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ORIGINAL ARTICLE



WILEY

Development and validation of search filters to retrieve medication discontinuation articles in Medline and Embase

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Abstract

Background: Medication discontinuation studies explore the outcomes of stopping a medication compared to continuing it. Comprehensively identifying medication discontinuation articles in bibliographic databases remains challenging due to variability in terminology.

Objectives: To develop and validate search filters to retrieve medication discontinuation articles in Medline and Embase.

Methods: We identified medication discontinuation articles in a convenience sample of systematic reviews. We used primary articles to create two reference sets for Medline and Embase, respectively. The reference sets were equally divided by randomization in development sets and validation sets. Terms relevant for discontinuation were identified by term frequency analysis in development sets and combined to develop two search filters that maximized relative recalls. The filters were validated against validation sets. Relative recalls were calculated with their 95% confidence intervals (95% CI).

Results: We included 316 articles for Medline and 407 articles for Embase, from 15 systematic reviews. The Medline optimized search filter combined 7 terms. The Embase optimized search filter combined 8 terms. The relative recalls were respectively 92% (95% CI: 87–96) and 91% (95% CI: 86–94).

Conclusions: We developed two search filters for retrieving medication discontinuation articles in Medline and Embase. Further research is needed to estimate precision and specificity of the filters.

KEYWORDS

database searching, Embase, medical subject headings (MeSH), MEDLINE, methodological filters, research methodology, review and systematic search, search strategies

INTRODUCTION

Medication discontinuation studies explore the benefits and harms of stopping a medication for a selected

population. Gnjdjic et al. defined discontinuation studies as ‘those where discontinuation is attempted in all participants in the intervention group’ (Gnjdjic & Reeve, 2021). Thus, in a medication discontinuation randomized

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controlled trial, one arm would be randomized to stop a medication while the other arm would continue its use. Discontinuation is both different from and complementary to deprescribing. Deprescribing is a complex intervention. It aims to reduce polypharmacy and to improve outcomes by identifying and, whenever it is possible, withdrawing inappropriate medication (Reeve et al., 2015). As such, a deprescribing intervention 'aims to increase, but does not require' discontinuation (Gnjidic & Reeve, 2021).

Researchers use controlled vocabulary (i.e., MeSH term for Medline and Emtree terms for Embase) to retrieve articles relevant to specific topics in bibliographic databases. The controlled vocabulary for discontinuation and deprescribing is recent and remains imprecisely defined. The MeSH term 'Deprescriptions' was created in 2016 and its definition encompasses discontinuation. There is no MeSH term dedicated to discontinuation. Medication discontinuation studies use different terminology, including terms such as withdrawal, cessation, stopping, de-escalation, and others. Thus, it is complex to retrieve discontinuation articles comprehensively and efficiently in bibliographic database.

Search filters are needed to improve searches for systematic reviews. Search filters combine relevant search terms related to methods or topics, and their recall (i.e., the number of relevant articles retrieved above all relevant articles available) has been validated (Damarell et al., 2019; Jenkins, 2004). These filters tend to maximize the efficiency of the literature search and provide a standardized approach to search for defined methods or topics (Lefebvre et al., 2017). Search filters to identify deprescribing articles have recently been developed (Morel et al., 2022). However, to the best of our knowledge, there are no such validated search filters for discontinuation.

We aimed to develop two search filters to retrieve discontinuation articles in Medline via PubMed and Embase via [Embase.com](https://www.ncbi.nlm.nih.gov/embase/), and to validate their performances using relative recall.

METHODS

Study design

We conducted a search filter development and validation study with a four steps development process:

1. We identified medication discontinuation articles from a convenience sample of systematic reviews on discontinuation, according to relative recall method (Sampson et al., 2006). The reference set was randomly divided into a development set (50% of the articles) and a validation set (50% of the articles).

Key Messages

- It is complex to retrieve articles evaluating medication discontinuation since various terms are used in the literature.
- We developed the first specific filters to retrieve medication discontinuation articles using term frequency analysis.
- Two optimized filters were developed with a maximized relative recall of 92% for Medline and 91% for Embase, respectively.

2. We identified relevant free-text terms and controlled vocabulary related to medication discontinuation using term frequency analysis in the development set.
3. We developed medication discontinuation search filters for PubMed and Embase using the identified terms. We sought to maximize relative recall in the development sets.
4. We validated the relative recall of each filter using the validation sets.

Creation of the reference set

We created a convenience sample of systematic reviews on discontinuation. Systematic reviews were identified from the *Cochrane database for systematic reviews* for the period 2018–2020 and completed with references previously identified by the authors (TM, JNS, WT, JPF). Systematic reviews were included if they included medication discontinuation studies. The discontinuation intervention could either be the studied intervention or the control intervention. A discontinuation intervention was defined as the cessation of a long-term medication for all participants in the intervention or in the control group (Gnjidic & Reeve, 2021). Long-term medications were defined by more than 4 weeks of use. Systematic reviews assessing brief discontinuation around an invasive procedure (surgery, coronary angiography, etc.) were excluded. One author (TM) manually reviewed title and abstract for all systematic reviews indexed in the Cochrane Library for the selected period. The third author (WT) validated the final list of discontinuation systematic reviews.

The primary articles were included in the Medline and Embase reference sets according to the following criteria:

1. articles included or excluded in the systematic review,
2. articles reporting data for a discontinuation intervention,
3. articles indexed in Medline or in Embase.

Articles were included regardless of the type of reporting (original articles, reviews, editorials, commentaries, etc.), the study design, the study population, the nature of control intervention (when appropriate) or the outcome.

Every title/abstract of these primary articles were screened by one author (TM) to confirm the presence of a discontinuation intervention. Full texts were assessed if abstracts had insufficient details. Information highlighted by reviewers were assessed if we did not have access to full texts. Medline and Embase reference sets were then randomized and equally divided in development sets and validation sets.

We calculated that 139 articles would be necessary in the validation set to validate a relative recall of 90% with a confidence interval of 95% (95% CI) $\pm 5\%$ (Buderer, 1996). A relative recall of 90% was considered acceptable to validate the filter (Beynon et al., 2013; Golder et al., 2018). Thus, we needed to include 278 articles for both Medline and Embase to ensure sufficient development and validation sets.

Search term identification

We identified relevant search terms using term frequency analysis in each development set.

We analysed the frequency of free-text terms, that is, terms used by authors in titles and abstracts, and controlled vocabularies. We selected free-text terms and controlled vocabularies identified in 5% or more of the articles from the development sets for further analysis. Frequency analysis for free-text terms and Embase controlled vocabulary (Emtree terms) was performed using the Text Mining package in R software (version 4.0.3). Frequency analysis for Medline controlled vocabulary (MeSH terms) was performed using PubReminer website. PubReminer is an online tool that analyses PubMed query to provide a list of frequency count of MeshTerms associated to this query (*PubMed PubReMiner: a tool for PubMed query building and literature mining*, n.d.).

One author (TM) reviewed all selected terms for relevance to discontinuation. Generic, population-related, setting-related, outcome-related, medication-related, or methodological terms were excluded. A generic term was defined as a single word with a definition considered too broad to be related to medication discontinuation when used outside a phrase. Controlled vocabularies that were not related to the medication discontinuation concept were excluded. Free-text terms were analysed with Antconc to identify truncation and terms co-occurrence relevant to discontinuation. Antconc is an open access software that allows corpus analysis and automated concordance analysis (Anthony, 2020. *AntConc (Version 3.5.9)*). We then analysed frequency of these truncated

terms and co-occurring terms in each development set. Finally, we analysed the term frequency of each selected terms in each database.

Search filter development

We developed search filters in Medline via PubMed and Embase via Embase.com using an incremental approach aimed at maximizing relative recall. We adapted an incremental approach as previously described by Golder et al. (2018). Relative recall differs from sensitivity by the nature of the denominator used to calculate it. The denominator to calculate the sensitivity would be the total number of discontinuation articles in all the bibliographic database (Sampson et al., 2006). Identifying every discontinuation article indexed in PubMed and Embase is theoretically possible but would require considerable time and human resources. To address this issue, we applied the relative recall methods and used the discontinuation articles identified in systematic reviews as denominator, in order to give an estimate of the sensitivity by pooling results of multiple search strategies on the same topic. Thus, the relative recall was the proportion of articles retrieved among a set of primary articles identified in systematic reviews on medication discontinuation.

We first selected free-text terms, truncated terms, combinations of terms and controlled vocabulary that had a relative recall of 10% or more in the development set of each database. Unique free-text terms that retrieved more than 1,000,000 references in the database were only selected when they were combined with other terms. This concession was made to avoid a dramatic decrease of the precision due to relevant but poorly significant free-text terms when used alone. We then selected the terms with the highest relative recalls and tested combinations with each other terms. We calculated the incremental increase of relative recall for each combination and selected the combination that achieved the higher relative recall. This process was repeated until no increase in the relative recall could be achieved with remaining terms. We then examined articles of the development sets that were not retrieved by the filter and extended the process to relevant terms that had a relative recall of 5%–9.9% to improve relative recall if possible. If discontinuation articles were still not retrieved by the filter, we analysed them using the Antconc software to identify supplemental relevant terms that had relative recall of less than 5% (Anthony, 2020. *AntConc (Version 3.5.9)*). We stopped developing the filter when relative recalls could not be improved anymore with these terms.

At the end of the development process, we thus obtained one filter for each database (one for PubMed, one for Embase) with the highest relative recall possible in the development set.

Search filter validation

We finally queried each database with the corresponding filter and calculated the relative recall to identify

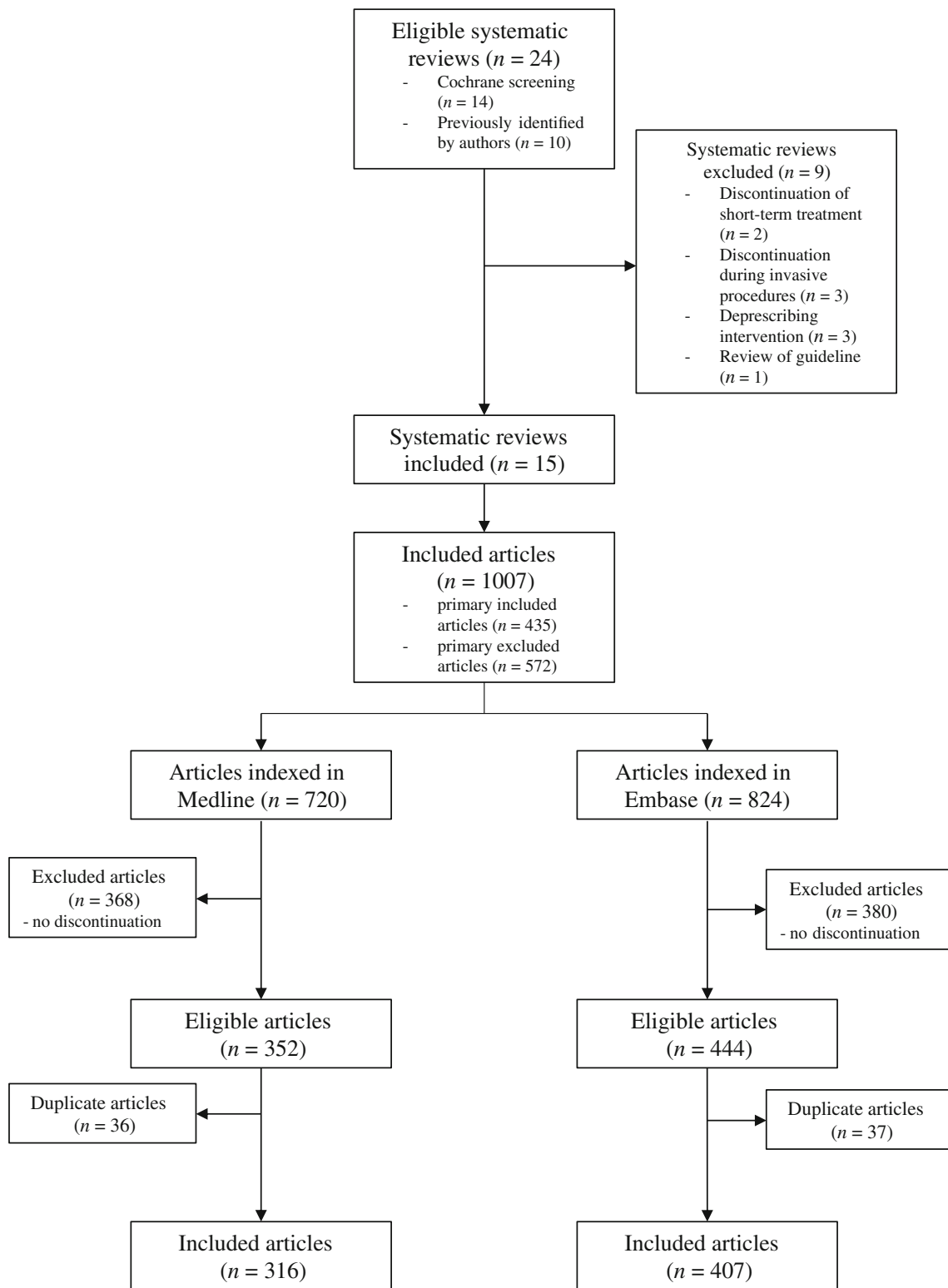


FIGURE 1 Flowchart of the inclusion process.

discontinuation articles of the validation set. Relative recalls were expressed with their 95% CIs. We documented discontinuation articles that were missed in each reference set.

Post-hoc analyses

We performed two post-hoc analyses to test the robustness of the filters we developed. First, we performed a post-hoc analysis that tested variation of the filter when the lists of relevant terms for discontinuation were increased by terms identified during the development process. These terms were initially considered irrelevant during the search term identification process. They appear to be meaningful to discontinuation considering the increase of relative recall they provided when added to the developed filters. We tested performance of the filter by adding these additional terms. Second, we examined how the terms in the filter varied depending on which articles were included in the reference set. Discontinuation articles had studied medication discontinuation as the intervention of interest or as a controlled intervention (i.e., the maintenance of a medication was the intervention of interest). We aimed to explore whether excluding studies where discontinuation was the controlled intervention changed the terms selected in the filters.

RESULTS

Creation of the reference set

Figure 1 shows the creation process of the reference set. We identified 14 systematic reviews from the *Cochrane database for systematic reviews* for the period 2018–2022 and 10 systematic reviews from our personal bibliography that were potentially eligible. We excluded two systematic reviews that focused on short-term medications, three reviews that assessed brief discontinuation around invasive procedures, three reviews that assessed deprescribing interventions, and one review that assessed guidelines. A total of 15 systematic reviews were finally included. Among these systematic reviews, three focused on discontinuation of antipsychotic medications (Bergman et al., 2018; Essali et al., 2019; Van Leeuwen et al., 2018), one on maintenance of antipsychotic medications (Ceraso et al., 2020), two on biologic medications (Boyapati et al., 2018; Verhoef et al., 2019), one on urate-lowering medications (Beslon et al., 2018), one on proton pump inhibitors (Boghossian et al., 2017), one on anti-epileptic medications (Ayuga Loro et al., 2020), one

on anti-hypertensive medications (Reeve et al., 2020), one on anti-cholinergic medications (Salahudeen et al., 2014), one on cholinesterase inhibitors (O'Regan et al., 2015), and three on various medications (Iyer et al., 2008; Narayan & Nishtala, 2017; Thio et al., 2018). These systematic reviews had included 435 primary articles and excluded 572 primary articles. Among those 1007 articles, 720 were indexed in Medline, 824 were indexed in Embase, and 172 were indexed neither in Medline nor in Embase. We identified 352 eligible articles for Medline and 444 eligible articles for Embase. After duplicate removal, we finally included 316 articles for the Medline reference set and 407 articles for the Embase reference set.

Medline search filter development

We randomly assigned 158 articles to the reference set and 158 articles to the validation set.

We identified 345 free-text terms used in 5% or more of articles. We included 12 free-text terms relevant to medication discontinuation for further analysis, and we excluded 333 free-text terms. Among excluded terms, 180 were generic terms, 31 were population-related terms, 6 were setting-related terms, 37 were outcome-related terms, 19 were medication-related terms and 64 were methodological terms. We also identified 56 truncated terms and phrases relevant to discontinuation using Antconc. Among the total of 68 relevant terms, 3 free-text terms retrieved more than 1,000,000 articles in Medline and were only used in phrases.

We identified 54 MeSH terms used in 5% or more articles. Among them, three MeSH terms were relevant to discontinuation and included. The 68 free-text terms, truncated terms, phrases and MeSH terms used to develop the filter are presented in Table S1.

The terms with the highest relative recall were 'withdr*' and 'withdraw*' (relative recall: 42%). We performed 87 successive tests to complete the incremental process. We created a search filter using a combination of seven free-text terms, truncated terms and phrases and one MeSH terms (Table 1). The search filter retrieved

TABLE 1 Discontinuation search filter for Medline via PubMed.

```

“withdraw*”[Title/Abstract] OR “maintenance”[Title/Abstract]
OR “discontinu*”[Title/Abstract] OR (“continu*”
[Title/Abstract] AND “treatment”[Title/Abstract]) OR
(“treatment*”[Title/Abstract] OR “dose*”[Title/Abstract])
AND “reduc*”[Title/Abstract]) OR “drug administration
schedule”[MeSH Terms] OR “relapse”[Title/Abstract]

```

147 of the 158 articles of the development set (relative recall: 93%). We added the term ‘relapse’ at the end of the development process since ‘relapse’ increased relative recall by 5.7%. ‘Relapse’ had been initially excluded at the search terms identification stage since it was considered related to an outcome. However, it remained strongly associated with included articles with a relative recall of 39%. Therefore, we decided to add it to the filter since its incremental increase in relative recall was judged critical. The analysis of the 11 missed articles did not lead to the identification of any supplementary relevant terms.

Medline search filter validation

The search filter developed for Medline retrieved 145 of 158 articles of the Medline validation set and 2,194,384 in Medline. The relative recall was 92% (95% CI: 86–96). Performance is presented in Table 3. Among the 13 articles that were missed by the filter, 11 were published before 2000 and 4 had an abstract available. We identified five free-text terms and phrases related to discontinuation (‘stopping AND therapy’, ‘de-escalation’, ‘decreasing doses’, ‘interrupting AND medication’ and ‘removal AND drugs’). Using these terms in the search filter would retrieve 5 supplemental articles balanced by an increase of 48,441 articles retrieved in Medline.

TABLE 2 Discontinuation search filter for Embase via [Embase.com](https://www.embase.com)

```
discontinuu*:ab,ti OR maintenance:ab,ti OR withdraw*:ab,ti OR
'drug withdrawal'/exp OR 'drug safety'/exp OR ((dose*
NEAR/5 (reduction OR decreas* OR taper*)):ab,ti) OR
relapse:ab,ti
```

Embase search filter development

We randomly assigned 204 articles to the reference set and 203 articles to the validation set.

We identified 383 free-text terms used in 5% or more of articles. We included 13 free-text terms relevant to discontinuation for further analysis, and we excluded 370 free-text terms. Among excluded terms, 198 were generic terms, 32 were population-related terms, 4 were setting-related terms, 42 were outcome-related terms, 26 were medication-related terms, and 73 were methodological terms. We also identified 77 truncated terms and phrases relevant to discontinuation using Antconc. Among the 90 relevant terms, 3 free-text terms retrieved more than 1,000,000 articles in Embase and were only used in phrases.

We identified 72 Emtree terms used in 5% or more articles. Among them, 6 Emtree terms were relevant to discontinuation and included. The 93 free-text terms, truncated terms, phrases, and MeSH terms used to develop the filter are presented in Table S2.

The term with the highest recall was ‘discontinue*’ (relative recall: 47%). We needed 86 successive tests to complete the incremental process. We created a search filter using a combination of 7 free-text terms, truncated terms, and phrases and 2 Emtree terms (Table 2). The search filter retrieved 196 of the 204 articles of the development set (relative recall: 96%).

We added the phrases ‘dose* NEAR/5 decreas*’ and ‘dose* NEAR/5 taper*’ at the end of the development process since they increase the relative recall, though they were identified in less than 5% of articles. As we did with the Medline search filter, we added the term ‘relapse’ since ‘relapse’ increased relative recall by 3.4% and this incremental increase was judged critical. This term was also strongly associated with included articles with a relative recall of 50%. The analysis of the eight missed articles did not lead to the identification of any supplementary relevant terms.

TABLE 3 Relative recalls of the discontinuation filters in the validation set.

Search filters	Articles retrieved in the validation set, (n)	Relative recall, %, (95% CI)	Articles retrieved in the database ^a , (n)
Medline filter	145 (158)	92 (86–96)	2,227,215
Embase filter	181 (203)	89 (84–93)	1,713,952
Optimized Medline discontinuation search filter	146 (158)	92 (87–96)	2,193,309
Optimized Embase discontinuation search filter	184 (203)	91 (86–94)	1,815,258

Abbreviation: 95% CI, 95% confidence interval.

^aOn December 6, 2022.

TABLE 4 Optimized discontinuation search filter for Medline via PubMed using 'relapse' as relevant term.

```

“withdraw*”[Title/Abstract] OR “relapse*”[Title/Abstract] OR
“discontin*”[Title/Abstract] OR “maintenance”
[Title/Abstract] OR (“continu*”[Title/Abstract] AND
“treatment”[Title/Abstract]) OR (“dose*”[Title/Abstract] OR
“treatment*”[Title/Abstract]) AND “reduc*”[Title/Abstract])

```

Embase search filter validation

The search filter developed for Embase retrieved 181 of 203 articles of the Embase validation set and 1,684,888 articles in Embase. The relative recall was 89% (95% CI: 84–93). Performance is presented in Table 3. Among the 22 articles that were missed by the filter, 15 were published before 2000 and 9 had an abstract available. We identified 10 free-text terms and phrases relevant to discontinuation that would have increased the relative recall, including 3 terms that had not been identified during the term frequency analysis. The seven other terms were not used during the incremental process as they did not increase the relative recall. Using these terms in the search filter would have retrieved 8 supplemental articles, balanced by an increase of 43,941 articles retrieved in Embase.

Post-hoc analyses

We conducted two post-hoc analysis to explore the consistency in the results.

We studied the impact of using the term 'relapse' earlier in the incremental process if we have considered this term as relevant to discontinuation. The term 'withdraw' remained the term with the highest relative recall for the Medline search filter development. We performed 104 successive tests to complete the incremental process. We created an optimized discontinuation search filter using a combination of seven free-text terms, truncated terms, and phrases (Table 4). We identified only two differences with the original filter. First, the truncated term 'relapse*' was used as it increased the relative recall more than the term 'relapse'. Second, the MeSH term 'drug administration schedule' was not used in the search filter as it did not increase anymore the relative recall during the incremental process. This optimized search filter retrieved 146 among the 158 articles of the PubMed validation set (relative recall: 92%). The supplementary article was retrieved using 'relapse*'.

The truncated term 'relapse*' had a higher recall (relative recall: 54%) than 'discontinue*' for the Embase search filter development and was then used as first term

TABLE 5 Optimized discontinuation search filter for Embase via Embase.com using 'relapse' as relevant term.

```

relapse*:ab,ti OR withdr*:ab,ti OR discontinu*:ab,ti OR
maintenance:ab,ti OR ‘drug withdrawal’/exp OR
‘drug safety’/exp OR ((dose* NEAR/5 (reduction OR
decreas*)):ab,ti)

```

of the incremental process. We performed 131 successive tests to complete the process. We created an optimized discontinuation search filter using a combination of six free-text terms and two Emtree terms (Table 5). We identified three differences with the original Embase filter. The truncated terms 'relapse*' and 'withdr*' were respectively used instead of 'relapse' and 'withdraw*'. The phrase 'dose NEAR/5 taper*' was not used in the filter as it did not increase anymore the relative recall. This search filter retrieved 184 of the 203 articles of the Embase validation set (relative recall: 91%). Two of the additional articles were retrieved using the truncation for 'relapse*' and one was retrieved using the truncation for 'withdr*'.

The second post-hoc analysis is available in Supporting Information (Supplementary results S3, Table S4 and Table S5).

DISCUSSION

We developed two filters that identify articles related to medication discontinuation in Medline and Embase with a relative recall of 92% (95% CI: 86–96) and 89% (95% CI: 84–93), respectively. After post-hoc analysis, the search filters were optimized to increase relative recall up to 92% (95% CI: 87–96) and 91% (95% CI: 86–94), respectively. We developed these filters to improve ability for future systematic review to be as extensive as possible retrieving medication discontinuation studies. We recommend researchers use the filters that were modified after post-hoc analysis (Tables 4 and 5).

The systematic reviews identified to create the reference set provided an overview of the literature published so far on medication discontinuation. The scope of discontinuation literature is extensive given the myriad long-term medications that could be discontinued.

Medication discontinuation is most relevant to specific populations frequently treated with long-term medications. Older persons are a highly relevant population for medication discontinuation, as they are frequently exposed to polypharmacy (Morin et al., 2016). Patients with psychiatric disorders or chronic inflammatory diseases are frequently targeted as well. Because the optimized search filters retrieved respectively 2,193,309 articles in Medline and 1,815,258 articles in Embase, terms

or filters that relate to these specific populations and/or to the studied medication should be combined with the discontinuation filters to reduce the number of retrieved articles.

We used a method to identify relevant terms and to develop the search filters that can be described as 'objective' (Hausner et al., 2012). By using term frequency analysis and validating relative recall on two independent sets of articles, we identified terms that were not expected in the medication discontinuation vocabulary. First, terms related to maintaining a medication were frequent and were included in the incremental process. Maintaining a medication is frequently the control intervention in medication discontinuation studies, but discontinuation interventions could conversely be the control intervention in 'continuation' studies. We found that systematic reviews which explored outcomes of maintaining a long-term medication included discontinuation articles (Ceraso et al., 2020). Similarly, systematic reviews on discontinuation also included 'continuation' articles (Boghossian et al., 2017). This could explain the high frequency of terms related to the maintenance of a medication and their inclusion in the incremental process, even when we excluded systematic review that focused on maintaining a medication in a post-hoc analysis (Supporting Information S1).

Second, the term 'relapse' was forced into the filter at the end of the development process. We initially excluded it as an outcome-related terms. 'Relapse' refers to the recurrence of symptoms of the disease. This is the most frequent outcome terms that we identified in the development sets. This term had a relative recall of 38% in Medline and almost 50% in Embase. We included 'relapse' as relevant term in a post-hoc analysis. We developed optimized filters with better performance than initial filters. This analysis highlighted the limitations of the process for identifying relevant terms. The process failed to identify 'relapse' as relevant although it has a robust association with discontinuation, even if it does not refer to the intervention itself.

Frequency analysis also highlighted the limited use of controlled vocabulary relevant to medication discontinuation. Only two MeSH terms had a relative recall up to 10% ("Drug administration schedule", 'substance withdrawal syndrome'). Only one of them was finally included in the Medline search filter. Definitions of these terms were relevant but did not focus on medication discontinuation. The lack of a specific MeSH terms focusing on medication discontinuation could explain the low relative recall of controlled vocabulary compared to free-text terms. Such specific controlled vocabulary is needed to improve the indexing of medication discontinuation related articles'.

Terms were combined by an incremental process previously described by Golder et al. to ensure better reproducibility (Golder et al., 2018). This process aimed to maximize relative recall but failed to include some relevant terms in filters. These relevant terms were later identified in missed articles of the validation set. To our knowledge, there is currently no Gold Standard that describes the most relevant methods to combine identified terms. Further research is needed to explore the most efficient methods that would avoid that pitfall.

Limitations

Our study has several limitations. First, due to limited resources, the reference set was created from a sample of systematic reviews. While the selected systematic reviews captured a wide scope of discontinuation articles, the non-systematic selection process may have led to lower reproducibility. Second, the primary articles were not screened in duplicate. Third, we selected 'subjectively' relevant terms after frequency analysis. While frequency analysis allowed an objective process to determine the recall of each terms (Jenkins, 2004), the choice of relevant terms remained based on the investigators' interpretation. Fourth, using the pragmatic approach of the relative recall method (Sampson et al., 2006) did not allow the estimation of the precision and specificity of the filters, since non-relevant articles were not included in the reference sets. The total number of articles retrieved in the databases was high, probably reflecting a low precision. However, the discontinuation filters should be used as part of a full search strategy, alongside methodological, population and setting filters that would refine precision. A pragmatic study that would compare the performances of discontinuation search strategies, using our filters, to discontinuation search strategies, using alternative filters, would allow a better estimation of precision and specificity.

CONCLUSION

We developed and validated two optimized search filters to identify medication discontinuation articles in Medline via PubMed and Embase via [Embase.com](https://www.embase.com). We achieved a relative recall of 92% (95% CI: 87–96) and 91% (95% CI: 86–94), respectively. To our knowledge, these are the first medication discontinuation filters available for Medline and Embase. These filters have been developed to be used as intervention filters, as part of search strategies of systematic reviews evaluating a discontinuation intervention. Further research is needed to estimate the precision and specificity of these filters.

AUTHOR CONTRIBUTIONS

Thomas Morel, Wade Thompson and Jean-Pascal Fournier were involved in the conception of the study. Thomas Morel, JNS, Wade Thompson and Jean-Pascal Fournier was involved in data collection; Thomas Morel and Jean-Pascal Fournier were involved in data analysis and interpretation. Thomas Morel drafted the first version of the manuscript. Thomas Morel, Jean-Pascal Fournier, Jérôme Nguyen-Soenen and Wade Thompson read and approved the final manuscript.


CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of 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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