Comparison of baseline information literacy skills of undergraduate and graduate nurses at the University of Queensland: A pilot study by health librarians - Part Two.

Jenny Hall  Stephanie Nunan  Ruth Foxlee  Kerri Holzhauser

The study aimed to evaluate the effectiveness of library information workshops. A pilot study comparing the baseline information literacy knowledge of undergraduate and graduate nurses was undertaken.

**Intervention**

Undergraduate nursing students and graduate nurses attended Library information skills workshops that were developed and conducted by two UQ Health Sciences liaison librarians, with every effort made to ensure consistency in the workshop content.

Both librarians delivered a Microsoft PowerPoint presentation followed by hands-on activities. Various techniques were used to make the information skills workshops interactive including teaching the anatomy of a citation and then searching for the journal title in the catalogue, this activity was followed by a further citation example with the participants asked to find the article via the library catalogue unassisted by the librarian. The clinically relevant question was developed and formed the basis of effective searching exercise employing a four step approach:

1. Ask a question
2. Identify key concepts
3. List synonyms or like terms
4. Use of Boolean Operators

The librarian facilitated a brain storming activity with participants to identify key concepts and synonyms and discussed the use of truncation tools and wildcards. The database searching component was based on the key concepts, synonyms and truncation tools identified by participants. A quiz was used at the end of the workshop to reinforce key concepts of the workshop. The group were divided into two teams and verbally asked five questions relating the content of the workshop.

The librarians developed the content, mode of delivery and resources to ensure there was minimal difference between each workshop. The intervention was conducted twice with one librarian providing the intervention and the other present to observe.

**Survey Tool**

For the purpose of the study a survey tool was developed to assess information literacy. The literature search identified several tools for assessing information literacy; however they did not address all the aspects of information literacy in which we were interested. Also due to time constraints the survey needed to be concise. A multi-choice questionnaire was developed for the information literacy section of the tool as it was an appropriate method to measure a body of knowledge (15p.21). The tool consisted of four demographic questions, three computer skills
questions and eight questions relating to the appropriate use of the library catalogue and databases to obtain specific information. The initial questions were generated by the research team based on latest evidence, current practices and the workshop content.

**The Stem**

The eight question stems uses a combination of questions or partial sentences that require completion. Where partial sentences are used, the section missing was consistently at the end of the sentence. Haladyna (15) recommends missing sections of sentences at the beginning or middle of a sentence should be avoided to assist the understanding of the question.

**The Key**

Each multi-choice question (MCQ) was analysed to ensure only one key (correct answer) was present. Care was taken not to use a repeating pattern in the key placement and an attempt was made to evenly distribute the key across the eight questions. This proved difficult as the number of distractors used per question was not consistent.

**Distractors**

Distractors are the responses that are clearly incorrect to those who understand the question but may be plausible to those who do not have a good grasp of the knowledge related to the question. Generally four distractors were included in the response with one being an “I don’t know” response. There is some debate about the use of “I don’t know” responses as a discriminator (15) distractor was included to reduce the number of guesses respondents made on questions they were unable to answer.

**Reliability**

Reliability was measured using Kuder-Richardson formula 20 (KR-20) for the dichotomous incorrect/correct responses and Chronbach’s alpha for the responses of the MCQ. The reliability of the dichotomous responses using KR-20 was 0.44. The reliability of the non-dichotomous responses using Chronbach’s alpha was 0.78. There was a clear discrepancy in reliability between the two tests. This may be due to the small number of questions within the tool.

**Validity**

Validity was undertaken using a panel of six experts in the fields of library and information science and nursing research to evaluate the content of the items. The expert panel was asked to assess each item for clarity, adequacy of wording, appropriateness for the population being tested and relevance. Prior to piloting the instrument, minor changes to wording and questions were made on the suggestions of the panel.

**Key Check**

A key check was conducted once the items had been selected. This ensured the key was the correct answer and there were no other correct answers present within the discriminators.

**Item discrimination analysis**

Item discrimination analysis was undertaken to examine how each MCQ related to the overall test performance. A point-biserial correlation \( r_{pb} \) was conducted to analyse the relationship between each MCQ and the overall test score. The \( r_{pb} \) ranges from 0.15 - 0.68.

**Results**

Eighty-six pre-test questionnaires were distributed to undergraduate nursing students in the workshops and 61 were returned (70.9% response rate).

Thirty-two post-test questionnaires were distributed and all were returned (100% response rate). Eighteen pre-test questionnaires were
distributed to graduate nurses in the workshops and 18 were returned (100% response rate). The post-test response rate was also 100% for graduates with 13 questionnaires distributed and returned.

The majority of participants who had completed the pre-test questionnaire had English as a first language (undergraduates 93.4%, graduates 94.4%), and were females aged between 17-24 years (undergraduates 70.5%, graduates 72.2%). Among undergraduates, 67.3% reported using email several or more times per week vs. only 29.4% of graduates. Internet use among undergraduates was also higher; 82% reported using the Internet several or more times per week vs. 64.7% of graduates. Almost all participants used Microsoft Office programs (undergraduates 98.4%, graduates 100%).

New graduate nurses had better baseline information literacy than the undergraduate students (Table 1). The most difficult concepts for both groups were Boolean logic and locating journal articles using the Library catalogue. Overall the study suggests both groups benefited from the library workshops; with performance in the following areas increasing to 100% post-test for questions on the purpose of catalogue, differentiating between a book and journal article and identifying keywords in a scenario.

Undergraduates performed poorly on most of the pre-test questions except for defining a bibliography (pre-test 98% vs. post-test 100%) and identifying keywords in a clinical scenario (pre-test 98% vs. post-test 100%). After the library workshops improvement was apparent on most questions though two areas of weakness remained (Table 1). On the questions about locating a full copy of a cited journal article (37% correct pre-test vs. 38% correct post-test (Figure 1)) and the use of Boolean operators (42% correct pre-test vs. 44% correct post-test (Figure 2)), the impact of the intervention was minimal. These were areas where baseline knowledge was poor and a single training session did not have any significant impact.

Graduates performed highly on most of the pre-test questions such as finding current information on a topic (pre-test 89% vs. post-test 100%). They did not perform as well on locating a full copy of a cited journal article, but did show a statistically significant improvement post-test on this question (17% correct vs. 69% correct, p=0.003 (Figure 1)). Their understanding of Boolean logic also improved (50% correct vs. 69% correct, p=0.388 (Figure 2)).

Discussion

The undergraduate cohort appeared to grasp most of the concepts covered in the one-hour library workshop. Their strong baseline understanding of how to draw key concepts from a clinical scenario was at odds with anecdotal reports from other UQ health librarians and research (Ellis and Salisbury, 2004). These results may point to higher research expectations of secondary schools in recent times and that some of the concepts learnt in the school system were readily transferred to the university environment. The graduates performed well on most of the pre-test questions and achieved 100% correct post-test on four out of eight questions. They did not show the same degree of improvement as the undergraduates but this may be due to their stronger baseline knowledge.

Marked improvement on most questions post-test suggests the library workshops may have a beneficial effect. It is possible that undergraduates misinterpreted the question on locating a cited reference as many of them circled more than one answer. Poor pre and post-test performance by both groups on the Boolean logic question may relate to the fact that insufficient workshop time is devoted to these concepts and that more concrete teaching strategies need to be used to help participants understand how to use the AND, OR, NOT operators. In addition a tiered
approach to information skills training may help undergraduates to build and reinforce skills and contribute to the achievement of the University's graduate attributes.

Even though the graduates answered more questions correctly at baseline, their poor performance on some questions was surprising as all had completed a Bachelor of Nursing degree within the previous 12 months. There was an expectation by the researchers that information skills would have been acquired, reinforced and firmly embedded over a three year degree. Informal comments by participants at the end of the workshops may help shed light to their performance:

"I wish we learnt these searching techniques at the beginning of our degree", "Why didn't we learn this throughout our degree", "My degree would have been so much easier if I knew about searching properly" and "I thought this workshop would be boring, but instead it was fun and I learnt lots".

These comments highlight the need to include an item on the questionnaire to establish where they undertook their undergraduate degree. This would provide data on information literacy outcomes of graduate nurses from other universities.

In addition, Barnard, Nash and O'Brien (2005, p.507) noted recently that the "development of information literacy skills in baccalaureate nursing programs has often been addressed unsystematically..." The graduate nurse pre-test performance should act as a reminder to health librarians that it is unwise to make assumptions about the information literacy of graduates. It is important to include an introduction to library services and the concepts of effective searching to all new staff members as part of their orientation process. Health professionals work in an ever changing, information rich environment which requires reasonable levels of information literacy to enable the use of the literature for clinical decision making. To that end, it is imperative that we ensure undergraduate nurses leave their degrees with strong information literacy skills in order to practice in a safe and considered way as nursing professionals.

**Study Limitations**

This study used a simple interrupted time-series design so it was impossible to establish a causal association between the workshops and improved information literacy skills. The observed improvement may only be a temporary effect or due to a normal skill development process not the intervention specifically. Without a control group who received no information skills intervention it is impossible to safely attribute any improvement in skill level to the training alone. In addition study numbers were low, particularly new graduates. The small sample size may have masked additional differences between the groups.

Although these are the pilot data, the results could be viewed as promising. Further investigation with larger sample sizes will elaborate on the current findings.

**Implications for Practice**

The study is important to other hospital staff and educators because it is often assumed that students who complete a degree have a high level of information literacy and therefore have the foundations necessary for evidence based practice (EBP). Our pilot study showed that it is important to revisit, at least some information literacy concepts (e.g. Boolean logic) with graduate nurses. The barriers to nurses' use of the literature should be recognised with appropriate strategies formulated to bridge the divide between nursing practice and nursing research. Barnard, Nash and O'Brien (2005) discuss the importance of integrating information literacy skills into the undergraduate nursing curriculum to ensure a high level of research skill...
is achieved providing a foundation for evidence-based practice. The “one shot” workshop may be effective as a catalyst for change, but it is important that a tiered approach to training be undertaken for both undergraduates and graduates. This can prove to be a challenge because the library competes with academic and clinical imperatives to get any teaching time with undergraduate and graduate nurses. Most academic and hospital libraries conduct information literacy workshops on a regular basis, however the comments made by the graduate nurses may indicate they are not as well as they could be.

The researchers recently received ethical clearance for a further three year period with the extension to include other health sciences students and new graduate nurses at other UQ hospital campuses.

Conclusion

This pilot study examined the baseline information literacy knowledge of undergraduate nursing students and newly graduated nurses. It indicated that there may be some improvement in information literacy skills after a library workshop, but it also highlighted the need to focus more heavily on Boolean logic and finding journal articles particularly for undergraduate students. It also indicated that a one-hour, one-off workshop may not be enough to adequately cover these more difficult concepts. The graduate nurses had better baseline information literacy skills however they still did not perform as well as expected given their tertiary qualifications. Even though they may have some prior knowledge of information literacy concepts it is important to include an introduction to library services and effective literature searching to all new staff members as part of their orientation process.

References

Table 1 Percentage of correct answers to eight information literacy questions pre-test and post-test for undergraduate nursing students and new graduate nurses

<table>
<thead>
<tr>
<th>Question</th>
<th>University of Queensland undergraduate nursing students</th>
<th>Princess Alexandra Hospital new graduate nurses N=18</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-test</td>
<td>Post-test</td>
</tr>
<tr>
<td>Purpose &amp; use of the library catalogue</td>
<td>n=61</td>
<td>n=32</td>
</tr>
<tr>
<td></td>
<td>59%</td>
<td>100%</td>
</tr>
<tr>
<td>Finding the most current information on a topic</td>
<td>n=61</td>
<td>n=32</td>
</tr>
<tr>
<td></td>
<td>57%</td>
<td>84%</td>
</tr>
<tr>
<td>Defining a bibliography</td>
<td>n=61</td>
<td>n=32</td>
</tr>
<tr>
<td></td>
<td>98%</td>
<td>100%</td>
</tr>
<tr>
<td>Locating a full copy of a cited journal article</td>
<td>n=61</td>
<td>n=32</td>
</tr>
<tr>
<td></td>
<td>37%</td>
<td>38%</td>
</tr>
<tr>
<td>Differentiating between book &amp; journal references</td>
<td>n=61</td>
<td>n=32</td>
</tr>
<tr>
<td></td>
<td>54%</td>
<td>81%</td>
</tr>
<tr>
<td>Best way to locate journal articles</td>
<td>n=61</td>
<td>n=32</td>
</tr>
<tr>
<td></td>
<td>38%</td>
<td>77%</td>
</tr>
<tr>
<td>Using Boolean logic</td>
<td>n=61</td>
<td>n=32</td>
</tr>
<tr>
<td></td>
<td>42%</td>
<td>44%</td>
</tr>
<tr>
<td>Identifying keywords in a clinical scenario</td>
<td>n=61</td>
<td>n=32</td>
</tr>
<tr>
<td></td>
<td>98%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure 1 Percentage of correct answers to the questions about locating a copy of a cited article via the catalogue for undergraduate nursing students and new graduate nurses, pre-test vs. post-test.
Health Technology Assessment Activities in Australasia
- Presentation at the HTAi International Conference – Resource Group Workshop – Adelaide July 2006

Catherine Voutier - Information & Research Officer, Centre for Clinical Effectiveness, Monash Institute of Health Services Research.

"I am running an update of this presentation at the 3rd Clinical Librarianship Conference in York, June 2007. There has been some changes, which I have noted here:

1. MTAG has been re-branded and is now known as IMS Pricing & Market Access
2. HTAnalysts no longer undertake HTAs for MSAC but they do act as MSAC advisors
3. MSAC have introduced a new publication called ‘MSAC Update’ which will summarise recent recommendations and profile various MSAC members
4. HTAAnalysts and AHTA have both updated their websites although access to AHTA publications remain problematic

The updated presentation will be available from the conference website.


What is Health Technology Assessment (HTA)? HTA, as described by the NLM National Information Center on Health Services Research and Health Care Technology’s HTA 101 Glossary, is: HTA is the systematic evaluation of properties, effects, and/or impacts of health care technology. It may address the direct, intended consequences of technologies as well as their indirect, unintended consequences. Its main purpose is to inform technology-related policymaking in health care. HTA is conducted by interdisciplinary groups using explicit analytical frameworks drawing from a variety of methods.

Reports authored by the organisations below can be found on their websites, on the MSAC website and (INAHTA organisations) in the CRD HTA database.