

Using Information Practices of Nurses to Reform Information Literacy Instruction in Baccalaureate Nursing Programs

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Résumé de l'article

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Methods - The researchers conducted a descriptive study using a 59-item survey instrument with a variety of question formats including short-answer, multiple choice, Likert, and open response. The researchers distributed the survey to baccalaureate nursing alumni who graduated in 2012-2017 from four universities in the state of Utah in the United States.

Results - Nurses seek practical information primarily to provide informed patient care, while also clarifying medical situations and expanding their health care knowledge. They frequently consult nursing colleagues and physicians when seeking information. The majority of nurses consult electronic health records daily. Respondents described time as the biggest barrier to accessing information. They requested authentic, clinically-focused scenarios, training on freely-accessible resources, and more explicit teaching of lifelong learning skills, such as critical thinking.

Conclusion - Information literacy education should prepare student nurses for the fast-paced information environment they will face in the workplace. This means incorporating more patient-focused scenarios, freely available quality resources, and time-based activities in their education. The researchers suggest areas to prepare nurses for information seeking, including problem-based clinical scenarios, building guides with databases accessible for free or little cost, and added emphasis on critical thinking and self-motivated learning.

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Research Article

Using Information Practices of Nurses to Reform Information Literacy Instruction in Baccalaureate Nursing Programs

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Abstract

Objective - Seeking information is a key element of evidence based practice and successful healthcare delivery. Significant literature exists on both the information seeking behaviour of professional nurses and information literacy teaching methods, but scarce evidence connects nurses' information behaviour and environments with their education. This study sought to use data from nursing alumni to answer the following research questions: What are the current information practices of professional bachelor's-prepared nurses? How do recently-graduated nurses suggest that their education could have better prepared them to find and evaluate information in the workplace?

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Results - Nurses seek practical information primarily to provide informed patient care, while also clarifying medical situations and expanding their health care knowledge. They frequently consult nursing colleagues and physicians when seeking information. The majority of nurses consult electronic health records daily. Respondents described time as the biggest barrier to accessing information. They requested authentic, clinically-focused scenarios, training on freely-accessible resources, and more explicit teaching of lifelong learning skills, such as critical thinking.

Conclusion - Information literacy education should prepare student nurses for the fast-paced information environment they will face in the workplace. This means incorporating more patient-focused scenarios, freely available quality resources, and time-based activities in their education. The researchers suggest areas to prepare nurses for information seeking, including problem-based clinical scenarios, building guides with databases accessible for free or little cost, and added emphasis on critical thinking and self-motivated learning.

Introduction

Preparing nurses for evidence based practice involves incorporating clinical expertise, the patient's preferences, and the "best available external evidence" (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996, p. 72). Perhaps the most difficult challenge in incorporating evidence into practice is the exponential growth of health care knowledge. An increase in published knowledge means more information

to sort through, and when nurses cannot find reliable information quickly, evidence based patient care is diminished (Clarke et al., 2013). Information literacy is a critical part of evidence based practice in a progressively more complex information environment, as it provides a framework to manage, retrieve, evaluate, and use information effectively. The Association for College & Research Libraries (2015) defines information literacy as "the set of integrated abilities encompassing the reflective discovery

of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning." Not surprisingly, the American Association of Colleges of Nursing (2008) recognizes information literacy as a component of liberal education of baccalaureate-level nurses. Given the great importance of nurses' ability to obtain evidence based information, and a lack of research connecting information behaviour with information literacy instruction, librarians from four universities in the state of Utah in the United States aimed to better understand information practices of professional nurses to improve information literacy instruction in baccalaureate nursing programs. The researchers wanted to place instruction in the context of evidence based practice to prepare nursing students for professional information seeking.

Literature Review

Prior to conducting the study, the researchers reviewed the literature for recent data on information literacy education of nursing students, as well as the information practices of nurses.

Information literacy is being taught to nursing students with varying levels of success. While information literacy is important, it is also difficult to teach and assess effectively, and at times outcomes are only moderately improved (Farrell, Goosney, & Hutchens, 2013; Moreton & Conklin, 2015). According to a survey of instruction librarians, information literacy programs in higher education are often limited to first year instruction, although discipline-specific instruction for undergraduates is also available (Julien, Gross, & Latham, 2018). The standards and frameworks available to librarians to teach information literacy fall short in teaching clinical information seeking, as they fail to capture the social and transformative aspects of information literacy (Lupton & Bruce, 2010). For example, the standards for nursing

appear to consider extensive library research as the norm while practicing nurses often have more immediate information needs that require quick turnaround times. Further, nursing students fail to see the connection between evidence based practice and their clinical experience (Aglen, 2016). One way to reinforce information literacy skills is to incorporate them throughout the curriculum as it may better prepare students for professional practice (Flood, Gasiewicz, & Delpier, 2010; Phelps & Hyde, 2018). Nursing students are eager to gain more information on patient care, database training, and computer skills, especially the primary database in nursing, CINAHL (Dee & Stanley, 2005; Duncan & Holtslander, 2012).

As nursing students transition to work in a clinical setting, they mimic the practices they will likely take on as practicing nurses - namely, they rely heavily on peers and electronic materials, although newer nurses tend to rely more heavily on print resources (Dee & Stanley, 2005; Wahoush & Banfield, 2013). Nurses seek information most frequently for patient care and in novel situations, such as a patient presenting with an atypical symptom (Newman & Doran, 2012; O'Leary & Ni Mhaolrúnaigh, 2012; Younger, 2010). Practicing nurses' reliance on colleagues and general Internet searches as their first and second sources of information, respectively, are well documented in the literature (Alving, Christensen, & Thrysoe, 2018; Argyri, Kostagiolas, & Diomidous, 2014; Baro & Ebhomeya, 2013; Clarke et al., 2013; Majid et al., 2011; Marshall, West, & Aitken, 2011; Newman & Doran, 2012; O'Leary & Ni Mhaolrúnaigh, 2012). Familiarity and proximity may play a large role in these preferences: using proprietary databases is time consuming and requires access and training, whereas speaking with colleagues is a normal occurrence (Gilmour, Huntington, Broadbent, Strong, & Hawkins, 2012; Marshall et al., 2011).

However, nurses and nursing students experience several barriers and frustrations to seeking and accessing information: a lack of

computer skills or, more specifically, database searching skills (Argyri et al., 2014; Dee & Stanley, 2005; Intas et al., 2016); frustration with choosing the right words or phrases to query information resources (Duncan & Holtslander, 2012); lack of access to computers or Internet connections (Raj, Sharma, Singh, & Goel, 2015; Sarbaz, Kimiafar, Sheikhtaheri, Taherzadeh, & Eslami, 2016); and resistance to evidence based practice (Kahouei, Babamohamadi, Panahi, & Zadeh, 2013). Nurses and students need better training using mobile technology, including apps, in clinical, classroom, and laboratory settings (Baro & Ebhomeya, 2013; Majid et al., 2011; Raman, 2015). A lack of time was the barrier most frequently reported by nurses (Argyri et al., 2014; Baro & Ebhomeya, 2013; Kumaran & Chipanshi, 2015; Majid et al., 2011). These barriers are not unique to nursing; they are commonly reported in literature for many health sciences professions. Lack of knowledge and time are compounding barriers: when a nurse is ignorant about or resistant to evidence based practice, they are unlikely to seek evidence to improve their practice. A lack of time would also make learning new skills or technologies more difficult. If a nurse fails to see the connection between accessing information and patient care, they are less likely to invest the time to change their thinking. Finally, when searching for evidence is not built into the professional nursing workflow, searching falls by the wayside (Alving et al., 2018).

No study connected information seeking behaviour to the teaching of information literacy skills explicitly by asking nurses how well their nursing education prepared them for the professional information environment.

Aims

In an effort to improve information literacy education of nursing students, this study answers the following research questions: What are the current information practices of professional bachelor's-prepared nurses? How do recently-graduated nurses suggest that their

education could have better prepared them to find and evaluate information in the workplace?

Methods

Study Concepts and Scope

For the purposes of this study, nurses are defined as practicing registered nurses (RNs) with at least a bachelor's degree in nursing (BSN). The authors defined information literacy instruction as teaching provided by academic librarians designed to teach students how to find, evaluate, and use information resources; however, understanding that nurses learn information literacy skills from non-librarians, the researchers included a question (see Question 53 in Appendix A) to elucidate the importance of a variety of sources in learning these skills.

The study was limited to surveying the perceptions of nursing alumni who 1) graduated with baccalaureate degrees in nursing (i.e. Bachelor of Science in Nursing) between 2012-2017 from one of four Utah-based institutions, and 2) were employed as a nurse while participating in the study. The researchers elected to do a cross-institutional study in order to study patterns of nurses educated statewide, as well as to increase the sample size. The four represented institutions include two public (Southern Utah University and the University of Utah) and two private universities (Brigham Young University and Roseman University of Health Sciences), two of which are small (i.e., an enrollment of fewer than 10,000 students) and two are large (i.e., enroll at least 20,000 students).

Data Collection and Analysis

A 59-item survey instrument was developed, tested, and administered using Qualtrics to capture data from the large group of nursing alumni (see Appendix A). The researchers chose the survey as a data collection tool to reach a large number of geographically dispersed

respondents with a set of standardized questions. Survey question topics and themes were informed by questionnaire-based research studies on nurses' and nursing students' information behaviour (Argyri, Kostagiolas, Diomidous, 2014; Baro & Ebhomeya, 2013; Intas et al., 2016; Kumaran & Chipanshi, 2015; Majid et al., 2011; O'Leary & Ni Mhaolrúnaigh, 2012; Sarbaz, et al., 2016; Wahoush & Banfield, 2014), specifically those studies which included their survey instruments (Dee & Stanley, 2005; Farrell, Goosney, & Hutchens, 2013; Pravikoff, Tanner, & Pierce, 2005). The survey questions, in a variety of formats including multiple choice and open-ended questions, were pre-tested and revised where necessary to prevent misinterpretation and bias. The survey was sent to librarians, nursing faculty, and practicing nurses, and testers' feedback was incorporated into the survey prior to its deployment. The survey consisted of eight sections: Introduction and consent; Demographics and current employment situation; Information needs; Information sources; Information environment at workplace; Barriers to finding, accessing, and evaluating information; Education & instruction; and Exiting the survey. Approval of the study was obtained from all four institutional review boards.

An email from each nursing dean, chair, or alumni office was sent to their respective nursing alumni asking them to participate in the upcoming survey. Within a week of this message, each nursing program graduate received an email link to the survey, which opened on November 13, 2017. A total of 1,926 invitations were distributed. Alumni received up to four reminders if their survey response had not been received within a specific timeframe. Respondents who did not graduate from one of the four institutions (e.g., because they were given the survey link through a forwarded email) or did not currently work as a nurse were routed to exit the survey. No questions were required, so response rates fluctuated from question to question. After completing the survey, respondents had the

option to leave the survey and go to another page to leave their contact information to enter one of ten \$20 Amazon gift cards. Gift cards were funded by a research award from the Nursing and Allied Health Resources Section of the Medical Library Association.

Preceding data analysis, all identifying information including names and contact information were removed to ensure anonymity of respondents. The results of the open-ended questions were analyzed for emergent themes using the qualitative method of analytical coding, where codes emerged from the data (Richards, 2009). Researchers did an initial round of coding for all responses to an open-ended question. In a second pass through these responses, more detailed codes were added and codes were normalized where needed. In a final round of coding, the codes were grouped into themes.

Results

What are the Information Practices of Professional Bachelor's-Prepared Nurses?

To answer the first research question, the researchers examined demographics of the group, reasons nurses seek information, source types used, and information access and barriers.

Demographics

Out of the 1,926 total invitations sent, 349 respondents completed the survey, resulting in a response rate of 18.1%. Most respondents graduated within two years of the study with at least half having two or more years of employment as a nurse. Ninety-six percent of respondents' highest degree completed was a Bachelor's in Nursing and 14% were currently enrolled in a graduate nursing degree program (see Table 1). While this study focused on nurses trained at a baccalaureate level, fourteen respondents earned a master's degree, doctorate or other degree. It is likely that they earned these other degrees in the time since completing

their BSN. These nurses, who only made up only 4% of all respondents, were included in the analysis as it did not appear education level made for drastically different responses. Eighty-eight percent of respondents worked in a hospital setting of some kind. Other settings, such as dialysis, endoscopy clinics, and home health agencies were also represented. Most respondents described their work setting as critical care nursing or medical-surgical nursing. Other specialties, such as pediatrics, oncology, endoscopy, hospice, and emergency nursing were also common. A majority of respondents are located in the Mountain West (66%), though there were a significant number from other states across the United States (33%) and two international respondents.

Table 1
Demographic Characteristics of Graduated Nurses who Responded to Survey

	N	Percent
<i>Nurses completed survey</i>	349	-----
<i>Graduation year</i>		
2012	36	10.32
2013	60	17.19
2014	58	16.62
2015	74	21.20
2016	81	23.21
2017	39	11.17
<i>Years of employment as a</i>		
0	39	11.17
1	83	23.78
2	75	21.49
3	71	20.34
4+	81	23.21
<i>Highest nursing degree</i>		
Bachelor's	334	95.70
Master's	8	02.29
Doctorate	5	01.43
Other	1	00.28

Reasons Nurses Seek Information

The top reasons survey respondents reported seeking information were: (a) "To answer

patient questions" (85%), (b) "To determine best practices for patient care" (70%), (c) "To consult clinical practice guidelines" (70%), (d) "To check clinical procedures" (70%), and (e) "To interpret laboratory data" (67%).

Respondents answered an open-ended question about how they used information to move beyond a recent moment at work where they struggled to make sense of a situation. From 131 responses to the question, the researchers identified seven core themes. These were: seeking information to help or educate patients (40%), clarifying medical situations (19%), expanding health care knowledge (13%), verifying medications (11%), clarifying hospital safety and policy procedures (8%), checking measurements, data, and labs (5%), and clarifying treatment plans (4%).

Source Types

Only two print sources were used at least daily by more than 10% of the nurse participants: policy & procedures manuals (12%) and paper fact sheets / handouts (15%). When asked about information sources, respondents reported most frequently using electronic health records, which may include links to external information sources, with daily usage reported in almost three out of four cases (72%). Far fewer use general search engines daily (39%) and websites with medical information (23%). Respondents reported a number of other electronic sources, including mobile apps (e.g., UpToDate, Lexicomp, Micromedex, and Epocrates), specific hospital resources (e.g., hospital handbooks, policies, and/or guidelines), and other websites (e.g., Center for Disease Control (CDC), Association of periOperative Registered Nurses (AORN), Associated Regional and University Pathologists (ARUP)). As interpersonal sources, nursing colleagues and physicians are used most frequently, with at least daily use for 70% and 62% of respondents, respectively. Table 2 shows survey respondent data for selected sources based on a 6-point Likert scale on

Table 2

Selected Sources Based on Frequency of Use

Values: 1 = never, 2 = rarely, 3 = monthly, 4 = weekly, 5 = daily, 6 = multiple times a day

Grouping	Source Type	1	2	3	4	5	6
<i>Electronic</i>							
	EMR	13	11	24	43	64	166
	General Search	21	30	53	92	75	48
	UpToDate	62	54	74	83	29	19
	Medical Websites	21	46	73	107	55	17
	PubMed	64	79	92	65	15	5
	Google Scholar	114	77	71	38	18	1
	CINAHL	151	100	47	18	2	0
	E-books	163	87	47	14	4	0
<i>Interpersonal</i>							
	Nursing Colleagues	8	13	24	53	103	112
	Physicians	3	13	31	77	117	83
	Pharmacists	7	25	43	101	94	53
	Allied Health Workers	29	55	62	79	71	27
	Social Workers	47	71	65	77	42	21
	Medical Librarians	214	71	21	12	0	0

frequency of electronic and interpersonal source use.

Access and Barriers

A series of survey questions addressed access to information sources, as well as barriers that prevent efficient and effective access. Several questions allowed respondents to check all options that apply; percentages add up to more than 100% in those cases. In total, 64% of respondents have access to information sources through their employers, either because the employers provided the sources themselves or could get them upon request. Other sources included local libraries (21%), personal membership(s) in professional organizations or societies (17%), personal purchases (11%), and professional contacts outside of the workplace (10%). The great majority of nurses used work computers (89%) and personal phones (58%) to access clinical information at work.

Respondents reported that they needed information in a number of clinical environments, including team meetings (48%), clinical rounds (45%), but mostly chairside or bedside (86%). Respondents are generally able to access information where they need it, reporting access as follows: team meetings (46%), clinical rounds (38%), and chairside or bedside (78%). Some of the other situations where respondents said they needed information included educating other nurses, during phone calls with patients, or when verifying the purpose of prescribed medications.

Most respondents (59%) reported that time constraints were a moderate or substantial barrier to accessing information. Other moderate to substantial barriers included lack of training on using information sources (24%), cost (21%), lack of expertise or training in accessing information (19%), lack of access to technology (12%) and lack of training in technology (13%). In the open-ended responses, time and access emerged as the most common barriers to

seeking information. For example, one respondent stated: *“on our unit, time constraints are a HUGE barrier.”* This response was typical of the comments on access: *“My worksite does not provide access to databases which require subscriptions, so I find myself mainly utilizing free resources such as pubmed [sic] and google scholar [sic].”*

How Do Recently-Graduated Nurses Suggest That Their Education Could Have Better Prepared Them to Find and Evaluate Information in the Workplace?

To answer the second research question, the researchers looked at respondents' answers to how they find and evaluate information generally, how they do this in the course of their work, confidence level in search and evaluation skills, and how their schooling could have better prepared them for information seeking at their workplace.

How Nurses Learned to Find and Evaluate Information

The researchers asked respondents to rank the importance of where they learned to find information on a five-point scale (important, somewhat important, neutral, somewhat unimportant, unimportant). Ninety-three percent of respondents ranked self-taught skills as either important or somewhat important. Similarly, on-the-job training was deemed at least somewhat important by 88% of respondents. Nursing school faculty also had a strong impact on teaching respondents to find information, with 84% reporting that it was important or somewhat important, and nursing school librarians were found important by 53% of respondents.

Finding and Evaluating Information at Work

When nurses need help searching for information at work, proximity seemed to be a major factor. Eighty-nine percent of the respondents answering this question consulted

their nursing colleagues within the workplace, while 59% consulted other healthcare colleagues in their workplace. Similarly, respondents sought help for evaluating sources from their immediate nursing colleagues (90%), or from other healthcare professionals in their workplace (63%).

Confidence in Search and Evaluation Skills

A series of questions asked respondents to evaluate their confidence in finding, evaluating, sharing and explaining information based on a five-point scale (Completely confident=4, Very confident=3, Moderately confident=2, Somewhat confident=1, Not at all confident=0). When averaging the values, most were moderately confident in their ability to share information with others (\bar{x} =3.26), evaluate the quality of the information (\bar{x} =3.21), find information (\bar{x} =3.16) and explain information needs (\bar{x} =3.07). Interestingly, respondents' confidence levels declined with their ability to understand the issues surrounding information, such as ethical use and copyright (\bar{x} =2.70).

How Nursing Education Could Have Better Prepared Nurses for Information Seeking

When the survey asked how their education could have better prepared respondents for information seeking, respondents provided a wealth of information. Of the 151 responses on this question, 17 had no suggestions and didn't explicitly mention whether the respondent felt prepared or not. Of the 135 remaining responses, 50 respondents (37%) mentioned they were either satisfied or happy with their preparation in this area. A thematic analysis of all 91 responses with suggestions revealed suggestions for improvement in four different categories: specific information literacy skills (41%), teaching methodology (24%), resources (35%), and miscellaneous (16%). Note that some responses fit multiple categories.

The researchers categorized the 37 suggested information literacy skills based on *The ACRL*

Information Literacy Standards for Nursing (Association of College & Research Libraries, 2013): information need (3%), information access (62%), evaluation (24%), information use (27%), ethics and legal issues (0%). In addition, the researchers added a miscellaneous category (22%). Information access skills were by far the largest category. Many respondents requested instruction in resources outside of typical nursing and medical databases, specifically quality sources that are freely available on the Internet. A representative comment was: "Teach us more places to get free, good information." On evaluation, respondents specifically wanted more practice, as well as more instruction on evaluating non-academic sources. Respondents also suggested additional instruction on information use. Some mentioned wanting instruction on reading and skimming research; others wanted more practice using sources to find answers and to solve problems. Interestingly, no respondents suggested more preparation on using information legally and ethically, an area in which they reported having lower confidence. Skills mentioned in the miscellaneous category were better knowledge of statistics, building critical thinking and lifelong learning skills.

Over two-thirds of the 22 suggestions to improve approaches to teaching information skills spoke clearly for using real-life scenarios. For example, one respondent stated: "Giving students a scenario "Patient" with a complicated diagnosis/history/problem and having them look up evidence, even in a made-up evidence-based-practice manual of a made-up facility could be good practice." Respondents also suggested factoring in other real-life aspects such as time constraints and realistic assignments, like creating care plans. Several comments recommended teaching information seeking and research skills in tandem with clinical experiences rather than in isolation in the classroom.

A third of comments about resources addressed the issue of losing access to subscription databases after graduation, as in this comment:

"More in depth training of resources available outside of school." Others also stressed that they don't have time to do actual research but need to have access to free online (24%) and vetted (18%) resources that allow them to quickly (15%) look up information they need. Respondents also suggested teaching a variety of sources (18%) including proprietary and other commercial sources (15%) they would be likely to use when practicing: *"more education on apps and tools on the internet that you can use, and also ones typically used by hospitals through the EHR."*

The remaining comments included suggestions for more and earlier instruction in the course of study (27%), more one-on-one time with the librarian (13%), and more organized and interesting library sessions (13%).

Discussion

Nurses' Information Use Patterns

The information use patterns of the surveyed nursing alumni were mostly in line with findings in the literature (Newman & Doran, 2012), with two exceptions. The use of print sources was much lower in the current study than previously reported by Dee and Stanley (2005). The drop in the use of print resources is likely explained by the fourteen-year time difference between the studies. In addition, the electronic health record as a frequently used source has not been reported elsewhere; this may reflect the recent adoption of electronic health records across healthcare systems.

Because they are motivated to provide the best patient care, nurses use information to question orders, ensure procedures are correct, seek clarification on diagnoses and treatments, and answer patient questions. When they are unsure, nurses speak to another medical professional (likely a nurse) and/or look up the answer. Nurses use readily available tools, including electronic medical records, local colleagues, and general Internet searches.

Time is of the essence and a lack of access to information can create a frustrating barrier to success. Though most of the nurses in this study had some access to databases through work, many wanted access to the same resources available during nursing school. To many, losing their information privilege (Hare & Evanson, 2018) was not something they had anticipated but a common frustration among college graduates (Head, 2016). A recent hashtag on Twitter, #NoJournalsNoEBP, has highlighted this situation for nurses and other health professionals (Cogan, 2019).

To respond to these factors, educators should prepare nurses for this information environment and teach student nurses to leverage what sources are available. Faculty and librarians should collaborate to ensure that librarian instruction is authentic and effective at building information literacy skills: subject faculty may

not feel comfortable teaching skills and resources alone, while librarians may lack the critical subject context that nursing faculty provide (Brasley, 2008; Saines et al., 2019). Collaborative partnerships tend to ensure the best information literacy education for students (Booth, Lowe, Tagge, & Stone, 2015; Varlejs & Stec, 2014).

Implications for Information Literacy Instruction

In an ever-evolving clinical environment, it is important that nurses' information skills match their patient-focused care preferences (Forster, 2015). Nursing students would benefit from developing critical thinking skills in order to quickly locate and evaluate information based on novel situations that prompt information seeking in their work.

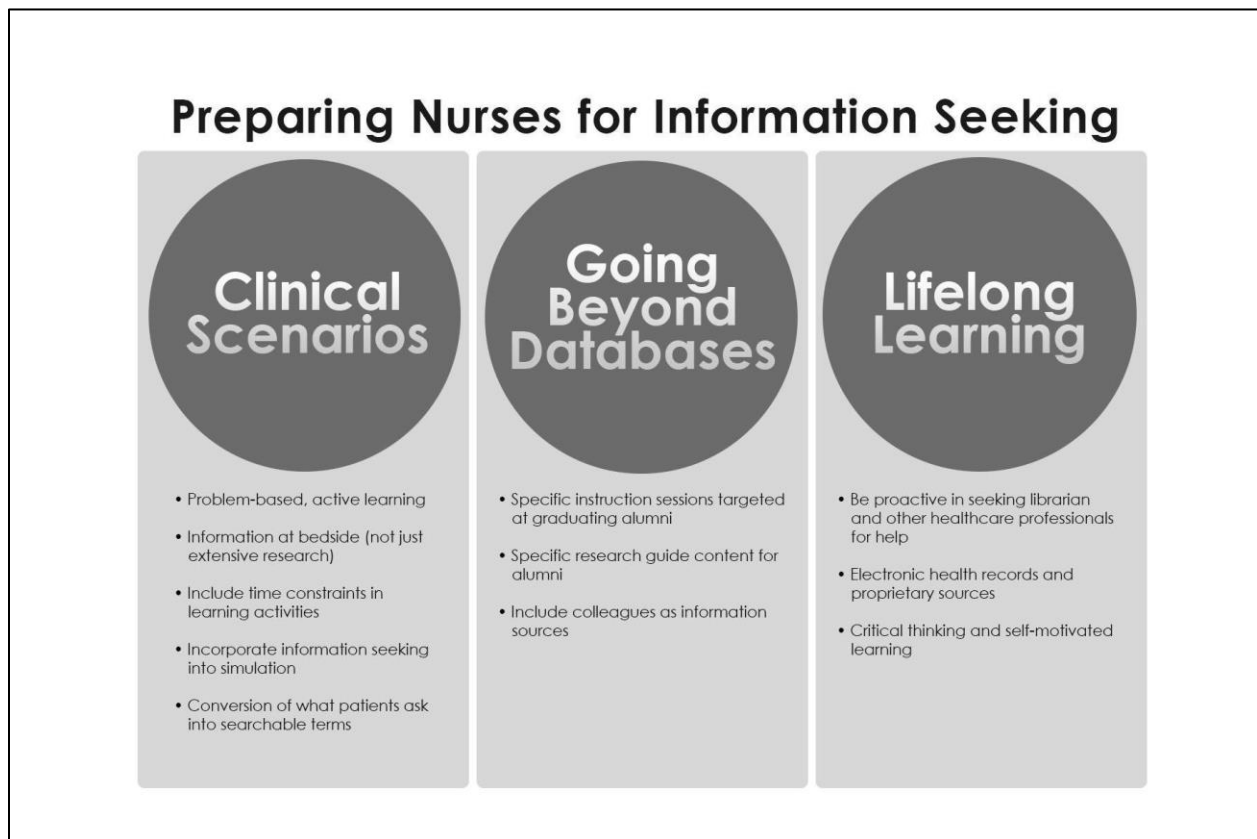


Figure 1. Researchers' suggested areas for preparing nurses for information seeking.

This study has significant implications for nursing information literacy instruction to facilitate knowledge transfer to the clinical setting. Conforming to the problematic research assignments described in Head and Eisenberg (2010), information literacy education in nursing is often focused on subscription-based article databases and finding sources for research paper assignments that span several weeks. While some respondents indicated that research-focused coursework was valuable to learn the research process, this survey showed that this type of information seeking is rare in the workplace. Nurses need to be prepared to access reliable information quickly during the course of their daily work. The researchers propose three new areas of emphasis: clinical scenarios, teaching beyond academic sources, and lifelong learning.

First, respondents indicated a desire for more active learning and clinical situations in information literacy sessions: they want instruction to mirror real life experience more closely. Hands-on, active exercises lead to improved student learning compared to delivering information through lecture (Maybee, Bruce, Lupton, & Rebmann, 2017). Faculty and librarians should collaborate on creating appropriate use cases and other clinical questions in assignments and instruction sessions. Educators can incorporate time constraints into learning activities in order to simulate the clinical information environment. For example, the researchers suggest integrating timed exercises where students seek information in a few minutes, then report if what they found was sufficient to inform their work. While this is a classroom-based activity, it can also be performed in patient simulation exercises to help students transfer their information skills to a clinical environment.

Second, teaching should not focus solely on traditional academic sources. Nursing students need to know what sources will be available to them after graduation; instruction sessions near

the end of the program and research guides for alumni will provide resources and guidance to new nurses. Students should be familiar with freely-available resources that provide reliable information (e.g., PubMed, Google Scholar). In addition, information literacy skills need to be taught in a way that encourages transferability from the academic environment to the professional one (Kuglitsch, 2015).

Third, it is important to teach and stimulate critical thinking skills and the importance of lifelong learning. Generic evaluation skills are often taught by librarians in general university curricula. Nursing students need further instruction on evaluating information in their professional context (Sleutel, Bullion, & Sullivan, 2018), especially because many of them turn to general Internet searches instead of academic sources. In addition, self-taught skills and on-the-job mentoring were very important to nurses. Educators can empower nursing students to teach themselves and each other when they encounter a new resource or interface. Educators should also introduce nursing students to colleagues as potential information sources and increase awareness of helpful co-workers such as hospital librarians. This type of interpersonal information seeking should not be considered a least-effort approach but rather quality-driven, seeking out trusted experienced colleagues (Xu, Tan, & Yang, 2006; Hertzum, 2014).

Implications for Partnering with Nursing Faculty

As the findings show, nursing faculty are important in teaching students to both find and evaluate information. Faculty subject expertise is essential to developing students' skills and is complemented by librarians' expertise in teaching information literacy. Faculty wishing to implement more authentic information seeking into their curricula partner with librarians on their campus to deliver expert instruction in this area, especially targeting using information in

clinical scenarios (Haines & Horrocks, 2006). Because information-seeking behaviours are built and reinforced over time, librarian involvement in scaffolding information literacy throughout curricula is more effective and engaging than having librarians present only at orientation or in a research-focused course (Johnson-Grau, Archambault, Acosta & McLean, 2016).

Librarians, while experts in information literacy, are not necessarily adept at developing authentic cases for either classroom or simulation instruction. The researchers encourage librarians to collaborate with nursing faculty to ensure their examples are specific and authentic to increase student engagement and learning (Carder, Willingham, & Bibb, 2001). Librarian involvement goes beyond research assignments; teaching students to seek information to inform care plans, answer patient questions, or resolve conflicting medical information would be useful in developing the skills the students will need in patient care. In involving nursing faculty in the creation of guides to curate resources in support of these activities, librarians can enhance the quality of their resources.

Since interpersonal sources are often consulted, it is important to help students learn how to critically evaluate information they learn from colleagues (Hertzum, 2014). Bachelor's-prepared nurses may be new to healthcare and orienting them to the wide variety of colleagues they will join, along with the information they can provide, is important. New nurses may be unaware that many hospitals have librarians who can assist with medical information searches (Dee & Stanley, 2005). Educating new nurses about the availability of librarians who can perform expert searches rapidly can free up nurses' time to provide patient care. The respondents had no problem contacting other health professionals for answers to their discipline-specific questions, e.g., asking pharmacists for drug information, medical laboratory technicians for questions about lab

tests, and physicians for diagnostic and treatment information; however, a lack of awareness of librarians may hinder their ability to provide evidence based care.

Study Limitations

All participating nurses received their education in the state of Utah and the majority were employed within the region. This limited geographic range might have affected the study results. It also should be noted that the response rate for this study was low, perhaps because busy nurses were intimidated by the estimated time commitment. In addition, the survey was long and not all participants completed all questions. Regrettably, the survey did not specifically ask nurses about their use of online or mobile apps as an information resource.

Conclusion

Through a survey, the researchers elucidated nurses' information-seeking behaviour and elicited suggestions for better preparation for finding and evaluating information. The results indicate discrepancies between the information environments of nursing school and professional nursing. Correspondingly, changes are necessary in nursing information literacy instruction to prepare nurses for the professional information environment. Emphasizing clinical scenarios, teaching beyond traditional academic sources, and encouraging lifelong learning skills will ensure students learn relevant, transferable skills in authentic settings. Lives depend on nurses delivering the best healthcare possible; it is imperative that librarians and educators enable nursing students to use information in the most effective way.

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Appendix A
Survey Instrument

1.	About this survey
2.	Do you want to take the survey? <input type="checkbox"/> Yes, I have a Bachelor of Science in Nursing graduate from one of the following institutions: Brigham Young University, Roseman University of Health Sciences, Southern Utah University, or the University of Utah <input type="checkbox"/> No thanks!
3.	Demographics
4.	Are you currently employed as a nurse? <input type="checkbox"/> Yes <input type="checkbox"/> No
5.	Where did you obtain your BSN degree? <input type="checkbox"/> Brigham Young University <input type="checkbox"/> Roseman University <input type="checkbox"/> Southern Utah University <input type="checkbox"/> University of Utah
6.	What year did you graduate with your BSN? <input type="checkbox"/> 2012 – 2017 (drop-down)
7.	What is the highest nursing degree that you have completed? <input type="checkbox"/> Bachelor's in Nursing <input type="checkbox"/> Master's in Nursing (including education, informatics, etc.) <input type="checkbox"/> Doctorate in Nursing (DNP, FNP, nursing education, etc.) <input type="checkbox"/> PhD in Nursing <input type="checkbox"/> Other, please specify: (fill in text)
8.	Are you currently enrolled in a graduate nursing degree program? <input type="checkbox"/> Yes <input type="checkbox"/> No
9.	Since graduating with your BSN, how many years have you been employed as a nurse? <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4+

10.	<p>Describe your employer or work setting. Please check ALL that apply.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Academic setting <input type="checkbox"/> Community clinic <input type="checkbox"/> Doctor's office <input type="checkbox"/> Government/Military <input type="checkbox"/> K-12 school <input type="checkbox"/> Nursing home/Long-term care facility <input type="checkbox"/> Non-hospital ambulatory care <input type="checkbox"/> General hospital <input type="checkbox"/> Research hospital <input type="checkbox"/> Specialty hospital <input type="checkbox"/> Teaching hospital <input type="checkbox"/> Other, please specify (fill in text)
11.	<p>Which of the following best describes the type of nursing work that you do. Please check ALL that apply.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Advanced practice nursing, please specify (fill in text) <input type="checkbox"/> Critical care nursing <input type="checkbox"/> Emergency nursing <input type="checkbox"/> Home health nursing <input type="checkbox"/> Labor and delivery nursing <input type="checkbox"/> Maternity nursing <input type="checkbox"/> Medical surgical nursing <input type="checkbox"/> Neonatal/Pediatric nursing <input type="checkbox"/> Oncology nursing <input type="checkbox"/> Orthopedic nursing <input type="checkbox"/> Perioperative nursing <input type="checkbox"/> Psychiatric/mental health nursing <input type="checkbox"/> Public health nursing <input type="checkbox"/> School nursing <input type="checkbox"/> Other, please specify (fill in text)
12.	<p>Information needs This section contains questions about information needs that might arise during your work day. For example, when a patient asks you whether her headache could be caused by the interaction of two medications she is currently taking, you might need information to be able to answer the question.</p>

13.	<p>Why do you look for information during your work? Please check ALL that apply.</p> <ul style="list-style-type: none"> <input type="checkbox"/> To answer administrative or policy questions <input type="checkbox"/> To answer patient questions <input type="checkbox"/> To clarify conflicting medical evidence <input type="checkbox"/> To consult clinical practice guidelines <input type="checkbox"/> To check clinical procedures <input type="checkbox"/> To determine best practices for patient care <input type="checkbox"/> To solve a clinical problem <input type="checkbox"/> To consult equipment manuals/processes <input type="checkbox"/> To keep up with the latest professional trends and news <input type="checkbox"/> To interpret laboratory data <input type="checkbox"/> To consult local practice data <input type="checkbox"/> To locate patient education materials or consumer health information <input type="checkbox"/> To interpret physical exam results <input type="checkbox"/> To solve problems you haven't seen before <input type="checkbox"/> To locate evidence about treatment modalities <input type="checkbox"/> To consult population statistics <input type="checkbox"/> To consult public health data <input type="checkbox"/> Other, please specify (fill in text)
*14.	<p>How often do you seek information to answer administrative or policy questions?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input type="checkbox"/> Rarely <input type="checkbox"/> Monthly <input type="checkbox"/> Weekly <input type="checkbox"/> Daily <input type="checkbox"/> Multiple times a day
*15.	<p>How often do you seek information to answer patient questions?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input type="checkbox"/> Rarely <input type="checkbox"/> Monthly <input type="checkbox"/> Weekly <input type="checkbox"/> Daily <input type="checkbox"/> Multiple times a day
*16.	<p>How often do you seek information to clarify conflicting medical evidence?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input type="checkbox"/> Rarely <input type="checkbox"/> Monthly <input type="checkbox"/> Weekly <input type="checkbox"/> Daily <input type="checkbox"/> Multiple times a day

*17.	<p>How often do you seek information to consult clinical practice guidelines?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input type="checkbox"/> Rarely <input type="checkbox"/> Monthly <input type="checkbox"/> Weekly <input type="checkbox"/> Daily <input type="checkbox"/> Multiple times a day
*18.	<p>How often do you seek information to check clinical procedures?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input type="checkbox"/> Rarely <input type="checkbox"/> Monthly <input type="checkbox"/> Weekly <input type="checkbox"/> Daily <input type="checkbox"/> Multiple times a day
*19.	<p>How often do you seek information to determine best practices for patient care?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input type="checkbox"/> Rarely <input type="checkbox"/> Monthly <input type="checkbox"/> Weekly <input type="checkbox"/> Daily <input type="checkbox"/> Multiple times a day
*20.	<p>How often do you seek information to solve a clinical problem?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input type="checkbox"/> Rarely <input type="checkbox"/> Monthly <input type="checkbox"/> Weekly <input type="checkbox"/> Daily <input type="checkbox"/> Multiple times a day
*21.	<p>How often do you seek information to consult equipment manuals and/or processes?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input type="checkbox"/> Rarely <input type="checkbox"/> Monthly <input type="checkbox"/> Weekly <input type="checkbox"/> Daily <input type="checkbox"/> Multiple times a day
*22.	<p>How often do you seek information to keep up with the latest professional trends and news?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input type="checkbox"/> Rarely <input type="checkbox"/> Monthly <input type="checkbox"/> Weekly <input type="checkbox"/> Daily <input type="checkbox"/> Multiple times a day

*23.	<p>How often do you seek information to interpret laboratory data?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input type="checkbox"/> Rarely <input type="checkbox"/> Monthly <input type="checkbox"/> Weekly <input type="checkbox"/> Daily <input type="checkbox"/> Multiple times a day
*24.	<p>How often do you seek information about local practice data?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input type="checkbox"/> Rarely <input type="checkbox"/> Monthly <input type="checkbox"/> Weekly <input type="checkbox"/> Daily <input type="checkbox"/> Multiple times a day
*25.	<p>How often do you seek information to locate patient education materials or consumer health information?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input type="checkbox"/> Rarely <input type="checkbox"/> Monthly <input type="checkbox"/> Weekly <input type="checkbox"/> Daily <input type="checkbox"/> Multiple times a day
*26.	<p>How often do you seek information to interpret physical exam results?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input type="checkbox"/> Rarely <input type="checkbox"/> Monthly <input type="checkbox"/> Weekly <input type="checkbox"/> Daily <input type="checkbox"/> Multiple times a day
*27.	<p>How often do you seek information to solve problems you haven't seen before?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Never <input type="checkbox"/> Rarely <input type="checkbox"/> Monthly <input type="checkbox"/> Weekly <input type="checkbox"/> Daily <input type="checkbox"/> Multiple times a day

*28.	How often do you seek information to locate evidence about treatment modalities? <input type="checkbox"/> Never <input type="checkbox"/> Rarely <input type="checkbox"/> Monthly <input type="checkbox"/> Weekly <input type="checkbox"/> Daily <input type="checkbox"/> Multiple times a day
*29.	How often do you seek information to consult population statistics? <input type="checkbox"/> Never <input type="checkbox"/> Rarely <input type="checkbox"/> Monthly <input type="checkbox"/> Weekly <input type="checkbox"/> Daily <input type="checkbox"/> Multiple times a day
*30.	How often do you seek information to consult public health data? <input type="checkbox"/> Never <input type="checkbox"/> Rarely <input type="checkbox"/> Monthly <input type="checkbox"/> Weekly <input type="checkbox"/> Daily <input type="checkbox"/> Multiple times a day
*31.	How often do you seek information about the other information need(s) you specified earlier? <input type="checkbox"/> Never <input type="checkbox"/> Rarely <input type="checkbox"/> Monthly <input type="checkbox"/> Weekly <input type="checkbox"/> Daily <input type="checkbox"/> Multiple times a day
32.	Briefly describe a recent moment at work where you struggled to make sense of a situation. How did you use information to move beyond that situation?
33.	Information sources This section contains questions about sources you use to get your information. The word "source" is used broadly; a source can be a research article or one of your colleagues.

34. How often do you use information from the following print sources?

	Never	Rarely	Monthly	Weekly	Daily	Multiple times a day
Handbooks (e.g. drug information handbook)						
Local education materials						

Manuals (e.g. Merck Manual)						
Medical reference books (e.g. dictionaries)						
Paper fact sheets / handouts						
Print journal						
Textbooks						

35. How often do you use information from the following electronic sources?

	Never	Rarely	Monthly	Weekly	Daily	Multiple times a day
BMJ Clinical Evidence						
CINAHL						
Clinical Key						
Cochrane Library						
Dynamed						
E-books						
Electronic patient record / Electronic health record / Electronic medical record						
Google Scholar						
National Guideline Clearinghouse						
PubMed / MEDLINE						
General search engines like Google/Bing/etc.						
UpToDate						
Websites with medical information						
Other point-of-care tool						
Other electronic source, please explain						

36. How often do you use information from the following interpersonal sources?

	Never	Rarely	Monthly	Weekly	Daily	Multiple times a day
Medical librarians						
Nursing colleagues						
Pharmacists						
Physicians						
Allied health professionals (e.g. physical therapists, occupational therapists, etc.)						
Social workers						
Other health professionals, please explain						

37. How often do you use information from the following educational sources?

	Never	Rarely	Monthly	Weekly	Daily	Multiple times a day
Conferences (conference presentations, posters, and/or proceedings)						
Courses						
In-service training						
Webinars						

38.	<p>Which options describe your access to full text copies of journal articles, papers, books, or other information sources? Please check ALL that apply.</p> <ul style="list-style-type: none"> <input type="checkbox"/> I don't know <input type="checkbox"/> Employer-provided access to journals, electronic databases, apps, and/or print materials <input type="checkbox"/> Employer-provided access to articles, guidelines, books, etc, upon request <input type="checkbox"/> Personal membership(s) in professional organizations or societies <input type="checkbox"/> Purchase with personal funds <input type="checkbox"/> Local academic library <input type="checkbox"/> Local public library <input type="checkbox"/> Professional contacts outside of my workplace <input type="checkbox"/> Other, please specify (fill in text)
39.	<p>Information Environment This section contains questions about the information environment in your workplace.</p>
40.	<p>In which of these clinical environments do you need information? Please check ALL that apply.</p>

	<input type="checkbox"/> Bedside <input type="checkbox"/> Chairside <input type="checkbox"/> Clinical rounds <input type="checkbox"/> Healthcare team meetings <input type="checkbox"/> Other, please specify (fill in text)
41.	<p>In which of these clinical environments can you access information? Please check ALL that apply.</p> <input type="checkbox"/> Bedside <input type="checkbox"/> Chairside <input type="checkbox"/> Clinical rounds <input type="checkbox"/> Healthcare team meetings Other, please specify (fill in text)
42.	<p>Does your workplace have a library, or other centralized information resource center?</p> <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unsure
**43.	<p>Who has access to the library or similar space? Please check ALL that apply.</p> <input type="checkbox"/> All employees/personnel <input type="checkbox"/> Certain employees/personnel <input type="checkbox"/> Patients <input type="checkbox"/> General public <input type="checkbox"/> Unsure
**44.	<p>Does a librarian or other information professional work in this space?</p> <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unsure
**45.	<p>Is there a librarian or other information professional available for you to contact?</p> <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unsure
46.	<p>What kind of device(s) do you typically use for finding clinical information at work? Please check ALL that apply.</p> <input type="checkbox"/> Employer supplied computer <input type="checkbox"/> Employer supplied phone <input type="checkbox"/> Employer supplied tablet <input type="checkbox"/> Personal computer <input type="checkbox"/> Personal phone <input type="checkbox"/> Personal tablet <input type="checkbox"/> Other, please specify (fill in text)

47.	Do you have access to the Internet at work? Please check ALL that apply. <ul style="list-style-type: none"> <input type="checkbox"/> Yes, on a shared computer <input type="checkbox"/> Yes, on a personal computer <input type="checkbox"/> Yes, on a mobile device <input type="checkbox"/> Yes, but Internet access is restricted (e.g. with a firewall or other security measures) <input type="checkbox"/> No <input type="checkbox"/> Other, please specify (fill in text)
48.	Barriers to finding, accessing, and evaluating information This section contains questions about problems you may face as you navigate your information needs.

49. Which barriers, if any, keep you from **accessing** information efficiently and effectively?

	Not at all a barrier	Minimal barrier	Moderate barrier	Substantial barrier
Expertise or training in accessing information				
Access to technology				
Cost				
Time constraints				
Training on technology				
Training on using information sources				
Other, please specify (fill in text)				

50. Which barriers, if any, keep you from **evaluating** information efficiently and effectively?

	Not at all a barrier	Minimal barrier	Moderate barrier	Substantial barrier
Expertise or training in accessing information				
Access to technology				
Cost				
Time constraints				
Training on technology				
Training on using information sources				
Other, please specify (fill in text)				

51.	Do you have any other comments about barriers or constraints to accessing and evaluating information that you would like to share?
52.	Education/Instruction This section contains questions about how you learned and developed the skills to access and evaluate information at your workplace. The instruction may have happened inside or outside of a classroom, and may have been formal or informal.

53. How important were the following in learning to **find** information?

	Important	Somewhat important	Neutral	Somewhat unimportant	Unimportant	N/A
Self-taught skills						
On-the-job mentoring/training						
Nursing school faculty						
Nursing school librarian						
Other higher education						
High school or earlier						

54. How important were the following in learning to **evaluate** information?

	Important	Somewhat important	Neutral	Somewhat unimportant	Unimportant	N/A
Self-taught skills						
On-the-job mentoring/training						
Nursing school faculty						
Nursing school librarian						
Other higher education						
High school or earlier						

55.	<p>If you seek help searching for information (e.g. tips on specific search strategies, tools, or sources), where do you get that help? Please check ALL that apply.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Healthcare colleagues other than nurses in my workplace <input type="checkbox"/> Healthcare colleagues other than nurses outside my workplace <input type="checkbox"/> Librarian or other information professional in my workplace <input type="checkbox"/> Librarian or other information professional at a public, academic, or other library in my community <input type="checkbox"/> Nursing colleagues in my workplace <input type="checkbox"/> Nursing colleagues outside my workplace <input type="checkbox"/> Online social networks, such as Twitter or Facebook <input type="checkbox"/> Other, please specify (enter text)
56.	<p>If you seek help evaluating information, where do you get that help? Please check ALL that apply.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Healthcare colleagues other than nurses in my workplace <input type="checkbox"/> Healthcare colleagues other than nurses outside my workplace <input type="checkbox"/> Librarian or other information professional in my workplace <input type="checkbox"/> Librarian or other information professional at a public, academic, or other library in my community <input type="checkbox"/> Nursing colleagues in my workplace <input type="checkbox"/> Nursing colleagues outside my workplace <input type="checkbox"/> Online social networks, such as Twitter or Facebook <input type="checkbox"/> Other, please specify (enter text)
57.	<p>What are some of the things you look for when evaluating information? For example, if you were searching for evidence-based articles, how would you determine their suitability to answer your clinical question?</p>
58.	<p>How do you stay up to date with information in your field? Please check ALL that apply.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Conferences <input type="checkbox"/> Continuing education (CEUs) <input type="checkbox"/> Interacting with colleagues who are up to date <input type="checkbox"/> Listservs <input type="checkbox"/> Personal reading <input type="checkbox"/> Professional organizations <input type="checkbox"/> Social Media <input type="checkbox"/> Webinars <input type="checkbox"/> Other, please specify (enter text)
59.	<p>How could your nursing education have better prepared you to find and evaluate information?</p>

60.	<p>How confident are you at explaining what kind of information you need (e.g. what sources to use)?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Not at all confident <input type="checkbox"/> Somewhat confident <input type="checkbox"/> Moderately confident <input type="checkbox"/> Very confident <input type="checkbox"/> Completely confident
61.	<p>How confident are you with finding information (e.g. selecting a database, creating and refining a search strategy, and managing the information you get back)?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Not at all confident <input type="checkbox"/> Somewhat confident <input type="checkbox"/> Moderately confident <input type="checkbox"/> Very confident <input type="checkbox"/> Completely confident
62.	<p>How confident are you with evaluating the quality and relevance of the information you find?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Not at all confident <input type="checkbox"/> Somewhat confident <input type="checkbox"/> Moderately confident <input type="checkbox"/> Very confident <input type="checkbox"/> Completely confident
63.	<p>How confident are you with applying the information you find to a problem or creating a product (memo, presentation, paper) to share what you learned with others?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Not at all confident <input type="checkbox"/> Somewhat confident <input type="checkbox"/> Moderately confident <input type="checkbox"/> Very confident <input type="checkbox"/> Completely confident
64.	<p>How confident are you with understanding the economic, legal, and social issues surrounding information (e.g. ethical use of information, familiarity with laws, regulations, and institutional policies about using and sharing information, citing your sources)?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Not at all confident <input type="checkbox"/> Somewhat confident <input type="checkbox"/> Moderately confident <input type="checkbox"/> Very confident <input type="checkbox"/> Completely confident
65.	<p>Please provide any additional comments that you have about your information needs and barriers.</p>
66.	<p>Thank you for taking the survey! Would you like to enter your name and email for the gift card drawing?</p> <ul style="list-style-type: none"> <input type="checkbox"/> Yes <input type="checkbox"/> No

* Questions 14 – 31 only displayed if the respondent checked the option that they sought information for that particular reason in question 13.

** Questions 43 & 44 displayed if the answer to question 42 was yes; question 45 displayed if the answer to question 42 was no.