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The usefulness of different information sources for retrieving adverse effects data for a systematic review

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Introduction

Authors of systematic reviews of adverse effects tend to focus on searching MEDLINE and reference checking to identify relevant studies for inclusion.[1,2] However, research which compares data sources for information on adverse effects indicates that MEDLINE may not yield the most data on adverse effects.[3]

The objective of this case study was to determine the contribution of searching a diverse range of different sources to identify adverse effects data for a systematic review, taking into account any limitations of the search strategies.

Methods

Fifty-eight included references from a case study systematic review of thiazolidinedione-related fractures in patients with type 2 diabetes mellitus formed the basis of the analysis. A record was made of where each reference was identified and from which sources each reference was available at the time of searching. This enabled calculations of sensitivity, precision and number needed to read (NNR) for searching each source.

Results

Where were the references identified?

Using search strategies with 'drug' and 'fracture' terms retrieved at least one included reference in all the bibliographic databases, except Inside Conferences (Table 1). Non-bibliographic sources (such as textbooks and websites) did not identify any unique references.

The minimum combination of sources required to retrieve all the relevant references with the search strategies used in this case study was; GlaxoSmithKline (GSK) website, Science Citation Index (SCI), EMBASE, BIOSIS Previews, British Library Direct, Medscape DrugInfo, handsearching, reference checking, AHFS First, and Thomson Reuters Integrity or Conference Papers Index (CPI).

Where were the references available?

The majority of the searches (using fracture and drug terms) did not retrieve all the relevant references available on each bibliographic database (Table 1).

The minimum number of sources that contained all the included references was Science Citation Index (SCI), Medscape DrugInfo, BIOSIS Previews, British Library Direct, and handsearching.

Table 1: References (RCTs and observational studies) retrieved by databases, in order of decreasing sensitivity

	Records retrieved	Relevant records retrieved	Unique relevant records retrieved	Sensitivity (n=58)	Precision	NNR	Missed references
Science Citation Index (SCI)	312	35	3	60.34%	11.22%	9	7
BIOSIS Previews	880	27	1	46.55%	3.01%	34	4
EMBASE	1017	24	2	41.38%	2.36%	42	3
MEDLINE	251	19	0	32.76%	7.57%	13	7
Scirus (journal sources)	1928	17	0	29.31%	0.88%	114	6
Derwent Drug File	141	16	0	27.59%	11.35%	9	5
PASCAL	64	16	0	27.59%	25.00%	4	6
British Library Direct	117	15	1	25.86%	12.82%	8	12
Thomson Reuters Integrity	96	15	0	25.86%	15.63%	6	6
ADIS Clinical Trials Insight	70	13	0	22.41%	18.57%	5	8
TOXLINE	141	14	0	24.14%	9.93%	10	5
Iowa Drug Information Service (IDIS)	60	12	0	20.69%	20.00%	5	4
GlaxoSmithKline	186	10	10	17.24%	5.38%	19	0
International Pharmaceutical Abstracts (IPA)	28	7	0	12.07%	25.00%	4	7
CINAHL	70	6	0	10.34%	8.57%	12	4
Conference Proceedings Citation Index-Science (CPCI-S)	45	6	0	10.34%	13.33%	8	0
CENTRAL	12	5	0	8.62%	41.67%	2	5
Medscape DrugInfo	115	4	1	6.90%	3.48%	29	2
Conference Papers Index (CPI)	31	2	0	3.45%%	6.45%	10	0
Inside Conferences	7	0	0	0%	NA	NA	0

Marginal Sensitivity and Marginal Precision

Order 1: Sources with the highest number of relevant references first

When the sources are searched in order of retrieval of the highest number of relevant records until all the relevant references are identified, the order for searching is as listed in Table 2.

Table 2: Marginal sensitivity, marginal precision and additional number needed to read using the sources with the highest number of relevant records first

	Additional records to sift	Additional relevant references	Marginal sensitivity (n=58)	Marginal precision	Additional number needed to read (NNR)
Science Citation Index (SCI)	312	35	60.34%	11.22%	9
GlaxoSmithKline (GSK) website	186	10	17.24%	5.38%	19
EMBASE	819	4	6.90%	2.81%	36
AHFS First*	2	2	3.45%	100%	1
Handsearching	N/A	2	3.45%	N/A	N/A
Conference Papers Index (CPI)	24	1	1.72%	4.17%	24
British Library Direct	46	1	1.72%	2.17%	46
Medscape DrugInfo	110	1	1.72%	0.91%	110
BIOSIS Previews	608	1	1.72%	0.16%	608
Reference checking	N/A	1	1.72%	N/A	N/A
TOTAL	2107	58	100%	2.75%	36

*AHFS First or a combination of Litt's Drug Eruption Global Database and either, Lexi-Comp Database or Clinical Pharmacology or Martindale: the complete drug reference or The Merck Manual or Side Effects of Drugs Annual (SEDA) or Medicines Safety Update or Drugs and Therapy Perspectives.

Order 2: Current Practice in systematic reviews

If only MEDLINE had been searched along with reference checking then only 34% (20/58) of the relevant references would have been identified. Even a search of MEDLINE, EMBASE, and CENTRAL along with reference checking, would have retrieved less than half (43%, 25/58) of the relevant references (Table 3).

Table 3: Marginal sensitivity, marginal precision and additional number needed to read using order of sources in current practice

	Additional records to sift	Additional relevant references	Marginal sensitivity (n=58)	Marginal precision	Additional number needed to read (NNR)
MEDLINE	251	19	32.76%	7.57%	13
Reference Checking	N/A	1	1.72%	N/A	N/A
EMBASE	808	5	8.62%	0.62%	161
CENTRAL	0	0	0%	0%	0
GlaxoSmithKline (GSK) website	186	10	17.24%	5.38	19
CINAHL	30	0	0%	0%	0
Handsearching	N/A	1	3.45%	N/A%	N/A
BIOSIS Previews	706	10	17.24%	1.67%	60
Science Citation Index (SCI)	58	6	10.34%	17.14%	6
Textbooks/bulletins	N/A	2*	3.45%	N/A	N/A
TOTAL	2039	55	94.83%	2.85%	35

Discussion

Our study demonstrates the value of searching multiple sources in order to identify adverse effects data for a systematic review. In this case study, the minimum number of sources which needed to be searched (with a proposed search strategy) in order to identify all the relevant references was ten. Even if it were possible to devise a perfect search strategy that could retrieve all the relevant references available on each source, a minimum of five sources would still need to be searched.

The main limitation is that this research is based on only one case study, and how it might generalise to other systematic reviews is unclear.

Conclusions

This case study demonstrates the potential value of searching a number of sources to identify adverse effects data and the failure of a broad search strategy with numerous synonyms, text words and indexing terms to identify all the relevant references available on each database.

References

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