

PROGRAM DESCRIPTION / DESCRIPTION DU PROGRAMME

Research-Embedded Health Librarians as Facilitators of a Multidisciplinary Scoping Review

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Abstract: Program objective: To advance the methodology and improve the data management of the scoping review through the integration of two health librarians onto the clinical research team. **Participants and setting:** Two librarians were embedded on a multidisciplinary, geographically dispersed pediatric palliative and end-of-life research team conducting a scoping review headquartered at the British Columbia Children's Hospital Research Institute. **Program:** The team's embedded librarians guided and facilitated all stages of a scoping review of 180 Q3 conditions and 10 symptoms. **Outcomes:** The scoping review was enhanced in quality and efficiency through the integration of librarians onto the team. **Conclusions:** Health librarians embedded on clinical research teams can help guide and facilitate the scoping review process to improve workflow management and overall methodology. Librarians are particularly well equipped to solve challenges arising from large data sets, broad research questions with a high level of specificity, and geographically dispersed team members. Knowledge of emerging and established citation-screening and bibliographic software and review tools can help librarians to address these challenges and provide efficient workflow management.

Introduction

The scoping review is increasingly being used as an alternative method to synthesize the literature on a particular topic. Librarians' contributions to knowledge synthesis on these types of reviews can dramatically influence search question and strategy development, methodology, and workflow management [1]. Unlike the more commonly recognized systematic review, the scoping review aims to provide a broad picture of a particular topic's existing scientific literature. This method of knowledge synthesis is often used to guide future research by mapping available evidence to offer a general picture of the potential size and scope of the literature, and is defined by the broad nature of the review's research question [2]. Best steps for conducting scoping reviews have been discussed [1], as have the multiple roles of the medical research librarian in the systematic review [3] and academic

librarian in the scoping review [2]; however a detailed program description chronicling the roles and processes of the research-embedded health librarian (REHL) in the scoping review remains absent from the literature.

This program description aims to fill that gap by examining the experiences of two health librarians participating in a scoping review project as embedded members of a multi-disciplinary, geographically dispersed pediatric palliative and end-of-life research team. By defining and describing their roles and functions throughout all stages of the review, the authors hope to provide a useful prototype for clinical research teams looking to integrate librarians into their research practice as embedded team members. Similar to emerging models of academic librarian collaborations with researchers [2], REHLs are well positioned to move from supporting to partnership roles by participating in large-scale knowledge synthesis projects with researchers [4]. Moreover, unlike their academic counterparts, REHLs do not face

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the same time constraints frequently reported by academic librarians as barriers to participating in large review projects [5]. In a 2013 mixed-method study, REHLs reported “traditional” library tasks as the least commonly performed or never performed out of thirteen categories of research librarian tasks, while the most commonly performed involved “information-related elements of the research process” [6]. The movement of REHLs away from traditional library management and service support has created opportunities for librarians to expand their roles beyond expert searching to include information and workflow management support [2]. Through the provision of customized, comprehensive information services, embedded librarians can open avenues for more prominent and active participation as members of the research team [6].

Description

A Network for Accessible, Sustainable and Collaborative Research in Pediatric Palliative Care (PedPalASCNET) is a multidisciplinary pediatric palliative and end-of-life research team with members dispersed across Canada. Two recent MLIS graduates, with supervision from experienced librarians at the head health library, were brought onto a project headquartered at the British Columbia Children’s Hospital Research Institute after an initial systematic review project being conducted by some members of PedPalASCNET was reframed as a scoping review. The team decided to conduct a scoping review, determining it would better fit the broad scope of the project and allow for a flexible inclusion and exclusion criteria. The ongoing scoping review began in 2015 with the purpose of providing a preliminary assessment of the size and scope of available literature on 180 Quadrant 3 (Q3) conditions and 10 symptoms associated with those conditions. Q3 conditions are progressive, metabolic, neurological, or chromosomal childhood conditions with no cure. Since Q3 conditions are not a stable group, conditions can move into the second and first quadrants as new treatments and cures are discovered. The paucity of published research on symptom management of these rare conditions negatively affects quality of life for children living with Q3 conditions.

Librarians guided and facilitated all stages of the reframed scoping review project, including the design, search, screening, and review phases. A disease and

symptom list was developed by conducting a Pilot MeSH literature search and the Charting the Territory study, a longitudinal study looking at the biopsychosocial-physical experiences of children with life-threatening conditions and their families [7], and by reviewing lists by experts in the field [8,9]. Search strategies were developed by one of the team’s librarians and run in several biomedical databases. The rarity of these conditions meant that many either had no defined MeSH term, or that the term had a very recent entry date with little indexed literature available. As a result, broader MeSH terms from the Previous Indexing of the Scope Note were used to include these conditions that had only recently been added (see [Appendix](#) for the full search strategy).

Contrary to the known lack of evidence on these conditions, the initial test search retrieved over 50,000 results. As this number was deemed unmanageable to screen, a symptom management search facet was suggested and created by one of the librarians to exclude symptoms discussed in the context of diagnosis and pure description. To reduce noise, broad and ambiguous search terms were either deleted, or keywords with adjacency were added. Relevant articles initially excluded as a result of the reduced search sensitivity were identified through hand and grey literature searching and citation chaining.

The broadness of the search led to over 27,000 results returned from MEDLINE, Embase, and CINAHL after duplicates were removed. As a team of busy clinical investigators, members decided that a double-blind screening each of the results would not be feasible. As an alternative, the librarians and research coordinator manually pre-screened the results using Endnote based on an explicit inclusion and exclusion criteria developed by the team. The Endnote search function was used to more efficiently group together articles that dealt with each disease, and to identify exclusion criteria through keywords such as “mouse model.” The function provided an efficient method for the team’s non-experts (i.e. the librarians and research coordinator) to identify themes and vocabulary pertaining to each disease. Any indecision by the librarians was discussed with experts on the team. The pre-screening left 996 results, excluding much of the literature that dealt with diagnosis or genetic screening.

Due to the large number of geographically dispersed screeners, the librarians determined that an alternative tool to Endnote would be required. After evaluating the options, the librarians recommended a

free, open-source, semi-automated tool called *abstrackr* [10] to facilitate the screening process. *Abstrackr* allows for double-blind screening, and the results can be exported into an Excel spreadsheet for analysis. The semi-automated screening was not used by the team, as there was concern that this could result in mistaken exclusions due to the relatively complex process of screening for 180 conditions and 10 symptoms; however the team would consider making use of this feature for use on future projects to increase efficiency. The tool saved the librarians substantial menial work by automatically recording the comparison between screeners' decisions. The high number of conflicts generated during the screening process demonstrated the importance of pilot testing future project phases to ensure inclusion and exclusion criteria were well defined and understood among all screeners. Conflicts were resolved through group discussions, resulting in a remaining count of 681 results.

For the review phase, it was clear that using Excel worksheets would again create substantial work for the librarians as they coordinated and compared the decisions of the seven reviewers. *Abstrackr* was favoured by the research team but was retired for the review process because it does not offer a PDF full-text upload feature. *Rayyan* [11] was instead recommended by the librarians and utilized as a suitable alternative. *Rayyan* had initially been considered for use in the screening phases but was sidelined because it does not offer a way to double-blind decisions when there are two or more reviewers. In order to avoid the high number of conflicts from the screening phase, team members individually reviewed 10 articles to test the inclusion and exclusion criteria. All conflicts were discussed in meeting updates, and additional clarifications were added to the inclusion and exclusion criteria. The pilot test and the discussion greatly reduced the number of conflicts for the review phase.

Excel worksheets had previously been used by the team to extract data in systematic and scoping reviews. Due to large data sets involved, the librarians alternatively recommended *REDCap* [12], a web application for surveys and databases which is supported by the research institute of one of the investigators. Although the librarians were not familiar with the use of *REDCap* for data extraction in other systematic or scoping reviews, the team was satisfied with the tool because it allowed them to access the data extraction instruments from all locations. As well,

the tool offered a method for uploading full-text PDFs to individual records. Most impressively, once completed, the results of the review could be manipulated and analysed using *REDCap*, including generating reports and graphs for publication. Table 1 shows the characteristic of the tools used for each phase of the review, and recommends tools for future scoping reviews.

Outcomes

The scoping review was enhanced in quality and efficiency through the integration of librarians onto the team. The development and execution of the search, data selection, extraction and management, and overall methodological approach were largely facilitated and guided by the team's librarians. The quality of search developed and executed in this scoping review contrasted from similar past projects completed by the team, which had not combined controlled vocabularies with keywords for each search concept, and had not used previous indexing for recent controlled vocabulary additions. The librarians were also able to identify and suggest strategies to increase search specificity through the creation of a new search facet to identify "symptom management" articles.

The clinician-researchers on the team initially expressed hesitation about using *abstrackr*, *Rayyan*, and *REDCap* because of the time requirement involved in learning new technologies. With the assistance of the team's librarians, however, all members were able to adopt these tools with relative ease, with members commenting that their use ultimately reduced and simplified many stages of the review. Team members also commented that the librarians' involvement on the team and advocacy for best practices during team decisions had methodologically improved the review. Additionally, feedback was received stating that the librarians' presence had provided much needed workflow and data management support. The team members expressed that in future scoping and systematic reviews, a librarian should be integrated as a member of the review team from the earliest stages.

The added value of embedded librarians to this project was further demonstrated by the permanent hire of one of the librarians, whose current role involves extensive collaborations with several research teams alongside *PedPalASCNET*. The permanent librarian and the supervising librarians were included as authors on a poster detailing the process and some

Table 1. Comparison of the features of Endnote, abstackr, and Rayyan

	Endnote	abstackr	Rayyan	Tool to be used in Future Reviews
Pre-Screening (Single)	STRENGTHS			Endnote / Rayyan
	<ul style="list-style-type: none"> • Small amount of setup needed (i.e. creating folders for inclusion and exclusion) • Advanced search feature helps group articles together for easy exclusion (i.e. “mouse model) 	<ul style="list-style-type: none"> • No mistakes made from mis-dragging citations into folders • Option for single-screening 	<ul style="list-style-type: none"> • No mistakes made from mis-dragging citations into folders • Option for single-screening through turning off blind mode • Able to detect and delete duplicates not found by reference manager • Able to export results directly to reference manager 	
Pre-Screening (Single)	WEAKNESSES			Endnote / Rayyan
	<ul style="list-style-type: none"> • Some mistakes made by dragging into wrong folder 	<ul style="list-style-type: none"> • Significant learning curve needed to import results (danger of creating duplicates) • No ability to detect and delete duplicates not found by reference manager • Only able to export results as Excel sheet 	<ul style="list-style-type: none"> • Minimal learning curve needed to import results • Lack of advanced search feature to group results 	
Screening (double)	STRENGTHS			abstackr (teams with more than two reviewers) Rayyan (teams with only two reviewers)
	<ul style="list-style-type: none"> • No learning curve required to learn new software 	<ul style="list-style-type: none"> • Simple setup for multiple screeners • Double blind screening for teams larger than two 	<ul style="list-style-type: none"> • Able to deleted and delete duplicates not found by reference manager • Able to export results directly to reference manager 	
Screening (double)	WEAKNESSES			abstackr (teams with more than two reviewers) Rayyan (teams with only two reviewers)
	<ul style="list-style-type: none"> • Complex setup for large number of screeners • Large amount of work for librarians and research staff to manage and compare screening results 	<ul style="list-style-type: none"> • Significant learning curve needed to import results (danger of creating duplicates) • No ability to detect and delete duplicates not found by reference manager • Only able to export results as Excel sheet 	<ul style="list-style-type: none"> • Does not support double blind screening for teams larger than two 	
Review (double)	STRENGTHS			Rayyan
		<ul style="list-style-type: none"> • Double blind screening for teams larger than two 	<ul style="list-style-type: none"> • Supports upload of full text • Able to export results directly to reference manager 	
Review (double)	WEAKNESSES			Rayyan
		<ul style="list-style-type: none"> • Does not support upload of full text • Only able to export results as Excel sheet 	<ul style="list-style-type: none"> • Does not support double blind reviewing for teams larger than two 	

initial results, which was presented at a palliative care conference [13]. The same librarians will be also included as authors in the final publication when it is prepared.

Discussion

This scoping review presented a specific set of challenges well suited to the expertise of librarians. The librarians' success finding workable solutions speaks to the value of this embedded model for future research teams. Embedded librarians can overcome issues arising from large data sets and geographically dispersed team members by integrating innovative tools and technologies into various stages of a project. They can also help to ensure that systematic, rigorous methodologies are followed throughout all stages of a review. Lastly, librarians are particularly well-equipped to assist teams engaged in new research, or who are exploring areas not well defined in the literature. As expert searchers, librarians can work alongside their clinical counterparts to develop the most efficient and effective approaches to comprehensively search the established and grey literature.

The embedded model discussed in this paper is currently being applied within another geographically dispersed research group based out of the BC Children's Hospital Research Institute. Minor modifications have been made to the model based on some of the lessons learned during the scoping review discussed in this paper. One such change is the involvement of the librarian in the initial planning stages of the review. This early involvement provides the librarian with the opportunity to map the field of study prior to completing the review protocol, which involves making suggested changes in scope and methodology, and aiding in the creation of explicit inclusion and exclusion criteria. Future programs will also incorporate more extensive pilot tests for each of the phases to ensure the suitability of new technologies based on the abilities and experience of team members, as well as to resolve ambiguities related to inclusion and exclusion criteria.

The high number of conflicts during the screening phase indicates that this phase is integral for reviews that explore broad research questions with a high level of specificity. Future reviews will evaluate the strengths and weaknesses of using *abstrackr* rather than *Rayyan* for the screening phase depending on the

characteristics of the review team. Duplicates were introduced into the set in *abstrackr* due to the more complicated requirements to upload citations. Using both *abstrackr* and *Rayyan* also requires team members to learn two new tools. However, as *Rayyan* does not currently support automatic double-blind screening, the librarians must spend time to break up the articles into manageable groups for each reviewer and then assign and manage multiple reviews. For this reason, future decisions to use either *abstrackr* over *Rayyan* will depend on the number of screeners on the team.

This model offers librarians with a roadmap for providing on-site and distance support to clinical team members located at multiple research-based satellite sites. The role of the librarian is largely created, defined, and funded by their research team; therefore, the success of this type of program hinges on the level to which researchers value collaboration with, and utilize the support of, librarians. Collaborations with research teams like *PedPalASCNET* provide opportunities for librarians to gain greater insights into the operations of research teams, to develop closer professional relationships and connections with researchers, and to make significant contributions to research projects which may or may not be acknowledged through co-authorship [14].

Conclusion

Health librarians embedded on clinical research teams can help guide and facilitate the scoping review process to improve workflow management and overall methodology. Librarians are particularly well equipped to solve challenges arising from large data sets, broad research questions with a high level of specificity, and geographically dispersed team members. Knowledge of emerging and established citation-screening and bibliographic software and review tools can help librarians to address these challenges and provide efficient workflow management.

Statement of Competing Interests

No competing interests declared.

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