

Information skills training in health libraries: are we any nearer the evidence?

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Abstract

Introduction: For some time health librarians have been wondering whether the training they provide is effective (Eldredge, 2001) and two systematic reviews have attempted to find answers (Brettle, 2003; Garg and Turtle, 2003). Both reviews concluded that there was only limited evidence (based on weak research studies) that training improves search skills, there was no evidence about different types of training and nor was there any evidence of the impact of training on patient care. A further conclusion (Brettle, 2003) was that until objective and validated measures of evaluating training were used, it would be impossible to determine whether training was effective. More recently Australian librarians were still asking questions regarding the effectiveness of training clinicians to perform literature searches (Lewis and Cotter, 2006). This presentation updates a systematic review presented at the first EBL conference in 2001 and questions whether, at EBLIP4, we are any nearer to finding evidence to aid health librarians in their practice?

Question: To examine whether training improves searching skills; to identify effective methods of training; to examine whether training effects patient care; to determine the availability/use of objective and validated outcome measures.

Data sources: Searches of ERIC, LISA, MEDLINE, CINAHL, personal collection of material, handsearch of Journal of Medical Library Association and Health Information and Libraries Journal

Study selection: Studies had to meet all the following criteria to be included in the updated review: Studies published post 2001 (cut off date for previous systematic review); health related (ie study on trainee or qualified clinicians in either academic or clinical setting); study examining information skills training (defined as: training that included searching electronic databases such as Medline, searching the Internet, finding information for patient care or searching for information in relation to evidence based practice); any research
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design using an objective outcome measure (ie one that measures change in knowledge/skills)

Data Extraction: Data was extracted by the author using a tool adapted for the purposes of the study. This was based on tools developed by the University of Salford (HCPRDU, 2003) for critically appraising different types of research evidence and the ReLIANT data extraction tool (Koufogiannakis et al, 2006).

Results: 51 studies met the inclusion criteria for the updated review. An interim analysis of the first 25 studies shows that there is some evidence that information skills training improves skills, knowledge and confidence. Only 4 studies consider the effect of training on patient care. 84% studies use objective outcome measures, but very few of these have proven validity and reliability.

Conclusion: Research in this field has greatly increased and is improving in quality, but perhaps not as greatly as one would hope. The conclusions of the updated review together with the studies located for the original systematic review and early studies excluded from the initial review should determine whether health librarians are indeed any nearer the evidence.

Introduction

For some time health librarians have been wondering whether the training they provide is effective (Eldredge, 2001) and two systematic reviews have attempted to find answers (Brettle, 2003; Garg and Turtle, 2003). Both reviews concluded that there was only limited evidence (based on weak research studies) that training improves search skills, there was no evidence about different types of training and nor was there any evidence of the impact of training on patient care. A further conclusion (Brettle, 2003) was that until objective and validated measures of evaluating training were used, it would be impossible to determine whether training was effective. More recently Australian librarians were still asking questions regarding the effectiveness of training clinicians to perform literature searches (Lewis and Cotter, 2006). This paper updates a systematic review presented at the first EBL conference in 2001 (Brettle, 2003) and questions whether, at EBLIP4, we are any nearer to finding evidence to aid health librarians in their practice? The questions the updated review aims to answer are the same as the first: To examine whether training improves searching skills; to identify effective methods of training; to examine whether training effects patient care. In addition the review will examine whether more objective and validated outcome measures are more widely used.

Methods

Search strategy

Electronic searches were undertaken February to March 2007. Searches of ERIC, LISA and Medline repeated the original searches (Brettle, 2003) and were conducted from 2002 onwards (the date the original searches were last run). Searches were also developed and run on the same databases, plus CINAHL for related projects (Brettle, 2005 and Brettle, 2006) and these searches were also rerun up to March 2007. This resulted in a total of 5301 potentially relevant references. Combinations of free text and subject heading searches were used. Examples of search terms used can be found in Box 1. Handsearches of Health

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Information and Libraries Journal and Journal of the Medical Library Association were also conducted from 2002 – issue 1 2007.

Information retrieval or online searching or databases or information literacy or CD-ROM or computer literacy or literature searching or bibliographic instruction

AND

User training or education or training or library instruction

For searches of non health related databases the following terms were added

AND

Health* or clinic*

Box 1: Examples of search terms used

The titles and abstracts of each of the references found were screened for relevance, 5228 references were excluded at this point (as they didn't fit inclusion criteria or were duplicates), leaving 73 potentially relevant references. These were loaded onto Endnote reference management software. These were further screened and 22 were removed (4 duplicate papers; 3 grey literature reports; 13 didn't meet the inclusion criteria; 2 papers describing the same study were combined; leaving a total of 51 studies for inclusion in the review.

Study selection

Studies had to meet all the following criteria to be included in the updated review: Studies published post 2001 (cut off date for previous systematic review); health related (ie study on trainee or qualified clinicians in either academic or clinical setting); study examining information skills training (defined as: training that included searching electronic databases

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such as Medline, searching the Internet, finding information for patient care or searching for information in relation to evidence based practice); any research design using at least one outcome measure that examines change in knowledge/skills.

Data Extraction

Data was extracted by the author using a tool adapted for the purposes of the study. This was based on tools developed by the University of Salford (HCPRDU, 2003) for critically appraising different types of research evidence and the ReLIANT data extraction tool (Koufogiannakis et al, 2006). A summary of the data extracted from each study was copied into an Exel spreadsheet in order to analyse the results which are presented below.

Quality

A crude measure of quality was applied to each study – poor, average, good or excellent.

This was based on:

1. Sufficient reporting of data
2. Appropriateness of study design
3. Appropriate sample size/selection
4. Accounting for potential bias

A study would be classed as excellent if it met all of these conditions, a study meeting less than these would be marked accordingly. For example an appropriately designed randomized controlled trial with low power would be marked as good, and one which appeared well designed, with appropriate sample size but insufficient reporting of much of the other data would be graded as average.

Results

To date 25 of the 51 papers have been extracted and critically appraised. A summary of the results of these are presented below. A full list of the papers to be included in the review is provided in appendix 1. Those whose results are included below are marked with an

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asterisk. More up to date results will be presented at EBLIP4. Note: All the numbers of studies and percentage calculations relate to the 25 papers that have been reviewed to date.

Location and participants

Table 1 shows that the majority of studies were carried out in the United States, with the UK following a close second.

Country	Number of Studies	% Studies
US	12	48
UK	8	32
Australia	0	0
Other-Europe	2	8
Canada	1	4
Other	2	8
Total	25	100

Table 1: Location of studies

Table 2 shows that the majority of studies took place in an academic setting, but about a third were undertaken in clinical practice.

Setting	Number of Studies	% Studies
Academic-medical	13	52
Academic-nursing	2	8
Academic-PAM	1	4
Clinical practice	9	36
Practice library	0	0
Other	0	0
Total	25	100

Table 2: Study setting

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Table 3 shows that the majority of studies (just under half) were carried out on undergraduates, however this was closely followed by a third of the studies being carried out on practicing clinicians (medical staff, nurses or professions allied to medicine)

Participants	Number of Studies	% Studies
Undergraduates	11	44
Post graduates	2	8
Resident	3	12
Practice	9	36
Total	25	100

Table 3: study participants

The Teaching

Table 4 shows that the most popular teaching methods were hands on or didactic teaching. Web based tutorials were used in 5 studies and in 5 of the papers it was impossible to determine what method of teaching was used (NC=not clear). Studies of clinical librarians were included as the papers described studies where teaching was a significant part of the role. However studies of clinical librarianship were not expressly sought.

Teaching Method	Number of Studies	% Studies
Didactic	11	25
Demo	3	6.82
Hands on	14	31.82
1 on 1	2	4.55
Distance	1	2.27
Web tutorial	5	11.36
Outreach	2	4.55
Clinical librarian	1	2.27
Not clear (NC)	5	11.36
Total	25	100

Table 4: Teaching method

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Topic taught

A wide range of topics were taught throughout the studies. Not all were explicitly carried out by librarians and many referred to the teaching of evidence based practice (of which information skills are a part) rather than the teaching of information skills or information literacy. Studies about evidence based practice which didn't include an information component were excluded, of those which included an information component, the majority of the analysis for this study focused on the information component rather than the remaining components. In most studies more than one of the following topics were taught – hence the sum does not equal 25.

Topic taught	Number of Studies	% Studies
Database searching	19	26.39
Question formulation	19	26.39
Critical appraisal	7	9.72
Sources	13	18.06
Referencing	1	1.39
Applying evidence to practice	2	2.78
Evaluating practice	1	1.39
Selecting articles	3	4.17
CATs	1	1.39
Library orientation	0	0
Internet	0	0
History of Medline	0	0
Research Methods	2	2.78
Computer literacy	1	1.39
Not clear (NC)	3	4.17
Total	72	100

Table 5: Topics taught

Table 5 shows that the two most common topics (taught in almost every study) were database searching and question formulation. Sources of evidence/information was also taught in a high number of studies. In three studies, it was not possible to determine what topics were taught.

Contact time

Teaching contact time varied greatly between the studies. However in the majority of studies there was more than 6 hours of teaching provided. This should be viewed with caution, however as the majority of these studies were in relation to evidence based practice courses where the contact time for the whole study has been reported rather than just the information related component. In a significant number of studies, however, it was not possible to determine the length of contact time. Table 6 shows a breakdown.

Contact time	Number of Studies	% Studies
Up to 1 hour	1	4
1-2 hours	3	12
3-5 hours	2	8
6+ hours	10	40
Not clear (NC)	9	36
Total	25	100

Table 6: Contact time

Quality of studies

Although experimental designs such as randomized controlled trials are often deemed to be of the highest quality, an RCT can still be poorly conducted and equally qualitative studies can be excellent. Although some studies employed randomized controlled designs, most of the studies extracted to date were of a pre experimental design. Table 7 shows the designs used in the studies examined to date. The definitions and categorizations of study design were taken from Robson (2002).

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Study type	Number of Studies	% Studies
RCT	5	20
Quasi experimental	2	8
Pre experimental	11	44
Longitudinal	3	12
Qualitative	3	12
Survey	1	4
Cross sectional	0	0
Case study analysis	0	0
Descriptive	0	0
Total	25	100

Table 7: Study design

As noted above a crude measure of quality was applied to each study, and using this measure it can be seen that the majority of studies were classed as average with almost a quarter being classed as good or poor. Only 1 study was classed as excellent.

Quality	Number of Studies	% Studies
Poor	7	28
Average	10	40
Good	7	28
Excellent	1	4
Total	25	100

Table 8: Quality

Does training improve skills, knowledge, confidence or patient care and is this sustained over time?

One of the main aims of the review was to determine whether training improved skills.

When extracting data it was noted whether the training had a positive, negative or neutral effect on skills. In some cases (n=11) this wasn't clear or reported. Some studies claimed

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to study the impact on skills and reported positive results. However a close examination of the study and in particular the outcome measures used suggested that the study was measuring knowledge rather than skills. For example a number used multiple choice questionnaires and suggested that database searching skills improved. However the ability to answer a multiple choice question about database searching correctly does not necessarily demonstrate that these skills have been learned in practice, therefore in these cases the effect on skills was classed as Not Clear and recorded as a positive improvement in knowledge/confidence. Table 9 shows that 11 studies report a positive change in skills, but in the same number of studies it was unclear or unreported whether skills had changed. No studies reported that skills decreased as a result of training.

Change in skills	Number of Studies	% Studies
Positive	11	44
Negative	0	0
Neutral	3	12
Not clear/Not reported	11	44
Total	25	100

Table 9: Change in skills

As noted above, a number of studies were measuring changes in knowledge or confidence post training rather than actual changes in skills (in some studies this is what they had set out to measure).

Change in knowledge/confidence	Number of Studies	% Studies
Positive	15	44
Negative	0	0
Neutral	4	12
Not clear/Not reported	6	44
Total	25	100

Table 10: Change in knowledge/confidence

Table 10 shows that the majority reported a positive impact in this area with a few showing neutral results. Almost a quarter of studies didn't measure or report this variable or it was unclear from the results.

Very few studies reported on the effect of training on patient care (n=4). Three of these reported a positive impact and 1 reported a neutral impact.

Effect on patient care	Number of Studies	% Studies
Positive	3	12
Negative	0	0
Neutral	1	4
Not clear/Not reported	21	84
Total	25	100

Table 11: Effect of training on patient care

Determining the effects of training over time is not possible from these results. Table 12 shows that studies demonstrated a wide variation in the times that measurements were taken and in over half the studies (n=14) it was not possible to determine how long after training the measurements were taken. One study undertook the measurements immediately post training and a fifth examined effects either up to 6 weeks post training or 6 months.

Last measurements taken	Number of Studies	% Studies
Immediate	3	4
Up to 6 weeks	0	20
Up to 6 months	1	20
Up to 1 year	0	0
1+ year	0	0
Not clear/Not reported	14	56
Total	25	100

Table 12: Effects of training over time

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Outcome measures

Although the subjective measure of user perceptions measured by a survey or interview was used in almost half the studies (n=12), almost all studies included at least one outcome measure which objectively examined skills, confidence or knowledge. These were wide ranging and can be seen in more detail in table 13. Multiple choice questionnaires were the most popular objective method (n=9), closely followed by scales or checklists for assessing the quality of literature searches (n=7) which were often used in conjunction with graded assessments (n=5), vignette/scenarios (n=3) or transaction logs (n=2).

Outcome measures	Number of Studies	% Studies
Test	4	16
Survey	12	48
Transaction log	2	8
Search scale/score/checklist	7	28
Graded assessment	5	20
Vignette/Scenario	3	12
Recall/Precision	1	4
Perceptions	12	48
MCQ	9	36
Relevance	0	0
Usage rates	2	8
OSCE	2	8
Interview	3	12
Gold standard	0	0
Citation analysis	0	0
Not stated/Not clear	0	0
Total	62	248

Table 13: Outcome measures

However whilst more objective measures are being used, the measures used in these studies are not necessarily proven to be reliable or valid. Only 3 studies mentioned validity of the measures and 6 reported reliability (mainly in relation to inter rater reliability, which ensures that different markers produce consistent marks).

Discussion

The results presented above show the results of 25 of the 51 studies located for inclusion in the updated systematic review. The volume of studies located illustrates that research in this field is vibrant – however whether the quality of studies has improved or whether we are any nearer the evidence will be discussed below. It is also important to note that these are results of a review in progress, once the remaining studies have been added, the comparison with the previous review and the conclusions drawn could change. A more up to date picture of results will be presented at EBLIP4.

Comparison with results of 2001 systematic review (Brettle, 2003)

Twenty four studies were included in the original review which was undertaken on the years 1995-2001, 51 studies will be included in this review for the period 2002-2007, indicating a dramatic increase in the amount of research being undertaken.

In the original review, the majority of studies (66%) took place in the US and 25% took place in the UK, in the update, there has been a slight shift with 48% taking place in the US, 32% in the UK and 20% from other countries. In the original review 83% studies took place in an academic setting whereas in the update 64% took place in an academic setting and 36% were undertaken in clinical practice.

Many different types of training, topics and varied session lengths were reported in the original review and these were not grouped or counted. Although a similar range was reported in the updated review, it was possible to classify the types of training and note that didactic and hands on methods were the most popular. Database searching, sources and

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question formulation were taught in most sessions and most studies examined training of over 6 hours duration.

The initial review noted that the quality of the studies included was problematic with many flaws in the execution, design and reporting. A range of study designs were used in the initial review including 2 RCTs, 1 experimental study and 1 quasi experimental study. The majority of studies included were cohort studies. A different method was used to classify the studies in the updated review – so it is difficult to make direct comparisons. However there were 5 RCTs and 2 quasi experimental designs suggesting a slight shift to the higher end of the hierarchy of evidence. The majority of studies were pre experimental, but slightly better in quality than those in the earlier review as they employed pre and post testing methods, albeit on one study group. The crude measure of quality used classified the majority of studies in the update as average – this is an improvement on the initial review, but clearly there is some way to go.

One of the problems highlighted in the original review was the use of user perceptions as the most popular outcome measure. It was suggested that this was unlikely to be the most reliable method of determining whether skills had changed following training. Although user perceptions of training are still being used as an outcome measure, a welcome shift is that to more objective measures of testing whether training has made a difference. Only half the studies in the original review used an objective measure to determine whether training was effective, whereas 84% of the studies described used objective outcome measures (although this was often accompanied by user surveys and perceptions). What is not so encouraging is that very few of these measures were validated, a finding echoed by Koufogiannakis and Weibe (2006). There are validated measures available (Brettle, 2006) and some of these were located as part of the searches for this review, but were excluded as they reported on the development and validation of the measure rather than their use in a study examining the effects of training. Use of these validated measures in future well designed studies would significantly improve the quality of the evidence base in this field.

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The original review concluded that there was only limited evidence that training was effective in terms of improving skills. The results presented above are not equivocal and need to be correlated against the quality of the studies and outcome measures used, but again show a change in the right direction with 44% demonstrating an improvement in skills and 60% showing an improvement in knowledge or confidence. The results on whether training affects patient care are unchanged with only 3 studies showing a positive effect and the majority not examining this factor. The results of whether certain types of training are more effective than others are yet to be examined.

These results provide only part of the picture – they present an analysis of some of the studies published from 2002 onwards. But the title of the conference presentation is “Are we any nearer the evidence?” To answer this it is essential to complete this analysis (and more of it will be completed and reported at EBLIP4) but even then, we don’t have the whole picture. To truly answer the question it is necessary to look at all the evidence as a whole. This would include all the studies identified above together with studies located in the initial review and studies that were carried out before the initial review (one of the limitations of the initial review was that it missed studies that took place before the 1995 start date). This is a task for the future and one I hope to do as part of writing up this paper for publication.

Conclusion

The results presented above demonstrate that research in the field of information skills training is vibrant and show some effectiveness in terms of improvement in skills, knowledge and confidence post training. The quality of research appears to be improving – but perhaps not as fast or as well as one would hope. Are we any nearer the evidence? Nearly? Perhaps? Drawing together the evidence from early studies, the original systematic review and this update should give us a clear picture with the results to be presented at EBLIP4 helping to move in the right direction.

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Appendix 1

Studies Included in Updated Systematic Review

* = included in data analysis for this paper

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