

# Prospective comparison of search strategies for systematic reviews: an objective approach yielded higher sensitivity than a conceptual one

Elke Hausner<sup>a,\*</sup>, Charlotte Guddat<sup>b</sup>, Tatjana Hermanns<sup>a</sup>, Ulrike Lampert<sup>a</sup>, Siw Waffenschmidt<sup>a</sup>

<sup>a</sup>Information Management Unit, Institute for Quality and Efficiency in Health Care (IQWiG), Im Mediapark 8, 50670 Cologne, Germany

<sup>b</sup>Department of Medical Biometry (IQWiG), Institute for Quality and Efficiency in Health Care, Im Mediapark 8, 50670 Cologne, Germany

Accepted 18 May 2016; Published online 30 May 2016

## Abstract

**Background:** In the development of search strategies for systematic reviews, “conceptual approaches” are generally recommended to identify appropriate search terms for those parts of the strategies for which no validated search filters exist. However, “objective approaches” based on search terms identified by text analysis are increasingly being applied.

**Objectives:** To prospectively compare an objective with a conceptual approach for the development of search strategies.

**Methods:** Two different MEDLINE search strategies were developed in parallel for five systematic reviews covering a range of topics and study designs. The Institute for Quality and Efficiency in Health Care (IQWiG) applied an objective approach, and external experts applied a conceptual approach for the same research questions. For each systematic review, the citations retrieved were combined and the overall pool of citations screened to determine sensitivity and precision.

**Results:** The objective approach yielded a weighted mean sensitivity and precision of 97% and 5%. The corresponding values for the conceptual approach were 75% and 4%.

**Conclusion:** Our findings indicate that the objective approach applied by IQWiG for search strategy development yields higher sensitivity than and similar precision to a conceptual approach. The main advantage of the objective approach is that it produces consistent results across searches. © 2016 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

**Keywords:** Information storage and retrieval; Medline; Data mining; Sensitivity and specificity; Prospective studies; Reproducibility of results

## 1. Introduction

The development of bibliographic search strategies for systematic reviews is a complex task and also requires detailed knowledge of the handling of databases. First of all, the search structure needs to be specified. The research question is commonly broken down into concepts, and only the most specific ones are used to develop the strategy [1], which generally includes the population, intervention(s), and types of study design [2]. If appropriate, validated search filters should be used [3,4]; these are predefined search strategies designed to retrieve citations based on a

particular feature (most commonly the study design) [3]. However, little research is available on how those components of the search strategy are developed and evaluated that are not covered by validated filters (usually “population” and “intervention”). For these components, “conceptual approaches,” which are manual, are usually applied to identify appropriate search terms for search strategy development. In this type of approach, different sources are used to identify terms and their synonyms to cover the research question as comprehensively as possible [2,5,6]. However, it remains unclear how to decide which terms to include in the search strategy. Furthermore, it is difficult, if not impossible, to determine when the strategy is complete.

An objectively derived search strategy (“objective approach”) is an alternative approach that is increasingly being used in search strategy development [7]. The objective approach applied by the German Institute for Quality and Efficiency in Health Care (IQWiG) in systematic searches is based on a structured procedure [8–10] and is already well established in the development of search filters

Funding: None.

Conflict of interest: All authors are IQWiG employees and developed the presented approach within the framework of their work at IQWiG.

\* Corresponding author. Institute for Quality and Efficiency in Health Care, Im Mediapark 8, 50670 Cologne, Germany. Tel.: 0049-221-35685-0; fax: 0049-221-35685-1.

E-mail address: [elke.hausner@iqwig.de](mailto:elke.hausner@iqwig.de) (E. Hausner).

<http://dx.doi.org/10.1016/j.jclinepi.2016.05.002>

0895-4356/© 2016 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

**What is new?****Key findings**

- The objective approach applied by Institute for Quality and Efficiency in Health Care (IQWiG) for the development of search strategies yields higher sensitivity than and similar precision to a conceptual approach.
- However, this objective approach does not necessarily save time.

**What this adds to what was known?**

- This prospective study supports the results of a previous (retrospective) study. The objective approach applied by IQWiG
  - generates high-quality search strategies
  - generates consistent search strategies
  - is especially helpful for complex search strategies

**What is the implication and what should change now?**

- Objective approaches should be routinely used in the development of high-quality search strategies.
- This is in line with the principles of evidence-based medicine, that is, decision making on the basis of empirical evidence.

[4]. The objective approach comprises the following steps [8,10]: generation of a test set (relevant references from, e.g., systematic reviews), division of the test set into development and comparator sets, development of the search strategy with references from the development set (analyzing information derived from the titles, abstracts, and subject headings of relevant references with text-mining tools such as WordStat [11]; see the IQWiG guidance in Appendix A at [www.jclinepi.com](http://www.jclinepi.com)), and validation of the search strategy (checking whether references from the comparator set can be identified with the search strategy developed beforehand) [9]. To identify previous systematic reviews in the area of interest, the information specialist or project manager conducts a preliminary search in bibliographic databases such as the Cochrane Library or MEDLINE. If systematic reviews are not available, a precise strategy is developed and relevant articles are screened and selected by the review authors [8]. The MEDLINE references identified in the systematic reviews or in precise searches are considered to be the test set.

In a precursor study, IQWiG retrospectively compared its objective approach with a conceptual one. For this

purpose, studies included in 13 Cochrane Reviews were searched for in MEDLINE and it was then tested whether references that had previously been removed could be identified via the objective approach [9]. The study was designed to demonstrate the noninferiority of the objective vs. the conceptual approach; this hypothesis was confirmed. In addition, the results indicated that the objective approach might even be superior. However, the study had a number of limitations. For instance, the retrospective design did not allow a direct comparison of the two approaches, only those Cochrane Reviews containing a minimum number of publications were considered (which may have led to a biased selection of topics), precision was not calculated, and only limited data on the time required to develop the search strategy were provided. These limitations were to be taken into account in the present study.

**2. Objective**

The aim of the present study was to compare an objective approach applied by IQWiG with a conceptual approach applied by external information specialists with regard to sensitivity and precision. In addition, the time required to develop the search strategies for the two approaches was compared.

**3. Methods**

The objective and conceptual approaches were compared directly in a prospective study by means of search strategies applied in a pool of systematic reviews prepared by IQWiG or by external organizations. For this purpose, we contacted information specialists from 11 German-language organizations between October 2012 and June 2013 and asked whether they were interested in participating in the study. These organizations included health technology assessment (HTA) agencies, private companies/freelance consultants, as well as universities and Cochrane groups.

We aimed for a pool of systematic reviews that covered a range of topics and study designs. We preferred those reviews with research questions requiring complex search strategies, that is, strategies where, for example, the vocabulary used to describe the topic or study design is diffuse or where various strands of PICO (or other concepts) are applied. For resource reasons, the number of systematic reviews considered was restricted to five (convenience sample).

For each systematic review, two different search strategies were developed for MEDLINE, one based on an objective approach (developed and applied by IQWiG) and one on a conceptual approach (developed and applied by the external experts). The evaluation of the approaches was performed in MEDLINE, as this is the most frequently used bibliographic database in medicine and health sciences [12].

Download English Version:

<https://daneshyari.com/en/article/5121911>

Download Persian Version:

<https://daneshyari.com/article/5121911>

[Daneshyari.com](https://daneshyari.com)