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SHORT COMMUNICATION

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Use of deprescribing search filters in systematic review search strategies: A case study

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Abstract

Two deprescribing search filters for MEDLINE and one deprescribing search filter for Embase have been recently developed, including objectively developed search filters. The objective of this case study was to implement these three deprescribing search filters in systematic review (SR) search strategies and to assess their effect on performances. SR that independently developed original search strategies (OSS) were selected. The deprescribing filters were implemented in each OSS, generating two implemented search strategies (ISS1 and ISS2) in MEDLINE and one ISS (ISS3) in Embase. OSS were re-run on the same date as ISS. The performances of ISS and OSS were calculated and compared. Two SR were included (SR1 and SR2). For MEDLINE, SR1 included 12 articles. The sensitivity was 50% for OSS, 58% for ISS1 and 42% for ISS2. SR2 included four articles. The sensitivity of OSS, ISS 1 and 2 was 25%. For Embase, SR1 included 12 articles. The sensitivity was 33% for OSS and 58% for ISS3. SR2 included four articles. None of the four included articles were retrieved with OSS or ISS3. While sensitivity of OSS was moderate, the objectively developed deprescribing filters maintained or slightly improved this sensitivity when implementing.

KEYWORDS
deprescribing, Embase, MEDLINE, methodological filters, research methodology, review and systematic search, search strategies

1 | INTRODUCTION

Deprescribing literature has been increasing continuously for the last 10 years, as have systematic reviews focusing on deprescribing-related questions. Authors developed various search strategies to retrieve deprescribing literature. To our knowledge, there is still no consensus on the terms to use to exhaustively retrieve deprescribing articles in bibliographic databases (i.e., MEDLINE, Embase). The use of carefully selected terms is recommended to ensure the exhaustiveness of a systematic review search strategy.[1] However, controlled

vocabulary aimed at identifying deprescribing articles remains unclear.

Search filters are specifically developed to avoid indexing pitfalls, which are sometimes due to imprecise controlled vocabulary (i.e., Medical Subject Heading [MeSH] for MEDLINE and Emtree terms for Embase), and to improve search effectiveness.[2] Search filters usually focus on a particular study design or a specific topic.[3] The performance of a search filter is usually evaluated based on a reference set of relevant articles for the target study design or topic.

We recently developed two deprescribing search filters with maximised sensitivity in a hand search reference set of relevant deprescribing articles using objective methodology.[4] We validated a sensitivity of 92% (95% CI: 83–97) for MEDLINE (using the PubMed interface) and 91% (95% CI: 82–96) for Embase (using the Embase.com interface), respectively.[4] The efficiency gained by using these objectively developed deprescribing filters in systematic reviews search strategies remains unknown. Simultaneously, The US Deprescribing Network (USDeN) developed a deprescribing search strategy that included a deprescribing search filter for MEDLINE using the PubMed interface, but its performance has not been evaluated yet.[5]

The aim of this case study was to implement these three deprescribing search filters in systematic review search strategies and evaluate their performances.

2 | METHODS

We have identified recent or ongoing systematic reviews that focused on deprescribing research-related questions using PROSPERO, active monitoring of MEDLINE via PubMed and of the 2022 International Conference of Deprescribing (ICOD) poster session. A call for additional candidate reviews was sent out via Twitter. Eligible systematic reviews had to use the deprescribing definition developed by Reeve et al.[6] and must have developed a search strategy for MEDLINE via PubMed and Embase via Embase.com independently from the tested deprescribing search filters, that is, authors were not aware of the objectively developed filters or USDeN search filters when they developed their search strategies.

First, authors were contacted and gave their consent to the use of their original search strategies. Information provided by systematic review authors included original search strategies for MEDLINE and Embase, a flowchart of the selection process, and data on excluded and included studies.

Then, we studied the objectively developed deprescribing filters for MEDLINE and Embase[4] and the USDeN deprescribing filter for MEDLINE[5] (Table S1). One author (TM) implemented the deprescribing filters in each search strategy. For that purpose, all terms originally used by authors that referred to deprescribing were removed and replaced by the tested deprescribing filter. In MEDLINE, two outputs were obtained for each systematic review: articles retrieved using the objectively developed filter (ISS1) and articles retrieved using the USDeN filter (ISS2). In Embase, one output was obtained for each systematic review: articles retrieved using the objectively developed filter (ISS3).

For comparison, original search strategies were re-run and updated on the same date. Original search strategies with date of first run and date of update are available in Data S1. Articles retrieved by each strategy were included for the strategy's performance. Systematic review authors that conducted the original selection process were then asked to re-run their search strategy as described in their original methods and to provide the list of excluded articles after title/abstract screening, after full-text screening and the list of included articles.

The performances of implemented search strategies were calculated and compared to the performances of original search strategies. Variations in performances between search strategies (expressed as absolute differences) reflected the individual performances of search filters. Performances calculated included (i) sensitivity: relevant articles retrieved as a proportion of all relevant articles indexed in the database, (ii) precision: relevant articles retrieved as a proportion of all articles (relevant and irrelevant) indexed in the database, and (iii) the number needed to read (NNR): the number of articles retrieved that need to be read to include one relevant article.[7] We calculated an absolute difference of sensitivity (AdS) and an absolute difference of precision (AdP) between original search strategies and ISS.

3 | RESULTS

Nine eligible systematic reviews were identified through PROSPERO and two during ICOD 2022. Five authors answered. Among them, two systematic reviews were excluded as they used a deprescribing definition larger than Reeve's,[6] and one was excluded as its search strategy was already informed by the objectively developed filters. Two systematic reviews met the inclusion criteria, and the authors consented to participate.

Systematic review 1 aimed to explore the barriers and enablers perceived by healthcare workers toward deprescribing in long-term care facilities.[8] Eight bibliographic databases were searched by the authors. Systematic review 2 aimed to identify guidelines for deprescribing in

older patients with diabetes.[9] Three bibliographic databases and 18 websites were searched by the authors.

Results for MEDLINE search strategies are available in Table 1. Twelve articles included in systematic review 1 were indexed in MEDLINE. The original search strategy retrieved 210 articles from MEDLINE. Six articles out of the 12 included articles were retrieved (sensitivity: 50.0%, precision: 2.8%, NNR: 35). During the inclusion process, authors were required to read two articles in full-text to include one relevant article. The ISS1 retrieved 389 articles from MEDLINE. Seven articles out of the 12 included articles were retrieved (sensitivity: 58.3%, AdS: 8.3%, precision: 1.7%, AdP: 1.1% and NNR: 55). During the inclusion process, authors were required to read 2.1 articles in full text to include one. The ISS2 retrieved 99 articles from MEDLINE. Five articles out of the 12 included articles were retrieved (sensitivity: 41.6%, AdS: 8.4%, precision: 5.1%, AdP: 2.7%, NNR: 20). During the inclusion process, authors were required to read 1.6 articles in full text to include one. Four articles included in systematic review 2 were indexed in MEDLINE. The original search strategy retrieved 1119 articles from MEDLINE. One article out of the four included articles was retrieved (sensitivity: 25%, precision: 0.1%, NNR: 1119). During the inclusion process, authors were required to read 14 articles in full text to include one. The ISS1 retrieved 454 articles from MEDLINE. One of the four included articles was retrieved (sensitivity: 25.0%, AdS: 0.0%, precision: 0.2%, AdP: 0.1%, NNR: 454). During the inclusion process, authors were required to read three articles in full text to include one. The ISS2 retrieved 55 articles from MEDLINE. One of the four included articles was retrieved (sensitivity: 25.0%, AdS: 0.0%, precision: 1.8%, AdP: 1.7%, NNR: 55). During the inclusion process, authors were required to read two articles in full text to include one.

Results for Embase search strategies are available in Table 2. Systematic review 1 included 12 articles indexed in Embase. The original search strategy retrieved 97 articles from Embase. Four out of the 12 included articles were retrieved (sensitivity: 33.0%, precision: 4.1% and NNR: 24). During the inclusion process, authors were required to read 1.7 articles in full text to include one. The ISS3 retrieved 339 articles from Embase. Seven out of the 12 included articles were retrieved (sensitivity: 58.0%, AdS: 25.0%, precision: 2.1%, RP: 2.0%, NNR: 48). During the inclusion process, authors were required to read two articles in full text to include one. Systematic review 2 included four articles indexed in Embase. The original search strategy retrieved 997 articles in Embase. None of the four included articles were retrieved. The ISS3 retrieved 339 articles. None of the four included articles were retrieved.

TABLE 1 Performances of search strategies for MEDLINE.

		Original search strategy	Implemented search strategy with objectively developed filter	Implemented search strategy with USDeN filter
Systematic review 1 (Articles included in the review and indexed in MEDLINE: $n = 12$, strategies ran on 2022/05/10)	Articles retrieved in MEDLINE (n)	210	389	99
	Included articles retrieved (n)	6	7	5
	Sensitivity (%)	50.0%	58.3%	41.6%
	AdS (%)	NA	8.3%	8.4%
	Precision (%)	2.8%	1.7%	5.1%
	AdP (%)	NA	1.1%	2.3%
	NNR (n)	35	55	20
Systematic review 2 (Articles included in the review and indexed in MEDLINE: $n = 4$, strategies ran on 2022/12/01)	Articles retrieved in MEDLINE (n)	1119	454	55
	Included articles retrieved (n)	1	1	1
	Sensitivity (%)	25.0%	25.0%	25.0%
	AdS (%)		0.0%	0.0%
	Precision (%)	0.1%	0.2%	1.8%
	AdP (%)		0.1%	1.7%
	NNR (n)	1119	454	55

Abbreviations: AdP, absolute difference for precision; AdS, absolute difference for sensitivity; NA, not applicable; NNR, number needed to read.

TABLE 2 Performances of search strategies for Embase.

		Original search strategy	Implemented search strategy with objectively developed filter
Systematic review 1 (Articles included in the review and indexed in Embase: $n = 12$)	Articles retrieved in Embase (n)	97	339
	Included articles retrieved (n)	4	7
	Sensitivity (%)	33%	58%
	AdS (%)	NA	25%
	Precision (%)	4.1%	2.1%
	AdP (%)	NA	2.0%
	NNR (n)	24	48
Systematic review 2 (Articles included in the review and indexed in Embase: $n = 4$)	Articles retrieved in Embase (n)	977	293
	Included articles retrieved (n)	0	0
	Sensitivity (%)	0%	0%
	AdS (%)	0%	0%
	Precision (%)	0%	0%
	AdP (%)	0%	0%
	NNR (n)	NA	NA

Abbreviations: AdP, absolute difference for precision; AdS, absolute difference for sensitivity; NA, not applicable; NNR, number needed to read.

4 | DISCUSSION

This case study investigated the prospective implementation of different deprescribing search filters in deprescribing systematic reviews search strategies. The objectively developed search filters and the USDeN filter were developed with alternative approaches. USDeN filter was developed as part of a larger search strategy that included an older people filter and specific drug name deprescribing filter. These alternative approaches partially explain the differences between the filters. The objectively developed deprescribing filter for MEDLINE included 18 free-text terms, phrases and MeSH terms against nine free-text terms and MeSH terms for USDeN's. Only three terms were in common and two differed only in where the truncation function was applied. This explained observed differences in sensitivity and precision.

Sensitivity of MEDLINE and Embase original search strategies used in both systematic was moderate. Using the objectively developed search filters for MEDLINE and Embase either maintained or slightly increased the strategies sensitivity. These results are consistent with the aim of objectively developed filters. Using the USDeN deprescribing filter either maintained or slightly decreased the strategies sensitivity.

Sensitivity is critical in order for systematic reviews to exhaustively summarise the evidence.[7] At equal sensitivity, the objectively developed search filter was more precise than the original search strategy in systematic review 2. However, higher sensitivity in systematic review 1 was associated with lower precision. On the other hand, the USDeN deprescribing filter had higher precision, thus allowing a significant decrease in the NNR of articles, at the cost of a lower sensitivity. Precision and NNR reflect the research burden of a search strategy[7]: the lower the precision, the higher the number of articles that need to be read to identify one additional relevant article. These performances are crucial for researchers who have limited resources. From that perspective, the USDeN deprescribing filter is a valuable tool for scoping reviews or rapid reviews, which are not intended to be systematic.

The main limitation of our case study is the small number of systematic reviews included and the moderate sensitivities of their search strategies. This reduces the extent to which the results can be generalised. Another limitation is the lack of systematic review focusing on deprescribing interventions in the included reviews.

To conclude, while sensitivity of original search strategies was moderate, the objectively developed deprescribing filters maintained or slightly improved this sensitivity. This result illustrates the relevance for their use in deprescribing systematic reviews search strategies. Alternatively, the USDeN deprescribing filter increased the precision of the search strategies, reducing the burden of extensive literature screening. Therefore, the USDeN deprescribing filter could be a convenient alternative for non-systematic reviews.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no competing interest.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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