Evidence Based Library and Information Practice

Using Evidence in Practice

Using Bibliometrics to Illustrate the Impact of the Library on Military Medical Research

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Setting

In this article, the authors describe how bibliometrics were used as a novel method of demonstrating use and impact of specialized biomedical library collections. By exploring an approach used previously for collection development, the authors were able to illustrate library impact on military medical research beyond the traditional approach of return-on-investment investigations and statistical presentations.

The U.S. Army Medical Research and Development Command (MRDC) libraries consist of the headquarters virtual library and five physical subcommand libraries, all staffed by master's degree-holding librarians. Information professionals in the MRDC libraries consortia are often solo librarians or small library teams who assist highly experienced researchers with electronic access and literature searching. MRDC libraries are present throughout the research workflow providing effective virtual libraries and end-user training.

MRDC libraries support basic science and translational research. The MRDC pursues medical research and testing that pertains to human treatments, like neurological effects of exposure and how illnesses or trauma manifest. Animal and human research conducted at our organizations frequently translates into military products and devices, as well as treatments for military and civilians. MRDC libraries facilitate the research of illnesses and their causation while also focusing on global military health. The focus on military health encompasses both physical and psychological causes and prevention.

Problem

The MRDC Library Program is a multifaceted consortium overseen by a command librarian in the headquarters library and five subcommand libraries located at the United States Army Medical Research Institute of Chemical Defense (USAMRICD), Walter Reed Army Institute of Research (WRAIR), United States Army Medical Research Institute of Infectious Diseases (USAMRIID), United States Army Institute of Surgical Research (USAISR), and the United States Army Aeromedical Research Laboratory (USAARL). Besides providing an onsite location for usage, each subcommand library offers additional resources and services specifically tailored to their users. The goal of the library program is to keep the service member at the forefront of our collections, services, and trainings to contribute to the MRDC mission of ensuring that the U.S. Armed Forces are equipped to protect themselves from disease and injury.

Historically, MRDC was a subordinate organization under the U.S. Army Medical Command and had access to the Army Medical Department (AMEDD) virtual library resources (Figure 1) as well as maintaining their local physical resources. Recently, the Defense Health Agency (DHA) was established to bring together all the medical departments of all military branches under one umbrella to consolidate resources when possible. As MRDC transitions to DHA, those clinical library resources are now accessible through the MRDC virtual library. However, as MRDC librarians know from first-hand experience, DHA clinical library resources alone would not be sufficient for MRDC researchers because of differing usage needs from their clinical colleagues.

DHA clinical library resources are designed to meet the needs of medical professionals working in military treatment facilities (e.g., clinicians, nurses, physician assistants, and other clinical staff directly

responsible for patient care). It is more likely that clinical library users would need evidence-based treatment summaries, patient care guidelines, anatomy or procedure textbooks, clinical decision support, manuals or electronic tools to check for contraindications or drug interactions. Maintaining access to older years of scientific literature coverage is rarely considered best practice in clinical libraries. This is especially true if clinical information services are implemented in a point-of-care setting where clinicians only need access to the most recent research as it relates to patient treatment. Information from the last five years is often sufficient for these purposes.

Military medical research library collections support scientific staff in the discovery and testing of novel therapeutics, preventative measures, or treatments for diseases and conditions that affect humans. The MRDC libraries provide access to the full body of knowledge within a given discipline, in applicable subject areas since such content might contribute to growth in the field of military medical research. Some of these subject areas encompass infectious diseases, combat casualty care, military operational medicine, chemical defense, clinical and rehabilitative medicine, and entomology, among others because of their prevalence in the field (U.S. Army Medical Research and Development Command, n.d.). Because the researchers frequently read and cite content from older scientific journal literature, the MRDC librarians also purchase backfiles to maintain journal access to many years of coverage. Lercher and Smolinsky (2016) extrapolate, "if the use of older scientific literature is increasing, then one might argue that the value of archives of such literature is likewise increasing" (pp. 1219–1220). Analysis of the increased citations and usage trends for older scientific literature supports the value of more extensive archives in research libraries, though the frequency of citing older articles can vary by discipline as can the definition of "older" articles (Verstak et al., 2014).

Though the librarians maintain an ongoing awareness of Army medical researchers' needs and advocate for the resources that these specialized library users require, new leadership or new funding agencies would also benefit from this information especially since DHA is largely composed of clinical military treatment facilities, whereas MRDC is composed of military medical research facilities. As a result, this project emerged to simultaneously advocate for the resources needed by MRDC researchers and staff while illustrating the differing subject expertise among researchers supported by the MRDC Library Program in preparation for the transition to DHA.

Evidence

Federal medical library surveys are conducted regularly by clinical libraries, but using a survey as the research instrument was not sufficient due to the clinical library-oriented questions in the survey instrument and the lack of statistical proof of library impact desired by the MRDC librarians. Though MRDC was invited to participate in a federal library survey initiated by clinical libraries, the points of data collection did not align with the mission and services provided by the medical research libraries. A working group consisting of four of the MRDC librarians developed questions for a survey in an earlier phase of this project, but ultimately chose not to use it.

Several different approaches to demonstrating value were explored through a literature review. Literature regarding "return on investment" in library settings uses different conceptual models like social value analysis, value co-creation, perceived value, long term impact of library service use, and economic impact (Urquhart, 2020). Literature on topics surrounding library value and approaches to impact studies often come from academic or clinical settings (De Groote et al., 2020; De Groote & Scoulas, 2022). Additionally, literature which addresses "value studies" focuses heavily on financial data and

justifying ever-increasing costs of operation rather than focusing on deliverables and the greater impact of library services. None of these options were found to be suitable for this project.

Very limited research was discovered on the topic of using bibliometric data in federal research libraries. Though identifying literature that would illuminate an applicable strategy for MRDC libraries proved challenging, Belter and Kaske's 2016 article in *College & Research Libraries* provided an example of how citation metadata could be used in federal research libraries for collection development. After reviewing the article, the working group determined that using the citation metadata of research publications authored by MRDC researchers could also be used to investigate whether MRDC or DHA provided the most access to cited articles in MRDC researchers' publications. Cited references would provide a compelling foundation for why specific resources are required and demonstrate the library's impactful role in the research process.

Though Belter and Kaske used Web of Science, the MRDC librarians used Scopus for their analysis. Scopus is an abstract and citation database that covers thousands of book and journal titles. The majority of the journals are peer-reviewed and cover such fields as life sciences, social sciences, physical sciences, and health sciences. Scopus also enables affiliation-based searching, which helps identify publications within a database that were written by individuals employed by or associated with a particular agency. From professional experience, the MRDC librarians knew that Scopus content coverage was more comprehensive and captured more research authored by MRDC affiliated researchers than Web of Science.

After determining how to proceed, the working group utilized the bibliometric tools in Scopus to analyze the citation metadata of all publications written by MRDC researchers from 2017–2021. All MRDC locations were included in the analysis of 3,631 total scientific journal articles (Figure 1). The librarians analyzed 130,256 cited references used to create the published articles. MRDC libraries currently receive subscription resources funded by DHA, MRDC, and subcommand libraries. Free or open access resources and interlibrary loan (ILL) services were evaluated as well. Further analysis determined the library that most likely provided the cited source. Coverage of cited references from the articles retrieved in the affiliation searches are presented in Figures 2 and 3, using one subcommand's affiliation search as an example. These data were compared to the MRDC virtual library and subcommand library holdings.

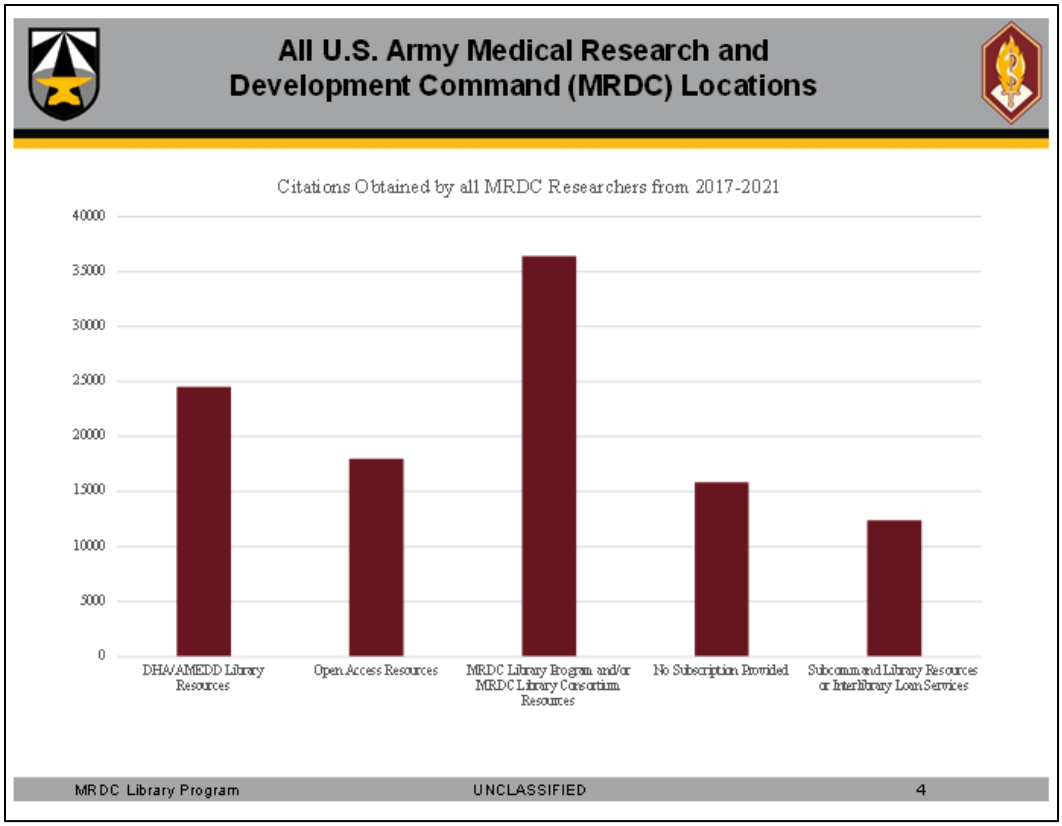

Figure 1
Coverage of all citations from MRDC researcher-authored publications between 2017–2021.

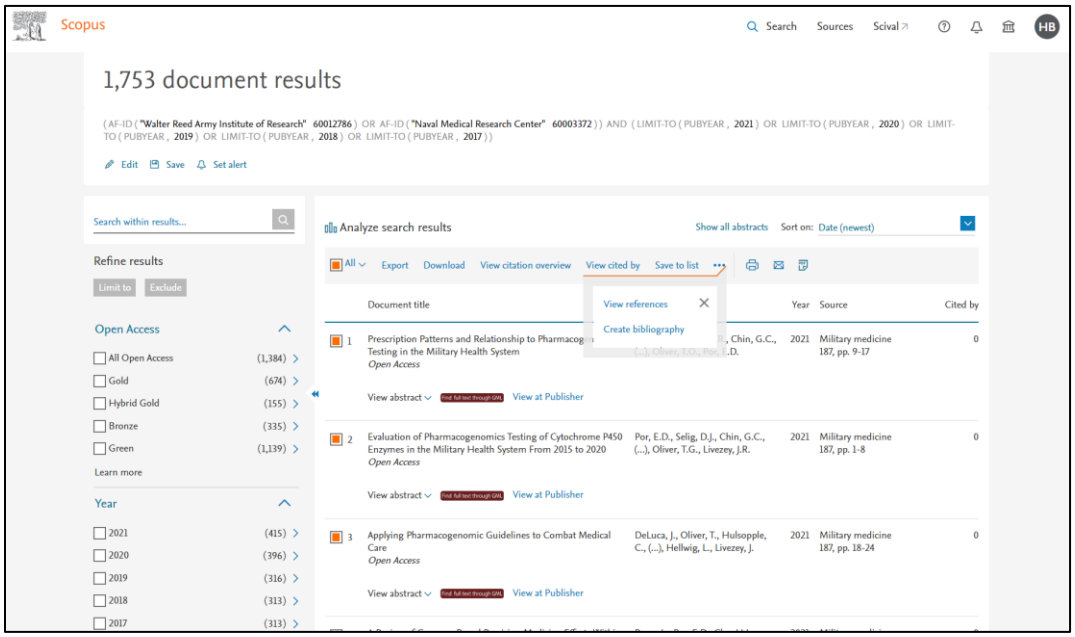

Figure 2
Example of affiliation search for one of the five subcommand libraries (WRAIR) evaluated in this study: What was published by WRAIR-affiliated authors between 2017–2021?

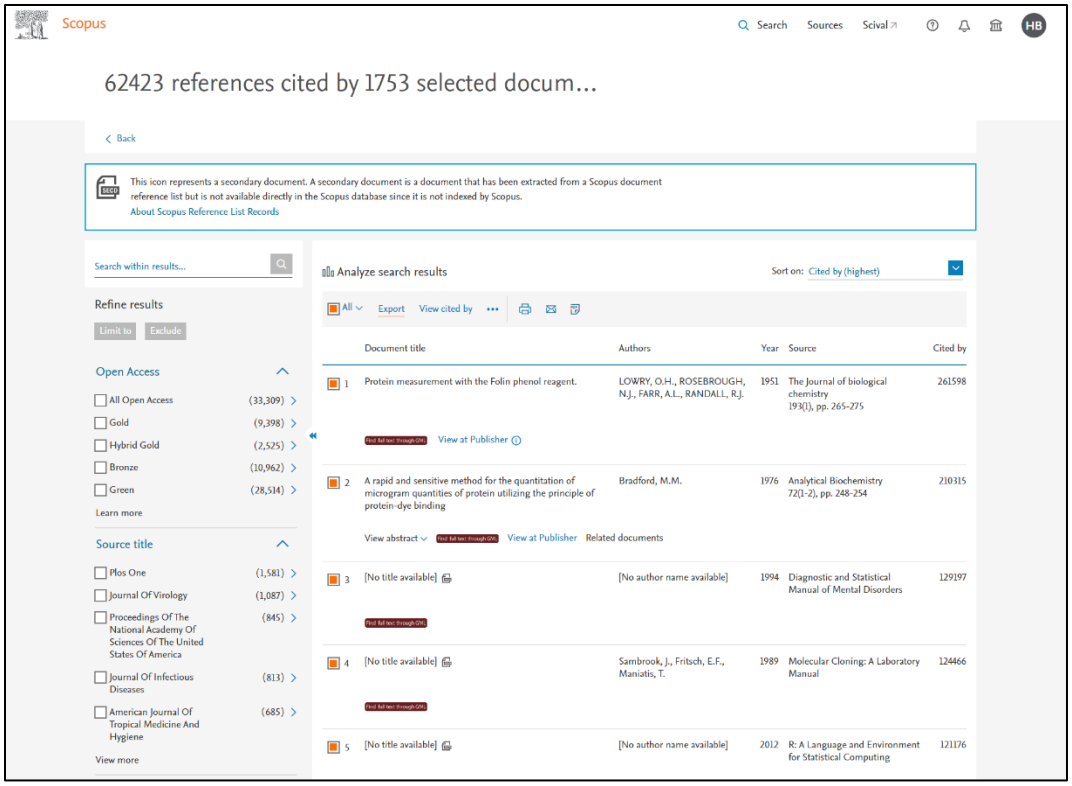

Figure 3

Example of publications' cited references for one of the five subcommand libraries evaluated in this study: What was cited by WRAIR-affiliated authors in their written publications between 2017–2021?

To identify the library that provided each cited source, librarians evaluated their holdings for each cited reference listed in MRDC-affiliated publications to determine the level of access provided. For every resource considered, current coverage was required at a minimum, and the archival coverage was also evaluated. In the instance that a resource was covered by MRDC and DHA, credit was given to the organization that provided the most extensive full text access and the most extensive archive (Figure 4). For example, each author went through the list of individual journal titles with articles that were cited by MRDC researchers between 2017–2021 and searched their online library catalog to confirm whether the MRDC command or their subcommand library provided current access to each journal's content. If a journal could be found in both a DHA-provided resource and an MRDC-provided resource, and current access was provided by both, the distinguishing criteria would be the extensiveness of the archive or the years of coverage that were provided for that journal within that resource (e.g., ClinicalKey or ScienceDirect). So, when comparing the level of access provided for a particular journal in the DHA-provided resource ClinicalKey versus the MRDC-consortium provided ScienceDirect, both DHA and MRDC had current coverage for the journal. However, MRDC was given credit because that agency had a more extensive archive for that journal.

ILL statistics were also incorporated to account for gaps in coverage and to highlight the MRDC subcommand libraries' contributions to connecting researchers with resources. ILL services facilitate unique literature requests from researchers and scientists to enable the work they do advancing their field of research and creating deliverables for military service members. Though outside libraries were used to fill ILL requests during this timeframe, most ILL requests were filled by other research libraries within

the MRDC consortia, thus reinforcing the fact that even if one of our libraries does not have access to a particular resource, local subscriptions throughout the consortia can often facilitate the request.

	A	B	C
3	Row Labels	Sum of Citatior	Purchasing Agen
4	Academic Medicine	114	DHA
5	Acarologia	104	Free
6	Acta Tropica	32	GML
7	AIDS	536	DHA
8	AIDS And Behavior	59	DHA
9	AIDS Research And Human Retroviruses	178	GML
10	American Journal Of Cardiology	50	MRDC
11	American Journal Of Epidemiology	222	MRDC
12	American Journal Of Kidney Diseases	83	DHA
13	American Journal Of Medicine	53	MRDC
14	American Journal Of Neuroradiology	219	Free
15	American Journal Of Obstetrics And Gynecology	147	DHA
16	American Journal Of Pathology	50	MRDC
17	American Journal Of Preventive Medicine	54	DHA
18	American Journal Of Psychiatry	238	
19	American Journal Of Public Health	141	DHA
20	American Journal Of Respiratory And Critical Care Medicine	199	Free
21	American Journal Of Roentgenology	170	Free
22	American Journal Of Sports Medicine	481	DHA
23	American Journal Of Surgery	182	MRDC
24	American Journal Of Surgical Pathology	65	DHA
25	American Journal Of Transplantation	119	Free
26	American Journal Of Tropical Medicine And Hygiene	759	DHA
27	Anesthesia And Analgesia	75	Free
28	Anesthesiology	155	Free
29	Annals Of Internal Medicine	318	DHA
30	Annals Of Oncology	50	Free (?)
31	Annals Of Surgery	326	Free
32	Annals Of The New York Academy Of Sciences	49	GML
33	Annals Of The Rheumatic Diseases	50	DHA
34	Antimicrobial Agents And Chemotherapy	515	MRDC
35	Archives Of Clinical Neuropsychology	206	MRDC

Figure 4
Example of evaluating one subcommand library's holdings: Which organization provided access (MRDC, DHA, Free = open access, or blank if covered by MRDC and DHA without a difference in archival coverage) to journals cited by researchers at this subcommand?

Implementation

This project determined that the resource collections put together by the MRDC library program and subcommand libraries are extremely comprehensive and effective at fulfilling the needs of researchers. Analysis of citation metadata can help justify continued funding for research-specific resources as libraries continue to partner with military medical researchers to fulfill the Department of Defense (DoD) needs for experimental research. Loss of resources will greatly impact the ability of military medical researchers to obtain research needed to further the missions of the DoD and could have potentially grave impacts for warfighters down the road.

These data have been presented in annual reports and multiple presentations discussing the importance of libraries to headquarters leadership.

Outcome

The majority of the topics covered in MRDC-authored publications are not clinical in nature and are clearly bench or experimental research; therefore, clinical-leaning resources would not satisfy the needs of the MRDC researchers. Each location determined that most of the references needed to generate their research were available through MRDC-provided subscriptions, either by the command-wide subscriptions or through locally subscribed resources. Further determination found that ILL provided by the subcommand libraries (Figure 1) was also used a small percentage of the time.

PowerPoint presentation slides were used to highlight the purchasing agency with the most expansive resource coverage at each MRDC institution based on citations from the last five years. The presentation was shared with MRDC leadership and local libraries to demonstrate library impact and advocate for comprehensive resource funding. Initial slides provided a description of how the data were gathered, the years included in our publication set, and significant revelations from the data. Namely, that most publications generated by MRDC organizations referenced materials provided by the MRDC Virtual Library or subcommand libraries. MRDC library subscriptions encompass a range of medical research topics designed to align with the organizational mission. In no instance did any library rely primarily on the clinical resources provided by DHA.

Conveying budgetary requirements to non-library stakeholders called for rethinking ways to distinguish clinical resources and MRDC research resources, and which subscriptions best support the needs of our users. Specialized backgrounds of non-library stakeholders ought to be considered when communicating with leadership, especially when contemplating how to best present library information and metrics that will most effectively illustrate the role of the library in the mission. The most effective metrics for each library may vary depending on the type of library and its deliverables.

Reflection

Analysis of citation metadata can help libraries justify budgetary costs, make collection development decisions, and affirm the libraries' alignment with critical research activities. Bibliometrics should be used to advocate the impact of libraries within their organizations. Although MRDC libraries differ from academic and clinical libraries, this evidence-based methodology is applicable in other types of library settings. While surveys can be beneficial for gathering feedback from the patron, information professionals should also consider using citation metadata to illustrate the role that the library plays in research, publication, and medical product development.

Many stakeholders are concerned with the cost of library operations, leading to an increase in library literature focused on value studies and return on investment. However, librarians in the MRDC library consortia recognize that the most important "currency" in our libraries is research. The bibliographies of MRDC publications prove that MRDC libraries provide access to the primary cited resources in our researchers' publications. Libraries must consider the backgrounds of library stakeholders and leadership when evaluating what evidence would most effectively communicate their impact.

Author Contributions

Holly Rose Beverley: Data curation (equal), Formal analysis (equal), Project administration (lead), Supervision (lead), Writing – original draft (lead), Writing – review & editing (lead) **Olivia Briere:** Data curation (equal), Formal analysis (equal) **Elisia George:** Data curation (equal), Formal analysis (equal), Writing – review & editing (equal) **Maureen Humphrey-Shelton:** Conceptualization (lead), Data curation (equal), Formal analysis (equal), Methodology (lead), Supervision (equal), Writing – review & editing (equal)

Disclaimer

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