Performance of Search Filters to Identify Health State Utility Studies

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BACKGROUND AND OBJECTIVES

The importance of quality-adjusted life years (QALYs) in healthcare decision-making and priority-setting means there is a need for methods which facilitate the effective and timely identification of studies reporting Health State Utility Values (HSUVs). Creating an effective search strategy which identifies HSUVs with both high sensitivity and acceptable precision is a recognised search challenge [1,2,3]. We are not aware of any published, validated search filters designed for this purpose, although a broad set of terms frequently used to index and describe relevant studies have been identified [1] and suggested for use in the absence of a validated filter [2]. A search filter would be a useful asset in HTA and economic model production, particularly if search precision could be enhanced.

The objective of this study was to test the sensitivity of 3 current search filters (CSFs) used by York Health Economics Consortium, to develop the best performing filter (with the aim of improving sensitivity, precision and the number-needed-to-read (NNR)), and to validate the resulting final search filters (FSFs) using a quasi gold standard (QGS) set of relevant studies reporting HSUVs.

METHODS

The study was conducted in 3 phases. In each phase, filter performance was assessed by measuring relative recall (RR) of a QGS set of relevant studies, calculating sensitivity, precision and NNR. 3 QGS sets (QGS1, QGS2, QGS3) of relevant studies were harvested from systematic reviews of studies reporting HSUVs, and from 10 manufacturers' submissions for NICE Single Technology Assessments which had conducted reviews of studies reporting HSUVs.

Phase 1: Testing the current search filters (CSFs)
The performance of the 3 CSFs was assessed by measuring their RR of studies in QGS1. The most sensitive CSF was identified. Where filters had the same sensitivity, the filter with the lowest NNR was nominated as the best performing filter.

Phase 2: Filter development
To improve the sensitivity of the best performing CSF from Phase 1, QGS1 records which were not retrieved by the filter in Phase 1 were analysed to identify candidate search terms which could be added to the filter to increase retrieval. To improve the precision of the best performing CSF whilst maintaining sensitivity, the impact of individual search lines in the filter on retrieval of studies from QGS1 was examined and terms which did not contribute to sensitivity were removed. The performance of the resulting filters was assessed by measuring their RR of studies in QGS2, and then developed further through analysis of QGS2 records not retrieved by the filters. This resulted in 3 final search filters: FSF1 – sensitivity maximising; FSF2 – precision and sensitivity balanced; FSF3 – precision maximising.

Phase 3: Validation of the final search filters (FSFs)
The 3 FSFs were validated using the QGS3 set of records. To assess the relative volume retrieval of the filters in a search context, each filter was also combined with search strategies for three example health conditions (diabetes, COPD and constipation). We assessed the performance of the filters compared to a set of search terms used in a published search strategy which included broad quality of life terms[1] (the NICE CS terms) and also combined these terms with the diabetes, COPD and constipation search strategies.

RESULTS

Phase 1: Testing the current search filters (CSFs)
QGS1 had 294 records. All 3 CSFs retrieved 268/294 (sensitivity: 91%) QGS1 records. CSF3 was the best performing filter with the lowest NNR (365).

Phase 2: Filter development
QGS2 had 139 records and these were used for Phase 2 filter development work resulting in 3 FSFs . The sensitivity maximising filter (FSF1) is shown in Figure 1.

Phase 3: Validation of the final search filters (FSFs)
QGS3 had 139 records and was used for validating the search filters. Results are shown in Table 1. FSF1 (sensitivity maximising) retrieved 132/139 records (sensitivity: 95%) and had a NNR of 842. FSF2 (balance of sensitivity and precision) retrieved 128/139 records (sensitivity: 92%) with a NNR of 502. FSF3 (precision maximising) retrieved 123/139 records (sensitivity: 88%) with a NNR of 383. The NICE CS terms had a sensitivity of 96% and a NNR of 2033.

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Figure 1: Final search filter 1 (FSF1) – sensitivity maximising

1 Quality-Adjusted Life Years/
2 (quality adjusted or adjusted life year$).ti,ab,kf.
3 (qaly$ or qald$ or qale$ or qtime$).ti,ab,kf.
4 (illness state$1 or health state$1).ti,ab,kf.
5 (hui or hui1 or hui2 or hui3).ti,ab,kf.
6 (multiattribute$ or multi attribute$).ti,ab,kf.
7 (utility adj3 (score$1 or valu$ or health$ or cost$ or measur$ or disease$ or mean or gain or gains or index$)).ti,ab,kf.
8 utilities.ti,ab,kf.
9 (eq-5d or eq5d or eq-5 or eq5 or euro qual or euroqual or euro qual5d or euroqual5d or euro qol or euroqol or euro qol5d or euroqol5d or euro quol or euroquol or euro quol5d or euroquol5d or eur qol or eurqol or eur qol5d or eur qol5d or eur?qul or eur?qul5d or euro$ quality of life or european qol).ti,ab,kf.
10 (euro$ adj3 (5 d or 5d or 5 dimension$ or 5dimension$ or 5 domain$ or 5domain$)).ti,ab,kf.
11 (sf36$ or sf 36$ or sf thirtysix or sf thirty six).ti,ab,kf.
12 (time trade off$1 or time tradeoff$1 or tto or timetradeoff$1).ti,ab,kf.
13 ((qol or hrqol or quality of life).ti,kf. or *quality of life/) and ((qol or hrqol$ or quality of life) adj2 (increas$ or decrease$ or improv$ or declin$ or reduc$ or high$ or low$ or effect or effects or worse or score or scores or change$1 or impact$1 or impacted or deteriorat$)).ab.
14 Cost-Benefit Analysis/ and (cost-effectiveness ratio$ and (perspective$ or life expectanc$)).ti,ab,kf.
15 *quality of life/ and (quality of life or qol).ti.
16 quality of life/ and ((quality of life or qol) adj3 (improv$ or chang$)).ti,ab,kf.
17 quality of life/ and ((quality of life or qol) adj (score$1 or measure$1)).ti,ab,kf.
18 quality of life/ and health-related quality of life.ti,ab,kf.
19 quality of life/ and ec.fs.
20 quality of life/ and (health adj3 status).ti,ab,kf.
21 (quality of life or qol).ti,ab,kf. and Cost-Benefit Analysis/
22 models,economic/
23 or/1-22

Table 1: Performance of FSFs and NICE CS terms using QGS3 (validation set) and combined with topic terms

Filter	Records retrieved in MEDLINE	Sensitivity %	Precision	NNR	Records when combined with diabetes terms	Records when combined with COPD terms	Records when combined with constipation terms
FSF1	111,205	95	0.12	842	5,025	2,530	1,445
FSF2	64,288	92	0.2	502	3,222	1,363	667
FSF3	47,060	88	0.26	383	2,476	759	334
NICE CSU terms	270,406	96	0.05	2,033	11,300	6,071	3,933

CONCLUSIONS

We have developed and validated a search filter (FSF1) to identify studies in Ovid MEDLINE reporting HSUVs. The search filter has high sensitivity (95%). We have also developed and validated two other search filters (FSF2 and FSF3) which have reasonably high sensitivity (92% and 88%) but greater precision, resulting in a lower NNR. To the best of our knowledge these are the first validated filters to be designed for this purpose. FSF1 compares well with the NICE CS terms in terms of sensitivity and NNR balance. FSF1 had a slightly lower sensitivity (95% vs 96%) but significantly lower NNR (842 vs 2033) than the NICE CS terms. As is shown by the results retrieved in the diabetes, COPD and constipation search examples (Table 1), this difference has the potential to translate to a significant decrease in record numbers for screening (with benefits for project timelines / resources). The availability of 3 filters with a range of sensitivity and precision options enables researchers to choose the filter which is most appropriate to their research aims, methods and resources.

REFERENCES

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