Evaluating the MEDLINE *Core Clinical Journals* Filter: Data-Driven Evidence Assessing Clinical Utility

Michele Klein-Fedyshin, MSLS, BSN, RN, AHIP (Correspondence). Faculty Librarian, University of Pittsburgh, Health Sciences Library System, 200 Scaife Hall, 3550 Terrace Street, Pittsburgh, Pennsylvania, 15261 USA, kleinf@pitt.edu

Andrea M. Ketchum, MLIS, AHIP. Faculty Librarian, University of Pittsburgh, Health Sciences Library System, Pittsburgh, Pennsylvania, USA

Robert M. Arnold, MD, Leo H. Creep Chair of Patient Care; Professor of Medicine; Chief, Section of Palliative Care and Medical Ethics; Director, Institute for Doctor-Patient Communication; University of Pittsburgh School of Medicine; Medical Director, UPMC Palliative and Supportive Institute, Pittsburgh, Pennsylvania, USA

Peter J. Fedyshin, MD, Staff Radiologist, Department of Radiology, University of Pittsburgh Medical Centre, Pittsburgh, Pennsylvania, USA

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**Abstract:**

**Rationale, aims and objectives:** MEDLINE offers the Core Clinical Journals filter to limit to designated clinically useful journals.Todetermine its effectiveness for contemporary clinical searching and patient-centric decision-making, this study compared literature used for Morning Report in Internal Medicine with journals in the filter.

**Method:** An EndNote library populated with references answering 327 patient-related questions during Morning Report from 2007- 2012 was exported to a file listing variables including designated Core Clinical Journal, Journal Impact Factor, date used and medical subject. Bradford’s law of scattering was applied ranking the journals and reflecting their clinical utility. Recall (sensitivity) and precision of the Core Morning Report journals and non-Core set was calculated. This study applied bibliometrics to compare the 628 articles used against these criteria to determine journals impacting clinical decision-making.

**Results:**

Analysis shows 30% of clinically-used articles are from the Core Clinical Journals filter and 16% of the journals represented are Core titles. When Bradford-ranked, 55% of the top twenty journals are Core. Articles <5 years old furnish 63% of sources used. Among the 63 Morning Report subjects, 55 have <50% precision and 41 have <50% recall including 37 subjects with 0% precision and 0% recall.

**Conclusions:**

Low usage of publications within the Core Clinical Journals filter indicates less relevance for hospital-based care. The divergence from high impact medicine titles suggests clinically valuable journals differ from academically important titles. With few subjects demonstrating high recall or precision, the MEDLINE Core Clinical Journals filter may require a thorough review and update to better align with current clinical needs.

**Introduction**

The Abridged Index Medicus (AIM) journal list was introduced in 1970 as a practical subset of 100 essential titles from the 2,300 English language journals then indexed in the full Index Medicus, or what we now know as MEDLINE. The list was originally published by the U.S. National Library of Medicine (NLM) with guidance from medical librarians, physicians and editors [1, 2]. The originators sought readily accessible journals, and physicians envisioned a list with clinical usefulness that would be continuously reviewed [[3]](#_ENREF_1). Lauded upon its publication, physicians appreciated having a manageable set of references selected for convenience, quality and clinical relevance [3,4].

The original AIM list included 100 journals and one more was added later. In 1979, 26 titles were added and 8 deleted, resulting in 119 indexed journals. Since then, due to publishers’ title changes plus journal discontinuations or splits, the AIM list has fluctuated without being systematically revised. After 31 years, MEDLINE'S AIM list was renamed the Core Clinical Journals (CCJ) subset [5]. It is an easily available filter for MEDLINE searches to restrict retrieval to clinically applicable citations from among the 5,652 journals currently indexed for MEDLINE. There is no extant data determining the CCJ filter’s effectiveness for contemporary clinical searching and patient-centric decision-making.

From 1970 to the present, clinicians have continued to have limited time to search, retrieve and judge the literature needed for patient care. The peer-reviewed nature of MEDLINE journals, which must be evaluated before indexing in MEDLINE, elevates the reliability and quality of MEDLINE retrievals. Although Google and Google Scholar sometimes substitute for a search of the professional medical literature, studies have found them marginally better than a coin toss for diagnosis [6,7]; laden with formats other than journal articles including patents, case law, lawyers’ ads and blogs[8-10]; and often inconsistent with professional medical society recommendations[11,12]. MEDLINE offers higher specificity[13], the ability to distinguish between human and animal studies, study methodology filters[13] and primary literature to answer drug-related questions [14]. As an advantage to community-based clinicians, PubMed is a free resource available without subscription. The CCJ subset is an easy filter to apply. With a few clicks, a MEDLINE search can focus on a set of journals selected for high quality and clinical utility. For clinicians this is an extremely efficient filter to apply, but the journals within the CCJ subset have not been evaluated or revised since 1979. This study analyzed data to determine external validation of its clinical utility or if an update is needed.

**Objective**

To determine the contemporary clinical utility of the CCJ filter, this list was compared to the physician-selected, clinically-used citations from the University of Pittsburgh Health Sciences Library System (HSLS) Internal Medicine Morning Report (MR) blog. This study incorporates the 327 clinical questions detailed in the online blog from 2007-2012. Clinical questions were generated daily by the physicians from Internal Medicine Rounds in a teaching hospital, and HSLS librarians searched for articles that answered them. Questions were selected by the Chief Resident in conjunction with other residents and attending staff. Physicians chose articles to be posted to the blog from selections made by the Clinical Librarian, generated from the librarian’s search or known to the team. Questions covered diagnosis, treatment, tests, drugs and other clinical issues. The questions were subject classified using the U.S. National Library of Medicine’s broad medical subject headings (MeSH). The blog’s 327 patient care questions were answered using 628 articles from 324 sources.

**Methods**

All of the Morning Report blog citations were populated into an EndNote library and sent to a Microsoft Excel file for Bradford law review, Impact Factor insertion and subject assignment; each becoming a method of measuring clinical relevance.

Bradford’s law of scattering describes how the literature on a subject is distributed in the journal literature [15]. It is a statistical expression used to demonstrate that a few journals account for many articles in a discipline and divides the distribution into three tiers. It finds that a small core of journals accounts for a substantial percentage of the articles in a subject and identifies the most frequently used journals in a discipline. Bradford’s law was applied to the list of 324 Morning Report sources to rank the clinical utility of the journals used to answer these patient care questions. Tier 1 consisted of 27 journals with 208 articles and represented those having the greatest clinical utility during the 5 years recorded in the Morning Report blog.

Journal Impact Factors compare journals using citation data to indicate the most often cited journals in a field and thus having the highest impact [16]. To compare the Morning Report clinical impact set with a standard impact factor, the Institute for Scientific Information (ISI) Impact Factors were reviewed [17]. The ISI Impact Factor subject category of General and Internal Medicine matched the Internal Medicine Department most closely. This ISI category’s list of journals was sorted by Impact Factor to find the top 20 ISI Medicine journals of 2010 for comparison with the Bradford-ranked Morning Report top 20. Any tie for frequency was broken using ISI Impact Factors which gave a slight bias to CCJ titles

The U.S. National Library of Medicine applies broad subject headings to MEDLINE journals from a list of approximately 120 valid Medical Subject Headings (MeSH). Subject headings were researched for all of the journals used for Morning Report to provide a basis for the recall/precision calculations. Recall and precision are concepts that relate to the fraction of relevant documents retrieved from a document set. This study defined relevance as being included in the CCJ filter. **Table 1** depicts the formulas used which can be represented conceptually as follows. Recall became the ratio of CCJs used in Morning Report/to all CCJs within a subject category. Precision became the ratio of CCJ’s used in Morning Report/to all MEDLINE journals within a subject used in Morning Report. Subject lists were limited to English language since only these journals were considered for use in Morning Report and journals currently indexed in MEDLINE. All the recall/precision calculations were done in Excel using this formula. The Morning Report clinical questions were classified using these same subject headings as well.

Table 1

To estimate the current usage of the AIM/CCJ subset by searchers, the publically available full-dayMEDLINE Query Log was downloaded from the NLM FTP site*(**ftp://ftp.ncbi.nlm.nih.gov/pub/wilbur/DAYSLOG****,*** last accessed on May 17, 2013.) This dataset wasimported into three Excel files and analyzed for subset limits with special focus on thejsubsetaim (AIM) limitusing the technical name for the CCJ filter.

**Results**

The primary purpose of this research was to determine how clinically useful the Core Clinical Journals were in a hospital to answer Internal Medicine patient care questions. The study found only 16% of the journals used in Morning Report was from the CCJ set. From an article perspective, only 30% of the articles selected for Morning Report were from CCJ titles **(Fig. 1**). The most influential journal was New England Journal of Medicine, which is listed as a CCJ title; however, the strong second highest was Clinical Infectious Diseases which is a non-CCJ title. When the top 20 Morning Report journals were compared with the ranked ISI General, Internal Medicine list, only 7 titles overlapped. **Table 2** lists both top 20 sets, and the overlap is in boldface. When Bradford-ranked, 27 Morning Report journals provided the top tier entries. Of the top 20 Morning Report journals only 11 were Core titles (55%), while only 10 of the top 20 ISI high impact medicine titles were Core (50%).

Fig

1

The study next considered whether current versus classic literature answered the clinical questions. Articles less than 5 years old answered over half the questions at 63%. While 22% of the sources used were 5-10 years old, approximately 16% were more than 10 years old. The implications for Collection Development are that a collection spanning 10 years would provide 84% of the information needed. Extend that collection another 10 years, and 20 years of literature would provide 96% of the sources used. The final 4% were articles 20-38 years old.

Table 2

2

Using subject headings assigned by NLM, 63 different subjects were distilled from the aggregated Morning Report journals. Some journals were indexed to more than one NLM subject specialty such as *Drugs & Aging*, which was indexed to both “Drug Therapy” and “Geriatrics” subject categories. While some of the journals were multiply classified, the MR clinical questions were singularly classified leaving 4 general subject topics without corresponding questions (Biochemistry, Biology, Hospitals, Science). The journals within those subjects (Annals of Clinical Biochemistry, Advances in Experimental Medicine and Biology, Journal of Hospital Medicine and Journal of Hospital Infection, and Annals of the New York Academy of Sciences respectively), had dual classifications in 2 instances. Among the 5 largest categories were the same subjects for both distributions (Gastroenterology, Medicine, Neurology, Radiology and Communicable Diseases). The journal subject categories often represented medical subspecialties rather than clinical conditions, a logical strategy for achieving high visibility for specialists. See Figure 2. When compared with another article listing Morning Report subspecialties [18], all of their subspecialties were represented on both the Morning Report question and journal lists so they seem very inclusive.

To further define utility, recall and precision were calculated to determine the fractions of relevant documents retrieved from the set. For each subject, recall and precision were analyzed based on whether the title was a CCJ title or not. In **Figure 3 the** horizontal line represents precision and the vertical bar is recall. Among the findings is that 58% (37/63) of NLM journal subject sets had 0% precision and 0% recall, which included 19 journal subjects with no Core Clinical Journal titles. Journals for 87% (55/63) of the subjects had <50% precision and 65% (41/63) included <50% recall. **Table 3** lists the 37 journal subjects having 0% recall and 0% precision noting those lacking CCJ titles. These less-covered subjects are being searched for Morning Report and are topics important to patient care clinical discussion.

Fig. 2

**Discussion**

Table 3

Fig 3

Ranking journals by their actual clinical use in a patient care environment demonstrates those with the greatest *clinical* utility. The divergence of the Morning Report list from the ISI high impact journals in internal medicine may indicate that clinically valuable journals differ from academically important titles. This contrasts with other~~s~~ studies, which found greater influence of impact factors and more overlap among top journals on ranked lists [19,20].

With 58% of the journal subjects having 0% recall and 0% precision, and 87% having less than 50% precision and 65% having <50% recall, many clinical discussion topics do not have adequate coverage within the CCJ set.Finding 19 Morning Report journal subjects with no core clinical titles to offer leaves such topics as sexually transmitted diseases, anti-bacterial agents and epidemiology absent from the CCJ limit. This impacts the potential success of finding particular clinical subjects using the CCJ filter. Even though four of the categories had no clinical questions specified within, that is likely because only one choice was allowed for each question categorization, whereas the journals had multiple categorizations. With the CCJ filter contributing less frequently or not at all to answering the Morning Report topics, searching with it would not have provided many answers to the patient care questions.

The low recall and precision may reflect journal title discontinuations which occurred without formal consideration given to replacing the coverage that was lost to ensure a balanced representation of core clinical disciplines. In addition, the low percentage of CCJ journals used in Morning Report may demonstrate that the CCJ filter has not been systematically updated for current clinical use. Although web-based searching offers another free alternative to finding information, Googledisplays results based on paid advertising or highest number of links and Google Scholar lagsin currency for peer-reviewed medical journals [21,22]*.* A comparison of the first 20 citations in MEDLINE sorted by publication date compared with Google Scholar sorted by date on the disease of Invasive Candidiasis found more than half of the Google Scholar citations missing from the MEDLINE set due to quality control concerns or currency lags. Google Scholar included duplicate citations, an unapproved manuscript proof, a PhD thesis, repository contributions and a workshop article among the search results.

The CCJ titles are also part of the NLM MedPrint serials preservation program designating a primary set of 250 journals to retain in print. Although the CCJ journals are widely-owned, based on actual clinical usage they may not offer an adequate list. Related to accessibility concerns if clinical rather than academic medical usage explains why 16% of the articles used were 10 years old or older, then retaining access to older journals becomes important. This finding is supported by another study on Morning Report which found older literature useful as well [23]. The implication for practice is that point-of-care commercial evidence-based medicine products that do not include older literature may be missing key articles.

A recent study using MEDLINE query texts as entered by users examined their application of search tags [24]. In general, usage of any search tags was low with only 11.38% of the total queries having any of the 48 available tags applied. Perhaps the low recall and relevance of the CCJ set might translate into users avoiding this particular filter. With physicians tending to “scan a maximum of 40 citations (the equivalent of 2 search pages in PubMed),” it is important to be able to limit retrievals and bring clinically valuable citations to the fore [25].

Despite the limited utility of the CCJ in this study, another evaluation of MEDLINE filters have found that the AIM/CCJ set combined with specific filters increased the retrieval to the highest precision in the dataset [26]. This suggests that updating the CCJ filter for current clinical use could offer clinicians an important tool to limit their retrieval to readily applicable, pertinent information. Knowledge-based information has been found to impact patient care decisions, costs and lengths of stay [27-31]. This study’s implications are that an updated CCJ may enhance search retrievals and translate into improved patient care.

Limitations

This data derived from a large, tertiary care hospital’s Internal Medicine residency program. Smaller or community hospitals, specialist or community physician practices may differ in their journal utility. Since this is a single institution study, the results may not be generalizable. The questions selected for Morning Report presentation may not be representative of the information typically needed. Yet the use of CCJ journals in community hospitals may not differ greatly. An early study of journal usage in a community hospital library found that 33% of titles requested were not indexed in AIM (CCJ) and only 7% of borrowed titles were AIM (CCJ) [32]. Interestingly, a similar 15% of borrowed items were from older literature.

**Conclusions**

With only 16% of relevant journals coming from the CCJ list, the current CCJ collection may have limited relevance for hospital-based clinical care. Low concordance with high impact journals reinforces the inference that clinically valuable journals differ from academically important titles. Although there is no mechanism to regularly evaluate or update the CCJ list, this filter is in continued use and its new name of Core Clinical Journals suggests that it should have high value for patient-centric decision-making. The expedience of the CCJ filter within MEDLINE warrants its systematic review to ensure rapid access to the most current and relevant clinical literature. In order to better align this set of journals with contemporary clinical searching, it should be routinely updated to address changes in coverage and practice.

Addendum: The AIM/CCJ filter is planned for an extension review and update in the future. A systematic review mechanism will also be put into place.

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**Legends**

**Table 1** Recall and Precision Formula

**Figure 1** Percentage of NLM Core Clinical Journals in Morning Report Articles vs Journals

Figure 2 Journal and Question Subject Analysis

**Table 2** Top 20 Bradford-Ranked and Impact Factor Journals

**Figure 3** Precision and Recall by Subject

**Table 3 Journal** Subjects with 0% Recall, 0% Precision

**Table 1** Recall and Precision Formula

|  |  |  |  |
| --- | --- | --- | --- |
| MEDLINE Journals in a Subject  | Core Clinical Journals(Relevant) | Non-Core Journals(Not relevant) | Total |
|  |  |  |  |
| Used in Morning Report | a | b | a + b |
|  |  |  |  |
| Not used in Morning Report | c | d | c + d |
|  |  |  |  |
|  |  |  |  |
| Total | a + c | b + d | n |

Recall = a/(a+c)
Precision = a/(a+b)

n= Total English language journals in a subject

**Table 2** Top 20 Bradford-Ranked and Impact Factor Journals

|  |  |
| --- | --- |
| Morning Report: Bradford-Ranked Top 20 | Impact Factor: General, Internal Medicine Top 20 |
| 1. New England Journal of Medicine (Core)
2. Clinical Infectious Diseases (Non Core)
3. Chest (Core)
4. Radiology (Core)
5. American Journal of Gastroenterology (Non Core)
6. Annals of Internal Medicine (Core)
7. Cochrane Database of Systematic Reviews (Non Core)
8. Kidney International (Non Core)
9. Archives of Internal Medicine (Core)
10. AJR American Journal of Roentgenology (Core)
11. American Journal of Medicine (Core)
12. Circulation (Core)
13. Hepatology (Non Core)
14. Medicine (Core)
15. Lancet Neurology (Non Core)
16. Neurology (Core)
17. American Journal of Kidney Disease (Non Core)
18. Journal of Neurology, Neurosurgery, & Psychiatry (Non Core)
19. Cleveland Clinic Journal of Medicine (Non Core)
20. American Family Physician (Core)
 | 1. **New England Journal of Medicine (Core)**
2. Lancet (Core)
3. JAMA (Core)
4. **Annals of Internal Medicine (Core)**
5. PLOS Medicine (Non Core)
6. British Medical Journal (Core)
7. Annual Review of Medicine (Non Core)
8. **Archives of Internal Medicine (Core)**
9. Canadian Medical Association Journal (Core)
10. **Cochrane Database of Systematic Reviews (Non Core)**
11. Journal of Internal Medicine (Non Core)
12. BMC Medicine (Non Core)
13. Mayo Clinic Proceedings (Core)
14. **American Journal of Medicine (Core)**
15. Annals of Family Medicine (Non Core)
16. Annals of Medicine (Non Core)
17. **Medicine (Core)**
18. American Journal of Preventive Medicine (Non Core)
19. **Cleveland Clinic Journal of Medicine (Non Core)**
20. Preventive Medicine (Non Core)
 |

Overlap bolded.

Note that 11 of the top 20 MR journals are CCJ/Core titles; 10 of the top 20 high impact medicine titles are CCJ/Core titles.

**Table 3** Journal Subjects with 0 Recall, 0 Precision

|  |  |
| --- | --- |
| 1. Acquired Immunodeficiency Syndrome (No Core)
2. Anesthesiology
3. Anti-bacterial Agents (No Core)
4. Biochemistry (No Core)
5. Biology (No Core)
6. Brain
7. Chemistry (No Core)
8. Chemistry, Clinical (No Core)
9. Clinical Laboratory Techniques
10. Diagnostic Imaging
11. Drug Therapy
12. Epidemiology (No Core)
13. Geriatrics
14. Hospitals
15. Microbiology (No Core)
16. Molecular Biology (No Core)
17. Neoplasms
18. Nephrology
 | 1. Nuclear Medicine (No Core)
2. Otolaryngology
3. Pharmacology
4. Physiology (No Core)
5. Psychiatry
6. Psychology
7. Psychophysiology (No Core)
8. Public Health
9. Radiotherapy (No Core)
10. Science (No Core)
11. Sexually Transmitted Diseases (No Core)
12. Technology, Medical
13. Therapeutics
14. Transplantation (No Core)
15. Traumatology
16. Urology
17. Veterinary Medicine (No Core)
18. Virology (No Core)
19. Vital Statistics (No Core)
 |