux connaissances fondées sur la recherche que sur celles fondées sur l'expérience. Pour encourager l'utilisation de la recherche dans la pratique infirmière, les chercheurs, les chercheuses et autres interlocuteurs concernés doivent d'abord comprendre les raisons pour lesquelles les cliniciens et les cliniciennes préfèrent les connaissances acquises à travers l'expérience et l'interaction sociale. Ils doivent ensuite concevoir des stratégies de diffusion et de mise en œuvre de la recherche qui reflètent davantage les préférences des cliniciens et des cliniciennes.

Mots-clés : sources de connaissance, utilisation de la recherche, utilisation des connaissances, personnel infirmier clinicien

Profiling Canadian Nurses' Preferred Knowledge Sources for Clinical Practice

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Several researchers have examined nurses' knowledge sources within the context of research utilization, but conclusions are equivocal. Common problems include a lack of replication, conflicting results, poor generalizability of results, and unclear implications for practice. The objectives of this study were to: (a) describe sources of knowledge and their frequency of use among staff nurses across 7 surgical units, (b) compare knowledge-source patterns across the units, (c) determine whether knowledge-source preferences correlate to research utilization scores, and (d) profile staff nurses' knowledge-source patterns over time. A total of 230 nurses in 5 adult and 2 pediatric surgical units from 4 hospitals in the Canadian provinces of Alberta and Ontario completed a self-administered survey. The results were compared to the findings of previous studies. Nurses' knowledge-source preferences were consistent across the 7 units despite differences in education and in research utilization scores. Across all units, nurses preferred to use knowledge gained through personal experience and interactions with co-workers and with individual patients rather than journal articles or textbooks. These findings are consistent with the longitudinal comparison in the 2 earlier studies. In contrast to the knowledge privileged by nurse clinicians, researchers tend to place greater value on research-based knowledge than on experience-based knowledge. To increase research utilization in the practice setting, researchers and others need first to understand the reasons behind clinicians' valuing of experiential and social knowledge sources and then to consider research dissemination and implementation strategies that are more closely aligned with clinician preferences.

Keywords: sources of knowledge, research utilization, knowledge utilization, clinical practice nurses

Nurses work in complex environments where they inevitably draw on many different types of knowledge in their practice. Understanding the types and variety of knowledge resources used by nurses is critical to our understanding of research utilization and decision-making processes in clinical settings. In the absence of a clear understanding of the sources of knowledge selected by practising nurses, solutions targeting the seemingly persistent research-practice gap will be ineffective. In this context, researchers have conducted empirical studies of nurses' knowledge

sources over the past two decades, but findings are equivocal, hindering the development of strategies for the dissemination and implementation of research.

Discussions of the research-practice gap in nursing (e.g., Allmark, 1995; Bostrom & Wise, 1994; Landers, 2000; Rafferty, Allcock, & Lathlean, 1996; Rolfe, 1998; Upton, 1999) often assume that a problem exists on one or both sides of the "gap," frequently associated with clinicians. In addition, a disconnect is emerging between researchers' understanding of practice knowledge and their subsequent approaches to measuring research use and nurses' actual sources of practice knowledge. Investigators in the academic setting generally continue to promote more traditional dissemination strategies, such as journals and textbooks, despite evidence of their limited effectiveness (Grimshaw et al., 2001; Grol & Grimshaw, 1999, 2003; McCaughan, Thompson, Cullum, Sheldon, & Thompson, 2002; Michel & Sneed, 1995; Valente, 2003). Related work in the decision-making field (Baumann & Bourbonnais, 1982; Hamers, Abu-Saad, & Halfens, 1994; Laurir & Salantera, 1998; Thompson & Sutton, 1985) suggests that nursing practice is highly contextual and that interpersonal knowledge and experiential knowledge are critical. This work suggests that traditional interventions to increase research use in nursing practice, such as the promotion of critical appraisal skills, and concomitant library use, may be inadequate. Further, a number of studies report low frequencies of reading among staff nurses (Armstrong & Gessner, 1992; Barnett, 1981; Fisher & Strank, 1971; Kajermo, Nordström, Krusebrant, & Lützén, 2001), which suggests that current strategies to increase research use may need reconsideration. We argue that, in order to increase research use in the practice setting, we need to step back and more carefully consider the knowledge required for practice and the information sources currently used by nurses.

The need for basic work in this area is, in part, the result of difficulties in drawing consistent conclusions about nurses' preferred knowledge sources from studies completed to date. Few "sources of practice knowledge" studies build on previous work and most are one-time "snapshots" of nursing subgroups (Estabrooks, 2001; Estabrooks, Floyd, Scott-Findlay, O'Leary, & Gushta, 2003; Estabrooks, Scott-Findlay, & Winther, 2004). The lack of replication in the field and inconsistent examination of knowledge-source items across studies result in equivocal findings and lack of generalizability. Without the ability to generalize findings, the applicability of research conclusions is called into question and implications for practice are unclear. Hence, additional basic work in the field is needed before we can understand how and where nurses acquire essential practice knowledge.

The purpose of this paper is to report new empirical findings on staff nurses' sources of knowledge, with links to their research utilization behaviour. In light of the generalizability issues presented above, a *secondary purpose* is to build a longitudinal profile of how nurses use a set of defined knowledge sources over time. Our analyses draw on: (a) data from two research utilization studies (2002¹) reported in this paper, (b) findings from Baessler et al.'s (1994) study on knowledge sources, and (c) findings from Estabrooks' 1996 study on research utilization (Estabrooks, 1998), which included Baessler et al.'s questions on sources of knowledge. All studies targeted staff nurses and examined a comparable group of knowledge-source items.

The objectives of the paper are to: (a) describe the knowledge sources and their frequency of use among staff nurses across seven surgical units, (b) compare knowledge-source patterns across units, (c) determine whether patterns of knowledge preferences (and use) correlate to research utilization scores, and (d) profile knowledge-source patterns over time.

Methods

Sample

Data from the 2002 research utilization studies were collected using a survey administered during two ethnographic multiple case studies examining the use of research by Canadian nurses in the context of adult and pediatric pain management. Each participating hospital and its academic Ethics Review Committee approved the study protocol. The self-administered survey was completed on two adult and five pediatric surgical units located in four teaching hospitals in the Canadian provinces of Alberta and Ontario. Nurses from the seven units were similar demographically except for their educational credentials; Ontario nurses reported a higher percentage of university degrees (see Table 1).

In the 2002 studies, research associates distributed packages containing survey instruments, including the research utilization survey, to all

¹ The 2002 research utilization studies comprise two studies examining research utilization in the context of pain management. Data for the first study concerned adult pain management and were collected over the 6-month period April to September 2000. Data for the second study concerned pediatric pain management and were collected over the 6-month period April to September 2001. Estabrooks, C. A. (PI), Lander, J., Norris, J., Boschma, G., Lau, F., Watt-Watson, J., O'Brien-Pallas, L., Stevens, B., Donner, G., & Williams, J. I. (1999–2002), *The determinants of research utilization: Pain management in adults*, funded by Canadian Institute of Health Research, Grant #144765, and Alberta Heritage Foundation for Medical Research Grant #199800311; Estabrooks, C. A. (PI), Landry, J., Norris, J., Boschma, G., Watt-Watson, J., O'Brien-Pallas, L., Stevens, B., & Donner, G. (2000–2003), *The determinants of research utilization: Pain management in infants and children*, funded by Canadian Institute of Health Research, Grant #44649.

Table 1 Demographic Characteristics of the Samples Across Studies

Characteristics	2002 Studies (n = 228) ^a							Baessler et al. (1994) (n = 212)	Estabrooks (1998) (n = 600)
	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7		
Mean Age (SD)	39.1 (10.6)	35.5 (8.8)	49.8 (7.7)	46.8 (6.2)	38.1 (9.6)	37.7 (8.3)	35.1 (7.8)	32.6 (8.3)	41.7 (9.9)
Sex (%)									
Female	91.9	88.9	10.0	93.8	89.5	98.7	95.5	90.1	97.5
Male	8.1	11.1	.0	6.3	10.5	1.3	4.5	6.6	2.5
No response	.0	.0	.0	.0	.0	.0	.0	3.3	.0
Highest Education (%)									
LPN	13.5	.0	15.4	12.5	5.3	.0	.0		
RN diploma	54.1	42.2	76.9	81.3	47.4	38.2	40.9	22.2	70.8
AD/AA								30.7	
BS/BA								7.5	
BSN/baccalaureate	27.0	51.1	7.7	6.3	47.4	51.3	5.0	31.6	25.2
MS/MSN ^b	.0	2.2	.0	.0	.0	9.2	9.1	3.3	.5
Other	.0	.0	.0	.0	.0	1.3	.0		2.7
No response	5.4	4.4	.0	.0	.0	.0	.0	4.7	.8
Mean hours worked per week (SD)	34.9 (9.6)	37.2 (10.8)	32.6 (8.8)	34.5 (6.5)	33.6 (10.6)	34.6 (8.5)	36.8 (5.9)		28.14 11.86

Note: Units 1 and 2 are adult surgical units and the rest are pediatric surgical units. Units 1, 3, 4, and 5 are Alberta sites and the rest are Ontario sites. LPN = licensed practical nurse; RN = registered nurse; AD/AA = associate degree/associate of arts; BS/BA = bachelor of science/bachelor of arts; BSN = bachelor of science in nursing; MS/MSN = master of science/master of science in nursing.
^a Only 228 of the 230 nurses who completed the survey are profiled demographically because these data were collected separately.
^b Only Baessler et al. (1994) included non-nursing education.

staff nurses on the units. Detailed instructions for completing the various surveys were included in the packages and nurses were asked to return the completed survey in a sealed envelope to a secure location on the unit. Research associates collected completed surveys from the designated location daily. The survey was administered twice during the 6-month data-collection period on each unit, once at the beginning and once close to the end. Interviews and focus groups with the nurses over the 6-month period, along with availability of project newsletters and other dissemination tools, were likely to have heightened awareness of research utilization. Therefore, the survey was administered twice, to investigate the study's impact on nurses' perception of their day-to-day research use. In the 2002 studies, 314 usable surveys were returned. Since 84 respondents were surveyed in both data-collection periods, the 314 returned surveys from the studies yielded a combined sample of 230 staff nurses.

In contrast, Estabrooks' 1996 survey (Estabrooks, 1998) was mailed out to a stratified random sample of 1,500 nurses selected from a total of 15,698 staff nurses registered with the Alberta Association of Registered Nurses in 1996. This survey yielded a sample of 600 using Dillman's (1978) methods.

Baessler et al. (1994) mailed questionnaires to 572 registered nurses in a large city in the northeastern United States working in medical-surgical clinical areas (excluding specialty areas such as emergency and critical care). Of the 572 nurses who received the questionnaire, 212 completed it.

Measures

The survey used in the 2002 studies was a condensed version of that used in Estabrooks' 1996 study (Estabrooks, 1998). However, data presented in this paper came from knowledge-source questions in the survey that were identical in the original and the condensed version of Estabrooks' survey. Questions on the frequency with which nurses used various sources of knowledge were scored on a five-point Likert scale, ranging from *never* to *always*. Responses to the overall research utilization question examined in our correlation analysis were also scored on a five-point Likert scale.

In the analysis, the knowledge-source data from the 2002 studies were compared to those from Baessler et al. (1994) and Estabrooks (1998). Twelve of the 16 knowledge-source questions in Estabrooks' 1996 and 2002 surveys were identical to those used by Baessler et al. The four items added are items j, n, o, and p listed in Tables 2 and 4. A detailed description of this survey's development is provided elsewhere (Estabrooks, 1998, 1999). Demographic characteristics of the various samples are reported in Table 1.

Analysis

SPSS 11.0 for Windows was used to perform all data transformation and analyses. Because the survey was administered twice in the 2002 studies, a paired-samples *t* test was used to determine whether sequence of data collection influenced nurses' responses to knowledge-source questions. The 84 nurses who completed the survey twice did not significantly differ in their responses over time at the specified .05 significance level, except on the in-service item. Based on these results, data from these nurses' first survey were included in the analyses. Although data from their second survey were equally representative, their first survey was chosen to parallel participants who were surveyed only once in this study and to parallel participants in the Baessler et al. (1994) and Estabrooks (1998) studies.

Descriptive statistics provided an overview of knowledge-source patterns and research utilization scores across the seven units in the 2002 studies. Nurses' knowledge-source preferences were *inferred* from their frequency of use of each item. In ongoing work, we have made the inference that reported frequencies equate reasonably well with preferences. Rank ordering of the sources in these studies, rank ordering of sources in other studies in the literature, and findings in our qualitative work reveal a consistent pattern of ranking and stated preference among those sources reported as used most often by nurses (Estabrooks, 2002²). We caution, however, that some assumptions must hold for this inference to be valid in isolation from other substantiation (e.g., that all or most sources of knowledge stated are available to nurses).

Items were ranked in ascending order based on mean frequency scores. Sources with tied means were assigned tied ranks. Ranks allowed for descriptive comparisons across the seven units, as well as across studies. In order to make more comprehensive comparisons across the seven units, one-way analysis of variance and, when applicable, nonparametric Kruskal-Wallis test were used to determine whether unit membership influenced knowledge sources. The null hypothesis tested was that nursing units do not differ in their frequency score on each item. Subsequent post-hoc multiple comparisons located differences among groups if the null hypothesis was rejected at the predetermined *p* value of .05 or less. Pearson's *r* correlation values were calculated between knowledge-source scores and overall research utilization scores to determine possible relationships.

²Estabrooks, C. A., Landry, R., Dickinson, H. D., & Golden-Biddle, K. (2002-2007). *Knowledge utilization and policy implementation*, funded by Canadian Institutes of Health Research, Grant #53107.

Results

Nurses' general patterns of knowledge-source use from the 2002 studies are presented in Table 2. Two items tied as the top source of knowledge: individual patient information³ and personal experience in nursing. The other items in the top five sources used were, in descending order of use: information from attending in-services, information learned in nursing school, a tie between discussions with physicians and information from fellow nurses, and intuition. In comparison, the five sources used least often were, in descending order of use: nursing journals, ways nurses have always done it, nursing research journals, medical journals, and the media. Nurses also used multiple sources.

The numbers of different knowledge-source items that are frequently or always used by nurses are reported in Table 3. Approximately half of the nurses sampled often used 6 to 10 sources in their practice, while approximately one quarter frequently or always used 11 to 15 sources.

Seven-Unit Comparisons

Few differences were seen when the seven units were compared descriptively on their ranked knowledge-source items. On average, nurses on all seven units ranked "my personal experience of nursing patients/clients over time" and "information that I learn about each patient/client as an individual" as their top two sources of knowledge. Nurses on these units also relied heavily on information learned in nursing school and in-services in the workplace. Another similarity among the seven units was infrequent use of journal articles. This observation is consistent with the findings reported by Baessler et al. (1994) and Estabrooks (1998). As with periodicals, textbooks were consistently ranked lower across the seven units.

Nonparametric Kruskal-Wallis single-factor analysis of variance by ranks indicated significant differences ($p < .05$) among units in nurses' use of specific sources of knowledge. These specific sources are, in order of decreasing importance: in-services in the workplace, nursing school, what has worked for years, nursing journals, nursing research journals, and medical journals. Post-hoc tests were then run to discover where the differences lay across the units. Dunn's (1964) multiple contrasts using ranked sums, which accounts for unequal group sizes, were able to detect only where these differences lay across units in their use of nursing school and nursing research journals. Even then, conclusions were ambiguous because the majority of units overlapped into different population subsets. This procedure failed to detect differences among units for the other knowl-

³Individual patient information refers to the information learned from each patient/client as an individual.

Table 2 *Distribution of Nurses' Sources of Knowledge in Daily Practice (2002 Studies)*

Item	Percentage (%)						Mean Score (SD)	Rank
	Never 1	Seldom 2	Sometimes 3	Frequently 4	Always 5	No Response		
a. Individual client / patient	0.4	0.0	12.2	52.6	30.4	4.3	4.18 (.68)	1.5
b. Intuition	1.3	7.0	29.6	45.7	13.0	3.5	3.64 (.85)	7
c. Personal experience	0.0	1.3	10.0	55.7	30.0	3.0	4.18 (.66)	1.5
d. Nursing school	1.7	5.7	23.9	46.5	18.3	3.9	3.77 (.89)	4
e. Physicians' discussions with nurse	0.4	4.3	29.1	48.3	13.9	3.9	3.74 (.78)	5.5
f. Physicians' orders	0.4	5.7	38.7	37.0	12.2	6.1	3.58 (.81)	9
g. Medical journals	10.0	31.7	33.5	19.1	1.7	3.9	2.70 (.97)	15
h. Nursing journals	1.7	15.7	40.9	33.5	4.3	3.9	3.24 (.84)	12
i. Nursing research journals	7.8	27.8	38.7	19.1	2.6	3.9	2.80 (.94)	14
j. Textbooks	1.3	14.3	37.4	34.3	7.8	95.2	3.35 (.88)	11
k. What has worked for years	2.2	10.0	24.3	48.7	9.1	5.7	3.56 (.89)	10
l. Ways nurse has always done it	3.0	20.9	45.7	23.9	1.7	4.8	3.00 (.82)	13
m. Fellow nurses	0.0	1.7	29.6	57.8	7.8	3.0	3.74 (.63)	5.5
n. In-services in workplace	0.9	3.0	27.0	49.6	16.5	3.0	3.80 (.79)	3
o. Policy and procedure manuals	2.2	10.4	27.4	37.0	18.7	4.3	3.62 (.99)	8
p. The media	14.8	38.3	31.3	9.6	1.3	4.8	2.42 (.92)	16

Note: Frequencies for each item total to 100%.

Table 3 *Variety of Sources of Knowledge Used by Nurses (2002 Studies)*

Number of Sources of Evidence Used	Number of Nurses	%
0	8	3
1 to 5	46	20
6 to 10	119	52
11 to 15	55	24
> 15	2	1
Total	230	100
Mean number of sources used: 8		
<i>Note:</i> Table reports the number of sources that were frequently or always used by the nurses in their daily practice.		

edge-source items queried using the Kruskal-Wallis test. This failure results partly because multiple comparison tests are underpowered in comparison to the analysis of variance tests and because type II errors are more likely to occur in multiple comparison tests (Zar, 1996). Despite a lack of detail, the possibility that units differ in their use of knowledge sources, especially in their use of highly ranked sources, have important implications for research utilization dissemination strategies.

Relationship Between Use of Knowledge Sources and Research Utilization

Pearson's correlation coefficients were calculated for each pairing of individual information items to overall research utilization. The items that were positively and significantly correlated ($p < .01$) with overall research utilization were: nursing journals, in-services in the workplace, discussions with physicians, nursing research journals, personal experience, and textbooks. However, only half of these items were ranked as top sources. Personal experience, in-services in the workplace, and discussions with physicians were ranked among the top five sources, while nursing research journals, nursing journals, and textbooks were ranked among the lowest five.

Longitudinal Cross-Study Comparison

Across the three studies (Baessler et al., 1994; Estabrooks, 1998; Estabrooks et al.¹) and over a period of 6 years, information learned about the patient and personal experience consistently ranked as the two most frequently used sources of knowledge (see Table 4). Other highly ranked

¹See note 1, page 121.

Table 4 Mean Frequency Scores of Knowledge-Source Items and Their Ascending Ranks Across Studies

Item	2002 Studies (n = 230) ^a							Baessler et al. (1994) (n = 212) ^b	Estabrooks (1998) (n = 600) ^a
	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7		
a. Individual client / patient (SD) Rank	4.08 (.64) 3	4.22 (.88) 1	4.23 (.60) 1.5	4.25 (.56) 2	4.17 (.62) 2	4.23 (.61) 1	4.00 (.71) 2.5	2.30 (.56) 1	4.29 (.69) 1
b. Intuition (SD) Rank	3.46 (.90) 8	3.68 (1.01) 8	3.92 (.76) 4	3.94 (.77) 5	3.78 (.88) 8	3.51 (.75) 7	3.86 (.79) 4.5	1.70 (.74) 8	3.56 (.78) 9
c. Personal experience (SD) Rank	4.11 (.74) 1.5	4.18 (.82) 2	4.23 (.60) 1.5	4.31 (.60) 1	4.22 (.55) 1	4.18 (.63) 2	4.14 (.48) 1	2.19 (.55) 2	4.11 (.70) 2
d. Nursing school (SD) Rank	4.11 (.74) 1.5	3.93 (.89) 4	4.00 (.91) 3	4.13 (.72) 3	3.89 (.68) 6.5	3.42 (.97) 9	3.57 (.68) 8	2.17 (.53) 3	3.83 (.77) 3
e. Physicians' discussions with nurse (SD) Rank	3.38 (.98) 9	3.86 (.72) 5.5	3.69 (.86) 7	3.75 (.86) 7	3.89 (.68) 6.5	3.88 (.66) 3	3.52 (.68) 9	1.73 (.59) 6.5	3.61 (.81) 7
f. Physicians' orders (SD) Rank	3.62 (.92) 7	3.78 (.80) 7	3.54 (.88) 9.5	3.75 (.93) 7	3.72 (.83) 9.5	3.49 (.73) 8	3.24 (.63) 12.5	1.73 (.60) 6.5	3.61 (.83) 8
g. Medical journals (SD) Rank	2.30 (.91) 15	2.86 (.93) 15	2.23 (1.24) 16	2.81 (1.22) 14.5	2.17 (.93) 15	2.91 (.81) 14	3.00 (.89) 15	0.99 (.69) 12	2.67 (.94) 14
h. Nursing journals (SD) Rank	2.81 (.88) 13	3.36 (.93) 12	3.00 (1.08) 13	3.37 (.86) 11	3.06 (.94) 13	3.38 (.66) 10	3.48 (.68) 10	1.54 (.71) 10	3.25 (.95) 12

i. Nursing research journals (SD) Rank	2.46 (.93) 14	2.93 (.95) 13	2.77 (1.09) 14	2.56 (.89) 16	2.17 (.99) 15.5	2.95 (.81) 13	3.38 (.87) 11	1.17 (.67) 11	2.55 (.95) 15
j. Textbooks (SD) Rank	3.32 (.88) 11	3.62 (.87) 9	3.31 (1.11) 11	3.19 (1.05) 12.5	3.39 (.92) 11	3.31 (.84) 12	3.10 (.70) 14		3.26 (.81) 11
k. What has worked for years (SD) Rank	3.64 (.90) 6	3.44 (1.12) 11	3.69 (1.01) 7	3.75 (.68) 7	3.94 (.54) 4.5	3.34 (.82) 11	3.86 (.73) 4.5	1.97 (.55) 4	3.54 (.74) 10
l. Ways nurse has always done it (SD) Rank	3.19 (.91) 12	2.88 (.85) 14	3.15 (.56) 12	3.38 (.62) 10	3.22 (.65) 12	2.76 (.84) 15	3.24 (.70) 12.5	1.63 (.62) 9	3.04 (.73) 13
m. Fellow nurses (SD) Rank	3.68 (.63) 4.5	3.86 (.63) 5.5	3.69 (.86) 7	4.00 (.63) 4	4.00 (.59) 3	3.59 (.57) 6	3.71 (.56) 7	1.89 (.46) 5	3.64 (.58) 6
n. In-services in workplace (SD) Rank	3.68 (.67) 4.5	4.07 (.73) 3	3.77 (1.01) 5	3.19 (1.17) 12.5	3.94 (.80) 4.5	3.76 (.70) 5	4.00 (.63) 2.5		3.77 (.74) 4
o. Policy and procedure manuals (SD) Rank	3.35 (1.18) 10	3.54 (1.14) 10	3.54 (.88) 9.5	3.50 (.97) 9	3.72 (.96) 9.5	3.78 (.86) 4	3.76 (.83) 6		3.66 (.83) 5
p. The media (SD) Rank	2.24 (.90) 16	2.63 (1.06) 16	2.69 (1.25) 15	2.81 (.54) 14.5	2.17 (.92) 15.5	2.27 (.78) 16	2.57 (.98) 16		2.41 (.84) 16

^a Responses were based on a five-point Likert scale: 1 = never, 2 = seldom, 3 = sometimes, 4 = frequently, 5 = always.

^b Responses were based on a four-point Likert scale: 0 = never, 1 = seldom, 2 = frequently, 3 = always.

knowledge sources were information learned in nursing school, in-services, and information learned from other nurses and from physicians. Nurses not only found discussions with physicians to be valuable, but learned almost as much from physicians' patient-care orders. Although personal experience and co-workers were preferred sources of knowledge, intuition ranked relatively low. Nurses may rank intuition lower than personal experience and interpersonal relationships because following their intuition sounds less reliable than scientific sources of information. However, we believe this finding may question the assertion that intuition, as a result of personal experience and interpersonal relationships, plays a central role in nursing practice (Agan, 1987; Benner & Tanner, 1987; Berragan, 1998; Correnti, 1992; Rew & Barrow, 1987). At the very least, it questions the assertion that intuition plays a central role if identified as a source of practice knowledge.

Regardless of the type of journal (nursing, medical, or research), nurses consistently ranked journals among their least preferred sources. Only popular media, which included magazines, television, and the Internet, were used less frequently than journals. Another infrequently used source was textbooks, despite their availability on most units. Textbooks were ranked only slightly higher than journals in the 1998 and 2002 studies; these results suggest that nursing staff prefer socially driven and relational knowledge sources to print sources such as journals and textbooks.

“What has worked for years” and “ways nurses have always done it” rank inconsistently across the three studies. In Baessler et al.'s (1994) sample, these sources ranked 4th and 9th, respectively. However, in the other recent studies, they decrease in use to 10th and 13th. This decrease in use over time may indicate that nurses change their practices, or it may be a response to the active rhetoric of evidence-based practice over the last decade. In the latter case, the two information sources rooted in tradition are less credible than those rooted in research. Hence, decreasing scores for these items over time may be a reflection of social desirability rather than actual practice.

Discussion

The overall trend emerging from the cross-unit and cross-study comparisons is that nurses rely most often on individual patient information, personal experience, and interactions as primary information sources for practice. Palfreyman, Tod, and Doyle (2003) used the same knowledge-source survey questions with a group of staff nurses in the United Kingdom and found parallel results. That group of nurses ranked information from the client as their top source, followed by personal experi-

ence and information from fellow practitioners. Although we could locate no other empirical studies that directly measured personal experience as a knowledge source, numerous authors have discussed its importance in nursing practice (i.e., Baumann & Bourbonnais, 1982; Benner, 1984; Berragan, 1998; Burrows & McLeish, 1995; Goding & Cain, 1999; Kennedy, 1998; Luker & Kenrick, 1992; Palfreyman et al.; Will, 2001). Similarly, individual patient information (learned from each patient/client as an individual) as a knowledge source was not measured in most empirical studies. Logically, individual patient information should rank high because it defines situational context, which nurses cite as critical to the decision-making process in practice (Clarke & Wilcockson, 2002; Corcoran-Perry & Graves, 1990; Luker & Kenrick). Cardiovascular nurses surveyed in the Corcoran-Perry and Graves study most frequently sought patient-specific data when seeking supplemental information.

Despite limited comparability, various findings from previous empirical studies support the importance of interactions among colleagues, particularly other nurses. Several investigators identify nursing staff, peers, and colleagues as main sources of practice knowledge (Bunyan & Lutz, 1991; Corcoran-Perry & Graves, 1990; Lathey & Hodge, 2001; Lawton, Montgomery, & Farmer, 2001; Palfreyman et al., 2003; Salasin & Cedar, 1985; Stetler & DiMaggio, 1991; Urquhart & Davis, 1997). Also, in Barta's (1995) study, pediatric nurse educators frequently scored interpersonal communications in their top three choices of useful sources for updating their instruction of students.

The Use of Journals

Part of the overall trend observed is the relative under-use of journals, textbooks, and popular media, including the Internet. The findings of Thompson et al. (2001a, 2001b) support this trend. Their cross-case analysis of qualitative data from hospital nurses in the United Kingdom shows that human sources of information are considered most useful and accessible in nurses' daily decision-making. Nurses in the practice setting prefer oral to written sources, most likely as a result of the hands-on nature and structure of their work (Salasin & Cedar, 1985). In addition, oral sources of information may best suit their need for immediate solutions to patient care. However, few empirical studies specifically examining nurses' sources of practice information support this claim; most actually report the opposite and report journal use to be moderate or high. In these studies, occupational-health nurses (Lathey & Hodge, 2001), nurse practitioners (Rasch & Cogdill, 1999), and staff and community nurses (Winter, 1990) ranked journals midrange amongst their sources. Groups that rated journals as the top source or one of the top sources

include community nurses (Lawton et al., 2001; Urquhart & Davis, 1997), nurse teachers (Love, 1996), acute-care nurses (Spath, 1996; Urquhart & Davis), and clinical nurse specialists (Stetler & DiMaggio, 1991). Of these eight studies, five also measured the use of books/textbooks, and nurses in all but one ranked these in their top three sources of knowledge.

The greater use of print sources by certain subgroups compared to staff nurses in our cross-study comparison (Baessler et al., 1994; Estabrooks, 1999) may relate to their degree of specialization and/or the nature of their tasks. In their survey of health professionals, Stinson and Mueller (1980) found that information sources used were partly related to practice type and specialty. Similarly, Salasin and Cedar (1985) report significant relationships between the use or value of various knowledge sources and nurses' work roles and settings. The nature of some work may dictate greater reliance on information to support practice decisions. For example, researchers argue that specialized nursing roles in highly complex environments, such as critical care and public/occupational health, differ from those in other areas (Baumann & Bourbonnais, 1982; Blythe, Royle, Oolup, Potvin, & Smith, 1995; Bucknall, 2000; Bucknall & Thomas, 1996; Lathey & Hodge, 2001; Thompson & Sutton, 1985). Hence, differential use of journals and textbooks by various specialities may be a function of the different nursing tasks and practice environments.

Despite nurses' self-reported frequent use of journals in some studies, the evidence for this trend is ambiguous. Bostrum and Suter (1993) and Rizzuto, Bostrum, Newton Suter, and Chenitz (1994) report that in one survey of 1,200 nurses only 21% used research findings in practice over the previous 6 months. Generally, nurses are unaware of or make limited use of research findings disseminated through research literature (Brett, 1987; Corcoran-Perry & Graves, 1990; Coyle & Sokop, 1990). Corcoran-Perry and Graves report that written sources sought by nurses relate mainly to patient records or other documentation. Along the same theme, other researchers report that nurses do not frequently read, subscribe to, or have access to journals (e.g., Corcoran-Perry & Graves; Crane & Urquhart, 1994; Urquhart & Crane, 1994; Wright, Brown, & Sloman, 1996). Regardless of reading or access issues, nurses reportedly lack library search and retrieval skills and the other technological skills needed to tap available information resources (Blythe, 1993; Royle, Blythe, Potvin, Oolup, & Chan, 1995). When they do overcome these barriers and read journals, many nurses still lack the critical appraisal skills to evaluate research quality and applicability (Camiletti & Huffman, 1998; Royle et al.). Few nurse researchers have directly addressed this apparent contradiction between nurses' reported use of journals as an

important information source and their reported inadequate access and inadequate reading and appraisal skills. One explanation — on the reported use of journals side of this equation — is that social desirability may positively skew responses to self-report surveys (Thompson, 1999). As discussed by Thompson, studies that combine observation with self-report have found that respondents over-report the use of journals and under-report the use of colleagues as information sources (e.g., Covell, Uman, & Manning, 1985).

Methodological Issues

The contradiction between our findings around print sources and the findings in the literature serves to highlight a number of methodological limitations in this field. One limitation is the sampling bias that impedes the ability to generalize results. Except in a handful of studies, hospital staff nurses were not widely sampled. Stetler and DiMaggio (1991) point out that their sample was “small, non-random and comes from one institution and one geographical area.” Lathey and Hodge (2001) note that their modest response rate (28%) and the choice to sample a subgroup of occupational-health nurses limit interpretation. Lack of replication in the field and lack of longitudinal studies, along with difficulties comparing sources of knowledge across studies, all add to the problem.

Another limitation is that nurses' knowledge sources are frequently examined with little regard for the highly contextual and situated nature of their work, which is critical in defining working knowledge (Kennedy, 1983). As an example, Luker and Kenrick (1992) point out that nurses are studied in the hospital setting rather than in their natural work environment, which limits the types of implications that can be drawn for practice. Taking it further out of context, researchers often ask nurses to reflect on knowledge use over a long period (e.g., weeks, months, years), thus failing to account for the dynamic nature of their daily work. Most importantly, nurses' knowledge sources are studied in isolation from other influences that might drive their information-seeking behaviour. Information-resource use is rarely measured in conjunction with critical determinants such as resource accessibility (e.g., Champion & Leach, 1989), organizational support (e.g., Champion & Leach; Clarke & Wilcockson, 2002; Hicks, 1998), and available time (e.g., Regan, 1998; Rizzuto et al., 1994). All research-design issues discussed ultimately affect the generalizability of findings and the subsequent implications derived for practice.

We chose a longitudinal cross-study approach when looking at nurses' information sources in order to mitigate some of these methodological issues. Because the same survey questions pertaining to knowledge sources were repeated in three different studies with staff nurses

over 6 years, patterns emerging from the data have greater validity when generalized to the population. Examination across units and across studies yielded consistent results. Staff nurses repeatedly rely more on informal and interactive, relational sources such as their experience, colleagues, and patients than on formal sources such as journals and textbooks. Despite the consistent patterns seen over the three studies, our longitudinal approach only served to highlight ongoing issues around lack of replication and lack of standardization of survey questions in this field, which affects the validity of findings.

Although an improvement over those of “snapshot” studies, the findings from this study illustrate a fundamental problem with current research in this area. Nurses report their reliance on experiential knowledge, yet the majority of researchers leave out experience as a knowledge item in empirical studies. Also, current methods of measuring research utilization primarily tap formal research knowledge codified in journals and textbooks. We do not understand how or if research can be introduced through other knowledge sources. For example, researchers often separate non-research knowledge from research-based knowledge when discussing nursing knowledge (e.g., Estabrooks, 1999; Luker & Kenrick, 1992). However, if nurses prefer relational and interactive sources, as well as other informal sources not easily examined using current research methods, we are likely measuring research utilization inadequately.

Our cross-unit results show that nurses’ research use is not the “sum” of their information-seeking behaviour. Because nurses across the seven units differed in their research utilization scores but not in their selection of knowledge sources, we argue that research utilization is a more general phenomenon influenced by multiple factors. Consequently, nurses’ information-seeking preferences may be poor predictors of their research utilization behaviours. This finding illustrates one dimension of the complexity inherent in studying research utilization — determinants other than the frequency with which nurses rely on various knowledge sources may influence differences in research utilization scores.

At the same time, the types of information sources preferred by nurses have critical implications for how we disseminate research findings. Since practising nurses frequently favour experiential, relational, and interactive resources over formal resources, researchers need to strategize accordingly. Nurses are relatively consistent in their choice of knowledge sources, a factor that is likely driven by the overall structure of nursing work in contemporary settings. Since the fundamental structures of nursing work are unlikely to change in the foreseeable future, we must reconsider traditional dissemination and implementation strategies.

Conclusion

We propose that our findings and those of others in this area lend support to the following assertions. First, the research-practice gap is poorly understood. Second, current attempts to measure research use are inadequate. Third, improved conceptualization and measurement of research use will be predicated on an improved understanding of research use within the broader context of practice knowledge.

The gap between what nurses report and what researchers measure may represent the major threat to validity of investigations in the field of research utilization. Luker and Kenrick (1992) and Salasin and Cedar (1985) found the distinction between practice-based knowledge and research-based knowledge to be more artificial than real. They argue that nurses are being exposed to research findings but may not be able to report the extent to which research informs their practice because it has been reclassified as general nursing knowledge. We argue that nurse researchers need to better understand how both research and practice knowledge are conceptualized and subsequently measured, and grapple with the impact of researchers' academically oriented value systems in a field centrally concerned with the use of *practice-relevant knowledge*. The motivation for this study was to add to our understanding of the factors that influence nurses' use of research. We conclude that, as researchers, we need to better understand how nurses gain and sustain knowledge for everyday practice in order to more meaningfully advance the use of research in practice.

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