

Full publication of results initially presented in abstracts (Review)

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[Methodology Review]

Full publication of results initially presented in abstracts

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ABSTRACT

Background

Abstracts of presentations at scientific meetings are usually available only in conference proceedings. If subsequent full publication of abstract results is based on the magnitude or direction of study results, publication bias may result. Publication bias, in turn, creates problems for those conducting systematic reviews or relying on the published literature for evidence.

Objectives

To determine the rate at which abstract results are subsequently published in full, and the time between meeting presentation and full publication.

Search methods

We searched MEDLINE, EMBASE, The Cochrane Library, Science Citation Index, reference lists, and author files. Date of most recent search: June 2003.

Selection criteria

We included all reports that examined the subsequent full publication rate of biomedical results initially presented as abstracts or in summary form. Follow-up of abstracts had to be at least two years.

Data collection and analysis

Two reviewers extracted data. We calculated the weighted mean full publication rate and time to full publication. Dichotomous variables were analyzed using relative risk and random effects models. We assessed time to publication using Kaplan-Meier survival analyses.

Main results

Combining data from 79 reports (29,729 abstracts) resulted in a weighted mean full publication rate of 44.5% (95% confidence interval (CI) 43.9 to 45.1). Survival analyses resulted in an estimated publication rate at 9 years of 52.6% for all studies, 63.1% for randomized or controlled clinical trials, and 49.3% for other types of study designs.

'Positive' results defined as any 'significant' result showed an association with full publication (RR = 1.30; CI 1.14 to 1.47), as did 'positive' results defined as a result favoring the experimental treatment (RR = 1.17; CI 1.02 to 1.35), and 'positive' results emanating from randomized or controlled clinical trials (RR = 1.18, CI 1.07 to 1.30).

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Other factors associated with full publication include oral presentation (RR = 1.28; CI 1.09 to 1.49); acceptance for meeting presentation (RR = 1.78; CI 1.50 to 2.12); randomized trial study design (RR = 1.24; CI 1.14 to 1.36); and basic research (RR = 0.79; CI 0.70 to 0.89). Higher quality of abstracts describing randomized or controlled clinical trials was also associated with full publication (RR = 1.30, CI 1.00 to 1.71).

Authors' conclusions

Only 63% of results from abstracts describing randomized or controlled clinical trials are published in full. 'Positive' results were more frequently published than not 'positive' results.

PLAIN LANGUAGE SUMMARY

Studies initially reported as conference abstracts that have positive results are subsequently published as full-length journal articles more often than studies with negative results.

Less than half of all studies, and about 60% of randomized or controlled clinical trials, initially presented as summaries or abstracts at professional meetings are subsequently published as peer-reviewed journal articles. An important factor appearing to influence whether a study described in an abstract is published in full is the presence of 'positive' results in the abstract. Thus, the efforts of persons trying to collect all of the evidence in a field may be stymied, first by the failure of investigators to take abstract study results to full publication, and second, by the tendency to take to full publication only those studies reporting 'significant' results. The consequence of this is that systematic reviews will tend to over-estimate treatment effects.

BACKGROUND

Results of many types of scientific research are presented at professional meetings and summarized in abstracts. These abstracts are usually available only in proceedings or journal supplements, which may not be indexed by electronic databases such as MEDLINE. This means that results presented in abstract form are generally only available to those with access to conference proceedings.

Full publication of a trial is more common when the results are 'positive' or 'significant' (Simes 1986; Dickersin 1987; Easterbrook 1991; Dickersin 1992; Dickersin 1993). This publication bias can be divided in two steps: from trial results to publication of a meeting abstract, and from publication of a meeting abstract to subsequent full publication (von Elm 2003).

There is difficulty not only in finding abstracts, but also in correctly identifying important aspects of study methodology. Because they are seldom indexed in an electronic database, conference proceedings must often be hand-searched. Even in abstracts describing randomized treatment assignment, it is not always possible to tell whether the results described are truly those of a randomized controlled trial. Nine of 77 authors who explicitly stated in an abstract that treatment assignment had been randomized denied random treatment assignment when surveyed subsequently (Scherer 1994).

The reliability of results presented in abstract form is also questionable. Abstracts may present preliminary results of an ongoing trial and may differ from those eventually published in full. Authors, sample sizes, and estimates of treatment effects reported in abstracts have been shown to differ from those presented in subsequent peer-reviewed publications (Weintraub 1987; Chokkalingam 1998; Hopewell 2003b)

For these reasons, attempts to prepare unbiased systematic reviews of a body of evidence may be thwarted by the existence of unpublished studies or by incomplete or imprecise information provided in abstracts. It is important that authors of systematic reviews take the extra time and effort to contact abstract authors to verify information presented in an abstract. If this is not done, then conclusions drawn from the review may be biased or imprecise.

Determining the proportions of studies that were initially presented in abstract form but never published in full is important in assessing the size and nature of the problem. An earlier systematic review (Scherer 1994) found that only 51% of all studies initially presented as abstracts were published in full, suggesting that this is a major problem. That same report found evidence of publication bias for the abstracts in that full publication was associated with 'significant' or 'positive' results (RR = 1.17; 95% confidence interval (CI) 0.99 to 1.39). That initial review was updated as a Cochrane methodological review (Scherer 2007) with similar

findings. This review updates and extends these earlier works.

OBJECTIVES

- To determine the rate at which studies reported in abstracts of any study design are subsequently published in full;
- To determine the rate at which abstracts describing results of randomized or controlled clinical trials are subsequently published in full;
- To determine the publication rate by time, i.e., the distribution of mean and/or median times to publication and the cumulative publication rate by time; and
- To determine the association between full publication of results initially presented in abstracts and characteristics of these abstracts and the studies they report on.

METHODS

Criteria for considering studies for this review

Types of studies

We included all reports that examined the subsequent rate of full publication of results related to biomedical sciences, which were initially presented in abstract or summary form. We will refer to the papers considered for this systematic review as 'reports,' which analyzed abstracts describing various 'studies.'

Eligible reports included information on the following:

1. The number of abstracts identified;
2. The number or proportion of abstracts followed by full publication of the studies; and
3. Follow-up of at least 24 months to assess full publication.

Types of data

Biomedical research studies.

Types of methods

The following study and abstract characteristics were examined for association with publication:

1. 'Positive' or 'significant' results;
2. Sample size equal to or above the median or mean of all presented studies;
3. Oral versus poster presentations;
4. Acceptance for presentation at a scientific meeting;
5. Clinical research versus basic science;

6. Study design;
7. Study quality;
8. Multi-center versus single center studies;
9. English versus non-English language;
10. Country of origin (North American versus European versus rest of the world); and
11. Funding source.

We did not impose our definitions for 'positive' results, 'clinical research', or 'basic science', but used the authors' definitions. Abstracts describing clinical research thus most likely include many types of study designs, from case reports to randomized controlled trials. We also used study authors' classification of an abstract as one that described a randomized or controlled clinical trial.

Types of outcome measures

Outcomes were subsequent full publication of the results described in the abstract and the time interval between presentation at meetings and subsequent full publication.

Search methods for identification of studies

We searched MEDLINE, EMBASE, The Cochrane Library, Science Citation Index, reference lists, and author files. References listed in each identified report were also reviewed for inclusion. Science Citation Index was searched for articles that cited identified reports (July, 2003). Additional reports were found through author files or word of mouth. For the full search strategy, see appendices ([Appendix 1](#); [Appendix 2](#); [Appendix 3](#); [Appendix 4](#)).

Data collection and analysis

Reports were included if abstracts or summary reports were followed for at least 24 months after presentation and a publication rate was presented or could be calculated from reported results or from personal communication with the author. For reports where abstracts were followed for varying lengths of time, only data from follow-up of abstracts for 24 months or more were included. If an explicit length of follow-up was not given, the number of follow-up months was calculated. If a month (e.g., for a meeting date) was not given or could not be extracted from additional sources (e.g., meeting/society websites), we used the middle of the year. If authors of reports determined the rate of publication using survival analysis, we included the reports because follow-up of less than 24 months was taken into account in determining the publication rate. Five reports did not specify an interval between time of the meeting and time of search for full publication ([Collet 1993](#); [Collet 1997](#); [Liu 1996](#); [Payne 1999](#); [Roy 2001](#)). In four ([Collet 1993](#); [Liu 1996](#); [Payne 1999](#); [Roy 2001](#)), the length of time between the last meeting and publication of the report was at least three years. In these cases, we assumed that the criterion for a minimum follow-up of 24 months had been met. In one ([Collet 1997](#)),

the time between the meeting and the publication of the report was only two years, and we assumed that this inclusion criterion could not have been met.

Information related to publication was extracted from each report by two reviewers (RWS, EVE), including total number of abstracts, number or proportion of abstracts subsequently published in full, rate of publication by six month time intervals since presentation, median or mean time to publication, median or mean sample size, and publication rate by pre-specified risk factors as indicated above. We also extracted information related to full publication and study characteristics for abstracts describing randomized or controlled clinical trials separately. Data that were collected but not published were requested from the corresponding author. Disagreements were resolved by discussion and consensus.

We calculated the mean rate of publication with 95% confidence intervals for all included reports by averaging the individually reported publication rates after weighting by the square root of the total number of abstracts studied in each report. For this calculation we included abstracts presented at meetings, or all abstracts in cases where the study population was not derived from a meeting presentation (e.g., all summary reports or all abstracts in a specialized database). We did not include abstracts submitted, but rejected, for presentation at a meeting in the main analyses as our previous reports show that the rate of publication is different for studies accepted for presentation from those rejected (Scherer 2007; von Elm 2003). We also calculated a weighted mean publication rate of reports that examined results only from abstracts describing randomized or controlled clinical trials or that provided a separate publication rate for controlled trials.

Time to publication was analyzed in two ways: First, we examined the distribution of mean or median times to publication and calculated the medians of median and mean times to publication. Second, we used survival or Kaplan Meier analyses to allow for differing lengths of follow-up. We pooled reported numbers of full publications after identical six month intervals since presentation. Abstracts that had not been published were censored at the point in time when follow-up for that report was ended, since subsequent publication could not be ascertained.

Strengths of association of factors possibly associated with publication versus no publication are expressed as relative risks (RR) with 95% confidence intervals using a random effects model.

Sensitivity analyses were performed to compare analyses excluding reports that were themselves published only as abstracts with reports published in full.

RESULTS

Description of studies

See: [Characteristics of included studies](#); [Characteristics of excluded studies](#).

We found 93 reports. Fourteen reports were excluded (Agustsdottir 1995; Berger 2000; Callaham 2001; Cloft 2001; Collet 1997; Duchini 1997; Garvey 1970; Garvey 1971; Gidding 1992; Godkin 1993; Huber 2001; Koren 1986; Singer 1999; and Timmer 2001b): three because follow-up was less than 24 months for at least a part of the meeting (Collet 1997; Garvey 1970; Huber 2001), eight because no relevant numeric data were given (Berger 2000; Callaham 2001; Garvey 1971; Gidding 1992; Godkin 1993; Koren 1986; Singer 1999; Timmer 2001b); one report examined publication of preliminary studies previously published (Cloft 2001), and two reports examined the publication rate of abstracts submitted for presentation at a meeting without reporting on abstracts accepted for presentation at that meeting (Agustsdottir 1995; Duchini 1997). We also excluded some data from five reports in which abstracts had been followed for less than 24 months (Ensom 1998; Maxwell 1981; Meranze 1982; Morrison 1994; Stolk 2002).

Of the 79 included reports, five (Bernstein 1983; Ohlsson 1999; Maleck 1998a; Maleck 1998b; Todd 1997) were reported as abstracts; one was an unpublished manuscript (Halpern 2002). One report included summary reports as well as abstracts, two-thirds of identified studies were in abstract form, the remainder were letters or brief communications (Chalmers 1990a). Nineteen reports included data from abstracts describing randomized or controlled clinical trials, of which ten included only controlled trials (Chalmers 1990a; Cheng 1998; Curry 2003; Diezel 1999; Evers 2000; Hopewell 2003a; Klassen 2002; Krzyzanowska 2003; Ohlsson 1999; Scherer 1994) and nine looked at the publication rate of controlled trials separately (Bhandari 2002; Castillo 2002; De Bellefeuille 1992; Eloubeidi 2001; Halpern 2002; Kiroff 2001; Riordan 2000; Timmer 2001a; Timmer 2002). Abstracts represented work in many different medical sub-specialties as well as basic sciences (see Table of Included Studies). The total number of abstracts followed in individual studies was 30,394 and ranged from 9 to 1,465 (median = 307) in individual reports.

The number or proportion of studies presented as abstracts and subsequently published in full was reported for all included reports. Forty-five reports calculated a cumulative publication rate by time and 33 a median or mean time to publication. Sixteen reports examined the association between 'positive' results and publication (Callaham 1998; Castillo 2002; Chalmers 1990a; Cheng 1998; De Bellefeuille 1992; Eloubeidi 2001; Evers 2000; Halpern 2002; Hashkes 2003; Kiroff 2001; Klassen 2002; Krzyzanowska 2003; Landry 1996; Petticrew 1999; Scherer 1994; Timmer 2002), and seven examined the association between sample size and publication (Callaham 1998; Castillo 2002; Chalmers 1990a; Cheng 1998; Evers 2000; Scherer 1994; Timmer 2002). The association between type of presentation (oral or poster) and subsequent publication was examined in twelve reports (Boldt 1999;

Castillo 2002; Davies 2002; Eloubeidi 2001; Evers 2000; Juzych 1991; Juzych 1993; Krzyzanowska 2003; Levett 2000; Maleck 1998a;Stolk 2002; Vuckovic-Dekic 2001), and the type of research (clinical or basic science) was examined in twelve reports (Bernstein 1983; Bhandari 2002; Davies 2002; Gavazza 1996; Goldman 1982; Hamlet 1997; Hashkes 2003; Juzych 1993; Kiroff 2001; Landry 1996; Timmer 2001a; Timmer 2002). The subsequent rate of full publication of abstracts accepted for presentation at meetings was compared to the publication rate of rejected abstracts in eleven reports (Bernstein 1983; Callaham 1998; De Bellefeuille 1992; Eloubeidi 2001; Goldman 1980; Goldman 1982; Jackson 2000; McCormick 1985; Ohlsson 1999; Timmer 2002; Todd 1997). Nine reports compared the subsequent publication of randomized or controlled clinical trials to that of other study designs (Bhandari 2002; Castillo 2002; De Bellefeuille 1992; Eloubeidi 2001; Halpern 2002; Kiroff 2001; Riordan 2000; Timmer 2001a; Timmer 2002). Authors of three reports scored the quality of abstracts and examined the association with publication (Callaham 1998; Chalmers 1990a; Timmer 2002). Five reports compared the publication of abstracts from multi- versus single-centered studies (Eloubeidi 2001; Krzyzanowska 2003; Scherer 1994; Timmer 2001a; Timmer 2002). However, definition of multi-center status varied from more than one center to more than three centers. Two reports compared English language versus non-English language abstracts (Diezel 1999; Evers 2000). The association between country of origin of the abstract and publication was compared in seven reports that parsed abstracts by originating in North America, Europe, or the rest of the world (Bhandari 2002; Castillo 2002; Eloubeidi 2001; Hashkes 2003; Stolk 2002; Timmer 2001a; Timmer 2002).

The association between funding source and full publication was evaluated in four studies, but differently for each study. In one study the authors examined the publication rate of abstracts with a "peer-reviewed" funding source versus those without such funding (Halpern 2002). Funding source was sought, but not found for any abstract in a second study (Bhandari 2002). A third study reported the publication rate of abstracts with government funding as well as those with industry funding, but a comparison could not be made because the categories were not mutually exclusive (Timmer 2002). Lastly, type of sponsorship was examined for effect on time to publication, comparing time to publication for abstracts with pharmaceutical sponsorship versus abstracts of 'co-operative groups' or those for which sponsorship was not reported (Krzyzanowska 2003).

Risk of bias in included studies

The quality of the reports can be evaluated in three respects:

1. Unbiased sample of abstracts;
2. Length of follow-up; and
3. Ascertainment of subsequent publication.

Abstracts represented either the entire set of abstracts presented at, or submitted to, a meeting (43/79; 54% of reports), abstracts systematically or randomly selected from those (30/79; 38% of reports), or abstracts derived from specialized registers (6/79; 8%). Specialized registers included the Oxford Database of Perinatal Trials (Chalmers 1990a), all abstracts representing presentations by residents in one department (Morrison 1994), all abstracts published in the *Nederlands Tijdschrift voor Geneeskunde* (Koene 1994), all abstracts published in the *Australian and New Zealand Journal of Medicine* (Hopewell 2003a), all abstracts presented by a single department (Dirk 1996), and a Cochrane specialized register (Cheng 1998).

Usually all abstracts identified were included in the study analyses, with a few exceptions. Gavazza excluded 21/397 abstracts from the determination of publication rate because there was only partial agreement between the results presented in the abstract and those presented in the subsequent publication (Gavazza 1996). Seaton excluded 71/696 abstracts because authors did not return 'usable' questionnaires (Seaton 1983), and Kiroff excluded 266/573 abstracts of authors who did not respond to a questionnaire (Kiroff 2001). Other reasons for excluded abstracts had to do with the type of presentation (e.g., electronic poster session, withdrawn abstract, oral presentation only) (Arrive 1996; Cromer 1998; Eloubeidi 2001; Kiroff 2001; Landry 1996; Nguyen 1998; Petticrew 1999) or the validity of the data in the abstract (e.g., unavailable methods; questionable data authenticity) (Halpern 2002; Klassen 2002). One report (Scherer 1994) included only abstracts of authors who verified a randomized controlled trial study design.

Minimum follow-up times of reports included in this review ranged from 2 to 25 years (median 45 months). The minimum time to follow-up was 24 months or less in five reports (Ensom 1998; Maxwell 1981; Meranze 1982; Morrison 1994; Stolk 2002) and less than three years in an additional twelve reports (Bowrey 1999; Ciesla 2001; Evers 2000; Hopewell 2001; Hopewell 2003a; Nguyen 1998; Petticrew 1999; Riordan 2000; Schwartz 1992; Seaton 1983; Vuckovic-Dekic 2001; Walby 2001). Data from reports with less than two years of follow-up were not included in any comparison of this review.

Ascertainment of full publication comprises two steps, first finding the full publication and, second, determining if that full publication represents the same study described in the abstract. Most report authors (73/79; 92%) found citations by searching an electronic database. The majority of these (69/73; 94%) looked for full publications by searching the US National Library of Medicine's MEDLINE database, either as PubMed or an earlier version of this database (e.g. MEDLARS, Index Medicus). Nine authors searched EMBASE, and 15 searched a topic-specific electronic database (e.g., CINAHL, Psychlit, Cancerlit, or Biological Abstracts). Twelve authors searched a specialized register of randomized or controlled trials or searched CENTRAL in the Cochrane Library, either in conjunction with another electronic database or by itself (Callaham 1998; Chalmers 1990a; Cheng

1998; Diezel 1999; Evers 2000; Halpern 2002; Hopewell 2001; Hopewell 2003a; Klassen 2002; Krzyzanowska 2003; Ohlsson 1999; Timmer 2002). One author measured inter-observer reliability of two independent searchers (Murrey 1999), and five used a trained librarian or an individual with librarian training to conduct the search (Collet 1993; Elder 1994; Eloubeidi 2001; Klassen 2002; Krzyzanowska 2003). Of the 73 authors who searched one or more electronic databases, 44 searched one database, 18 searched two databases and 11 searched three or more.

Seventeen authors sent questionnaires directly to the abstract author to obtain information about subsequent publication (Bernstein 1983; Callaham 1998; De Bellefeuille 1992; Dirk 1996; Hashkes 2003; Hopewell 2001; Kiroff 2001; Krzyzanowska 2003; Morrison 1994; Petticrew 1999; Riordan 2000; Sanders 2001; Scherer 1994; Schwartz 1992; Seaton 1983; Timmer 2002; Vuckovic-Dekic 2001); ten of these authors also searched electronic databases (Callaham 1998; De Bellefeuille 1992; Hashkes 2003; Hopewell 2001; Krzyzanowska 2003; Petticrew 1999; Riordan 2000; Scherer 1994; Schwartz 1992; Timmer 2002).

Of authors who did not contact abstract authors directly, the majority (48/63; 76%) required a match of at least two characteristics, usually at least one author name and some measure of content, as grounds for judging that the study in a publication cited in an electronic database was the same study reported in a previously presented abstract. Some authors listed specific items that required matching (e.g., sample size, methodology, results) while others did not. Fourteen authors did not state criteria used for matching study details in abstracts and subsequent full reports (Bowrey 1999; Curry 2003; Diezel 1999; Herron 1993; Levett 2000; Liu 1996; Marx 1999; Maxwell 1981; McCormick 1985; Murrey 1999; Payne 1999; Petticrew 1999; Schwartz 1992; Todd 1997) and four reported only matching on a single characteristic, usually the first or presenting author or study content (Bernstein 1983; Ensom 1998; Koene 1994; Riordan 2000; Seaton 1981; Timmer 2001a; Timmer 2002).

Effect of methods

Rate of publication

The weighted mean rate of full publication derived from the 79 included reports was 44.5% (95% confidence interval (CI) 43.9 to 45.1); and the median rate was 47% (range 8 to 81). This represents subsequent full publication of results from 12,987 studies out of 29,729 reported in abstracts. The mean publication rate was similar when we excluded those reports that were published only as abstracts themselves (44.2%; CI 43.6 to 44.8). The weighted mean rate of full publication based on the 19 reports that looked separately at abstracts describing randomized controlled trials was 57.5% (CI 55.7 to 59.4); the median rate was 58% (range 11 to 89). This represents subsequent publication of results from 2,054 studies out of 3,411 reported in abstracts.

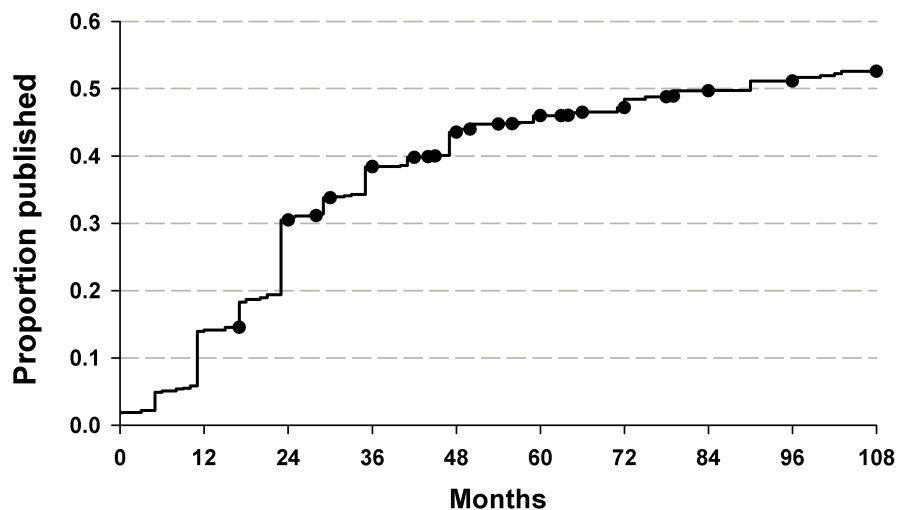
Time to publication

Mean time to full publication determined in 17 reports of 24 scientific meetings ranged from 12 to 32 months, with a median of 19.6 months and overall mean of 18.4 months. Median time to full publication determined in 21 reports of 26 scientific meetings ranged from 9 to 36 months, with a median of 17.9 months.

Cumulative rate of publication over time

Data on time to publication was reported in 45 reports. Using survival analysis, the estimated cumulative publication rate for all studies was 52.6% after 9 years (Figure 1). The annualized rate of publication was highest during the first three years following presentation at a meeting, and decreased during each subsequent year. After 9 years, the estimated publication rate for abstracts describing results of randomized controlled trials was 63.1%, and for abstracts describing other types of study design was 49.3% (Figure 2).

Figure 1. Cumulative full publication of results initially presented as abstracts from 45 studies reporting time to publication

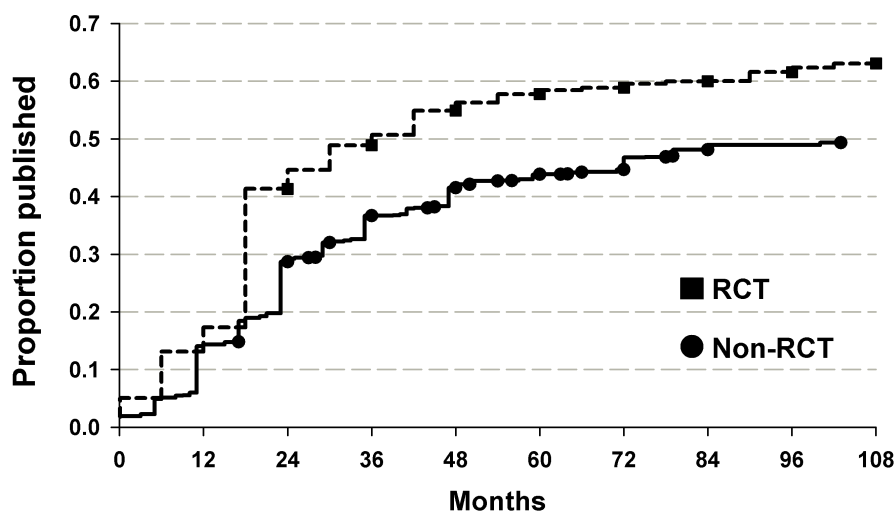


month	0	12	24	36	48	60	72	84	96	108
# published	362	2,460	3,348	1,519	800	280	282	84	27	10
# remaining	20,227	19,091	16,313	10,758	9,032	6,518	4,030	1,803	1,352	246

N = 20,227 abstracts

Circles show points where data censored because reports stopped follow-up.

Figure 2. Cumulative full publication; comparison of abstracts describing randomized or controlled clinical trials (RCTs, 9 studies) with abstracts describing other study designs (Non-RCTs, 36 studies)



N = 17,344 abstracts for non-RCTs and 2,917 abstracts for RCTs
Circles and squares show points where data censored because reports stopped follow-up.

Factors associated with publication

'Positive' results, using the report authors' definition of 'positive,' were associated with full publication in fifteen studies that examined this factor (RR = 1.28; 95% CI 1.15 to 1.42). There was heterogeneity among these reports, however (Chi squared = 39.19 with 15 degrees of freedom, P = 0.006; I² = 62%).

In the previous version of this review, we investigated individual authors' definition of 'positive' results, and identified two different definitions. The first definition described 'positive' results as those showing a statistically significant result in the direction of, or a stated preference for, the experimental compared to the control treatment. Results from seven reports by authors who used this definition showed an association between positive results and full publication (RR=1.17; 95% CI 1.02 to 1.35). Abstracts with neutral results, i.e., those not showing statistically significant results, were handled differently by different authors: one author excluded them from the analysis (Callahan 1998), three authors included

them with abstracts describing 'not positive' results (Chalmers 1990a; Krzyzanowska 2003; Petticrew 1999), and two authors included them with abstracts describing 'positive' results if the study had the stated objective of showing equivalence (Cheng 1998; Klassen 2002).

The second definition described 'positive' results as those showing statistically significant results or a definite preference for either treatment arm compared to neutral results. Results from the seven reports using these definitions of 'positive' results also showed an association between 'positive' results and full publication (RR = 1.30; CI 1.14 to 1.47).

Results from eight reports that examined full publication of abstracts describing randomized or controlled trials showed an association between 'positive' results and full publication (RR = 1.18, CI 1.07 to 1.30).

Results from seven reports showed that sample size equal to or above the median of all presented studies showed a trend towards association with full publication (RR = 1.12; CI 0.98 to 1.29),

and five reports that examined abstracts describing randomized or controlled trials showed an association with full publication (RR = 1.18, CI 1.05 to 1.33).

Results from twelve reports showed that abstracts presented orally rather than at poster sessions were associated with full publication (RR = 1.28; CI 1.09, 1.49). Excluding one report which is itself an abstract (Maleck 1998a) did not make any difference (RR = 1.26; CI 1.08 to 1.48). The RR of the association between full publication and oral presentation in two reports that examined abstracts of randomized or controlled clinical trials was similar (RR = 1.30, CI 0.80 to 2.09), although with a wide confidence interval.

Results from eleven reports showed a strong association between acceptance versus rejection of abstracts for oral or poster presentation at a meeting and full publication (RR = 1.78; CI 1.50 to 2.12). Excluding three reports which are abstracts themselves (Bernstein 1983; Ohlsson 1999; Todd 1997) changed the RR very little (RR = 1.75; CI 1.46, 2.08).

Results from twelve reports showed that clinical research was not published so often as basic science (RR = 0.79; CI 0.70 to 0.89). Excluding one report which is itself an abstract (Bernstein 1983) did not change the RR.

Results from nine reports showed that abstracts describing randomized controlled trials are published more often than abstracts describing other types of clinical research (RR = 1.24; CI 1.14 to 1.36).

Results from three reports found that abstracts scored as having higher versus lower quality showed a trend towards association with full publication (RR = 1.24; CI 0.97 to 1.58), and an association was found in two reports that examined abstracts describing randomized or controlled clinical trials (RR = 1.30, CI 1.00 to 1.71).

Results from five reports found no evidence that the number of centers contributing to a study was associated with full publication (RR = 1.14; CI 0.91 to 1.44). We found a similar result in three reports that examined publication of abstracts describing randomized or controlled trials (RR = 1.27, CI 0.95 to 1.70).

Results from two reports sought but did not find an association between English language versus non-English language abstracts and full publication (RR = 1.25; CI 0.73 to 2.14).

Seven reports examined the publication of abstracts by country of origin, comparing full publication of abstracts originating in North America versus Europe versus the rest of the world. Together the results did not show an association between full publication and country of origin.

Only three studies examined the association of funding with full publication. The rate of full publication was higher for abstracts with 'peer-reviewed' funding compared with those without 'peer-reviewed' funding (9/51 (18%) versus 7/94 (7%), respectively; Halpern 2002). The publication rate for abstracts with govern-

ment support was 73% (93/128) and that for industry support was 66% (102/154) (Timmer 2002); some abstracts were categorized into both categories, however. Abstracts with pharmaceutical sponsorship were published in full sooner compared with those with funding not specified (Hazard Ratio = 1.5; CI 1.1 to 2.1; Krzyzanowska 2003). Overall, while funding itself appears to be associated with subsequent full publication, the effect of funding source is not clear. Due to heterogeneity of these comparisons, results could not be combined.

DISCUSSION

We found that only about half of all studies first presented as abstracts were published in full following presentation at meetings or publication as a summary report, whether estimated as a weighted average 44.5% (CI 43.9 to 45.1) or using survival analyses (52.6%). A somewhat larger proportion of studies describing randomized or controlled clinical trials are published in full, with an estimated rate of full publication of 63.1% using survival analysis compared with 49.3% for other designs. The weighted average publication rate is most likely smaller due to the inclusion of studies with different lengths of follow-up. Abstract results that are published after the stated length of the follow-up cannot be considered when calculating an average publication rate, but they are considered when using a time-to-event analysis.

The weighted mean publication rate may represent an underestimate for two reasons: First, some reports had only a minimum follow-up of between two and three years and full publication may have occurred later. Second, the majority of report authors found subsequent publications only by searching indexed electronic databases, and there may be additional non-indexed publications. The survival analysis takes into account the first limitation and indicates a somewhat higher publication rate.

At least when patients are involved, this under-reporting constitutes scientific misconduct (Chalmers 1990b; Antes 2003). Most trial participants give consent to the risks involved in an experimental study under the assumption that they are making a contribution to science. If that study remains unpublished, their contribution is for naught. In addition, those who rely on the scientific literature to make health care decisions are faced with a biased subset of scientific evidence.

Examination of the survival analyses confirms our earlier findings in that the highest annualized rates of publication are in the first three to four years following presentation at a meeting (Scherer 2007). Forty-five reports used in the survival analysis measured the proportion of abstracts followed to full publication at time intervals ranging from two to 16 years following presentation. We present results up to nine years, as data beyond this time point did not appear to be robust. The cumulative publication rate of

presented abstracts is similar to that reported earlier (Scherer 1994; Scherer 2007; von Elm 2003).

Meta-analyses of results of reports looking at factors associated with full publication suffered from substantial heterogeneity with I^2 values exceeding 50% in 13/19 analyses. Reasons for heterogeneity may be methodological differences between studies with regard to definition of factors, ascertainment of full publication, study design, and type of abstracts evaluated. We were not able to identify any consistent factors that contributed to the heterogeneity and so the association of publication with factors based on pooled results need to be interpreted cautiously. Because of the increased heterogeneity, we used a random effects model rather than a fixed effect model for all analyses, with the 'side effect' that some confidence intervals of previously reported associations between sample size and full publication (Scherer 2007) were no longer significant.

We found evidence for publication bias in that 'positive' results were associated with full publication, no matter how 'positive' was defined. Some authors defined 'positive' results as those showing that the experimental treatment was better than the control treatment, while others defined 'positive' results as those showing a statistically significant difference or a preference for either treatment arm. Only two reports defined 'positive' results for non-inferiority or equivalence trials (Cheng 1998; Klassen 2002), categorizing study results as 'positive' if the study hypothesis had been supported. Clearly, a uniform definition of 'positive' is needed, including that to be used for non-inferiority trials. Some heterogeneity persisted when results were divided into the subgroups categorized by type of definition for 'positive.' There was no clear difference among reports within the subgroups to identify the source of the heterogeneity. However, the significant association between 'positive' results and subsequent full publication using either definition indicates that this is a robust finding. Positive outcome bias is also supported by the findings that 'positive' results are published sooner than non-significant results (Hopewell 2007; Ioannidis 1998; Stern 1997). Eight of nine reports examining the association of 'positive' results to publication also looked at abstracts describing randomized or controlled clinical trials separately. Since the same association can be shown in this subgroup, authors of systematic reviews of randomized clinical trials should be especially aware of this potential for bias.

Studies with larger sample sizes had appeared more likely to be published in full in a previous version of this review (Scherer 2007). In this update, the strength of the association is attenuated, most likely due to the change from a fixed effect model to a random effects model in the present version. It is not possible to isolate the association of sample size from the association of significant results with full publication: significant results are published more often; and studies with small sample sizes are more likely to be under-

powered, and thus less likely to achieve statistical significance. In this situation, there could be fewer publications because of lack of significant results and not necessarily because of sample size. In all cases, studies with small sample sizes should still be published because, in a meta-analysis, they can contribute in proportion to their numbers.

Results from clinical research studies presented in abstracts were published in full less often than results from basic science presented in abstracts. This finding seems inconsistent with the observation that abstracts describing randomized controlled trials were published more often than abstracts of other study designs. A number of reasons may be responsible for this apparent discrepancy. First, we used each report author's definitions of 'clinical research' or 'basic science'. So, the group of 'clinical' abstracts most likely includes studies with many different types of study design besides randomized controlled trials that are often not published, a suggestion supported by the apparent heterogeneity of the meta-analysis. Second, some clinical research abstracts may describe protocols for studies that may or may not be eventually completed and would not necessarily be expected to be subsequently published. Third, it may be that less time and effort is required to complete the dissemination process for basic science.

Acceptance of an abstract for presentation at a meeting was strongly associated with full publication (RR=1.78; CI 1.50 to 2.12). Abstract authors may believe that rejected abstracts are also more likely to be rejected for subsequent publication due to implied poor quality or uninteresting results, and may not prepare a manuscript for publication. We found a trend towards an association between full publication of abstracts with 'high' quality scores compared to 'low' quality (RR = 1.24; CI 0.97 to 1.58) and a positive association when we looked only at full publication of abstracts describing randomized or controlled clinical trials (RR = 1.30; CI 1.00 to 1.71). Among abstracts accepted for presentation, study results presented orally appear more likely to be subsequently published in full than results presented in poster sessions (RR=1.28; CI 1.09 to 1.50). There may be a perception on the part of authors that results selected for oral presentation are more interesting and of higher quality and thus are more likely to be accepted for full publication. The most common reason for non-publication elicited by surveys of authors of non-published abstracts is lack of time or low priority (Scherer 2007; von Elm 2003; Callahan 1998; Dickersin 1992; Easterbrook 1991; Weber 1998). On the other hand, we did not find an association between oral presentation and full publication of abstracts describing randomized or controlled clinical trials, suggesting that mode of presentation at a meeting is not a factor related to publication of trials.

Report authors also examined the influence of language and country of origin on full publication of abstract results. Possible influences include the relation between language proficiency and publi-

cation, since most scientific journals are published in North America and Europe. It is also possible that full publication of abstracts from non-Western countries may be higher in journals that are not indexed in MEDLINE, EMBASE and other electronic databases used by report authors for ascertainment of subsequent full publication. When we examined the combined results however, we did not find an association between English language and full publication compared to non-English language abstracts. Neither did we find any association between full publication and origin in North America, Europe, or the rest of the world.

Report authors infrequently evaluated funding source. This is possibly due to the fact that, in general, abstracts do not provide information about funding. Reports that examined funding were not consistent in the approach or definitions used. The data suggest that funding itself may be associated with full publication. Funding source should be evaluated with respect to full publication in future reports.

Prospective registration of randomized controlled trials will alleviate many of the problems created by failure to publish study results. Registration for all trials is a necessary first step to enable reviewers and consumers alike to have access to complete, ongoing, published and unpublished studies. Events supporting and leading to trials registration, summarized by Dickersin and Rennie (Dickersin 2003), have led to many organizations to recommend or require prospective trial registration. For instance, the World Health Organization (WHO) has adopted a policy requiring registration of randomised controlled trials approved by its ethics review board (<http://www.who.int/mediacentre/news/releases/2004/pr23/en/>). Multi-disciplinary registers currently in existence are the ISRCTN Register and the metaRegister of Controlled Trials (both available at <http://www.controlled-trials.com>) or the register of clinical trials at TrialsCentral (<http://www.TrialsCentral.org>). Even with registration, trial results may still not be available to consumers; thus registration does not relieve an investigator from the responsibility to publish trial results. Good publication practice recommendations state that "Companies should endeavour to publish the results from all of their clinical trials of marketed products. These publications should present the results of the research accurately, objectively, and in a balanced fashion." (<http://www.gpp-guidelines.org/>).

AUTHORS' CONCLUSIONS

Implication for systematic reviews and evaluations of healthcare

There is clear evidence of publication bias in the step between presentation of a study at a meeting and subsequent full publication. Studies reported primarily as abstracts are published more frequently in full if their results show a positive effect of the experimental treatment or have significant results. Researchers performing systematic reviews should make every effort to obtain unpublished study results in order to avoid making biased reviews. Health care providers should be aware that conclusions derived from systematic reviews may be biased due to lack of inclusion of not fully published or unpublished data. Researchers initiating randomized controlled trials should register trials prospectively to ensure availability of trial results and should endeavor to publish trial results regardless of magnitude and direction of the effect size.

Implication for methodological research

Investigators examining full publication of results initially presented in abstracts should follow several minimal requirements to ensure methodological quality, including: follow-up time of at least 24 months; use of more than one database as well as author contact to determine subsequent publication; and use of more than a single criterion to match an abstract with its subsequent full publication. When studying factors associated with full publication, investigators should (1) explicitly define 'positive' results and describe how the definition applies to non-inferiority trials; (2) define 'clinical research'; and (3) examine the impact of funding source on subsequent full publication. Methodological differences between reports and the existence of heterogeneity need to be addressed in further reviews of this kind. The robustness of results of this review should be examined further, especially in studies that look at randomized controlled trials.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Arrive 1996

Methods	search by investigator of PubMed from 1997 through 1999 by first, then second author; matched by first and second author, content
Data	456 abstracts presented at the 1996 Journées Francaises de Radiologie meeting
Comparisons	
Outcomes	39 abstracts published; publication rate by time
Notes	radiology

Bernstein 1983

Methods	author contact; search of MEDLARS by first author; date of search and person searching not given; match criteria not given
Data	177 abstracts presented at the 1978 AASLD meeting
Comparisons	abstracts accepted for presentation versus those rejected; clinical research versus basic science research
Outcomes	106 abstracts published; 56/82 abstracts accepted for presentation versus 50/95 rejected abstracts published; 53/101 abstracts describing clinical research versus 53/76 abstracts describing basic science published
Notes	gastroenterology

Bhandari 2002

Methods	search by investigator of MEDLINE and PubMed from January 1995 through February 2001 by first, second, and last author and keywords; matched on authors, sample size, title, methodology, results and research question
Data	465 abstracts presented at the 1996 American Academy of Orthopedic Surgeons meeting
Comparisons	clinical research versus basic science research; RCT design versus all other designs; North American vs European vs other origin
Outcomes	231 abstracts published; mean time to publication = 17.6 months (standard deviation = 12 months); median time to publication = 14 months (range = 1 to 56 months); 122/357 abstracts describing clinical research versus 37/107 abstracts describing basic science research published; 7/23 abstracts with RCT design versus 152/442 abstracts with non-RCT design published; 148/412 abstracts originating from North America versus 5/28 from Europe versus 6/14 from rest of world published

Bhandari 2002 (Continued)

Notes	orthopedic surgery
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Bird 1999

Methods	search by trained librarian of Aquatic Sciences and Fisheries Abstracts (1982 - Aug 1998), Biological Abstracts (1969 - Sep 98), Biosis (1985 - Jun 1997), MEDLINE (1966 - 1998), PsychINFO (1967 - Oct 1998), Zoological Record (1978 - Sep 1998) by keywords and phrases combined with search by all authors; match is at least 1 author the same, subject matter same or similar, including species, study area, time, methodology
Data	425 abstracts randomly selected from 849 abstracts presented at the 1989 and 1991 Society for Marine Mammals
Comparisons	
Outcomes	234 abstracts published; publication rate by time
Notes	marine mammals

Boldt 1999

Methods	search of MEDLINE by investigator from 1993 to 1999 by first author and all co-authors and keywords; match by contents
Data	566 abstracts presented at the 1994 Deutscher Anesthetik Kongress and European Society of Anaesthesiologists meeting
Comparisons	oral versus poster presentation, English language journals versus other languages
Outcomes	233 abstracts published; publication rate by time; 137/349 abstracts presented orally versus 96/217 abstracts presented as posters published; of 233 published abstracts, 173 published in English language journals versus 60 published in languages other than English
Notes	anesthesiology

Bowrey 1999

Methods	search of MEDLINE by investigator from 1981 through 1997 by first, then other authors' name; match criteria not given
Data	496 abstracts presented at the Welsh Surgical Society between 1983 and 1995
Comparisons	

Bowrey 1999 (Continued)

Outcomes	233 abstracts published; median time to publish = 17 months
Notes	surgery; author reports on five additional articles 'accepted' for publication, but not included

Byerly 2000

Methods	search of MEDLINE Current Contents, and International Pharmacy Abstracts by investigator from 1996 through 1998 by first author; matched by authors, title, methodology, sample size, results, and research question
Data	716 abstracts; 501 presented at the 1994 American Society of Health-System Pharmacists meeting and 215 at the 1994 American College of Clinical Pharmacy meeting
Comparisons	
Outcomes	126 abstracts published; median time to publish abstracts presented at the 1994 American Society of Health-System Pharmacists meeting = 12.8 months; median time to publish abstracts presented at the 1994 American College of Clinical Pharmacy meeting = 14.9 months
Notes	pharmacy

Callaham 1998

Methods	search of MEDLINE, EMBASE, Cochrane Library by investigator; match criteria not given; author contact
Data	492 abstracts submitted to Society for Academic Emergency Medicine meeting of which 380 met criteria for logistic regression (positive results, sample size)
Comparisons	'positive' (defined by the direction of results) versus not 'positive' results; accepted versus rejected abstracts; 'high' quality versus 'low' quality; abstracts with sample size above the median versus abstracts with sample size below the median
Outcomes	235 of 492 total abstracts published; 110 presented abstracts published; publication rate by time; mean time to publication = 18 months; 77/153 'positive' versus 36/74 not 'positive' abstract results published; 99/212 abstracts with sample size equal or above the median versus 114/281 with sample size less than the median published; 110/179 abstracts accepted for presentation versus 104/313 rejected abstracts published; 106/199 abstracts rated by author as 'high' quality versus 107/294 rated as 'low' quality published
Notes	emergency medicine

Castillo 2000

Methods	MEDLINE search by investigator from 1990 to 1998 by author name; match by content
Data	491 abstracts presented at XX Congress of the Spanish Society of Anesthesiology and Resuscitation
Comparisons	
Outcomes	84 abstracts published; publication rate by time; mean time to publication = 21.6 months
Notes	anesthesiology

Castillo 2002

Methods	search of PubMed, DataStar by investigator from 1993 to December 2000 by first, second, third and last author, and keywords in title; matched by content
Data	472 abstracts presented at the 1995 European Society of Anesthesiologists meeting
Comparisons	'positive' (defined as significant results) versus not 'positive' results; abstracts with sample size above the median versus abstracts with sample size below the median; oral versus poster presentation; RCT design versus all other designs; North American vs European vs Other origin
Outcomes	199 abstracts published; mean time to publish = 16.8 months (standard deviation = 15.6); range = 24 to 60 months; publication rate by time; 160/361 'positive' results versus 23/56 not 'positive' abstract results published; 73/197 abstracts with sample size above the median versus 106/230 abstracts with sample size less than the median published; 83/210 abstracts presented orally versus 116/262 abstracts presented as posters published; 69/146 abstracts with RCT design versus 128/326 abstracts with non-RCT design published; 8/14 abstracts originating from North America versus 84/408 from Europe versus 7/49 from rest of world published
Notes	anesthesiology

Chalmers 1990a

Methods	search by investigator of Oxford Database of Perinatal Trials; match by author, title, content
Data	176 RCT 'summary reports' found in Oxford Database of Perinatal Trials; two-thirds are abstracts
Comparisons	'positive' (defined by direction of results) versus not 'positive' results; abstracts with sample size above the median versus abstracts with sample size below the median; 'high' versus 'median' versus 'low' quality
Outcomes	64 summary reports published; 32/98 'positive' versus 32/78 not 'positive' abstract results published; 38/85 abstracts with sample size equal or above the median versus 23/85 with sample size less than the median published; 3/10 abstracts rated as 'high' quality by author versus 43/114 of 'medium' quality and 18/52 of 'low' quality published

Chalmers 1990a (Continued)

Notes	perinatology
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Chan 2002

Methods	search of MEDLINE using OVID by investigator from January 1997 to September 2001 by author and institution; hand search of 3 local journals (Medical Journal of Malaysia, Malaysia Journal of Paediatrics and Child Health, Malaysia Journal of Pathology) from 1997 to Sept 2001; match criteria not given
Data	105 of 110 abstracts of studies conducted in Malaysia in children 0 to 16 years of age and presented at the 1997 - 1998 Malaysian Paediatric Association Annual Congress, Perinatal Society of Malaysia Annual Congress, Academy of Medicine of Malaysia Annual Scientific Congress of Medicine meetings
Comparisons	
Outcomes	37 abstracts published
Notes	pediatrics

Cheng 1998

Methods	search of Cochrane Cystic Fibrosis group register of trials by investigator; match by title and full report
Data	178 RCT abstracts found in Cochrane Cystic Fibrosis group's register of trials (from 182 abstracts, 2 were duplicates and 2 were published before presentation and excluded)
Comparisons	'positive' (defined by direction of results) versus not 'positive' results; abstracts with sample size above the median versus abstracts with sample size below the median
Outcomes	survival analysis of proportion published with 71.4% publication rate (127/178 abstracts published); median time to publication = 18 months; 43/113 'positive' versus 14/42 not 'positive' abstract results published; 36/92 abstracts with sample size equal or above the median versus 25/78 with sample size less than the median published
Notes	cystic fibrosis

Ciesla 2001

Methods	search of PubMed by investigator to April 2001 by author and keywords; person completing search not given; matched by authors, keywords, content, results
Data	257 abstracts related to cytopathology; 66 presented at the 1998 International Academy of Pathology - United States and Canadian Academy of Pathology meetings; 179 presented at the 1998 American Society of Cytopathology meeting; and 12 presented at the American Society of Clinical Pathologists/College of American Pathologists meeting

Ciesla 2001 (Continued)

Comparisons	
Outcomes	116 abstracts published; mean time to publication = 15.8 months; range = 2 to 26 months; publication rate by time
Notes	cytopathology

Collet 1993

Methods	manual search by investigator of Index to Dental Literature, Index Medicus by author with date of search not given; matched by authors, title, content
Data	747 abstracts presented at the 1980 -1989 Argentine Division of the International Association for Dental Research meetings
Comparisons	
Outcomes	94 abstracts published; publication rate by time
Notes	dental research

Corry 1990

Methods	search of Index to Dental Literature and MEDLINE by investigator from 1983 through 1988; match determined by author name, title, purpose, study methodology, sample size, and results/conclusions
Data	275 abstracts randomly selected from 2,789 abstracts presented at the 1983 and 1984 International Association for Dental Research and American Association of Dental Research meetings
Comparisons	
Outcomes	63 abstracts published; publication rate by time
Notes	dentistry

Craig 2001

Methods	search of PubMed by investigator from 1966 through 2000 by all authors and words from title; matched by at least one author, content/subject matter, methodology, results
Data	1005 abstracts; 320 presented at the 1980- 1984 British Orthopaedic Association meetings and 685 presented at the 1990 - 1994 British Orthopaedic Association meetings
Comparisons	

Craig 2001 (Continued)

Outcomes	495 abstracts published; publication rate by time; mean time to publication for 1980 -1984 meetings = 21.4 months; mean time to publication for 1990-1994 meetings = 16.8 months
Notes	orthopaedics

Cromer 1998

Methods	search of MEDLINE by investigator for 5 years following meeting; match by title and content
Data	128 oral presentations from 422 abstracts presented at the 1974, 1976, 1977, 1983, 1986, and 1993 meetings of Society of Adolescent Medicine
Comparisons	
Outcomes	58 abstracts published
Notes	adolescent medicine

Curry 2003

Methods	search of MEDLINE by author; date of search not given; match criteria not given
Data	9 RCT abstracts of 760 abstracts presented at the 1996 - 2000 British Association of Paediatric Surgeons meetings
Comparisons	
Outcomes	1 abstract published
Notes	paediatric surgery

Daluiski 1998

Methods	Melyl Medline Plus search by investigator by first author and keywords, then subsequent authors with same keywords; match by identical or nearly identical hypothesis, study design, protocol, results, number of specimens
Data	888 abstracts representing all abstracts presented at the 1991, 1992, 1993 meetings of the Orthopaedic Research Society
Comparisons	
Outcomes	463 abstracts published; publication rate by time; median time to publication calculated for each meeting, for 1991 meeting median time to publication = 20 months, for 1992 = 23 months and for 1993 meeting = 18 months

Daluiski 1998 (Continued)

Notes	orthopedic research
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Davies 2002

Methods	search of PubMed, CINAHL to October 2000 by all authors; person completing search not given; matched by authors, sample size, content/subject matter/methodology, results
Data	172 'publishable' abstracts (from a total of 193 abstracts, defined as containing clear methods and results) presented at the 1997 Perinatal Society of Australia and New Zealand meeting
Comparisons	clinical research versus basic science; oral versus poster presentation
Outcomes	78 abstracts published; median time to publication = 18 months (range = -36 to 41 months and interquartile range = 9 to 26 months); survival analysis showing proportion abstracts published; 48/127 abstracts describing clinical research versus 30/45 abstracts describing basic science published; 67/125 abstracts presented orally versus 11/47 abstracts presented as posters published
Notes	paediatrics

De Bellefeuille 1992

Methods	search of Cancerline data bank by investigator by first and last authors, key words; questionnaire to authors if no publication found; match criteria not given
Data	197 abstracts randomly selected from 1058 presented at 1984 American Society of Clinical Oncology meeting
Comparisons	'positive' (defined as significant results) versus not 'positive' results; abstracts accepted for presentation versus those rejected; RCT design versus all other designs
Outcomes	63 abstracts published; publication rate by time; mean time to publication = 22.8 months; 48/65 'positive' versus 67/132 not 'positive' abstract results published; 63/81 abstracts accepted for presentation published versus 52/116 rejected abstracts; 20/31 abstracts with RCT design versus 83/166 abstracts with non-RCT design published
Notes	cancer

Diezel 1999

Methods	MEDLINE search by investigator from 1966 through 1996 and Psychlit from 1974 through 1996 by author and key words; EMBASE from 1980 through 1985 and Biological Abstracts from 1985 through 1996; ISI from 1981 through 1996; Cochrane Controlled Trials Register from 1996 through 1998; match criteria not given
Data	95 RCT abstracts from 1204 abstracts of the Vth World Congress of Psychiatry

Diezel 1999 (Continued)

Comparisons	Anglophone abstract authors versus all others
Outcomes	44 abstracts published; 32/58 abstracts written by authors from Anglophone countries versus 12/37 abstracts written by authors from non-Anglophone countries published
Notes	psychiatry

Dirk 1996

Methods	questionnaire to author
Data	147 abstracts submitted by single anesthesiology department
Comparisons	
Outcomes	80 abstracts published; mean time to publication = 32.4 months
Notes	anesthesiology

Dudley 1978

Methods	search of Index Medicus by investigator by author and subject for the 3 years following the meeting
Data	51 abstracts, representing all presentations at the Surgical Research Society of Great Britain in 1972
Comparisons	
Outcomes	29 abstracts published
Notes	surgery

Elder 1994

Methods	search of MEDLINE and Health Planning and Administration abstracts system by trained librarian; match by author and title or 'same information'
Data	475 abstracts presented at the 1987 and 1988 North American Primary Care Research Group and Society for Teachers of Family Medicine meetings
Comparisons	
Outcomes	226 abstracts published; publication rate by time

Elder 1994 (Continued)

Notes	family medicine
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Eloubeidi 2001

Methods	search of Cancerlit, CINAHL, MEDLINE, Health Star, and Current Contents by trained librarian by first and senior author; matched by title, keywords, content, methodology and results
Data	461 abstracts presented at the American Society for Gastrointestinal Endoscopy in May 1994; 10 excluded because withdrawn (2) or from an electronic poster session (8)
Comparisons	'positive' results (defined as significant results) versus not 'positive' results; abstracts accepted for presentation versus those rejected; oral versus poster presentation; RCT design versus all other designs; 'prospective' versus 'retrospective' design; US vs non-US origin; multicenter vs single center
Outcomes	113 abstracts published; publication rate by time; mean time to publication = 20 months; median time to publication = 17.8 months; interquartile range for time to publication = 11.7 to 27.9 months; 36/98 'positive' versus 77/353 not 'positive' results published; 80/247 abstracts accepted for presentation versus 33/204 rejected abstracts published; 16/40 abstracts presented orally versus 64/207 abstracts presented as posters published; 14/41 abstracts with RCT design versus 99/410 abstracts with non-RCT design published; 64/216 abstracts with prospective study design versus 49/235 with retrospective design published; 81/350 abstracts originating from the U.S. versus 32/101 non U.S. published; 19/76 abstracts describing multicentered vs 94/376 single centered studies published
Notes	gastrointestinal endoscopy

Ensom 1998

Methods	search of MEDLINE by investigator through to March 1998 by authors, followed by author contact and hand search of Canadian Journal of Hospital Pharmacy from 1992 to "present"; match criteria not given
Data	363 abstracts presented at the Canadian Society of Hospital Pharmacists meetings; 11 'award winning' abstracts from the 1992 meeting; 56 abstracts from the 1993 meeting; 84 abstracts from the 1994 meeting; 105 abstracts from the 1995 meeting; and 107 abstracts from the 1996 meeting
Comparisons	
Outcomes	80 abstracts published ; mean time to publish = 11 months
Notes	hospital pharmacies; (award winning abstracts and those from 1996 meeting excluded by authors)

Evers 2000

Methods	search of the Cochrane database in February 2000; search of EMBASE and MEDLINE from year of meeting through February 2000; matched by all authors and content/subject matter; handsearch of two major journals
Data	151 RCT abstracts of 2691 abstracts presented at the 1992-1997 meetings of the European Society of Human Reproduction and Embryology
Comparisons	'positive' (defined as significant results) versus not 'positive' results; abstracts with sample size above the median versus abstracts with sample size below the median; oral versus poster presentation; abstracts originating from English language versus those from non-English language speaking countries
Outcomes	79 abstracts published; median time to publication = 32.5 months (range = 0 to 79 months); survival analysis showing proportion of abstracts published with 56% publication rate; 41/69 'positive' versus 38/82 not 'positive' abstract results published; 46/76 abstracts with sample size above the median versus 40/75 with sample size less than the median published; 50/72 abstracts presented orally versus 33/79 presented as posters published; 22/40 abstracts originating in English language country versus 62/111 from non-English language country published
Notes	human reproduction

Gavazza 1996

Methods	search of MEDLINE Plus by investigator from 1990 through 1995 by all authors; match by title, authors, methodology, results
Data	376 abstracts, from 397 presented at American Society for Surgery of the Hand meetings of 1990, 1991, and 1992; only partial agreement between a subsequent full publication and abstract was found for 21 abstracts, which were deleted from study population
Comparisons	clinical research versus basic science research
Outcomes	165 abstracts published; publication rate by time; 105/254 abstracts describing clinical research versus 18/32 describing basic research published (remaining 42/90 published abstracts derived from mixed sessions featuring presentations by fellows and residents)
Notes	hand surgery; author excluded 21/397 abstracts where the results of a published report appeared to match only partially the results included in the abstract

Goldman 1980

Methods	search of MEDLARS by investigator from November 1975 through June 1979 by first author; match by title, number of participants, data, experimental material
Data	276 abstracts: 69 abstracts representing all cardiology presentations and posters at the 1976 meetings of American Federation for Clinical Research, American Society for Clinical Investigation, and Association of American Physicians; 69 cardiology abstracts randomly selected from abstracts published but not presented; 69 abstracts from American Heart Association scientific sessions; and 69 abstracts from American College of Cardiology scientific sessions

Goldman 1980 (Continued)

Comparisons	abstracts accepted for presentation versus those rejected; clinical research versus basic science research (also included in Goldman 1982)
Outcomes	137 abstracts published; publication rate by time; median time to publication = 14 months; 113/207 abstracts accepted for presentation versus 24/69 rejected abstracts published
Notes	cardiology

Goldman 1982

Methods	search of MEDLARS by investigator from December 1975 through June 1979 by first author; match by title, number of participants, data, experimental material
Data	303 abstracts; 48 hematology and 53 nephrology abstracts representing all presentations and posters at the 1976 meetings of the American federation for Clinical Research, the American Society for Clinical Investigation, and the Association of American Physicians; random selection of 48 hematology and 53 nephrology abstracts not selected for presentation at these meetings; random selection of 48 hematology abstracts presented at the American Society of Hematology meeting in December 1975 and 53 nephrology abstracts presented at the November 1975 meeting of the American Society of Nephrology
Comparisons	abstracts accepted for presentation versus those rejected; clinical research versus basic science research
Outcomes	171 abstracts published; publication rate by time; median time to publication = 15 months; 127/202 abstracts accepted for presentation versus 44/101 rejected abstracts published; 116/254 abstracts describing clinical research versus 192/327 abstracts describing basic research published
Notes	hematology, nephrology

Gorman 1990

Methods	search of MEDLARS by investigator by first author, then subsequent authors; match by author, title, content
Data	269 abstracts presented at 1984 and 1986 American Association of Poison Control Centers, American Academy of Clinical Toxicologists, American Board of Medical Toxicologists, Canadian Association of Poison Control Centers meetings
Comparisons	
Outcomes	134 abstracts published; mean time to publication = 19 months for the meeting held in 1984 and 12 months for the meeting held in 1986; median time to publication = 12 months for the meeting held in 1984 and 9 months for the meeting held in 1986

Gorman 1990 (Continued)

Notes	toxicology
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Halpern 2002

Methods	search of Cochrane database, EMBASE, MEDLINE by investigator in April 2000 by first and senior author and keywords; search of personal files; match criteria not given
Data	145 abstracts related to obstetrical anesthesia presented at the 1994 and 1995 American Society of Anesthesiologists meetings
Comparisons	'positive' (defined as significant results) versus not 'positive' results; clinical research versus basic science research; RCT design versus all other designs; abstracts with peer-reviewed funding versus all others
Outcomes	51 abstracts published; mean time to publication = 28 months (standard deviation = 17); 29/83 'positive' versus 9/47 not 'positive' results published; 40/113 abstracts describing clinical research versus 11/32 abstracts describing basic science published; 21/47 abstracts with RCT design versus 30/98 with non-RCT design published; 9/51 abstracts with peer-reviewed funding versus 7/94 without peer-review funding published
Notes	obstetrical anesthesia; unpublished results; 9 full publications found and excluded, including 3 abstracts published at another meeting; 4 articles that did not match abstract content, although titles were similar; 1 which was a review of the abstract as published in another journal; and 1 abstract that was a description of the methodology subsequently used in another published manuscript

Hamlet 1997

Methods	search of Medvyl MEDLINE Plus by investigator from 1990 through 1996 for abstracts from 1990 and 1991 meeting and from 1992 through 1996 for abstracts from 1992 meeting by key words and author; match if "nearly identical to ... with regard to the experimental protocol and the number of patients"
Data	1465 abstracts presented at the 1990, 1991, and 1992 meetings of the American Academy of Orthopaedic Surgeons
Comparisons	clinical research versus basic research
Outcomes	668 abstracts published; publication rate by time; 650/1437 abstracts describing clinical research versus 18/28 abstracts describing basic science published
Notes	orthopedic surgery

Hashkes 2003

Methods	search of MEDLINE by investigator through to January 2002 by first, last and senior author and keywords; match criteria not given; also sent questionnaire to authors
Data	331 abstracts; 257 presented at the 1998 Fourth Park City Pediatric Rheumatology Meeting; 46 randomly selected from 92 abstracts presented at the 1991 Third Park City Pediatric Rheumatology Meeting; and 28 randomly selected from 55 abstracts presented at the Second Park City Pediatric Rheumatology Meeting
Comparisons	'positive' (not defined) versus not 'positive' results; clinical research versus basic science; North American vs European vs Other origin
Outcomes	134 abstracts published; median time to publication = 24 months; publication rate by time; 54/112 'positive' versus 38/145 not 'positive' abstract results published; 87/245 abstracts describing clinical research versus 5/12 abstracts describing basic science published; 49/135 abstracts originating from North America versus 26/58 from Europe versus 17/64 from rest of world published
Notes	rheumatology

Herron 1993

Methods	search of CIM and CINAHL by investigator by first and second authors from 1987 through June 1992; match criteria not given
Data	160 abstracts; 120 presented at the American Society of Parenteral and Enteral Nutrition meeting in 1990, and 40 presented at the Eastern Association of the Surgery of Trauma meeting in 1990; author also included 68 abstracts presented at the 1990 meetings of Association of Air Medical Services, National Flight Nurses Association, National Flight Paramedics Association, National EMS Pilots Association not included in this analysis, and 311 abstracts presented in 1987, 1988, 1989, and 1990 at American Transport conference meeting and previously reported on by Schwartz, 1992
Comparisons	
Outcomes	72 abstracts published
Notes	air medical services

Hopewell 2001

Methods	search of Cochrane Library, MEDLINE by investigator in January and June 2000 by each author; matched by authors, content
Data	91 abstracts: 30 presented at the First Symposium of Systematic Reviews in 1998; and 61 presented at the Third Cochrane Colloquium in 1995
Comparisons	
Outcomes	39 abstracts published; abstracts published at two time points

Hopewell 2001 (Continued)

Notes	methodology
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Hopewell 2003

Methods	search of Cochrane Library, PubMed by investigator to May 2002 by each author; matched by authors, content
Data	962 RCT abstracts published in Australian and New Zealand Journal of Medicine from 1980 to 2000 and originally presented at 17 different society meetings
Comparisons	
Outcomes	589 abstracts published; publication rate by time
Notes	general medicine

Jackson 2000

Methods	search of Melvyl MEDLINE Plus from 1988 through 1998 by investigator by first author and key words, then subsequent author; match by title, author and required identical or nearly identical match by number of participants, results and study design
Data	777 abstracts submitted for presentation at the 1991, 1992, 1993, 1994 meetings of Pediatric Orthopaedic Society of North America, of which 349 were accepted for presentation
Comparisons	accepted versus rejected abstracts
Outcomes	184 abstracts published; publication rate by time; median time to publication = 29 months 184/349 abstracts accepted for presentation versus 164/248 rejected abstracts published
Notes	pediatric orthopedics

Juzych 1991

Methods	search of MEDLARS by investigator from 1984 through July 1989 by first author; match by author, number of participants and data
Data	175 abstracts: 75 randomly selected from 275 abstracts presented at the 1984 American Academy of Ophthalmology meeting and 100 randomly selected from 1659 abstracts presented at the Association for Research in Vision and Ophthalmology meeting
Comparisons	oral versus poster presentation

Juzych 1991 (Continued)

Outcomes	105 abstracts published; publication rate by time; median time to publication = 13 months; mean time to publication for Association of Research in Vision and Ophthalmology = 19.4 months and median time to publication = 18 months; mean time to publication for American Academy of Ophthalmology meetings = 13 months and median time = 11 months; 63/88 abstracts presented orally versus 42/87 abstracts presented as posters published
Notes	vision

Juzych 1993

Methods	search of MEDLARS by investigator from 1984 through August 1992 by first author; match by author, subjects, experimental material or data
Data	327 abstracts randomly selected from 1693 abstracts presented at the 1985 Association for Research in Vision and Ophthalmology meeting; stratified by type of session
Comparisons	oral versus poster presentation; clinical research versus basic science
Outcomes	206 abstracts published; median time to publication = 17 months; mean time to publication = 19.7 months; 127/186 abstracts presented orally versus 79/141 abstracts presented as posters published; 71/126 abstracts describing clinical research versus 135/201 abstracts describing basic science published
Notes	vision

Kioff 2001

Methods	author contact only, completed in June 1996
Data	307 abstracts presented at the 1994 through 1996 meetings of the Royal Australasian College of Surgeons
Comparisons	'positive' (not defined) versus not 'positive' results; clinical research versus basic science; RCT design versus all other designs
Outcomes	165 abstracts published; 98/139 'positive' versus 76/159 not 'positive' abstract results published; 11/12 'positive' vs 4/8 not 'positive' RCT abstract results published; 121/249 abstracts describing clinical research versus 44/53 describing basic science published; 15/20 abstracts with RCT design versus 150/288 abstracts with non-RCT design published
Notes	surgery; 266 abstracts excluded because abstract author did not respond to survey

Klassen 2002

Methods	search of CINAHL, Cochrane CCTR, EMBASE, PubMed, Web of Science, Current Contents and HealthStar by trained librarian between February and July of 2000 by primary author and keywords; matched by author, keywords, and at least one common outcome
Data	447 RCT abstracts from all abstracts presented at the Society for Pediatric Research meetings; 95 RCT abstracts presented at the 1992 meeting; 109 at the 1993 meeting, 128 at the 1994 meeting, and 115 at the 1995 meeting; 16 abstracts subsequently excluded
Comparisons	'positive' (defined by direction of results) versus not 'positive' results
Outcomes	264 abstracts published; publication rate by time; 162/235 'positive' versus 93/187 not 'positive' abstract results published
Notes	pediatrics

Koene 1994

Methods	search of MEDLINE by investigator for 3 years before and 5 years after abstract was published in Nederlands Tijdschrift voor Geneeskunde; match by contents
Data	803 abstracts published in Nederlands Tijdschrift voor Geneeskunde from 1988 through January 1989 from 29 scientific sessions
Comparisons	
Outcomes	385 abstracts published
Notes	general medicine

Krzyzanowska 2003

Methods	author contact; search of MEDLINE, PubMed, EMBASE, and Cochrane Library by research assistant with library science background by first, second, and presenting author and then keywords to November 2001 except for Cochrane Library, which was searched in November, 2002; matched by content
Data	510 of 539 abstracts describing RCTs with sample sizes larger than 200 and presented at the 1989 - 1998 American Society of Clinical Oncology meetings
Comparisons	'positive' (defined two different ways: significant results and by direction of results) versus not 'positive' results; oral versus poster presentation; multicenter versus single center
Outcomes	415 abstracts published; median time to publication = 32.4 months; survival analysis of proportion published with 74% publication rate; survival analyses comparing publication rate of abstracts by significant or not significant results; 195/223 'positive' versus 220/287 not 'positive' abstract results published (where 'positive' is defined as significant results); 160/183 'positive' versus 255/327 not 'positive' abstract results published (where 'positive' is defined as experimental better than control); 232/278 abstracts presented orally versus 100/126 abstracts presented as posters published; 364/443 abstracts describing multicentered RCTs versus 51/67 abstracts describing single centered RCTs

Krzyzanowska 2003 (Continued)

	published
Notes	oncology

Landry 1996

Methods	search of MEDLINE by investigator from 1990 through 1994 by 'principal' author and subject; match by author, content
Data	168 abstracts of presentations at 1990 ABA meeting (abstracts from 54 posters were not included in author's analysis)
Comparisons	'positive' (defined as significant results) versus not 'positive' results; clinical versus basic research
Outcomes	44 abstracts published; 24/58 'positive' versus 20/110 not 'positive' abstract results published; 16/65 abstracts describing clinical research versus 15/63 describing basic research published
Notes	trauma/burn

Larian 2001

Methods	search of Melvyl MEDLINE Plus, PubMed by investigator through July 1999 by first author and keywords and subsequently other authors; matched by authors, keywords, content, methodology, results, research question, and sample size
Data	839 abstracts; 249 presented at the 1993 American Academy of Otolaryngology - Head and Neck Surgery meeting; 293 presented at the 1994 American Academy of Otolaryngology - Head and Neck Surgery meeting; and 297 presented at the 1995 American Academy of Otolaryngology - Head and Neck Surgery meeting
Comparisons	clinical research versus basic science
Outcomes	270 abstracts published; publication rate by time; 131/370 abstracts describing clinical research published versus 139/440 abstracts describing basic science published
Notes	otolaryngology, head and neck surgery

Levett 2000

Methods	search of MEDLINE for 'three year period'; person completing search not given; match criteria not given
Data	790 abstracts presented at the 1980 - 1990 Caribbean Health Research Council Annual meetings
Comparisons	oral versus poster presentations
Outcomes	263 abstracts published; 194/525 abstracts presented orally versus 69/265 abstracts presented as posters published

Levett 2000 (Continued)

Notes	health research
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Liu 1996

Methods	search of MEDLINE by investigator; match criteria not given
Data	400 abstracts, 100 randomly selected from each of 1992 meetings of American Heart Association, Federation of American Societies in Experimental Biology, American Gastroenterology Association, and American Academy of Neurology
Comparisons	
Outcomes	141 abstracts published; median time to publication = 22.8, 19.2, 26.4, and 22.8 months for meetings of the American Heart Association, Federation of American Societies in Experimental Biology, American Gastroenterology Association, and American Academy of Neurology, respectively
Notes	circulation, basic science, gastroenterology, neurology

Loevy 1997

Methods	search of MEDLINE by investigator by author; match if 'titles and/or the data were identical or very similar'
Data	189 abstracts presented at 1989 and 1990 American Academy of Pediatric Dentistry and American Association of Dental Research meetings
Comparisons	
Outcomes	87 abstracts published; publication rate by time
Notes	pediatric dentistry

Maleck 1998a

Methods	search of MEDLINE by investigator from 1993 to 1996 by first author; match by title and content
Data	98 abstracts presented at 1993 and 1994 Prehospital Care Research Forum meeting
Comparisons	oral versus poster presentation
Outcomes	10 abstracts published; 4/16 abstracts presented orally versus 3/34 abstracts presented as posters published
Notes	prehospital care

Maleck 1998b

Methods	search of MEDLINE by investigator from 1994 to 1998 by first author; match by title and content
Data	109 abstracts presented by 1994 Pan-European Conference on Emergency Medical Systems meeting
Comparisons	
Outcomes	11 abstracts published
Notes	emergency medicine

Marx 1999

Methods	search by MEDLINE by investigator from 1993 through 1997 by first author and major text word then senior author; match criteria not given
Data	527 abstracts presented at the 1993 American Society of Neuroradiologists and Radiological Society of North America meetings
Comparisons	abstracts with sample size above the median versus abstracts with sample size below the median; clinical research versus basic science research
Outcomes	194 abstracts published; publication rate by time; mean time to publication = 15 months; compared proportion of abstracts published with sample size above and below the mean by meeting but did not report actual numbers of abstracts; compared proportions of abstracts published describing clinical research versus basic science by meeting but did not report actual numbers
Notes	neuroradiology

Maxwell 1981

Methods	search of MEDLARS and International Nursing Literature by investigator by first, second author followed by telephone contact in March 1981, then contacted editors of major nursing journals for articles in press
Data	121 abstracts presented at the Oncology Nursing Society meetings; 23 presented at the 1977 meeting, 42 from the 1978 meeting, and 56 from the 1979 meeting; 106 abstracts from 1979 and 1980 meetings not included because less than two years of follow-up
Comparisons	
Outcomes	28 abstracts published
Notes	oncology nursing; authors presented work for an additional 106 abstracts followed for < 2 years and not included here

McCormick 1985

Methods	search of Index Medicus by investigator through June 1983 (for 1976 - 1980 meetings); search strategy not identified; match criteria not given
Data	1238 abstracts submitted for presentation: 371 submitted to the Ambulatory Pediatric Association, 1976-78; 347 to the Society for Pediatric Research within the American Pediatric Society, 1976-78; 194 to the Ambulatory Pediatric Association, 1979-80; 326 to the Society for Pediatric Research within the American Pediatric Society, 1979-80; 355 abstracts (from selected sessions) presented at above meetings: 100, 89, 86 and 80, respectively
Comparisons	accepted versus rejected abstracts
Outcomes	330 abstracts published; publication rate by time; 172/355 abstracts accepted for presentation versus 158/883 rejected abstracts published
Notes	pediatrics

Meranze 1982

Methods	search of MEDLARS by investigator 27 months after International Anesthesia Research Society meeting (included in this review) and 15 months after American Society of Anesthesiologists meeting (not included in this review) by any author; match by title, data, dates of study
Data	345 abstracts: 55 abstracts presented at 1979 International Anesthesia Research Society meeting and 324 presented at the 1978 American Society of Anesthesiologists meeting; did not include 62 abstracts from 1980 International Anesthesia Research Society meeting since less than two years of follow-up
Comparisons	
Outcomes	122 abstracts published; publication rate by time
Notes	anesthesiology

Morrison 1994

Methods	contact with author
Data	72 abstracts representing all presentations by residents from 1983 through 1991; deleted 11 abstracts presented in 1992 and with only 1 year of follow-up
Comparisons	clinical research versus basic science
Outcomes	52 abstracts published of all abstracts, but only 36 with more than 24 months follow-up; 32/48 abstracts describing clinical research versus 20/24 describing basic science published (data not included in analyses because included some abstracts with less than one year of follow-up)

Morrison 1994 (Continued)

Notes	obstetrics & gynecology; authors present work of 11 additional abstracts followed for < 2 years and not included here
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Murrey 1999

Methods	search of MEDLINE by investigator through 1997 by author; match criteria not given, but measured interobserver reliability for 2 searchers (95.1%)
Data	764 abstracts; 573 presented at 1993 American Academy of Orthopaedic Surgeons meeting; and 191 presented at the 1992 and 1993 Society for Surgical Oncology meetings
Comparisons	
Outcomes	377 abstracts published; publication rate by time
Notes	orthopedic surgery, surgical oncology

Nguyen 1998

Methods	search of MEDLINE by investigator from 1986 to June 1997 by key and text words; match by comparison of 'content and authors'; author contact
Data	490 abstracts of all paper presentations at Orthopaedic Trauma Association meetings from 1990 through 1995
Comparisons	
Outcomes	292 abstracts published; publication rate by time; mean time to publication = 16 months
Notes	orthopedic trauma; date of meeting not given, need to assume that meeting was on or before June 1995 and that follow-up was at least 2 years

Ohlsson 1999

Methods	search of the Cochrane Library, EMBASE, MEDLINE to March 1999; person completing search not given; matched by authors, title
Data	141 abstracts of neonatology RCTs presented at the 1993-1994 American Pediatric Society/ Society for Pediatric Research meetings
Comparisons	abstracts accepted for presentation versus those rejected
Outcomes	73 abstracts published; 62/107 abstracts accepted for presentation versus 11/34 rejected abstracts published

Ohlsson 1999 (Continued)

Notes	neonatology
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Payne 1999

Methods	search of MEDLINE and CINAHL by investigator; match criteria not given
Data	71 abstracts randomly selected from 710 abstracts presented at the 1992 meeting for European Association for Study of Diabetes, 1992 American Diabetes Association, 1990 Australian Diabetes Educators Association
Comparisons	
Outcomes	87 abstracts published
Notes	diabetes

Petticrew 1999

Methods	search of 'electronic databases' by investigator followed by contact with author if publication unclear; match criteria not given
Data	77 abstracts orally presented at the Society for Social Medicine in 1996
Comparisons	'positive' (defined by direction of results) versus not 'positive' results
Outcomes	39 abstracts published; 18/36 'positive' versus 21/41 not 'positive' abstract results published
Notes	social medicine

Riordan 2000

Methods	search of MEDLINE by investigator, followed by questionnaire to author, match criteria not given
Data	88 abstracts: 48 of 49 abstracts from plenary sessions presented at the 1996 spring and summer Pediatric Research Society meetings and 40 of 265 abstracts presented at the 1996 British Paediatric Association meeting
Comparisons	RCT design versus all other designs
Outcomes	55 abstracts published; 8/9 abstracts with RCT design versus 47/79 abstracts with non-RCT design published
Notes	pediatrics

Roy 2001

Methods	search of PubMed by investigator by author and keyword and then other authors; date of search not given; matched on authors, title, and content/subject matter
Data	660 abstracts presented at the 1978-1995 Otorhinolaryngological Research Society meetings
Comparisons	
Outcomes	456 abstracts published; mean time to publication = 22.5 months; publication rate by time
Notes	otorhinolaryngology

Sanders 2001

Methods	search of EMBASE and MEDLINE by first and senior authors and keywords; dates of search not given; author contact ; matched by content/subject matter
Data	255 abstracts presented at the 1994 British Society of Gastroenterology meeting
Comparisons	
Outcomes	178 abstracts published; median time to publication = 19 months (range = 0 to 66)
Notes	gastroenterology; letter

Scherer 1994

Methods	questionnaire to first, second, or last author; followed by search of MEDLINE from year of presentation through 1992 by first, second, or last author; match by author and content
Data	93 RCT (verified by author) abstracts from 6014 abstracts presented at the American Academy of Ophthalmology and Association for Research in Vision and Ophthalmology meetings for 1988 and 1989
Comparisons	'positive' (defined as significant results) versus not 'positive' results; abstracts with sample size above the median versus abstracts with sample size below the median; multicenter versus single center
Outcomes	61 abstracts published; publication rate by time; 33/46 'positive' versus 28/47 not 'positive' abstract results published; 31/43 abstracts with sample size equal or above the median versus 24/42 with sample size less than the median published; 14/19 abstracts describing multicentered vs 45/71 single centered RCTs published
Notes	vision

Schwartz 1992

Methods	search of Index Medicus by investigator by first authors and all issues of J Air Medical Transport followed by attempted telephone contact with authors
Data	312 abstracts presented at the 1987, 1988, 1989, and 1990 Association for Air Medical Services meetings
Comparisons	
Outcomes	56 abstracts published
Notes	air medical services

Seaton 1981

Methods	search of 'dsh' abstracts (2 years before to 8 years after presentation) and search of MEDLARS for abstracts for alaryngeal speech
Data	583 abstracts presented at the 1967 through 1976 American Speech-Language Hearing Association National Conventions
Comparisons	
Outcomes	174 abstracts published
Notes	stuttering, hearing aids, alaryngeal speech

Seaton 1983

Methods	questionnaire to author 14 months after presentation followed by second questionnaire 26 months after presentation
Data	625 of 696 abstracts presented at the 1978 American Speech-Language Hearing Association Convention (only 'usable questionnaires' included)
Comparisons	
Outcomes	202 abstracts published; median time to publication = 13 months
Notes	stuttering, hearing aids, alaryngeal speech

Stolk 2002

Methods	search of MEDLINE and International Pharmaceutical Abstracts to March 2001 by first author, then co-authors; matched by authors, research question, and sample size
Data	1216 abstracts presented at the International Conference on Pharmacoepidemiology meetings; 174 from the 1995 meeting, 218 from 1996 meeting, 240 from 1997 meeting, 315 from 1998 meeting, and 269 from 1999 meeting

Stolk 2002 (Continued)

Comparisons	oral versus poster presentations; North American vs European vs Other origin
Outcomes	319 abstracts published; 262 abstracts with more than 24 months follow-up published; 97/249 abstracts presented orally versus 222/967 abstracts presented as posters published; 102/408 abstracts originating from North America versus 183/596 from Europe versus 34/212 from the rest of the world published
Notes	pharmacoepidemiology

Timmer 2001a

Methods	search of MEDLINE to July 1999; person completing search not given; matched by first and last authors
Data	594 abstracts; 254 presented at the 1994-1995 American Pancreatic Association meetings and 340 presented at the 1995-1995 European Pancreatic Club meetings
Comparisons	clinical versus basic science; multicenter (defined as 3 or more centers) versus single centered (defined as 1 or 2 centers); RCT design versus all other designs; North American vs European vs Other origin
Outcomes	341 abstracts published; median time to publish = 36 months; publication rate by time; 126/232 abstracts describing clinical research versus 215/362 describing basic science published; 24/40 abstracts with RCT design versus 317/554 abstracts with non-RCT design published; 75/141 abstracts originating from North America versus 245/418 from Europe versus 21/35 from rest of world published; 43/82 abstracts describing multicentered vs 298/512 single centered studies published
Notes	pancreatology

Timmer 2002

Methods	search of the Cochrane Library, EMBASE, MEDLINE, Bios by first and last author; person completing search not given; match criteria not given
Data	863 of 1000 abstracts randomly selected by categories of basic science, controlled clinical trials, and other clinical research and presented at the 1992-1995 Digestive Diseases Week, combined meetings for American Gastroenterological Association, American Association for the Study of Liver Diseases, American Society for Gastrointestinal Endoscopy, and Surgical Society for the Alimentary Tract
Comparisons	'positive' (defined as significant results) versus not 'positive' results; abstracts with sample size above the median versus abstracts with sample size below the median; abstracts accepted for presentation versus those rejected; clinical research versus basic science; RCT design versus all other designs; 'high' versus 'low' quality; multicenter (defined as 3 or more centers) versus single centered (defined as 1 or 2 centers); North American vs European vs Other origin
Outcomes	392 abstracts published; median time to publish = 18 months; survival analysis comparing publication rate by study design; 177/354 'positive' versus 213/482 not 'positive' abstract results published; 181/377 abstracts with sample size above the median versus 142/330 abstracts with sample size below the median published; 292/541 abstracts accepted for presentation versus 98/288 rejected abstracts published; 310/662 abstracts describing clinical research versus 82/174 abstracts describing basic science published; 170/326 abstracts with RCT design versus 222/510 abstracts with non-RCT design published; 150/300 abstracts of 'high' quality versus 240/533 abstracts of 'low' quality published;

Timmer 2002 (Continued)

	36/46 multicentered studies versus 134/279 single centered studies published; 147/311 abstracts originating from North America versus 181/384 from Europe versus 62/141 from rest of world published; 36/46 abstracts describing multicentered vs 134/280 single centered controlled clinical trials published
Notes	gastroenterology

Todd 1997

Methods	search 5 years after presentation
Data	118 abstracts submitted to 1992 Southern Section Triological Society of which 53 were presented
Comparisons	abstracts accepted for presentation versus those rejected
Outcomes	43 abstracts published; 35/53 abstracts accepted for presentation versus 8/65 rejected abstracts published
Notes	otolaryngology

Vuckovic-Dekic 2001

Methods	author contact only
Data	63 abstracts by authors affiliated to Serbian institutions and responding to enquiry and presented at the First (1996) and Second (1998) Balkan Congress of Oncology meetings
Comparisons	oral versus poster presentation
Outcomes	42 abstracts published; 16/23 abstracts presented orally versus 26/40 abstracts presented as posters published
Notes	oncology

Walby 2001

Methods	search of PubMed up to December 2000 by presenting author and keywords; hand search of the journal Emergency Medicine through December 2000; match criteria not given
Data	207 abstracts presented at the 1995 through 1998 meetings of the Australasian College of Emergency Medicine and Australasian Society for Emergency Medicine; and the 1996 and 1998 meetings of the International Conference on Emergency Medicine
Comparisons	
Outcomes	73 abstracts published; mean time to publication = 12.6 months; median time to publication = 11 months

Walby 2001 (Continued)

Notes	emergency medicine
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Wang 1999

Methods	search Medline Plus by investigator from 1990 through 1997 by first author, then subsequent authors; match by author and content, title, protocol
Data	1186 abstracts from 1990, 1991, 1992 North American Spine Society, 1991, 1992, 1993 Scoliosis Research Society, and 1991, 1992, 1993 International Society for Study of the Lumbar Spine meetings
Comparisons	
Outcomes	516 abstracts published; publication rate by time
Notes	spine

Yentis 1993

Methods	search of MEDLINE by investigator for years 1985-1990 by first author; match by author and content
Data	215 abstracts; 114 randomly selected from 573 abstracts presented at the 1985 American Society of Anesthesiologists meeting; 39 randomly selected from 119 abstracts presented at the 1985 International Anesthesia Research Society meeting; 33 randomly selected from 99 abstracts presented at 1985 Anesthetic Research Society meeting; 29 randomly selected from 58 abstracts presented at the 1985 Canadian Anaesthesiologists' Society meeting
Comparisons	
Outcomes	108 abstracts published; publication rate by time
Notes	anesthesiology

Yoo 2002

Methods	search Medline Plus by investigator from 1990-1998 by first, then subsequent authors; matched by authors, title, and content
Data	166 abstracts presented at the 1991 through 1993 American Orthopaedic Society for Sports Medicine meetings and 167 abstracts from the 1991 through 1993 Arthroscopy Association of North America meetings
Comparisons	
Outcomes	188 abstracts published; publication rate by time

Yoo 2002 (Continued)

Notes	sports medicine
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Characteristics of excluded studies [ordered by study ID]

Study	Reason for exclusion
Agustsdottir 1995	authors looked at publication rate of submitted abstracts, not those presented at a meeting
Berger 2000	authors did not look at publication of abstracts, but only stated an opinion about subsequent publication of results first appearing in abstracts
Callahan 2001	author did not look at publication rate of abstracts, but examined the citations of studies first presented as abstracts and subsequently published
Cloft 2001	authors did not look at publication rate of abstracts, but examined rate of subsequent definitive publications of published preliminary reports defined by having the word 'preliminary' or 'pilot' in title
Collet 1997	no exact interval of follow-up reported, interval of < 24 months assumed
Duchini 1997	authors looked at publication rate of submitted abstracts, not those presented at a meeting
Garvey 1970	follow-up of only 1 year
Garvey 1971	inexact totals of 'technical reports' or abstracts given and only with approximate publication rates, e.g. 'We studied over 1,000 technical reports that were produced by psychologists in 1962 and found that the main content of one-third of these had been published in a scientific journal by 1965'
Gidding 1992	number of summary reports or abstracts presented and published not presented and not able to be calculated from report
Godkin 1993	number of summary reports or abstracts presented and published not presented and not able to be calculated from report
Huber 2001	follow-up of < 24 months for a part of the meetings, and we could not calculate length of follow-up from report for individual years, author contact unsuccessful
Koren 1986	number of summary reports or abstracts presented and published not presented and we could not calculate from report
Singer 1999	number of summary reports or abstracts presented and published not presented and we could not calculate from report
Timmer 2001b	number of summary reports or abstracts presented and published not presented and we could not calculate from report

DATA AND ANALYSES

Comparison 1. publication rate

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 publication rate for abstracts			Other data	No numeric data

Comparison 2. time to publication

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 cumulative percent publication by month			Other data	No numeric data
2 Mean or median time to publication			Other data	No numeric data

Comparison 3. 'positive' versus 'not positive' results

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 publication by 'positive' versus 'not positive' results	16	4562	Risk Ratio (M-H, Random, 95% CI)	1.28 [1.15, 1.42]
2 publication by 'positive' versus 'not positive,' defined by direction of results	7	1865	Risk Ratio (M-H, Random, 95% CI)	1.17 [1.02, 1.35]
3 publication by 'positive' versus 'not positive,' defined by 'positive' results in either direction	9	2953	Risk Ratio (M-H, Random, 95% CI)	1.30 [1.14, 1.47]
4 publication by 'positive' versus 'not positive results,' randomized or controlled clinical trials	8	2363	Risk Ratio (M-H, Random, 95% CI)	1.18 [1.07, 1.30]

Comparison 4. sample size

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 publication by sample size equal to or above vs below median/mean	7	2203	Risk Ratio (M-H, Random, 95% CI)	1.12 [0.98, 1.29]
2 publication by sample size equal to or above vs below median/mean, randomized or controlled clinical trials	5	1283	Risk Ratio (M-H, Random, 95% CI)	1.18 [1.05, 1.33]

Comparison 5. oral vs poster presentations

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 publication by oral versus poster presentations	12	4630	Risk Ratio (M-H, Random, 95% CI)	1.28 [1.09, 1.49]
2 publication by oral versus poster presentations, randomized or controlled clinical trials	2	555	Risk Ratio (M-H, Random, 95% CI)	1.30 [0.80, 2.09]

Comparison 6. accepted abstracts versus rejected abstracts

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 publication by acceptance versus rejection for presentation	11	4999	Risk Ratio (M-H, Random, 95% CI)	1.78 [1.50, 2.12]

Comparison 7. clinical versus basic research

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 publication by clinical research versus basic science	12	5587	Risk Ratio (M-H, Random, 95% CI)	0.79 [0.70, 0.89]

Comparison 8. randomized controlled trials versus other study designs

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 publication by randomized controlled trial versus other study designs	9	3556	Risk Ratio (M-H, Random, 95% CI)	1.24 [1.14, 1.36]

Comparison 9. higher vs lower quality

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 higher vs lower quality	3	1388	Risk Ratio (M-H, Random, 95% CI)	1.24 [0.97, 1.58]
2 higher vs lower quality, randomized or controlled clinical trials	2	232	Risk Ratio (M-H, Random, 95% CI)	1.30 [1.00, 1.71]

Comparison 10. multicentered vs single center

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 multicentered vs single center	5	1972	Risk Ratio (M-H, Random, 95% CI)	1.14 [0.91, 1.44]
2 multicentered vs single center, randomized or controlled clinical trials	3	926	Risk Ratio (M-H, Random, 95% CI)	1.27 [0.95, 1.70]

Comparison 11. English language vs non-English language

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 English language vs non-English language	2	246	Risk Ratio (M-H, Random, 95% CI)	1.25 [0.73, 2.14]

Comparison 12. North America vs Europe vs other origin

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 North America vs Europe	6	3313	Risk Ratio (M-H, Random, 95% CI)	0.94 [0.82, 1.08]
2 North America vs Other	6	1936	Risk Ratio (M-H, Random, 95% CI)	1.26 [0.93, 1.69]
3 Europe vs Other	6	2407	Risk Ratio (M-H, Random, 95% CI)	1.34 [0.92, 1.96]

Analysis 1.1. Comparison 1 publication rate, Outcome 1 publication rate for abstracts.

publication rate for abstracts

Study	sub-specialty	total abstracts	abstracts published	percent published	limited to RCTs
Arrive 1996	radiology	456	39	8.6	No
Bernstein 1983	gastroenterology	82 (presented) 177 (submitted)	56 (presented) 106 (submitted)	68.3 (presented) 59.9 (submitted)	No
Bhandari 2002	orthopedic surgery	456	231	50.7	No
Bird 1999	marine mammals	425	234	55.1	No
Boldt 1999	anesthesiology	566	233	41.2	No
Bowrey 1999	surgery	496	233	47.0	No
Byerly 2000	pharmacy	716	126	17.6	No
Callaham 1998	emergency medicine	179 (presented) 492 (submitted)	110 (presented) 214 (submitted)	61.5 (presented) 43.5 (submitted)	No
Castillo 2000	anesthesiology	491	84	17.1	No
Castillo 2002	anesthesiology	472	199	42.2	No
Chalmers 1990a	perinatology	176	64	36.4	Yes
Chan 2002	pediatrics	105	37	35.2	No
Cheng 1998	cystic fibrosis	178	not given	71.4	Yes
Ciesla 2001	cytopathology	257	116	45.1	No
Collet 1993	dental research	747	97	13.0	No
Corry 1990	dental research	275	63	22.9	No

publication rate for abstracts (Continued)

Craig 2001	orthopaedics	1005	495	49.3	No
Cromer 1998	adolescent medicine	128	58	45.3	No
Curry 2003	paediatric surgery	9	1	11.1	Yes
Daluiski 1998	orthopedic research	888	463	52.1	No
Davies 2002	paediatrics	172	78	45.3	No
De Bellefeuille 1992	oncology	81	63	77.8	No
Diezel 1999	psychiatry	95	44	56.3	Yes
Dirk 1996	anesthesiology	147	80	54.4	No
Dudley 1978	surgery	51	29	56.9	No
Elder 1994	family medicine	475	226	47.6	No
Eloubeidi 2001	gastrointestinal endoscopy	247 (presented) 461 (submitted)	80 (presented) 113 (submitted)	32.4 (presented) 24.5 (submitted)	No
Ensom 1998	hospital pharmacies	363	80	22.0	No
Evers 2000	human reproduction	151	79	52.3	Yes
Gavazza 1996	hand surgery	376	165	43.9	No
Goldman 1980	cardiology	207 (presented) 276 (submitted)	113 (presented) 137 (submitted)	54.6 (presented) 50.0 (submitted)	No
Goldman 1982	hematology, nephrology	202 (presented) 303 (submitted)	127 (presented) 171 (submitted)	62.9 (presented) 56.4 (submitted)	No
Gorman 1990	toxicology	269	134	49.8	No
Halpern 2002	obstetrical anesthesiology	145	51	35.2	No
Hamlet 1997	orthopedic surgery	1465	668	45.6	No
Hashkes 2003	rheumatology	331	134	40.5	No
Herron 1993	nutrition, emergency medicine	160	72	45.0	No

publication rate for abstracts (Continued)

Hopewell 2001	research methodology	91	39	42.8	No
Hopewell 2003	general medicine	962	589	61.2	Yes
Jackson 2000	pediatric orthopedics	349 (presented) 777 (submitted)	184 (presented) 348 (submitted)	52.7 (presented) 44.8 (submitted)	No
Juzych 1991	vision	175	105	60.0	No
Juzych 1993	vision	327	206	63.0	No
Kiroff 2001	surgery	307	165	53.7	No
Klassen 2002	pediatrics	447	264	59.1	Yes
Koene 1994	general medicine	803	385	47.9	No
Krzyzanowska 2003	oncology	510	415	81.3	Yes
Landry 1996	trauma, burn	168	44	26.2	No
Larian 2001	otolaryngology, head and neck surgery	839	270	32.1	No
Levett 2000	health research	790	263	33.3	No
Liu 1996	circulation, basic science, gastroenterology, neurology	400	141	35.3	No
Loevy 1997	pediatric dentistry	189	87	46.0	No
Maleck 1998a	prehospital care	98	10	10.2	No
Maleck 1998b	emergency medicine	109	11	10.1	No
Marx 1999	radioneurology	527	194	36.8	No
Maxwell 1981	oncology nursing	121	43	35.5	No
McCormick 1985	pediatrics	355 (presented) 1238 (submitted)	172 (presented) 330 (submitted)	48.5 (presented) 26.7 (submitted)	No

publication rate for abstracts (Continued)

Meranze 1982	anesthesiology	379	122	32.2	No
Morrison 1994	obstetrics and gynecology	72	36	50.0	No
Murrey 1999	orthopedic surgery and surgical oncology	764	377	49.3	No
Nguyen 1998	trauma	490	292	59.4	No
Ohlsson 1999	neonatology	107 (presented) 141 (submitted)	62 (presented) 73 (submitted)	57.9 (presented) 51.8 (submitted)	Yes
Payne 1999	diabetes mellitus	196	87	44.4	No
Petticrew 1999	social medicine	77	39	50.6	No
Riordan 2000	pediatrics	88	55	62.5	No
Roy 2001	otorhinology	660	456	69.1	No
Sanders 2001	gastroenterology	255	178	69.8	No
Scherer 1994	vision	93	61	65.6	Yes
Schwartz 1992	air medical services	312	56	17.7	No
Seaton 1981	speech	583	174	29.8	No
Seaton 1983	communication disorders	625	202	32.3	No
Stolk 2002	pharmacoepidemiology	1216	319	26.2	No
Timmer 2001a	pancreatology	594	341	57.1	No
Timmer 2002	gastroenterology	541 (presented) 863 (submitted)	292 (presented) 392 (submitted)	54.0 (presented) 45.4 (submitted)	No
Todd 1997	otolaryngology	53 (presented) 118 (submitted)	35 (presented) 43 (submitted)	66.0 (presented) 36.4 (submitted)	No
Vuckovic-Dekic 2001	oncology	63	42	66.7	No

publication rate for abstracts (Continued)

Walby 2001	emergency medicine	207	73	35.3	No
Wang 1999	spine	1186	516	43.5	No
Yentis 1993	anesthesiology	215	108	50.2	No
Yoo 2002	sports medicine	333	188	56.5	No

Analysis 2.1. Comparison 2 time to publication, Outcome 1 cumulative percent publication by month.
cumulative percent publication by month

Study	% pub- lished at 6 mo	% pub- lished at 12 mo	% pub- lished at 18 mo	% pub- lished at 24 mo	% pub- lished at 30 mo	% pub- lished at 36 mo	% pub- lished at 42 mo	% pub- lished at 48 mo	% pub- lished at 54 mo	% pub- lished at 60 mo
Arrive 1996		3.7		6.5		8.5				
Bhandari 2002	8.4 (8 months)		23.0 (20 months)		29.0 (32 months)		31.8 (44 months)			
Bird 1999		13		27		34		39		41
Boldt 1999		13.1		26.5		34.3		39.4		
Callahan 1998		16		30		38		41		
Castillo 2000	4		78		12		15		16	
Castillo 2002		10.6		25.2		33.5		39.6		41.5
Chalmers 1990a		23		30				36		
Cheng 1998		8		27						40
Ciesla 2001		16.0		21.8						
Collet 1993		5.1		8.0		11.1		11.9		12.4

cumulative percent publication by month (Continued)

Corry 1990	5			16		21	22	23		
Craig 2001	(5 months) 13. 4 (1980-84 meet-ings) 10. 4 (1990-94 meet-ings)	(11 months) 22.5 (1980-84 meet-ings) 17. 2 (1990-94 meet-ings)	(17 months) 28. 8 (1980-84 meet-ings) 24. 5 (1990-94 meet-ings)	(23 months) 38. 1 (1980-84 meet-ings) 31. 1 (1990-94 meet-ings)	(29 months) 41. 9 (1980-84 meet-ings) 36. 1 (1990-94 meet-ings)	(35 months) 45. 0 (1980-84 meet-ings) 39. 3 (1990-94 meet-ings)	(41 months) 47. 5 (1980-84 meet-ings) 41. 8 (1990-94 meet-ings)	(47 months) 50. 3 (1980-84 meet-ings) 42. 8 (1990-94 meet-ings)		(59 months) 52. 5 (1980-84 meet-ings) 44. 4 (1990-94 meet-ings)
Daluiski 1998		15		31		43		48		52
Davies 2002	4 (5 months)	12 (10 months)	26 (20 months)	31 (25 months)	38	42 (35 months)	42			
De Belle- feuille 1992	11		29		41		52		58	58
Elder 1994				30		35				
Eloubeidi 2001		6.7		16.2		22.8		25.1		
Evers 2000		17		35		48				53
Gavazza 1996	9	14	24	36	42	46				
Goldman 1980	5	19	30	40	46	49				
Goldman 1982	12	24	34	43	49	54				
Hamlet 1997	8	15	22	29	35	40	42	44	44	45
Hashkes 2003		7.8		20.2		29.2		33.8		36.2

cumulative percent publication by month (Continued)

Hopewell 2003				51.5				58.2		
Jackson 2000		10		23		33		40		44
Juzych 1991	10	20	40	49	53	55	56	58	60	
Klassen 2002	6.9	15.9	22.7	35.5	43.0	49.3	52.0	54.3	56.6	58.1
Krzyzanow: 2003	11.4	22.2	30.0	41.8	49.4	57.6	62.2	65.9	69.2	73.3
Larian 2001	5.0 (1993 meeting) 7.2 (1994 meeting) 5.0 (1995 meeting)	7.6 (1993 meeting) 13.0 (1994 meeting) 8.7(1995 meeting)	21.0 (1993 meeting) 19.9 (1994 meeting) 10.5 (1995 meeting)	24.6 (1993 meeting) 25.3 (1994 meeting) 19.5 (1995 meeting)	27.8 (1993 meeting) 28.2 (1994 meeting) 26.1 (1995 meeting)	30.0 (1993 meeting) 31.5 (1994 meeting) 31.5 (1995 meeting)	31.8 (1993 meeting) 33.8 (1994 meeting)	33.3 (1993 meeting) 35.0 (1994 meeting)		
Loevy 1997		12		27					48	
Mc- Cormick 1985	6	17	34	39	41	48				
Meranze 1982	5	17	28	32						
Murrey 1999		11		28		40		43		44
Nguyen 1998	12	24	36	45	50	55	56	58		59
Ohlsson 1999		19.9		33.3				46.8		51.8 (57 months)
Roy 2001		27.1		51.8		61.7		65.2		66.7
Sanders 2001	9.1	22.0	32.5	42.4	49.8	58.4	62.4	65.5	66.7	69.0

cumulative percent publication by month (Continued)

Scherer 1994	16	24	40	50	56	57	60	63		
Stolk 2002	5.6 (1995 meeting)	11.2 (1995 meeting)	18.4 (1995 meeting)	22.8 (1995 meeting)	26.4 (1995 meeting)	28.4 (1995 meeting)	29.9 (1995 meeting)	29.9 (1995 meeting)	29.9 (1995 meeting)	29.9 (1995 meeting)
	5.6 (1996 meeting)	11.2 (1996 meeting)	18.4 (1996 meeting)	22.4 (1996 meeting)	26.4 (1996 meeting)	28.4 (1996 meeting)	30.0 (1996 meeting)	30.0 (1996 meeting)	30.7 (1996 meeting)	30.7 (1996 meeting)
	5.6 (1997 meeting)	11.2 (1997 meeting)	18.4 (1997 meeting)	22.4 (1997 meeting)	26.4 (1997 meeting)	28.4 (1997 meeting)	30.0 (1997 meeting)	30.4 (1997 meeting)		
	1.6 (1998 meeting)	9.6 (1998 meeting)	16.4 (1998 meeting)	23.6 (1998 meeting)	25.6 (1998 meeting)	29.6 (1998 meeting)	30.0 (1998 meeting)	30.4 (1998 meeting)		
	4.0 (1999 meeting)	8.0 (1999 meeting)	14.0 (1999 meeting)	18.8 (1999 meeting)	20.8 (1999 meeting)	22.4 (1999 meeting)				
		8.4 (1999 meeting)	14.4 (1999 meeting)	21.2 (1999 meeting)						
Timmer 2001a		19.5		40.7				57.4		
Timmer 2002	9 (basic science)	19 (basic science)	27 (basic science)	32 (basic science)	38 (basic science)	41 (basic science)	43 (basic science)	46 (basic science)	46 (basic science)	48 (basic science)
	6 (con- trolled trials)	19 (con- trolled trials)	25 (con- trolled trials)	32 (con- trolled trials)	36 (con- trolled trials)	45 (con- trolled trials)	48 (con- trolled trials)	51 (con- trolled trials)	53 (con- trolled trials)	54 (con- trolled trials)
	5 (other clinical research)	11 (other clinical research)	17 (other clinical research)	24 (other clinical research)	30 (other clinical research)	36 (other clinical research)	37 (other clinical research)	38 (other clinical research)	39 (other clinical research)	40 (other clinical research)
Walby 2001				30.9				35.3		
Wang 1999		27		37		41		43		44
Yentis 1993	7		31		41		44		48	
Yoo 2002		14.5 (Ameri- can Or- thopaedic Society for Sports Medicine)		49.4 (Ameri- can Or- thopaedic Society for Sports Medicine)		57.8 (Ameri- can Or- thopaedic Society for Sports Medicine)		62.0 (Ameri- can Or- thopaedic Society for Sports Medicine)	66.9 (Ameri- can Or- thopaedic Society for Sports Medicine)	
		24.0		32.9						

cumulative percent publication by month (Continued)

	(Arthroscop Associ- ation of North America)	(Arthroscop Associ- ation of North America)	38.3 (Arthroscop Associ- ation of North America)	41.9 (Arthroscop Associ- ation of North America)	46.1 (Arthroscop Associ- ation of North America)
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Analysis 2.2. Comparison 2 time to publication, Outcome 2 Mean or median time to publication.

Mean or median time to publication

Study	Number abstracts	of	Mean in months	Standard Deviation	Median in months	Range
Bhandari 2002	465		17.6	12	14	1 to 56 months
Bowrey 1999	496				17	interquartile range (10.0 to 27.5 months)
Byerly 2000	501 (American Society of Health-System Pharmacists) 215 (American College of Clinical Pharmacy)				12.8 (American Society of Health-System Pharmacists) 14.9 (American College of Clinical Pharmacy)	not given
Callaham 1998	492		18	not given		
Castillo 2000	491		21.6			-2 to 6 years
Castillo 2002	472		16.8	15.6		25 to 60 months
Cheng 1998	178				18	derived from Kaplan Meier survival table
Ciesla 2001	257		15.8	not given		2 to 26 months
Craig 2001	320 (1980-1984 meetings) 685 (1990-1994 meetings)		21.4 (1980 -1984 meetings) 16.8 (1990 - 1994 meetings)	not given		
Daluiski 1998	296 (1991 meeting) 296 (1992 meeting) 296 (1993 meeting)				20 (1991 meeting) 23 (1992 meeting) 18 (1993 meeting)	not given

Mean or median time to publication (Continued)

Davies 2002	172			18	-36 to 41 months
De Bellefeuille 1992	81	22.8	not given		
Dirk 1996	147	32.4	not given		-12 to 96 months
Eloubeidi 2001	461	20	not given	17.8	interquartile range = 11.7 to 27.9 months
Evers 2000	151			32.5	0 to 79 months
Goldman 1980	276			14	not given
Goldman 1982	303			15	not given
Gorman 1990	103 (1984 meeting) 165 (1986 meeting)			12 (1984 meeting) 9 (1986 meeting)	not given
Halpern 2002	145	28	17		
Hashkes 2003	331			24	not given
Jackson 2000	349			29	not given
Juzych 1991	175	19.4 for Association for Research in Vision and Ophthalmology meeting 13.0 for American Academy of Ophthalmology meeting	not given	18 for Association for Research in Vision and Ophthalmology meeting 11 for American Academy of Ophthalmology 13 for both meetings	not given
Juzych 1993	327	19.7	not given	17	not given
Krzyzanowska 2003	510			32.4	not given
Liu 1996	100 (Circulation) 100 (FASEB) 100 (Gastroenterology) 100 (Neurology)	22.8 (Circulation) 19.2 (FASEB) 26.4 (Gastroenterology) 22.8 (Neurology)	9.6 months 10.8 months 10.8 months 10.8 months		
Marx 1999	527	15	not given		
Nguyen 1998	490	16	not given		

Mean or median time to publication (Continued)

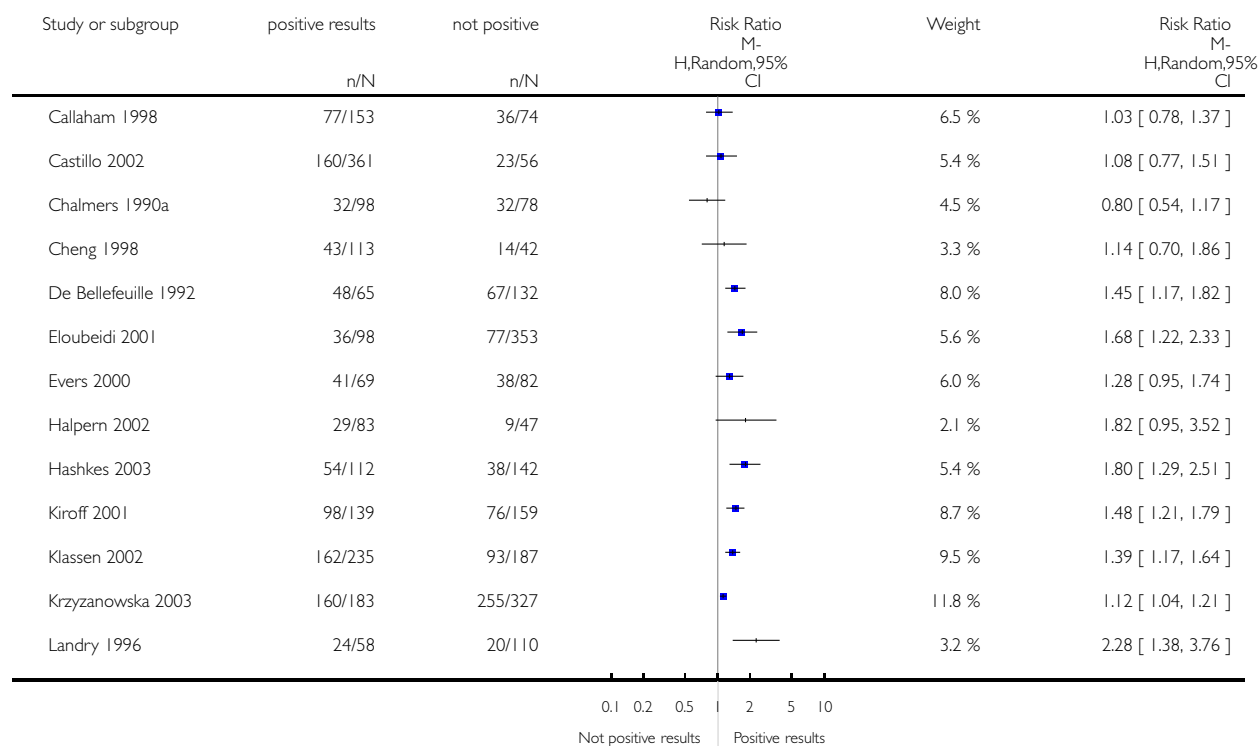
Roy 2001	660	22.5	not given		-5 to 9 years
Sanders 2001	255			19	0 to 66 months
Seaton 1983	625			13	not given
Timmer 2001a	594			36	not given
Timmer 2002	863			18	not given
Walby 2001	207	12.6		11	not given

Analysis 3.1. Comparison 3 'positive' versus 'not positive' results, Outcome 1 publication by 'positive' versus 'not positive' results.

Review: Full publication of results initially presented in abstracts

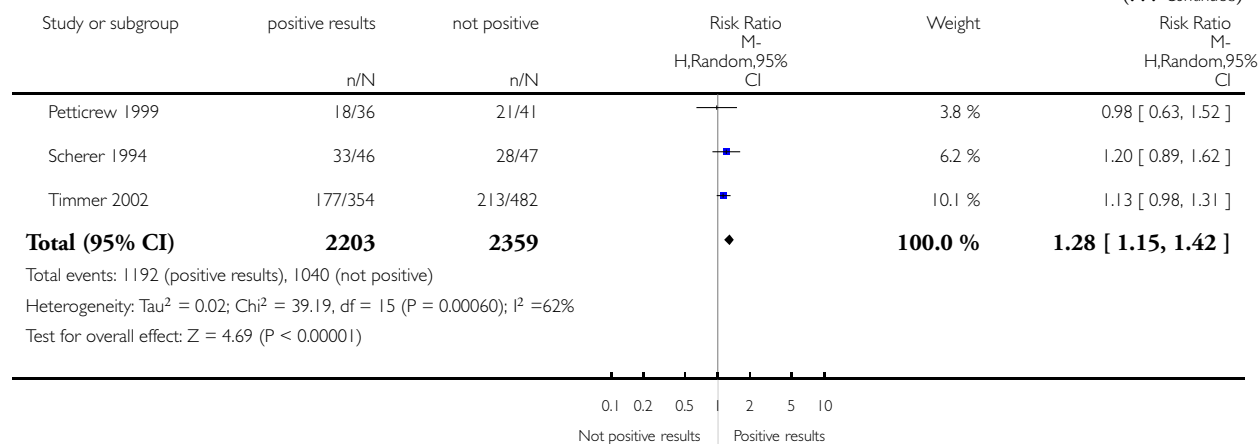
Comparison: 3 'positive' versus 'not positive' results

Outcome: 1 publication by 'positive' versus 'not positive' results



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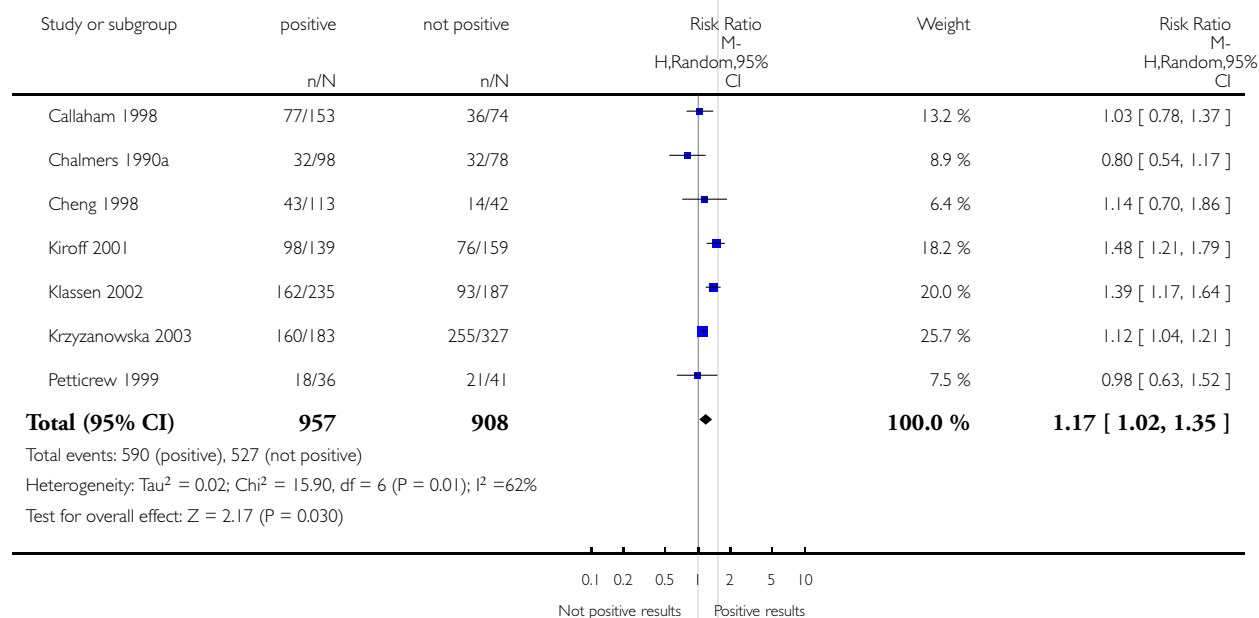


Analysis 3.2. Comparison 3 'positive' versus 'not positive' results, Outcome 2 publication by 'positive' versus 'not positive,' defined by direction of results.

Review: Full publication of results initially presented in abstracts

Comparison: 3 'positive' versus 'not positive' results

Outcome: 2 publication by 'positive' versus 'not positive,' defined by direction of results

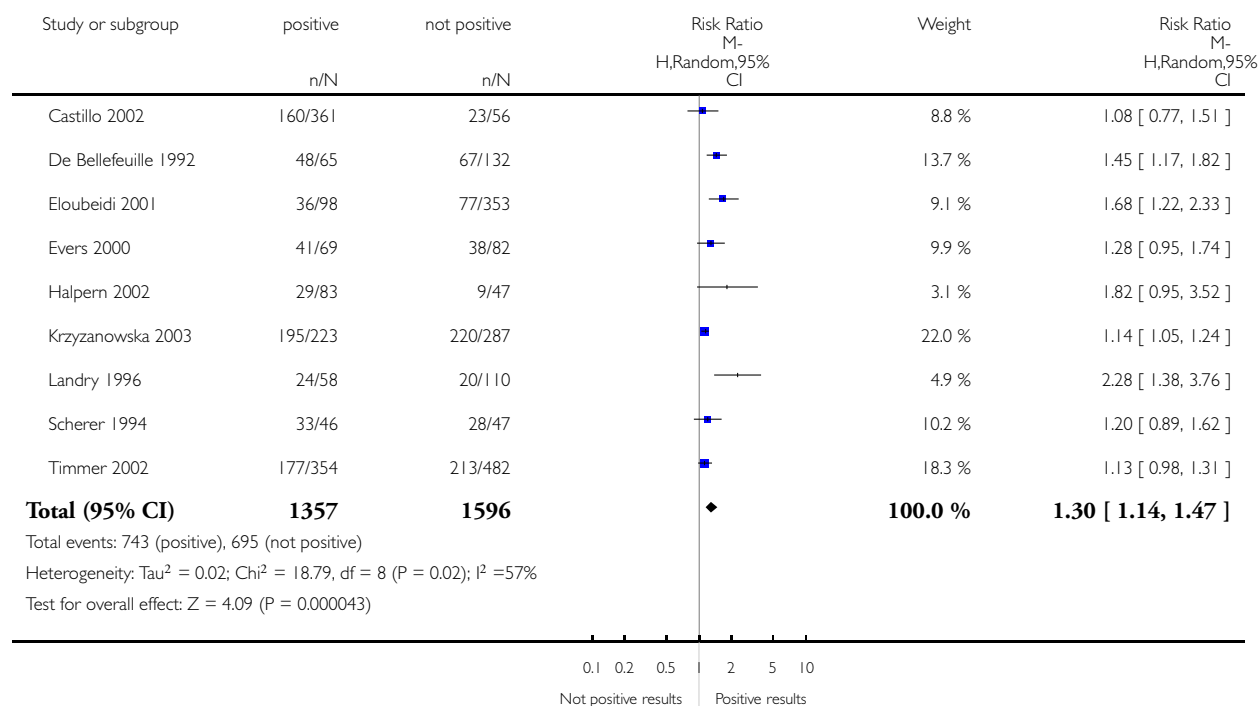


Analysis 3.3. Comparison 3 'positive' versus 'not positive' results, Outcome 3 publication by 'positive' versus 'not positive,' defined by 'positive' results in either direction.

Review: Full publication of results initially presented in abstracts

Comparison: 3 'positive' versus 'not positive' results

Outcome: 3 publication by 'positive' versus 'not positive,' defined by 'positive' results in either direction

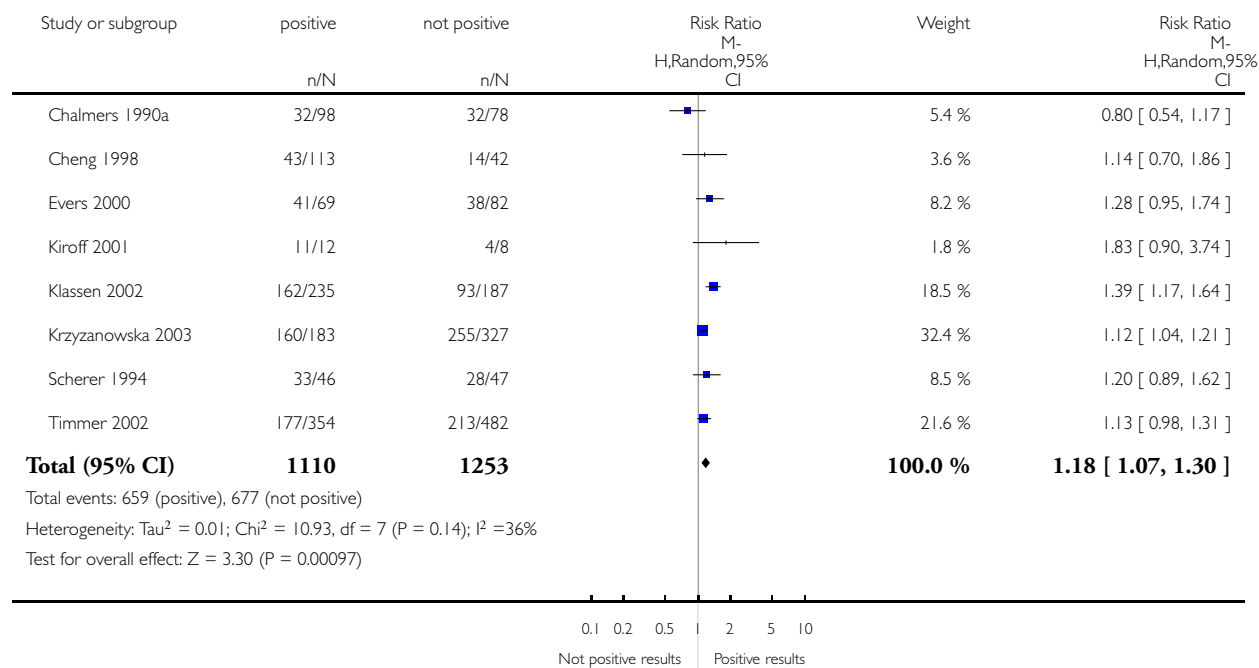


Analysis 3.4. Comparison 3 'positive' versus 'not positive' results, Outcome 4 publication by 'positive' versus 'not positive results,' randomized or controlled clinical trials.

Review: Full publication of results initially presented in abstracts

Comparison: 3 'positive' versus 'not positive' results

Outcome: 4 publication by 'positive' versus 'not positive results,' randomized or controlled clinical trials

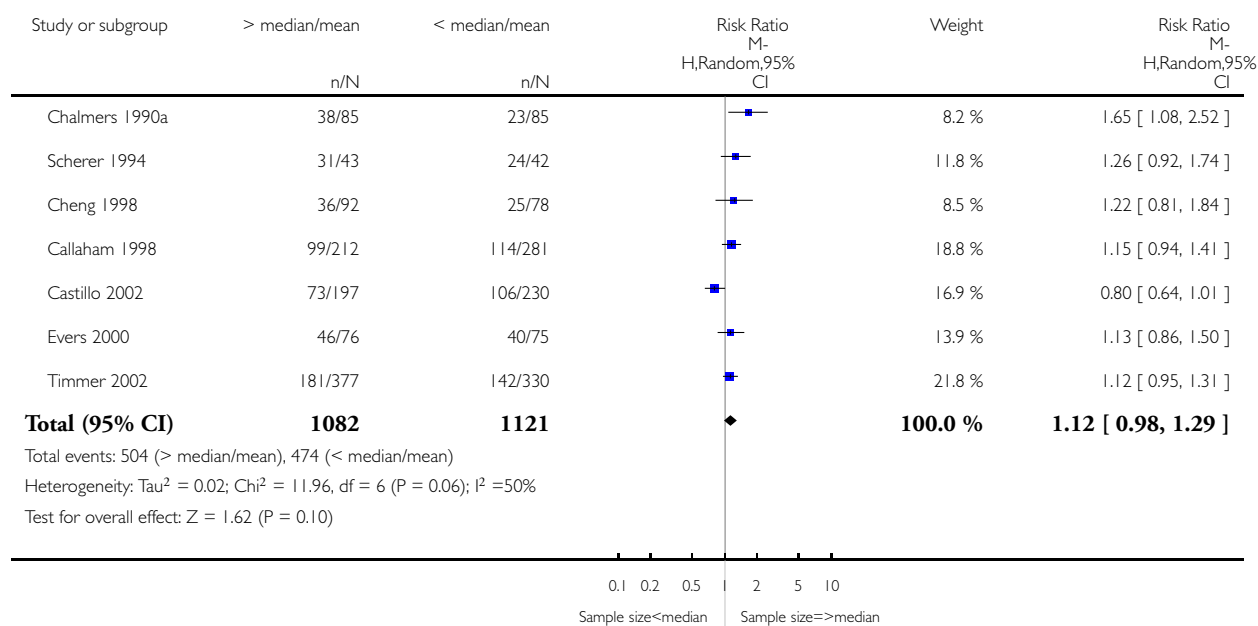


Analysis 4.1. Comparison 4 sample size, Outcome 1 publication by sample size equal to or above vs below median/mean.

Review: Full publication of results initially presented in abstracts

Comparison: 4 sample size

Outcome: 1 publication by sample size equal to or above vs below median/mean

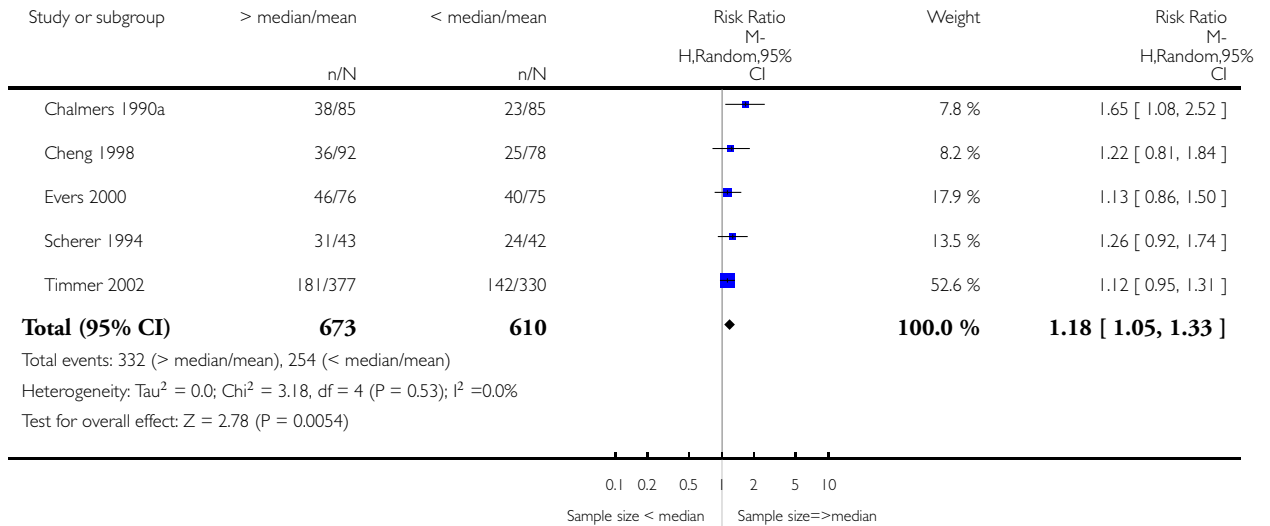


Analysis 4.2. Comparison 4 sample size, Outcome 2 publication by sample size equal to or above vs below median/mean, randomized or controlled clinical trials.

Review: Full publication of results initially presented in abstracts

Comparison: 4 sample size

Outcome: 2 publication by sample size equal to or above vs below median/mean, randomized or controlled clinical trials

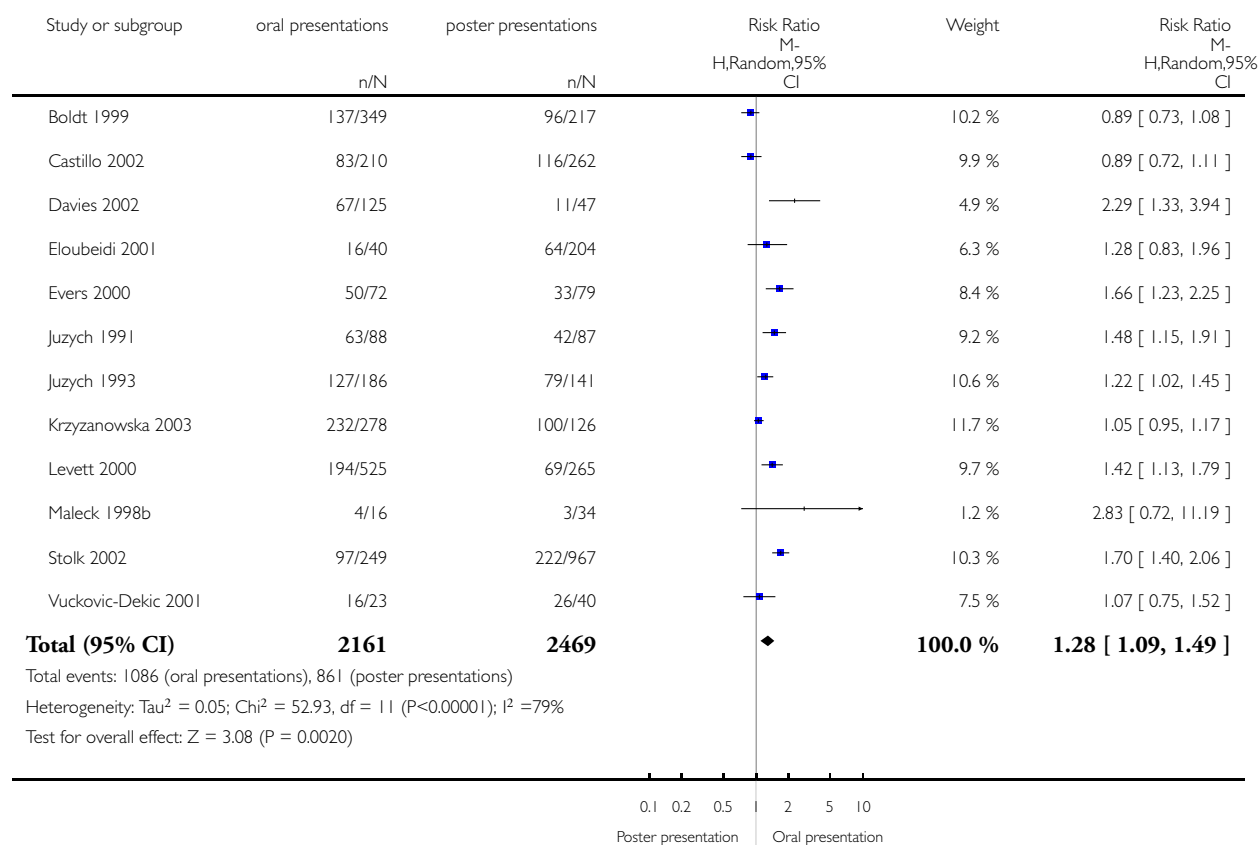


Analysis 5.1. Comparison 5 oral vs poster presentations, Outcome 1 publication by oral versus poster presentations.

Review: Full publication of results initially presented in abstracts

Comparison: 5 oral vs poster presentations

Outcome: 1 publication by oral versus poster presentations

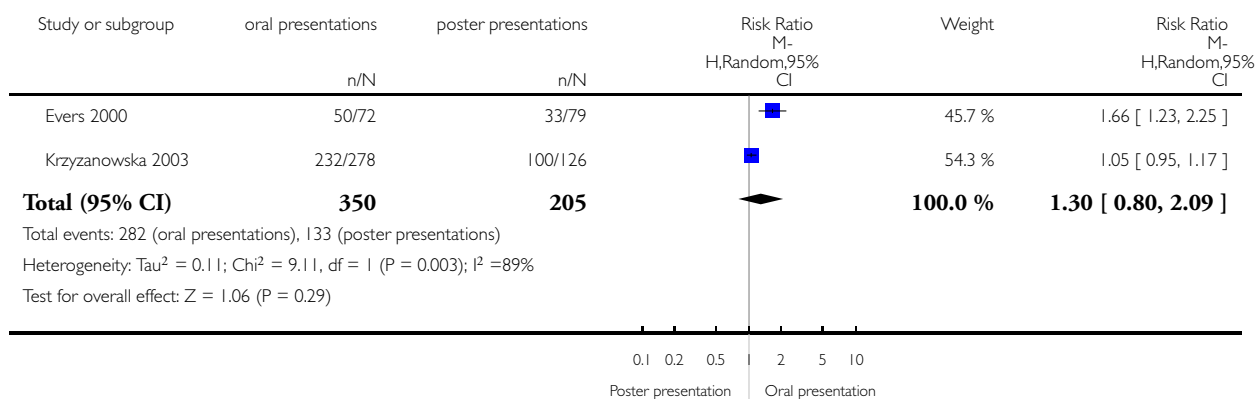


Analysis 5.2. Comparison 5 oral vs poster presentations, Outcome 2 publication by oral versus poster presentations, randomized or controlled clinical trials.

Review: Full publication of results initially presented in abstracts

Comparison: 5 oral vs poster presentations

Outcome: 2 publication by oral versus poster presentations, randomized or controlled clinical trials

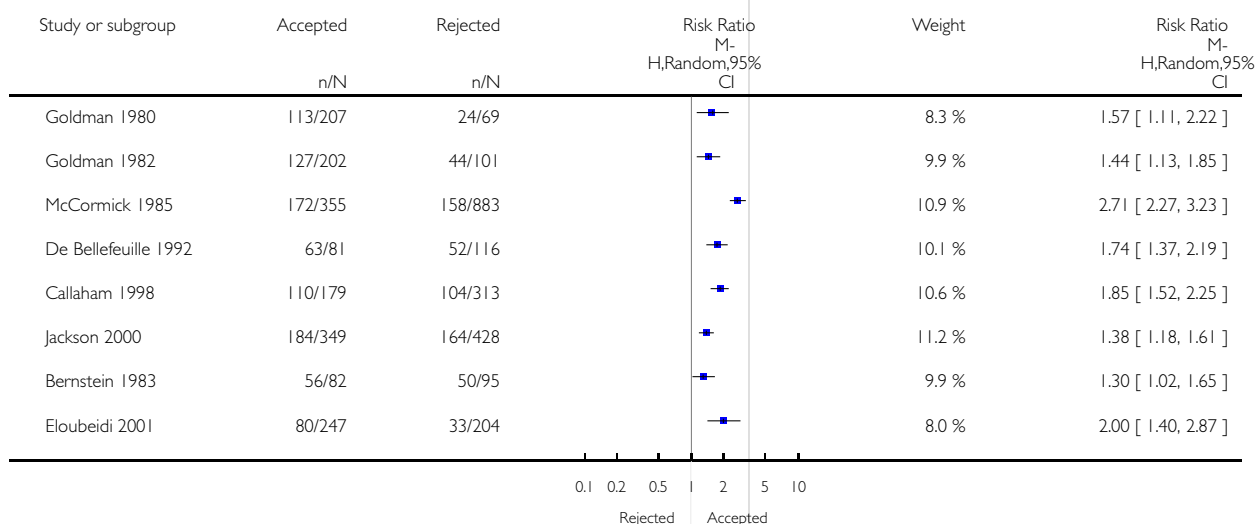


Analysis 6.1. Comparison 6 accepted abstracts versus rejected abstracts, Outcome 1 publication by acceptance versus rejection for presentation.

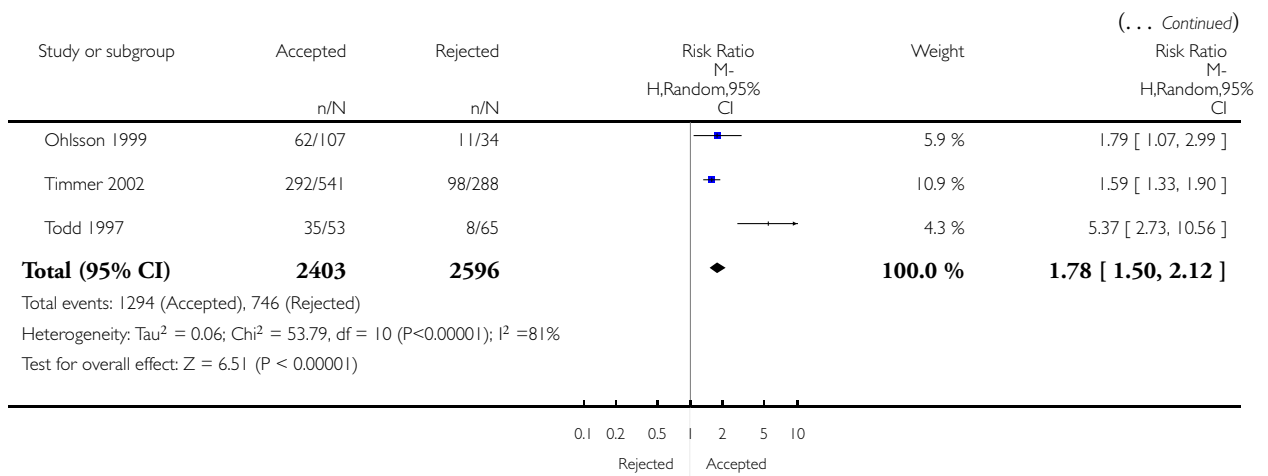
Review: Full publication of results initially presented in abstracts

Comparison: 6 accepted abstracts versus rejected abstracts

Outcome: 1 publication by acceptance versus rejection for presentation

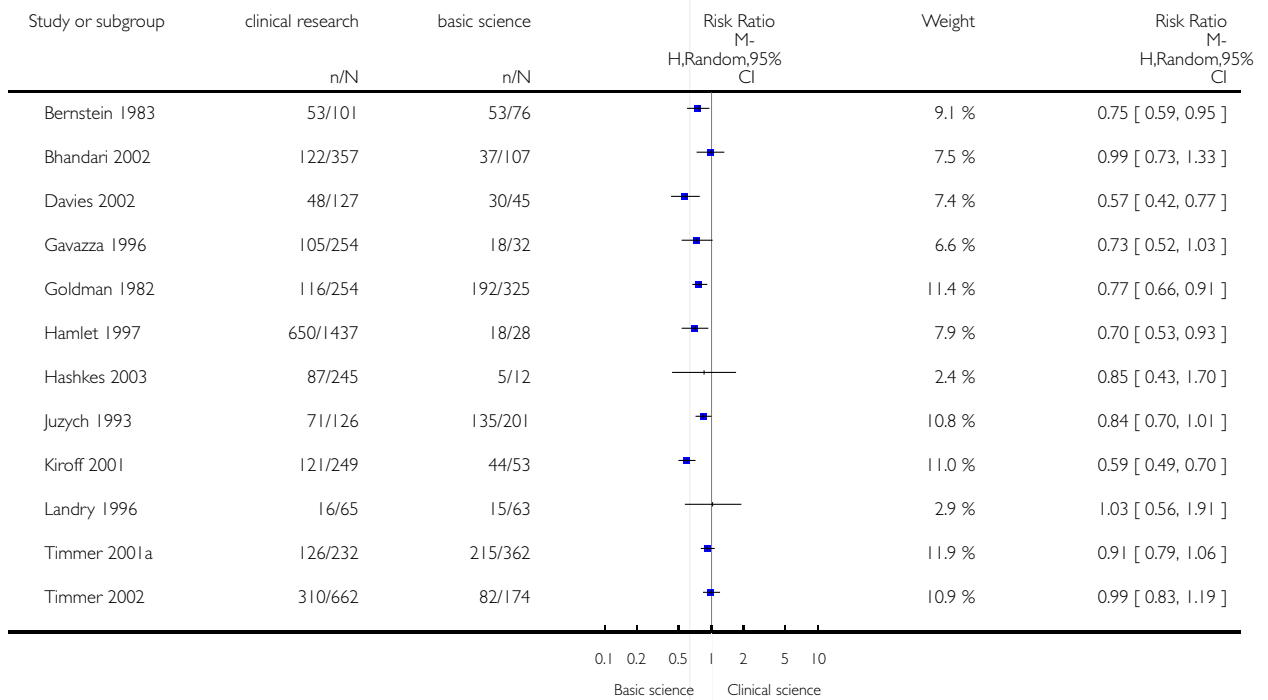


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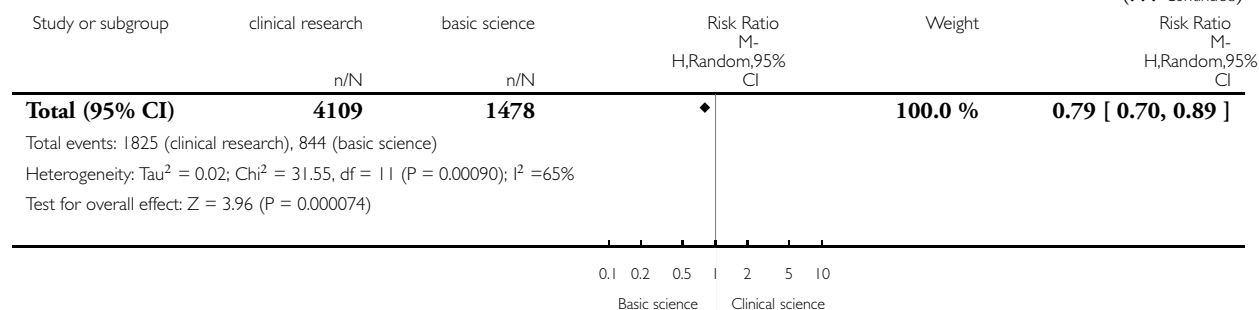
Analysis 7.1. Comparison 7 clinical versus basic research, Outcome 1 publication by clinical research versus basic science.

Review: Full publication of results initially presented in abstracts
Comparison: 7 clinical versus basic research
Outcome: 1 publication by clinical research versus basic science



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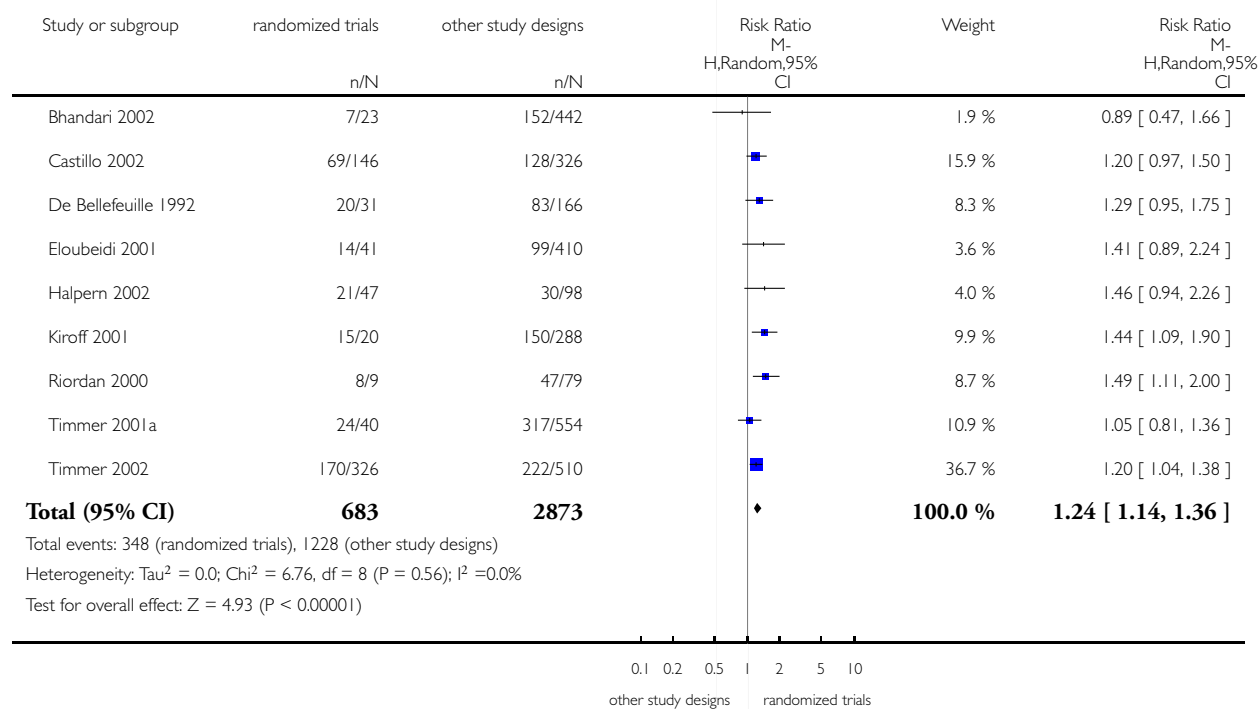


Analysis 8.1. Comparison 8 randomized controlled trials versus other study designs, Outcome 1 publication by randomized controlled trial versus other study designs.

Review: Full publication of results initially presented in abstracts

Comparison: 8 randomized controlled trials versus other study designs

Outcome: 1 publication by randomized controlled trial versus other study designs

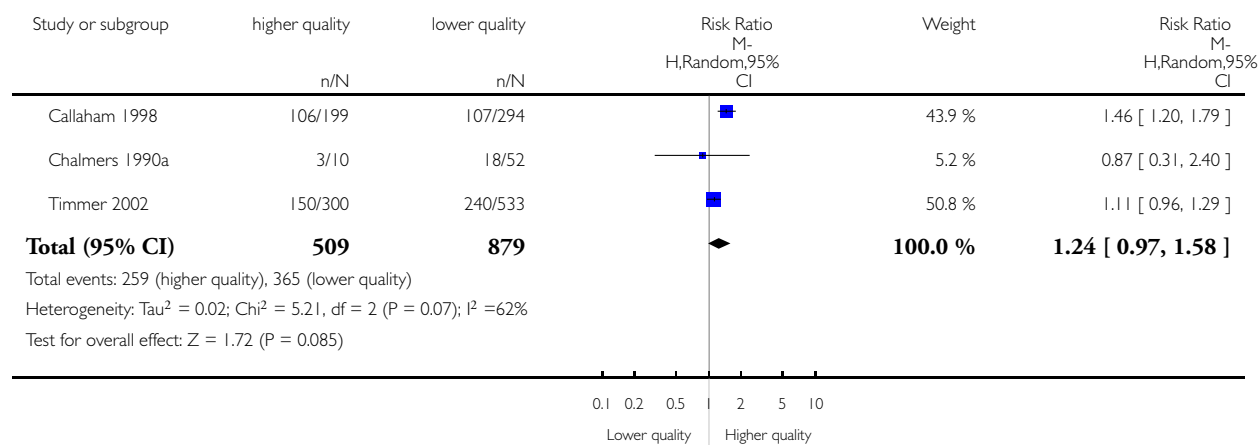


Analysis 9.1. Comparison 9 higher vs lower quality, Outcome 1 higher vs lower quality.

Review: Full publication of results initially presented in abstracts

Comparison: 9 higher vs lower quality

Outcome: 1 higher vs lower quality

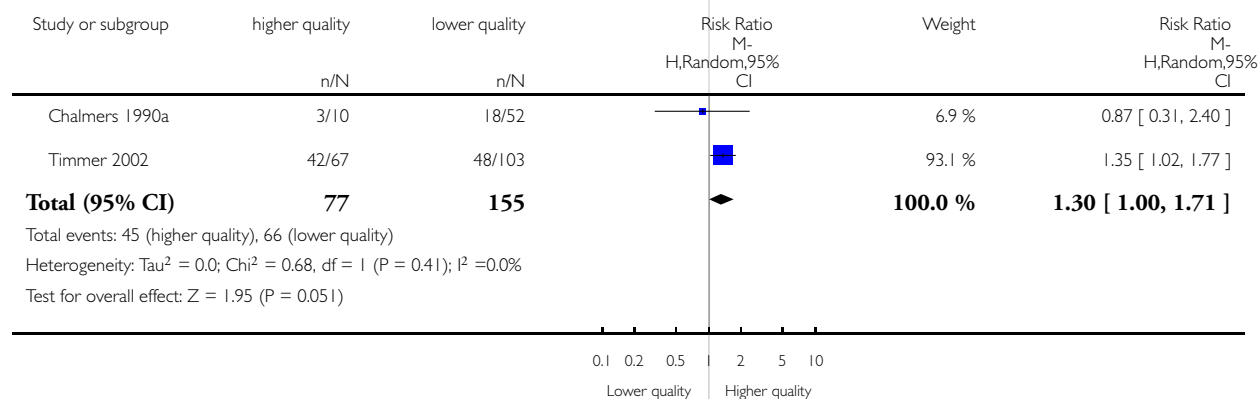


Analysis 9.2. Comparison 9 higher vs lower quality, Outcome 2 higher vs lower quality, randomized or controlled clinical trials.

Review: Full publication of results initially presented in abstracts

Comparison: 9 higher vs lower quality

Outcome: 2 higher vs lower quality, randomized or controlled clinical trials

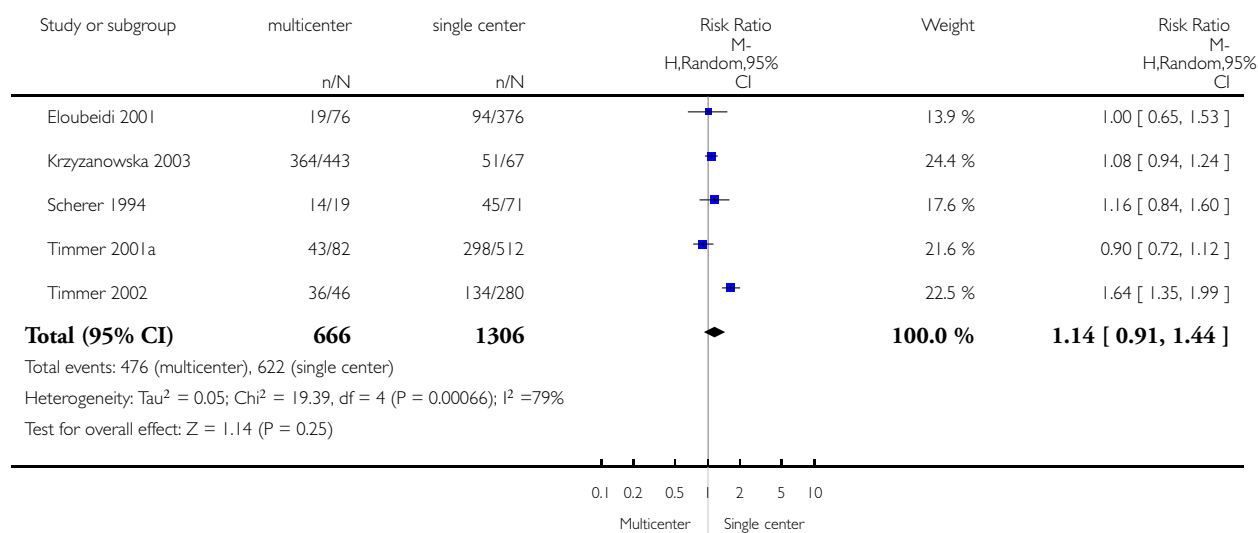


Analysis 10.1. Comparison 10 multicentered vs single center, Outcome 1 multicentered vs single center.

Review: Full publication of results initially presented in abstracts

Comparison: 10 multicentered vs single center

Outcome: 1 multicentered vs single center

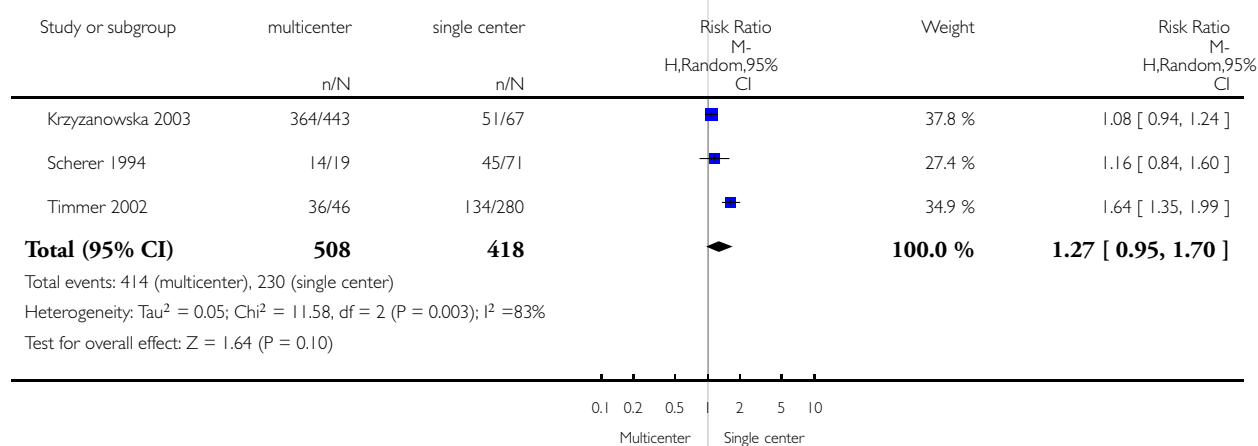


Analysis 10.2. Comparison 10 multicentered vs single center, Outcome 2 multicentered vs single center, randomized or controlled clinical trials.

Review: Full publication of results initially presented in abstracts

Comparison: 10 multicentered vs single center

Outcome: 2 multicentered vs single center, randomized or controlled clinical trials

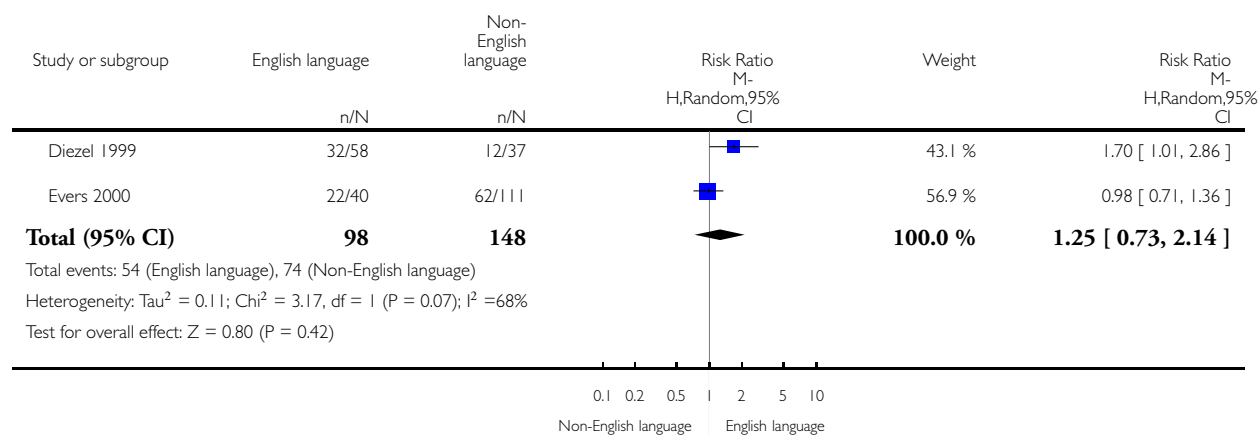


Analysis 11.1. Comparison 11 English language vs non-English language, Outcome 1 English language vs non-English language.

Review: Full publication of results initially presented in abstracts

Comparison: 11 English language vs non-English language

Outcome: 1 English language vs non-English language

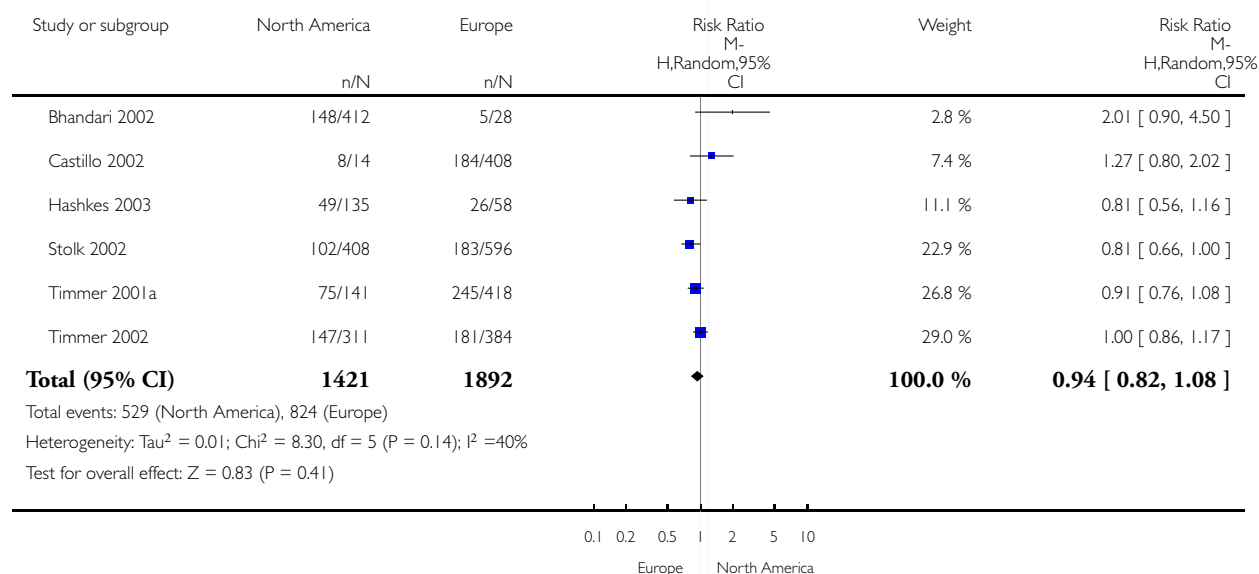


Analysis 12.1. Comparison 12 North America vs Europe vs other origin, Outcome 1 North America vs Europe.

Review: Full publication of results initially presented in abstracts

Comparison: 12 North America vs Europe vs other origin

Outcome: 1 North America vs Europe

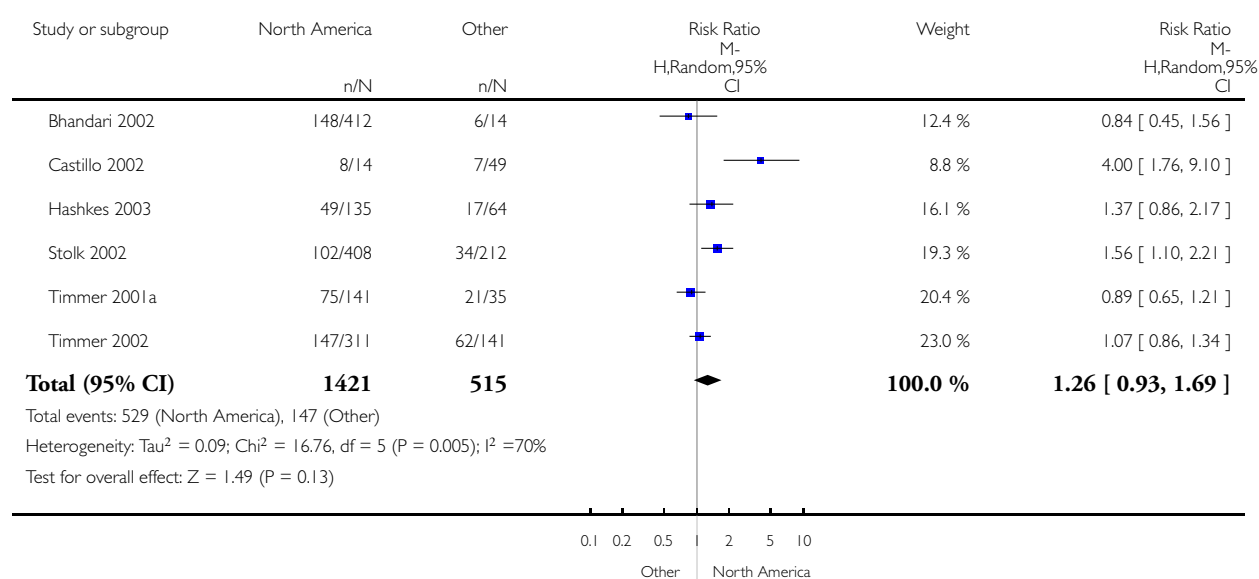


Analysis 12.2. Comparison 12 North America vs Europe vs other origin, Outcome 2 North America vs Other.

Review: Full publication of results initially presented in abstracts

Comparison: 12 North America vs Europe vs other origin

Outcome: 2 North America vs Other

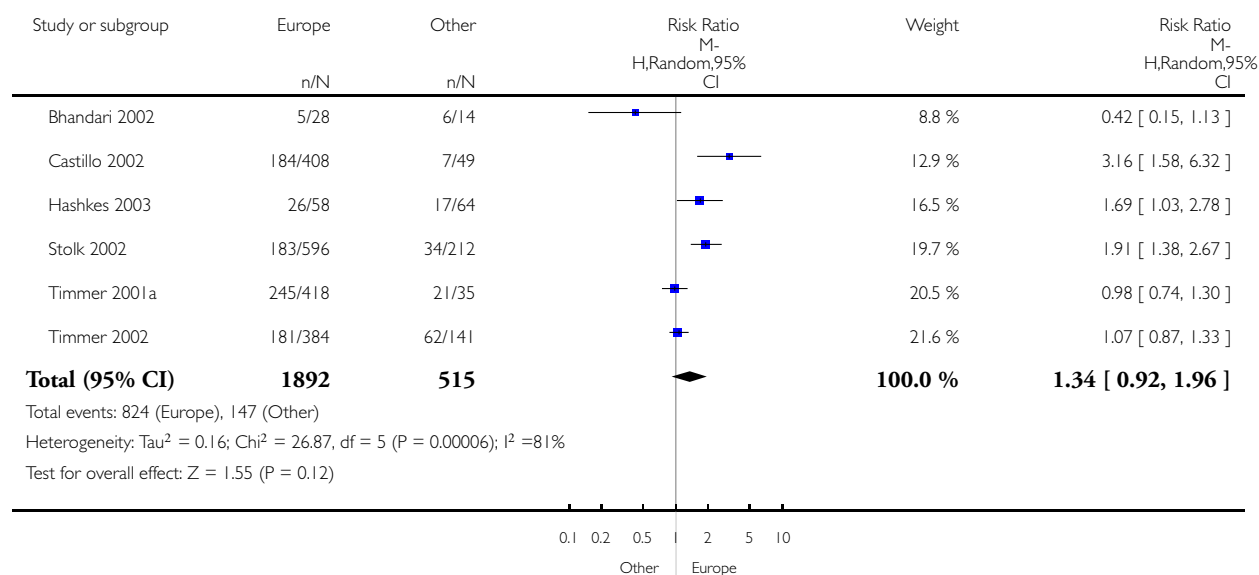


Analysis 12.3. Comparison 12 North America vs Europe vs other origin, Outcome 3 Europe vs Other.

Review: Full publication of results initially presented in abstracts

Comparison: 12 North America vs Europe vs other origin

Outcome: 3 Europe vs Other



APPENDICES

Appendix I. MEDLINE search strategy

MEDLINE using Ovid (June 15, 2003):

1. abstract?.tw.
2. paper?.tw.
3. ((summary or preliminary or pilot) adj (report? or article? or paper? or study or studies or data)).tw.
4. (presented or presentation?).tw.
5. or/1-4
6. Publishing/
7. (publish or published).tw.
8. ((full or complete) adj1 (report? or article? or paper? or study or studies?)).tw.
9. Manuscripts, Medical/
10. manuscript?.tw.
11. Periodicals/
12. Publications/
13. "Abstracting and Indexing"/
14. Peer Review/
15. Peer Review, Research/
16. peer review\$.tw.

17. Publication Bias/
18. or/6-17
19. Congresses/
20. congress\$.tw.
21. conference?.tw.
22. meeting?.tw.
23. Societies, Medical/
24. Societies, Nursing/
25. Societies, Dental/
26. Societies, Scientific/
27. society.tw.
28. societies.tw.
29. Research/
30. or/19-29
32. 5 and 18 and 30

Appendix 2. EMBASE search strategy

EMBASE (June 2003):

1. Abstract Report/
2. abstract?.tw.
3. paper?.tw.4. ((summary or preliminary or pilot) adj (report? or article? or paper? or study or studies or data)).tw.
5. Pilot Study/
6. (presented or presentation?).tw.
7. or/1-6
8. Publishing/
9. (publish or published).tw.
10. ((full or complete) adj1 (report? or article? or paper? or study or studies)).tw.
11. Publication/
12. publication?.tw.
13. Medical Literature/
14. manuscript?.tw.
15. Peer Review/
16. peer review\$.tw.
17. publication bias.tw.
18. or/8-17
19. Organization/
20. Symposium/
21. congress\$.tw.
22. conference?.tw.
23. meeting?.tw.
24. Medical Society/
25. society.tw.
26. societies.tw.
27. Research/
28. Medical Research/
29. or/19-28
30. 7 and 18 and 29

Appendix 3. Cochrane Methodology Register search strategy

Cochrane Methodology Register (Issue 2, 2003):

1. abstract*
2. paper*
3. summary report* or summary article or summary articles or summary paper* or summary study or summary studies or preliminary report* or preliminary article or preliminary articles or preliminary paper* or preliminary study or preliminary studies or preliminary data or pilot report* or pilot article or pilot articles or pilot paper* or pilot study or pilot studies
4. presented or presentation*
5. #1 or #2 or #3 or #4
6. publish or published
7. full near report* or full near article or full near articles or full near paper* or full study or full studies or complete near report* or complete near article or complete near articles or complete near paper* or complete near study or complete near studies
8. manuscript*
9. peer review*
10. publication bias
11. #6 or #7 or #8 or #9 or #10
12. congress* or conference* or meeting* or society or societies
13. #5 and #11 and #12

Appendix 4. The Cochrane Library search strategy

The Cochrane Library (Issue 2, 2003):

1. abstract*
2. paper*
3. summary report* or summary article or summary articles or summary paper* or summary study or summary studies or preliminary report* or preliminary article or preliminary articles or preliminary paper* or preliminary study or preliminary studies or preliminary data or pilot report* or pilot article or pilot articles or pilot paper* or pilot study or pilot studies
4. presented or presentation*
5. PUBLISHING single term (MeSH)
6. publish or published
7. full near report* or full near article or full near articles or full near paper* or full study or full studies or complete near report* or complete near article or complete near articles or complete near paper* or complete near study or complete near studies
8. MANUSCRIPTS MEDICAL single term (MeSH)
9. manuscript*
10. PERIODICALS single term (MeSH)
11. PUBLICATIONS single term (MeSH)
12. ABSTRACTING AND INDEXING single term (MeSH)
13. PEER REVIEW single term (MeSH)
14. PEER REVIEW RESEARCH single term (MeSH)
15. peer review*
16. PUBLICATION BIAS single term (MeSH)
17. CONGRESSES single term (MeSH)
18. congress* or conference* or meeting* or society or societies
19. SOCIETIES MEDICAL single term (MeSH)
20. SOCIETIES NURSING single term (MeSH)
21. SOCIETIES DENTAL single term (MeSH)
22. SOCIETIES SCIENTIFIC single term (MeSH)
23. #1 or #2 or #3 or #4
24. #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16
25. #17 or #18 or #19 or #20 or #21 or #22
26. #23 and #24 and #25

WHAT'S NEW

Last assessed as up-to-date: 19 February 2007.

Date	Event	Description
27 December 2007	Amended	Converted to new review format.

HISTORY

Protocol first published: Issue 2, 2001

Review first published: Issue 2, 2001

Date	Event	Description
20 February 2007	New citation required and conclusions have changed	Substantive amendment

CONTRIBUTIONS OF AUTHORS

Building on a previous systematic review, Roberta Scherer conducted the literature search, reviewed the papers for inclusion, extracted the data from papers, obtained unpublished information from authors, and entered the data in RevMan. Patricia Langenberg provided statistical expertise in the data analyses for both this and the previous systematic review. Erik von Elm conducted the literature search, reviewed the papers for inclusion, extracted the data from papers, and obtained unpublished information from authors. All three reviewers interpreted the data and contributed to the review.

DECLARATIONS OF INTEREST

None.

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External sources

- No sources of support supplied

INDEX TERMS

Medical Subject Headings (MeSH)

*Congresses as Topic; Controlled Clinical Trials as Topic; Publication Bias; Publishing [*statistics & numerical data]; Randomized Controlled Trials as Topic; Time Factors