

PubMed Training Needs Assessment of Cancer Researchers

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Abstract

OBJECTIVE

The objective of the PubMed Training Needs Assessment of Cancer Researchers project is to design and implement a needs assessment of cancer researchers to identify their top research tasks and PubMed training needs. Cancer researchers, a broad group that consists of social and behavioral science, lab and basic science, and clinical researchers, were selected as the specific user group in consultation with NLM staff. The information gathered will be used to develop training priorities that the PubMed Training Team can use to inform future targeted training efforts, as well as recommendations for further investigation of this group.

METHODS

To gain insight into cancer researchers' information-seeking behavior and research needs, the Associate reviewed the literature. She conducted interviews with six librarians who work with cancer researchers to learn about this group's typical search behavior and training needs. The Associate arranged three focus groups with different groups of National Cancer Institute (NCI) fellows and staff: Hematology Oncology Fellows, Cancer Prevention Fellows, and scientists at NCI at Frederick. Focus group data were analyzed to identify trends in information behavior, which informed a follow-up survey. Additional methods are recommended as next steps.

RESULTS

The focus groups and follow-up survey revealed that cancer researchers often use PubMed to search for specific citations, authors, and to find out what research has already been done on a topic. Overall, this group of researchers is moderately to highly confident in their PubMed searching skills, but there is a gap between their skills and the importance of searching to their work.

DISCUSSION

Based on the focus group and survey results, the Associate identified three top tasks and three challenges this group has when searching PubMed. Each top task and challenge is associated with suggested learning objectives that can be used to guide PubMed training that is relevant to this group.

RECOMMENDATIONS

This needs assessment is a first step in using market segmentation to identify and address the PubMed training needs of user groups. If the PubMed Training Team develops training for cancer researchers, they should use the suggested learning objectives to create training that is associated with this groups' top research tasks and challenges. Cancer research is a broad field that incorporates researchers from multiple disciplines and with different research needs and goals. The PubMed Training Team should consider verifying the results of this study to determine if the differences are due to methods or real differences between the groups.

Background

The PubMed Training Team at the National Library of Medicine (NLM) provides training for a variety of groups using industry-accepted models for training and instructional design. Most models of instructional design, including the ADDIE model, begin with identifying student needs, specifically what student behavioral outcomes are desired. NLM's PubMed Training Team wants to identify the main tasks that their various groups of searchers need to accomplish in PubMed in order to identify and prioritize learning objectives for PubMed instruction. As a virtual intern for NLM in Fall 2015, the Associate Fellow successfully applied this model to identify nurses' top tasks and create the [PubMed for Nurses](#) tutorial (Kellner, 2015). The project was a first step in identifying the needs of identified user groups and the PubMed Training Team would like to expand this to another high-priority user group.

The Associate identified cancer researchers as a high priority user group after speaking with expert trainers at NLM and exploring the range of user groups who work at the National Institutes of Health (NIH). Given the rapid growth in cancer research and corresponding growth in cancer publications and original research articles, it is no surprise that cancer researchers are faced with an overwhelming volume of information (Vishnu, 2016). Clinical specialists and biomedical researchers at the National Institutes of Health (NIH) reported spending an average of 3.5 hours searching for published information and 5.8 hours reading it each week (Grefsheim & Rankin, 2007). Online searches of biomedical databases such as PubMed are often the preferred method of accessing the research literature in this field (Ciarlo et al., 2016 & Schuers et al., 2016).

Under the umbrella term "cancer researchers" are many subgroups, including but not limited to clinical oncology, basic or lab science, and social or behavioral science. Some groups are more heavily studied than others; multiple authors mention the lack of studies of basic science researchers' information needs relative to that of clinicians and other groups such as engineers and physicists (Detlefsen, 1998; Grefsheim & Rankin, 2007; Haines et al., 2010). The groups of cancer researchers share some information-seeking behaviors but also differ, even within groups, in how and why they turn to the literature. Physicians and PhDs, or "medical scientists," engage in information seeking at the beginning of their research when they are generating ideas and planning their research projects, and again at the end of their research as they report on their work (Roos, 2015). Although this group monitors new publications, they approach the task differently. Some set up email alerts for subject searches in PubMed while some manually search PubMed occasionally.

Researchers' search confidence and self-reliance varies but is generally moderate to high. In a survey of oncologists and general practitioners who work with cancer patients, oncologists most often rated their comfort in information-seeking as "good" whereas general practitioners chose "satisfactory." Less than 5% of participants rated their confidence as "sufficient" or "poor" (Ciarlo et al., 2016). Similarly, basic science researchers who work at a medical school are self-reliant searchers who are reluctant to turn to librarians for help. Instead, they rely on their network of colleagues both within and outside of their institution for assistance with searching and retrieving full text of articles (Haines, Light, O'Malley, & Delwiche, 2010). NIH scientists reported most often searching for information on their own (Grefsheim & Rankin, 2007). Physicians and residents believe that experience plays an important role in creating

valid search queries. However, they also indicated that they have not mastered searching medical databases, including PubMed (Schuers et al., 2015). Schuers also found that this group often assesses the quality of information based on intuition. They may rely on the information's concordance with what they already know from their clinical practice in order to evaluate the content. Confidence and self-reliance could be possible deterrents from participation in PubMed Training. However, an understanding that this group is generally confident and self-reliant in their information seeking provides a foundation for creating relevant and usable training for this group.

Project Objectives

The objective of this project was to support the PubMed Training Team by conducting an in-depth examination of a specific user group's training needs. The Associate's goals were to identify a high-priority PubMed user group and develop and implement a training needs assessment. The Associate would characterize cancer researchers' top research tasks for which they use PubMed and develop learning objectives to guide training for this group. Additionally, the Associate provided recommendations and next steps for the PubMed Trainers to consider.

Methods

Selecting User Group

The Associate spoke with several NLM staff, analyzed PubMed survey data, and briefly scanned the literature on PubMed user groups to select a high-priority user group for this needs assessment. Cancer researchers were selected as cancer research is a national health priority. This initial needs assessment focused on researchers at the National Cancer Institute (NCI).

Interviews with Librarians

The Associate reached out to six librarians who work with cancer researchers at five institutions: Johns Hopkins Welch Medical Library, Memorial Sloan Kettering Cancer Center Library, NIH Library, Research Medical Library at M.D. Anderson Cancer Center, and the Scientific Library at NCI at Frederick. The Associate held 30-minute informal phone interviews with the librarians to learn about cancer researchers' information needs, PubMed searching skills, emerging areas of research, and participation in training.

Focus Groups

The Associate identified and made connections with three distinct groups of cancer researchers at NCI. Scheduling the focus groups and recruiting participants required persistence and schedule flexibility. The three groups are: Hematology Oncology Fellows (Clinical Group), Cancer Prevention Fellows (Prevention Group), and senior researchers and staff at NCI at Frederick (Basic Science Group). The Hematology Oncology Fellowship is an Accredited Graduate Medical Education program supported by NCI and the National Heart, Lung, and Blood Institute. Fellows gain experience in clinical rotations as well as laboratory or clinical research (NIH Clinical Center, 2017). Eleven fellows participated in the focus group

during a weekly meeting in the Clinical Center on June 9, 2017. The Cancer Prevention Fellowship program provides training for clinicians and scientists from variety of disciplines to train in cancer prevention and control. Fellows earn a Master of Public Health degree and receive up to four years of financial support to engage in research (Cancer Prevention Fellowship Program, n.d.). Five fellows participated in the focus group held at NLM on June 20, 2017. Four had backgrounds in social and behavioral sciences and one had a basic science background. The third focus group consisted of scientists who work at NCI at Frederick. NCI at Frederick has several cancer research facilities with over 3,000 researchers, laboratory technicians, and staff (NCI at Frederick, n.d.). The focus group was held at the Scientific Library at NCI at Frederick on June 27, 2017. The six participants included four senior investigators, a research associate, and a postdoctoral fellow.

For this exploratory needs assessment, selection and recruitment of focus group members was done by convenience sampling. Participants in the Clinical Group did not elect to participate; they were volunteered to participate during their weekly meeting time. There was also a discrepancy between the Clinical and Prevention groups which consisted of fellows and the Basic Science Group, made up of mostly senior researchers. The gap in experience should be considered when comparing results. These three focus groups provided the bulk of qualitative data. The Associate developed a set of questions for the Focus Group Discussion Guide based on insight from the literature review and librarian interviews (Appendix 1). Following the focus groups, the Associate identified major themes and differences in the groups' responses.

Follow-up Survey

Several additional questions emerged after reviewing the focus group transcripts, including the connection between search confidence for several types of searches and the importance of those searches to their work as well as participants' preferred format to receive PubMed training. The Associate drafted and revised a set of four follow-up questions to explore these questions further (Appendix 2). SurveyMonkey was used to create and collect survey results. The survey was open for one week, from July 14 to July 21, 2017.

Results

Librarian Interviews

The informational interviews with six librarians who work with basic science cancer researchers and oncologists provided insight to guide the next stages of the needs assessment. The librarians support cancer researchers by providing library orientations for postdoctoral researchers, creating saved search alerts in PubMed, and providing research consultations to help them craft focused search strategies using controlled vocabulary. The librarians discussed researchers' interactions with librarians, use of PubMed and other biomedical databases, and some emerging topics and areas of research.

From their experience working with cancer researchers, the librarians noted that senior researchers tend to be less likely to reach out to the library for research support and that basic science researchers may view literature searching as part of their job and are less likely to ask for assistance. A librarian who

works with basic science researchers has found that a lot of researchers do not think they need PubMed training but will often acknowledge after training that there are useful features they did not know existed. Despite their independence and familiarity with PubMed, the librarians noted that they may not be the most thorough searchers and often do not use MeSH to build their searches, perhaps because they need to find the most current literature before it has been indexed.

The librarians identified common and emerging areas in cancer research and what resources or database features are used to address the information needs. They most frequently mentioned the importance of searching for genetic and genomic information. Because of this focus, researchers and cancer librarians utilize other NCBI databases such as Gene in conjunction with PubMed. Personalized medicine and targeted therapies are another commonly mentioned research area. Finally, cancer researchers search for cancer drugs and drug adverse effects.

Focus Groups

In total, 22 fellows and researchers participated in the focus groups. The participants were:

- 11 Hematology Oncology Fellows (Clinical Group)
- 5 Cancer Prevention Fellows (Prevention Group)
- 6 NCI at Frederick Researchers (Basic Science Group)

Frequency of Use

All three groups of researchers are frequent PubMed users. All participants use PubMed at least monthly. All but one (94.7%) use it at least weekly, and over half (58%) of participants use PubMed every day.

Confidence in search ability

Participants are moderately to very confident in their ability to find the best quality research on a given topic (Figure 1). No participants identified their search ability as 1 (not at all confident) or 2 out of 5 (very confident). Over half (52.4%) rated their confidence in their search skills as 3 and 38.1% rated their confidence as 4. Two participants (18.2%) in the Clinical group rated their confidence as 5.

Figure 1: Confidence in Search Ability by Focus Group

| Confidence | Clinical | Behavioral Science | Basic Science | Total |
|----------------|----------|--------------------|---------------|-------|
| 1 (not at all) | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 |
| 3 | 45.5% | 80.0% | 40.0% | 52.4% |
| 4 | 36.4% | 20.0% | 60.0% | 38.1% |
| 5 (very) | 18.2% | 0 | 0 | 9.5% |

Several participants offered explanations for their level of confidence. After participants revealed their level of confidence, one participant in the Basic Science group said “Overconfident,” acknowledging that they knew this was a problem. A few said they feel they are satisfied with their search results, but they do not know if they could be retrieving more or better results if they had stronger search skills.

"I always find something." (Basic Science)

"Well, yeah, I find something, but is it the most I can't tell you." (Basic Science)

"I'm always worried there's something, some way that I could have phrased it that isn't quite incorporated." (Prevention)

How do you use PubMed?

Participants identified three common uses of PubMed: searching for a specific citation, searching for a specific author, and general subject searching to find out what research has already been conducted on a topic.

Citation search

Focus group participants mentioned that they often went to PubMed when looking for a specific clinical trial or article.

"To look up results of a specific trial on ovarian cancer." (Clinical)

"I usually went [to PubMed] when I was looking for a specific article that I knew would be on PubMed..." (Prevention)

"I look for specific papers if I'm looking up a reference." (Basic Science)

Author search

Participants often search for works by a particular author with several goals. First, they look up authors to learn about their professional biographical information.

"The last thing I used PubMed for was an author search, because we're going through and kind of doing a mentor search right now and so I had chosen somebody off the NCI website and was trying to look and see whatever they had published..." (Prevention)

"And sometimes just to find out more about their bios. I know today you can go to any university and everybody will have a website, but I still use PubMed for trying to track down specific authors: where they are now and what they've already published." (Basic Science)

Participants in the Clinical and Basic Science Groups mentioned looking up lecturers or presenters at conferences to see what paper they were referring to or to see what they've published. Clinical participants conduct author searches to determine if the author is an expert in their field.

"...I'm at a meeting and somebody's giving a talk and I want to see what else that person has published on..." (Basic Science)

"Sometimes I do a speaker search. I want to look up speakers for Grand Rounds and weigh the time commitment." (Clinical)

What research has been done?

Several participants indicated that they often conduct searches at the beginning of their research to learn what research has already been conducted on that topic.

“So just to kind of get a grasp of what the actual breadth of knowledge was for that one particular subject area.” (Prevention)

Basic Science researchers mention the importance of finding out if the research has been done before to avoid repetition.

“...see if somebody else has done it, because we obviously don’t want to repeat what other people have done.” (Basic Science)

“My main use of PubMed, I should admit, is to make sure that what I’m doing is not being done by somebody else.” (Basic Science)

Challenges when searching PubMed

Participants in both the Clinical Group and Prevention Group identified some of the challenges in searching PubMed in response to the question, “What is the main thing that frustrates you about PubMed?” Common challenges and concerns are as follows:

Saved search alerts

Several participants in the Clinical Group expressed concern that the alerts they set up were not retrieving relevant results. One participant expressed a desire for alerts that are well-curated and take the place of scanning the table of contents of multiple journals each week.

“I can be pretty specific about the things I need to keep up to date with and I’ve set it up so PubMed sends me those references every week, but I still feel like I’m missing stuff.”

“I can’t handle more than 5 emails a day. So I just had to turn it off because it’s irrelevant. It gives me random stuff.”

Author searches

Participants in both the Prevention Group and Basic Science Group were frustrated that it can be difficult to find a specific author.

“And then you get all the authors that have all kinds of second initials. Like ‘Smith, A.’ then you get ‘Smith, AB,’ ‘Smith, AC’. I assume there’s a way to eliminate those guys but I don’t know how.”

“It’s not straightforward, right.”

“Sometimes you get ‘Smith, JA’ if it’s the middle initial.” (Basic Science)

“I think they had more or less a generic name so it was a little bit more difficult for me to kind of track down some of the things they had published on, but I could do ‘Author AND cancer’ and it helped me narrow things down a little...” (Prevention)

Using proper syntax

Participants in the Prevention and Basic Science Groups shared that they do not fully understand what operators are used in PubMed to express search strategies.

"I always had a hard time figuring out what the brackets did, what the parentheses did, what the quotations did [several agreements: "Boolean." "Yeah, Boolean terms."] because it's totally different in PubMed from other databases, and I'm more accustomed to other databases, so it was difficult to find a lot of stuff." (Prevention)

"I always get confused if I should write out the word 'AND' or if I should put the '& symbol' and, you know, if I should put quotes around it or not quotes around it..." (Basic Science)

Subject scope of PubMed

Several of the participants in the Prevention Focus Group mentioned that PubMed does not contain all the literature they need for their research in fields such as behavioral science.

"Yeah, it does seem that PubMed caters more towards bench science or basic science [several agreements] than social science."

"...my background is in behavioral science – it's in family science – and so a lot of the stuff that I need from a theoretical perspective isn't often there. So I have to search other things as well."

Currency of articles

Participants in the Clinical and Prevention Groups expressed concern that their searches do not yield the most current results.

"I'll get stuff that came out three months ago and is just now getting annotated in PubMed [indexed in MEDLINE]." (Clinical)

"I'm always afraid I'm not getting the most recent articles because of the – there's always a delay before they get reviewed and the MeSH terms assigned, and sometimes I don't know if I'm getting everything." (Prevention)

Training delivery preferences

Though it was not directly asked of participants in the focus groups, several participants mentioned their preferred format for training or documentation. While most preferred brief video tutorials, some preferred in-person training or written documentation.

Participants often conduct a Google search to identify tutorials or to answer their questions.

"I usually type it in Google and it will often reroute me to their documentation but I find that an easier way to search for things, just in general." (Basic Science)

"And it's got to be easily Googled. So, yeah, stats is a really good example. I google for my STATA codes and certain websites are so good about explaining those things and it's easily searchable in Google if you type in what you want." (Prevention)

Use of PubMed training or documentation

When asked if they had used PubMed documentation or training, participants tended to begin the discussion by saying “No,” followed by laughter or agreements from the other participants. Participants in the Prevention Group prefer brief, targeted training as opposed to longer tutorials.

“If it’s more than five or six minutes then I’m probably not going to watch.”

“I know my attention span leads to, like if I can find a two-minute or three-minute video about something on, say, how to use correct Boolean terms or something I would definitely watch that as opposed to read a full article about it.”

“...a piecemeal approach as opposed to having a half hour or 45 minute-long video where, you know, I’m not sure if I’m actually going to get what I need when I start and I have to invest 45 minutes to find out if it’s actually there.”

Willingness to seek help

The focus groups had different attitudes towards seeking help to find information or conduct a search. Many in the Clinical Group did not respond to this question and one participant indicated that they would rather try a different search strategy than ask for help.

“I’d go to Google or another search engine. We know what keywords and what we’re looking for, so if we can’t find it there we just go somewhere else.”

The Prevention group gave mixed responses on their willingness to seek help; participants discussed their experiences working with librarians or attending training sessions in the past but some also said they do not seek help or had unsuccessful consultations with librarians.

“I never have [asked for help].”

“I have but it wasn’t successful.”

“I’ve done a couple of systematic reviews that have been in coordination with the university librarian...helped me make these search terms to be very specific for that review, but outside of doing those I kind of just do it on my own.”

The Basic Science researchers were the most likely to seek assistance, and had successfully sought the assistance of their librarian in the past. They were not likely to seek the assistance of coworkers.

“Robin [Librarian at NCI at Frederick Scientific Library] always helps us. Robin’s the point person for PubMed.”

“Maybe a couple of times I asked my boss, but rarely.”

Follow-up Survey

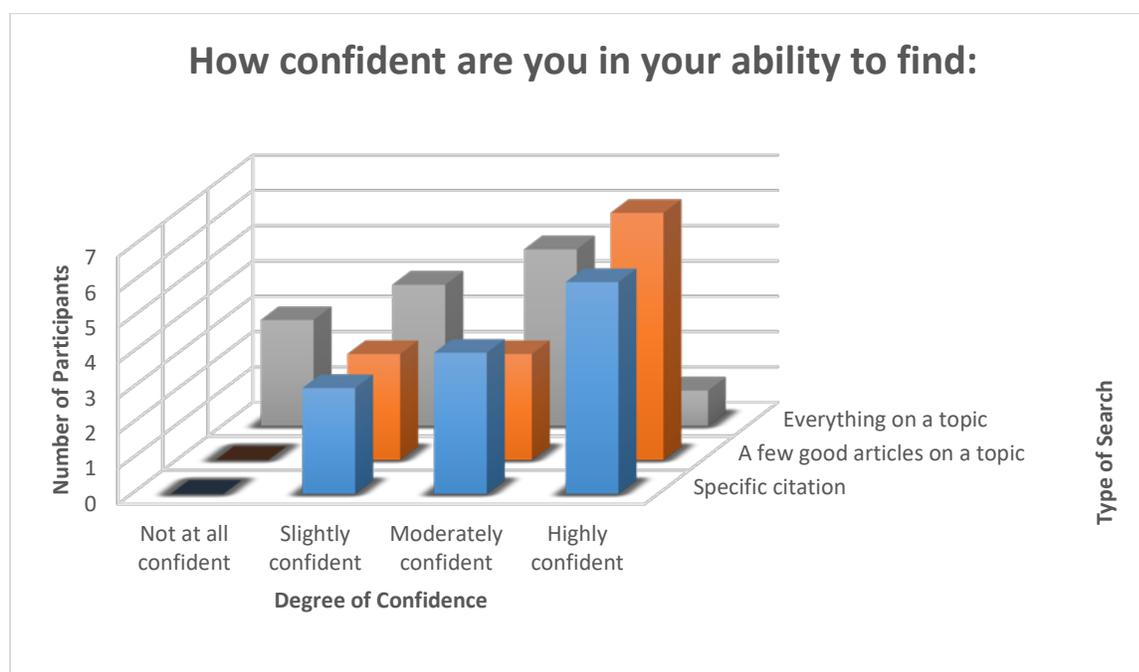
The link to the follow-up survey was emailed to the 22 focus group participants and 13 completed the survey (59% response rate). The response breakdown by group is as follows:

- 3 Clinical (27.3% of this group)
- 5 Prevention (100% of this group)
- 5 Basic Science (83.3% of this group)

Question 1: Search confidence

Question 1 asked, “When searching PubMed, how confident are you in your ability to find...” and participants rated their degree of confidence in performing three types of searches using a Likert scale (not at all, slightly, moderately, and highly confident). Figure 2 shows the degree of confidence in each of these three types of searches. Participants were most confident in finding a few good articles on a topic and finding a specific citation. Only two participants were highly confident in finding everything on a topic, and three were not at all confident in their ability to perform this task.

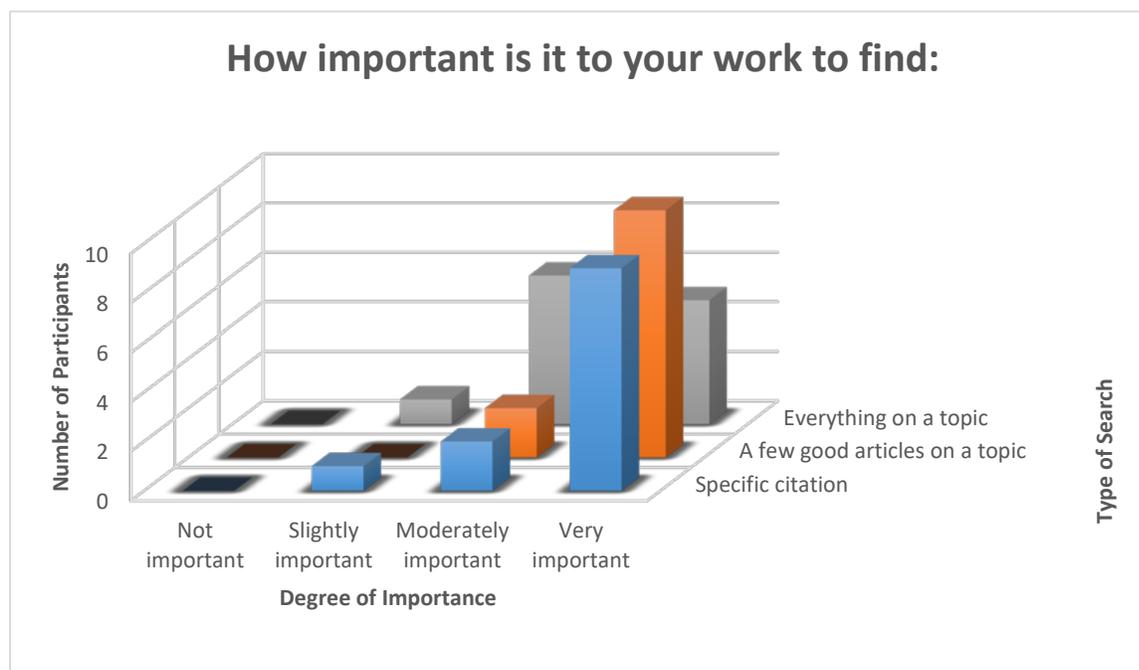
Figure 2: Search Confidence by Task



Question 2: Importance of searching

Question 2 asked, “How important is it to your work to find...” and participants rated their confidence on a Likert scale (not, slightly, moderately, and very important) for three types of searches. The chart in Figure 3 shows the results. More participants rated the importance of these three types of searches to their work as very important than rated their confidence as highly confident.

Figure 3: Importance of Searching by Task



Question 3: How do you prefer to learn or seek help with PubMed searching skills?

Question 3 was free-response. Eleven participants answered Q3 and two skipped it. Only one member of the Clinical Group answered this question. Several participants listed more than one preferred delivery style, for a total of 19 responses. Figure 4 shows the responses. The most frequently listed format was video tutorials (5), followed by in-person class (4), written (3), individual assistance (3), and webinar (1). Two participants' responses were unclear about format, and one participant listed "trial and error."

Figure 4: Preferred way to learn or seek help

| Preferred Delivery Format | Number of Responses |
|---------------------------|---------------------|
| Video Tutorials | 5 |
| In-Person Class | 4 |
| Written | 3 |
| Individual Assistance | 3 |
| Webinar | 1 |
| Other* | 1 |
| Unclear+ | 2 |

*"trial and error;" + "online," "tutorials"

Discussion of Top Tasks and Challenges

Based on the results of the focus groups and survey, there are three top tasks and three top challenges that cancer researchers have when searching PubMed (Figure 5). In combination with the results, the

top tasks and challenges are translated into suggested learning objectives crafted in consultation with expert PubMed Trainers that could be used to guide training for this group.

Figure 5: Cancer Researchers' Top Tasks and Top Challenges

| Top Tasks | Top Challenges |
|---|------------------------|
| Search for an author | Search for an author |
| Find a specific citation | Use proper syntax |
| Determine what research has already been done | Create relevant alerts |

Search for an author

Searching for a specific author in PubMed is both a top task and a top challenge for cancer researchers. They search for authors' professional affiliations and what they have published but sometimes experience difficulty in searching by author name. Successfully meeting the following suggested learning objectives would help researchers to identify two ways to conduct an author search in PubMed.

- Successfully retrieve all relevant citations for articles by a specific author using the search box.
- Locate and search by author name variations using the Advanced Search Builder.

Find a specific citation

Focus group data shows that researchers often conduct a PubMed search when looking for a specific article or study. Training could consist of the following learning objective on citation searching.

- Find a specific citation using known citation elements (title, journal, author).

Determine what research has already been done

Participants shared that they conduct exploratory searches in PubMed at the beginning of their research to determine what research, if any, has been conducted on a topic of interest. This is a somewhat ambiguous task, but suggests two goals: gain a broad overview of a subject and conduct a more comprehensive literature review. Learning objectives *a* and *b* address the broad overview task. The second goal of conducting a comprehensive literature review cannot be feasibly met through a brief instruction program. Comprehensive searches require assistance from an expert searcher and the use of multiple databases, and it is not clear from the focus groups whether researchers understand that. Though the confidence data suggests that researchers are aware of their own skill gap, it is not clear if they are aware of the existence of expert searchers. This suggests an additional goal, *c*.

- Create a PubMed search involving multiple concepts and check Search Details to see how the search was mapped to MeSH. For terms that do not map, find a synonym that does.
- Successfully apply filters to a to retrieve review articles, including Reviews, Core clinical journals, and Cancer subset.
- Consult with a librarian to develop a comprehensive literature review search strategy.

Use correct syntax

Researchers expressed concerns about formulating effective search strategies during the focus groups. They were unsure if they should use Boolean operators to effectively connect multiple concepts in a

search. No punctuation or tags are needed to perform a basic search, as reflected in this suggested learning objective.

- a. Perform a simple subject search with no tags, punctuation, or operators.

Create relevant alerts

Keeping up to date on the literature is one of the purposes for which medical scientists use PubMed (Roos, 2015). The importance of monitoring new publications was reflected by members of the Clinical Group, who use the saved search alerts feature of PubMed but are unhappy with the relevance of results and the high volume of articles they receive in search alerts. Though this group expressed less of a willingness to seek help with searching, they may be more likely to seek help from a librarian for a task that is relevant to their work, such as developing a successful search strategy for alerts. The following suggested learning objectives would help researchers achieve this goal.

- a. Construct and test a search strategy that yields relevant and current citations.
- b. Implement a successful saved search in MyNCBI and schedule alerts.
- c. Avoid using filters that inadvertently screen out the most recent results.

Understand the scope of PubMed

Members of the Prevention Group shared that some of the research they need is not available in PubMed. Improving their understanding of what can and cannot be found in PubMed would improve their search efficiency and potentially reduce the frustration of unfruitful searches.

- a. Describe the scope of literature that is included in PubMed.
- b. List 3-4 databases that cover behavioral health literature.

General Discussion

Confidence in search skills

In the focus groups, participants generally rated their confidence in their PubMed search skills moderately high. Focus group participants rated their confidence as an average of 3.5 on a scale of 1 to 5. Participants in the Clinical Focus Group rated their confidence in their search skills higher than the other two groups. This high level of confidence among clinicians was also reflected in the literature (Ciarlo et al., 2016). Despite their modest and high confidence, participants in the Prevention and Basic Science Groups qualified their knowledge by mentioning that they are sure they are missing some results or that there must be some better way to perform searches they do not know about. The follow-up survey, which asked participants to further specify their confidence on three tasks, provided more detail on confidence and importance of the search skills to their work. The results showed that most participants are moderately to highly confident in finding a specific citation or a few good articles on a topic but not highly confident in finding everything on a topic. Looking at both charts, a skill gap is apparent as nearly all participants ranked the importance of finding a specific citation or a few good articles on a topic as highly important but over half of participants were only moderately or somewhat

confident in their ability to perform these tasks. It is important to acknowledge that confidence could be a possible challenge in offering training to this group, however their acknowledgement of not knowing everything and the skill gaps might indicate that they would be receptive to training or using training materials.

Seeking assistance

The literature on who lab and basic science researchers ask for assistance in searching differs from the results of the Basic Science Focus Group. According to the literature, these researchers are less likely to ask a librarian for assistance, instead turning to fellow researchers for assistance or full text of articles. However, the scientists in the Basic Science Group preferred asking their librarian for help and infrequently asked coworkers for searching assistance. This difference may reflect how participants were recruited for this focus group; all participants had attended training in the library or received assistance from their librarian; they are aware of and use the resources provided by the Scientific Library.

Training delivery style

Focus group and survey participants discussed multiple preferred training formats. Brief video tutorials of three to five minutes were the preferred format in the focus groups, especially in the Prevention Group. The usefulness of brief, task-oriented videos was noted by several focus group attendees. Likewise, “video tutorials” or “YouTube tutorials” were mentioned most frequently in the survey, followed by in-person class, written, and individual assistance. To meet the needs of most in this group, the PubMed Trainers should focus on providing training in brief task-oriented video tutorials. Additionally, the cancer researchers in this study would be most likely to use NLM-created training resources if they are easily discoverable on Google, as several participants reported not knowing training existed and did not go directly to NLM’s website to seek training.

Recommendations

Training Recommendations

This needs assessment identified areas where cancer researchers could benefit from training and revealed what practical training might look like to them. If the PubMed Training Team chooses to develop training for cancer researchers based on the findings of this needs assessment, the suggested learning objectives that correspond with the top tasks and challenges would be a good starting point to provide training that is relevant to cancer researchers.

This group generally has moderate to high confidence in their ability to search, which has implications for how to market and deliver training they would use. Participants indicated they prefer targeted, skill-focused training rather than general tutorials that contain all PubMed searching skills. Creating training that is task-focused could improve usage. For example, the Clinical Group expressed dissatisfaction with their saved search alerts, which yield too many irrelevant results to be useful, but are also the least likely to use training or documentation. The PubMed Trainers could create task-focused training on how to improve saved search alerts and include a brief section on crafting successful search strategies. This

group also wants training that is easy to find. The Trainers could explore ways to embed training within the users' commonly performed tasks.

Both the focus group and survey responses reveal that this group prefers brief video tutorials. One training delivery model that was successful for another user group is the PubMed for Nurses tutorial, a collection of five two-to-three minute videos focused on accomplishing specific tasks such as applying filters to a search (Kellner, 2015). A tutorial in this format did not take long to create and met the users' needs. The PubMed Trainers should consider if this delivery format could be adapted to create a "PubMed for Researchers" tutorial.

Next steps and further questions

Several features of this needs assessment model were successful in gaining qualitative information on cancer researchers' use of PubMed and could be adapted for needs assessments of other user groups. Speaking with librarians and information professionals who work with these user groups was useful in gaining perspective on cancer researchers' research skills and attitude toward training. The information gained also helped to develop the focus group discussion guide. Focus groups were a good way to collect qualitative data about the users' experience with PubMed and the follow-up survey made it possible to explore some themes in more depth. The survey also provided the opportunity to ask questions that arose during or after the focus groups but were not originally planned. This needs assessment required a considerable amount of time and it may not be feasible for the PubMed training staff to conduct a needs assessment to this level of detail for additional PubMed user groups.

This study was exploratory in nature, and had a small sample of three groups of NCI researchers. It is unclear if the results of this needs assessment are generalizable to the whole of NCI researchers or the larger population of cancer researchers. The PubMed Trainers might consider confirming the top tasks and challenges through a survey of a larger population of NCI researchers.

Several questions and considerations for future research emerged that the PubMed Training Team should consider in planning their next steps. It is important to note that cancer research is a broad category that encompasses many groups of researchers from various disciplines. Because of this, and for the practical purpose of scheduling focus groups, it was useful to segment the population into three groups. Though this study focused on the similarities between the groups' PubMed search behavior and tasks, there were some potential differences in their search confidence, likeliness of using training, and specific tasks and challenges. Should the PubMed Training Team focus on the differences between subgroups of cancer researchers for future needs assessments? One possible next step would be to verify if those differences are due to research methods or researchers' subject area, and how they might impact training. Though the *PubMed for Nurses* tutorial was successful in meeting the needs of most nursing students and nurses, one tutorial might not be able to address the training needs of all subpopulations of cancer researchers.

This exploration of cancer researcher's PubMed training needs was a first step in investigating the usefulness of market segmentation to create PubMed training. The methods employed in this needs assessment were

successful in gathering the qualitative data that the PubMed Training Team can use to develop training that is relevant to user groups.

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Appendix 1: Focus Group Discussion Guide

Focus Group Discussion Guide: NCI Frederick Researchers

| | |
|--|-----------------|
| Total participant time required: | 30 – 45 minutes |
| Number of participants per session: | 7 |
| Total number of participants: | |

Dates:

Tuesday June 27, 2017, 12:00pm – 12:45pm

Key Objectives:

- Identify cancer researchers' PubMed training needs to inform training priorities for this group.

Methodology

Three focus group sessions will be conducted in-person with up to 10 users per group.

During each session, the facilitator will ask questions about users' experience in finding published information and using PubMed. Both sessions will be audio recorded. The recordings will be deleted after satisfactory notes are acquired.

Discussion Guide

Below is a general guide for leading the focus groups. We may modify this guide as needed for the first focus group will inform the subsequent groups.

I. Introduction: [2 min]

- Thank you all for taking the time to speak with us today.
- My name is Megan Kellner and I'm an Associate Fellow at NLM.
- Today, we want to get your input on PubMed so that we can better develop training for researchers and health professionals.
- *** We would like hold a few brief phone interviews to learn more about how you use PubMed. If you would be willing to help us out, please and we will be in touch.
- 45 minutes, please don't wait to be called on.
- Speak openly and honestly, as everything that is said in this room will not be associated with your name.
- Taking notes and recording the session. The audio recording will only be used for research purposes and will be heard only by our research team.
- We have 10 questions, with about 3-5 minutes for each.
- Do you have any questions before we begin?

[PAUSE - ANSWER ANY QUESTIONS]

II. Warm-Up Question: Frequency of Use [1 min]

Show-of-hands question: How often do you use PubMed?

- Please raise your hand if you use PubMed at least **monthly**.
- Keep your hand up if you use it at least **weekly**.
- Keep your hand up if you use it at least **daily**.

III. Question 1: Context of PubMed Use [5 min]

People use PubMed for different purposes, and at different times in their research process. For example:

- some do a literature review at the very beginning of their research project;
- for some, particular questions pop up during research or patient care, for which they turn to PubMed;
- some use PubMed to explore and "dabble" around topics of interest to learn about recent research;
- some get regular alerts from PubMed to keep abreast of research in their field;
- some work with librarians to conduct systematic reviews as part of their research.

How do you use PubMed? Could you describe some of the types of tasks you do with PubMed?

IV. Additional Questions: [3 min each]

If you're willing to share, do you remember the last PubMed search you did? Were you successful? Why or why not?

Are there types of literature you are most often searching? Do you often search for review literature, results of clinical trials, case studies?

Do you ever seek assistance in finding information? If so, whom do you ask? How do they help?

Where and when do you conduct the majority of your searching? (On your phone, laptop, at a desk, etc)

V. Question 2: Search expertise/Confidence [5 min]

On a scale of 1 to 5, 1 being not at all confident and 5 being completely confident, how confident are you in your ability to use PubMed to find the best quality research literature on a specific topic?
Please hold up your fingers with the number.

VI. Question 3: Frustrations [5 min]

What is the main thing that frustrates you about PubMed?

Follow-up: (ex: Interface, data, frequency it is updated)

VII. Question 4: Ability to evaluate the quality of information [5 min]

How do you determine if the articles you find in your searches contain good evidence?
(How do you know if something is authoritative/true? What do you look for?)

Follow up:

If training on evaluating sources was offered, would you be interested in participating?

VIII. Question 5: PubMed Training enablers/barriers [5 min]

How often do you refer to PubMed documentation/training resources when using PubMed?

Follow-up:

What did you think of it?

If you haven't used training resources, what is the reason? (time, don't know they exist, don't need help, etc.)

OR

What are some of the barriers you face when it comes to participating in PubMed training?

VI. Wrap-Up [1 min]

Do you have any other thoughts you would like to share on PubMed?

Appendix 2: Follow-up Survey Questions

1. When searching PubMed, how confident are you in your ability to find:
 - a. a specific author, journal, or citation
 - b. A few good articles on a particular topic
 - c. Everything on a topic

Likert Scale: Not at all confident, Slightly confident, Moderately confident, Highly confident

2. How important is it to your work to find:
 - a. a specific author, journal, or citation
 - b. A few good articles on a particular topic
 - c. Everything on a topic

Likert Scale: Not important, Slightly important, Moderately important, Very important

3. How do you prefer to learn or seek help with PubMed searching skills? (e.g., in-person class, webinar, YouTube tutorials, individual assistance, etc.).
4. If you have saved search alerts in PubMed, were you happy with your results? Please share a saved search alert strategy that you are unsatisfied with.
 - a. Box 1: What are you looking for?
 - b. Box 2: Paste saved search alert here: