

SUPPLEMENTARY FILE 1

Details of literature searches

Searching for results on cigar smoking was complicated by the Medline search term “cigar smoking” being available only from the start of 2018. Before then the only search term to include cigar smoking was “tobacco products”, which also includes cigarettes, pipes, bidis and kreteks, so that most of the papers retrieved using that term would not relate to cigar smoking.

For each disease definition several searches were made, as no single search method retrieved more than a few relevant papers. Papers identified as giving results for one disease were reviewed in case they also reported results for the other diseases. Searching ended when no new relevant papers were found and all the papers referenced by reviews had been examined.

Lung cancer

A review in 2012 related lung cancer to various indices of smoking based on studies published during the 1900s^[1]. This identified 13 publications relevant to this review^[2-14]. Note that two of these^[4, 5] are by the same authors reporting the same study, the first giving overall study information and the second giving results by disease. Twenty-two publications, while considering cigar smokers, did not report results for exclusive cigar smokers^[15-36].

Initial Medline searches were therefore restricted to recent publications.

Search 1

A first search, using the terms (((("cigar smoking"[MeSH]) AND "lung neoplasms"[MeSH]) AND "humans"[MeSH]) AND ("2000"[Date - MeSH] : "3000"[Date - MeSH])), and carried out on 4 April 2019, identified no papers. This search, using the new MeSH term for cigar smoking, had failed to identify recently-published papers. Search 4 (below) used an alternative method to identify recent papers.

Search 2

A second search, using the terms (((cigar smoking) AND lung neoplasms) AND humans) AND ("2000"[Date - MeSH] : "3000"[Date - MeSH]), also carried out on 4 April 2019, identified 14 papers. Of these, four^[37-40] reported studies carried out outside the USA, two^[41, 42] did not present results on exclusive cigar smoking, one entitled "The Green Cigar" and published in Academic Radiology was considered irrelevant, and one was our previous review of smoking and lung cancer^[1]. This left six papers^[43-48].

Of these six, one^[43] was a review of evidence on the health risks of cigar smoking. For lung cancer risk this review cited a Smoking and Tobacco Control monograph by the National Cancer Institute^[49] of which the paper by Shanks and Burns^[13], identified from the 2012 review^[1], is the relevant chapter.

Another^[45] was a review of the evidence relating cigar smoking to health problems. The section on lung cancer cited various studies in the USA. Several had already been identified from the 2012 review^[1] as giving useful results^[2, 4, 5, 12, 13] or as not reporting results for exclusive cigar smokers^[15, 16]. Three references to studies in the USA^[50-52] had no useful data on exclusive cigar smokers and lung cancer and one had already been identified by this second search^[44]. The remaining paper^[53] was considered further.

Another paper identified^[46] was a review of cigar smoking and mortality which considered three US studies of lung cancer. These had already been identified, two^[8, 13] from the 2012 review^[1] and one from this second search^[44].

Yet another paper identified at this stage^[47] reported only three lung cancers among exclusive cigar smokers and no lung cancers among cigarillo smokers so no risk ratio values were reported.

Thus, only two papers identified in the search^[44, 48] and one identified in a review^[53] remained to be considered further.

Search 3

A third search, carried out on 25 April 2019, did not restrict the publication year range, but used the terms ("cigar" OR "cigars") AND "lung neoplasms"[MeSH] AND "United States"[MeSH]. This identified 12 papers. Of these:

one was rejected from the summary (the title "Cigars and health: the National Cancer Institute reports" in the journal Harvard Men's Health Watch suggesting a summary of available research reports);

one^[28] had already been identified and rejected from the 2012 review of smoking and lung cancer;

one^[44] had already been identified in the second search;

one^[41] had been rejected in the second search;

one^[54] was a review that mentioned three relevant studies, two reporting only joint cigar and pipe habits^[16, 55] and the third having been already identified above^[8]; and the other seven^[56-62] gave no results for exclusive cigar smokers and lung cancer.

Therefore, no new sources were identified as a result of this search.

Search 4

A fourth search attempted to retrieve relevant papers not yet indexed with MeSH terms on Medline, by using the terms ("cigar" OR "cigars") NOT MEDLINE[SB]. This search was carried out 25 April 2019 and generated 296 hits. This search was not lung cancer specific. The results were reviewed for lung cancer reports in the USA. Most were rejected from the abstract, but three were examined in more detail.

The first^[63] reported only “All cancer” rather than lung cancer separately. The second^[64] reported relevant results from the National Longitudinal Monitoring Study (NLMS) and was considered further. The final possible source^[65] was a letter responding to a published paper and contained no data useful to this review.

Search 5

The final search, using the basic non-MeSH search terms ("cigar" OR "cigars") AND “lung” AND "USA", was carried out on 26 April 2019. It resulted in 30 hits with 21 of these rejected from details given in the abstract. Of the remaining nine papers:

one^[42] had already been identified and rejected in the second search;

three^[43, 45, 46] were reviews identified in the second search;

two^[44, 53] had already been identified in the second search as justifying further consideration; and

three^[62, 66, 67] were rejected for lack of relevant lung cancer and cigar smoker data.

This left no additional sources to be considered further.

Finally checking the papers giving useful data for chronic obstructive pulmonary disease (COPD) or for heart disease or stroke (see below) identified no additional sources of data.

These searches are summarised in Figure 1.

COPD

Search 1

A first search, using the search terms ((cigar smoking) AND "pulmonary disease, chronic obstructive") AND humans), and carried out on 4 April 2019, identified 7 papers. One was rejected from the abstract as reporting a study not carried out in the USA. Of the remaining six, three^[38, 40, 68] were also found to report studies carried out outside the USA, and two^[66, 69] gave no results for exclusive cigar smoking. The remaining paper^[42] reported only pipe smoking but included a review mentioning cigar smoking which cited two papers reporting cancer only^[14, 44] and a report of the US Surgeon General^[70]. That report cited another US Surgeon General's report^[71] and a report by the US Department of Health and Human Services^[72], neither of which gave useful results. It also cited a report by the US Department of Health, Education and Welfare^[73] which provided a summary of results relating to cigar smoking. This cited a study in Canada by Best^[74]; a study in the USA^[7] which reported results for "pulmonary diseases (excluding neoplasms)", too broad a definition to be included; and a report of the Dorn study in the USA^[8], which was considered further.

Search 2

A second search, using a more general term for COPD (((cigar smoking) AND "COPD") AND humans), was carried out on 5 April 2019 and identified six papers. Three had been identified in the first search, two^[75, 76] were reports of studies carried out outside the USA and one^[53] had relevant data.

Search 3

A third search, using different cigar terms and a MeSH term for disease, was carried out on 23 April 2019. It used the terms ("cigar" OR "cigars") AND "pulmonary disease, chronic obstructive"[MeSH]. This identified 13 papers, of which seven had

already been seen in previous searches, one was a case report, one was a report on tobacco fungi, and three^[77-79] did not report exclusive cigar smoking. The other^[45] was a review which included a section on cigar smoking and COPD. This cited an already-rejected source^[66], an already identified source^[53] and a new useful source paper^[13].

Search 4

A fourth search, using a broader smoking term and restricting attention to the USA was carried out on 23 April 2019. It used the terms (Smoking[MeSH] AND "pulmonary disease, chronic obstructive"[MeSH] AND "United States"[MeSH]). This identified 290 papers, 282 of which were rejected from details given in the abstract. The remaining eight were checked in more detail with seven rejected^[80-86] as not reporting cigar-only smoking. The remaining paper was the review^[42] identified in the first search.

Search 5

A fifth search, carried out on 24 April 2019, used the search terms ("cigar" OR "cigars") AND (Smoking/mortality[MeSH] OR Smoking/adverse effects [MeSH]) AND United States[MeSH]. This identified 59 papers, of which 53 were rejected from the abstract. Of the remaining six papers, three^[14, 42, 44] had been identified in earlier COPD searches, one^[67] had no data on exclusive cigar smoking, and one^[87] was a review which only cited sources already identified^[13, 53]. The final paper^[43] was a review which cited a source already identified^[53], Smoking and Tobacco Control Monograph No. 9^[49], the relevant chapter of which^[13] had already been identified and a US Surgeon General's report^[88] relating only to cardiovascular disease.

Search 6

The final search was the same as Search 4 for lung cancer, which attempted to retrieve papers that had not yet been indexed with MeSH terms on Medline, by

using the terms ("cigar" OR "cigars") NOT MEDLINE[SB]. All but three of the 296 papers identified were rejected from details given in the abstract. On further investigation two further papers were rejected, the first^[63] reporting only heart disease and "All cancer" and the second^[65] being a letter responding to a published paper and containing no data useful to this review. The final paper^[64] reported relevant results from the National Longitudinal Monitoring Study (NLMS) and was considered further.

Finally, two papers identified as giving useful data for lung cancer (see above) or for heart disease or stroke (see below) were identified as also providing COPD results. One^[89], which gave results for heart disease, reported there were fewer than 10 COPD deaths among cigar smokers. The other,^[11] which gave results for both lung cancer and heart disease, reported observed and expected deaths for bronchitis and emphysema (ICD7 codes 500-502, 527.1) but, as these numbers of deaths were 10 and 14 respectively, no relative risks were given.

A review in 2011 of smoking and COPD^[90] cited various studies in the USA. The source for each of these was reviewed. Only one paper^[91] reported data for cigar-only smokers, but the results reported for emphysema and for reduced expiratory volume related to pipe and cigar smokers combined.

These searches are summarised in Figure 2.

Heart disease, stroke and circulatory disease

Search 1

A first search, using the search terms (“cigar” OR “cigars”) AND (“Heart Diseases”[MeSH]), and carried out on 23 July 2019, identified 49 papers. Of these 30 were rejected from details given in the abstract: one was a report by an expert group, three were case reports and the others described studies not carried out in the USA, not reporting cigar smoking, or not reporting heart disease. The remaining 19 papers were considered in more detail. Of these five^[92-96] were not carried out in the USA, six^[42, 97-101] had no relevant data, two^[102, 103] gave relevant results, and six^[46, 104-108] were reviews.

Of these reviews, one^[46] cited two papers already identified^[99, 102] and two papers providing useful data^[8, 13], a second^[105] cited one useful paper^[53], while a third review^[104] cited two papers already identified^[102, 105], two papers reporting non-USA studies^[37, 109] and a paper on acute effects on arterial stiffness^[110]. The fourth and fifth reviews^[106, 107] both cited a Smoking and Tobacco Control monograph by the National Cancer Institute^[49] of which the paper by Shanks and Burns^[13], already identified in^[46], is the relevant chapter. The final review^[108] cited papers already identified^[95, 100], papers with no useful data^[88, 111] and one paper with useful data^[11].

This gave a total of six papers^[8, 11, 13, 53, 102, 103] to be considered further.

Search 2

A second search (for papers on stroke), using the search terms (“cigar” OR “cigars”) AND (“Stroke”[MeSH]) and carried out on 23 July 2019, identified six papers. From the abstract, two were rejected as not reporting studies in the USA and one as not reporting cigar smoking. The remaining three papers were reviewed in more detail. Two^[97, 101] had already been identified in the first search and found to have no useful results. The final paper was a review^[112] which cited Wannamethee et al., 1995^[113]

(which reported only cigars and pipes together), and another paper identified in the first search and rejected^[109].

Search 3

A third search using the non-MeSH terms (“cigar” OR “cigars”) AND “Stroke”, also carried out in 23 July 2019, identified 21 papers. From the abstract, eight were rejected as describing studies not carried out in the USA, four as not reporting heart disease or stroke and three as not reporting cigar smoking. The remaining six papers were considered in more detail. One^[114] gave no results comparing with never smokers, two^[97, 112] had already been identified in the first search, and two^[63, 64] gave useful results. The final paper identified in this search^[115] was a review. This cited three papers identified in the first search^[13, 53, 102], one reporting a study outside the USA^[116] and two reviews^[43, 71].

The first of these reviews cited only the second review^[71] and a paper already identified^[53].

The second review cited two papers that only reported overall mortality^[4, 117]; six papers that did not report exclusive cigar smoking^[118-122] (and an unreferenced paper by Epstein, 1967); two papers that had already been identified^[8, 112]; and two papers giving useful results^[5, 7].

Search 4

The fourth Medline search, carried out on 30 July 2019, used broader non-MeSH search terms: (“cigar” OR “cigars”) AND “Heart”. This identified 85 papers. From details given in the abstract, 29 were rejected for not being carried out in the USA, 10 for not reporting cigar smoking, 26 for not reporting heart disease or stroke, and two for providing only summary level results. Of the 18 papers reviewed in more detail 16 had already been identified in previous searches, one^[123] was not carried out in the USA and one^[89] had new useful information.

Search 5

The final search was the same as Search 4 for lung cancer, which attempted to retrieve papers that had not yet been indexed with MeSH terms on Medline, by using the terms ("cigar" OR "cigars") NOT MEDLINE[SB]. After studying it for relevant papers on heart disease, stroke and circulatory disease, all were rejected except for two^[63, 64], which had already been identified and one^[65] which reported nothing useful.

Thus across all the Medline searches 11 papers were found containing results for exclusive cigar smoking and heart disease and/or stroke^[5, 7, 8, 11, 13, 53, 63, 64, 89, 102, 103].

Finally, reviewing the source papers previously identified as providing results for cigar smoking and lung cancer or COPD identified a single additional source^[6].

Searching our database of references to papers identified only three papers, all by Jacobs et al. One^[102] had been identified already, one^[124] reported the same dataset but used slightly different age groupings and the final one^[14] reported cancers only.

These searches are summarised in Figure 3.

Figure 1 Lung cancer searches

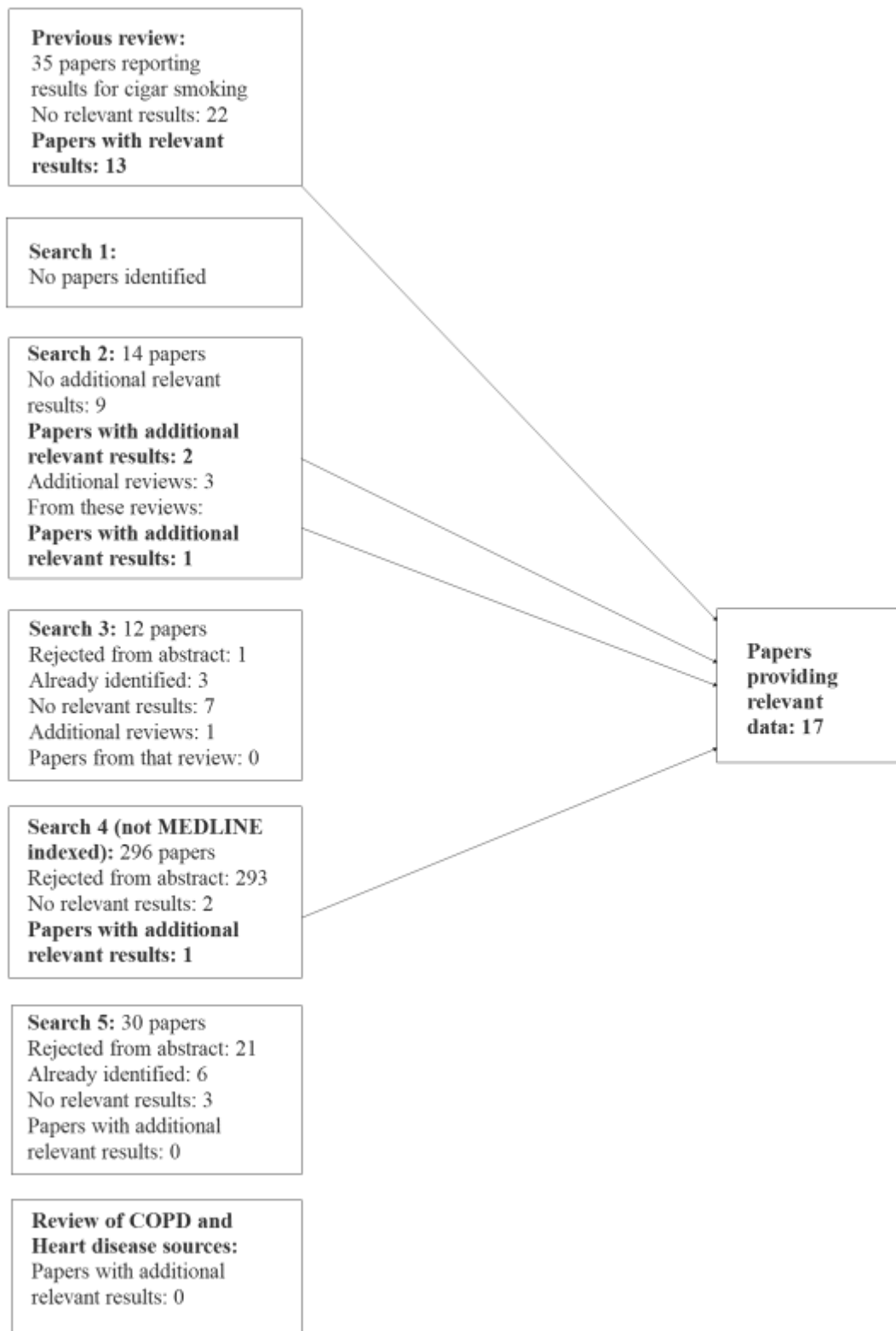


Figure 2 Chronic obstructive pulmonary disease (COPD) searches

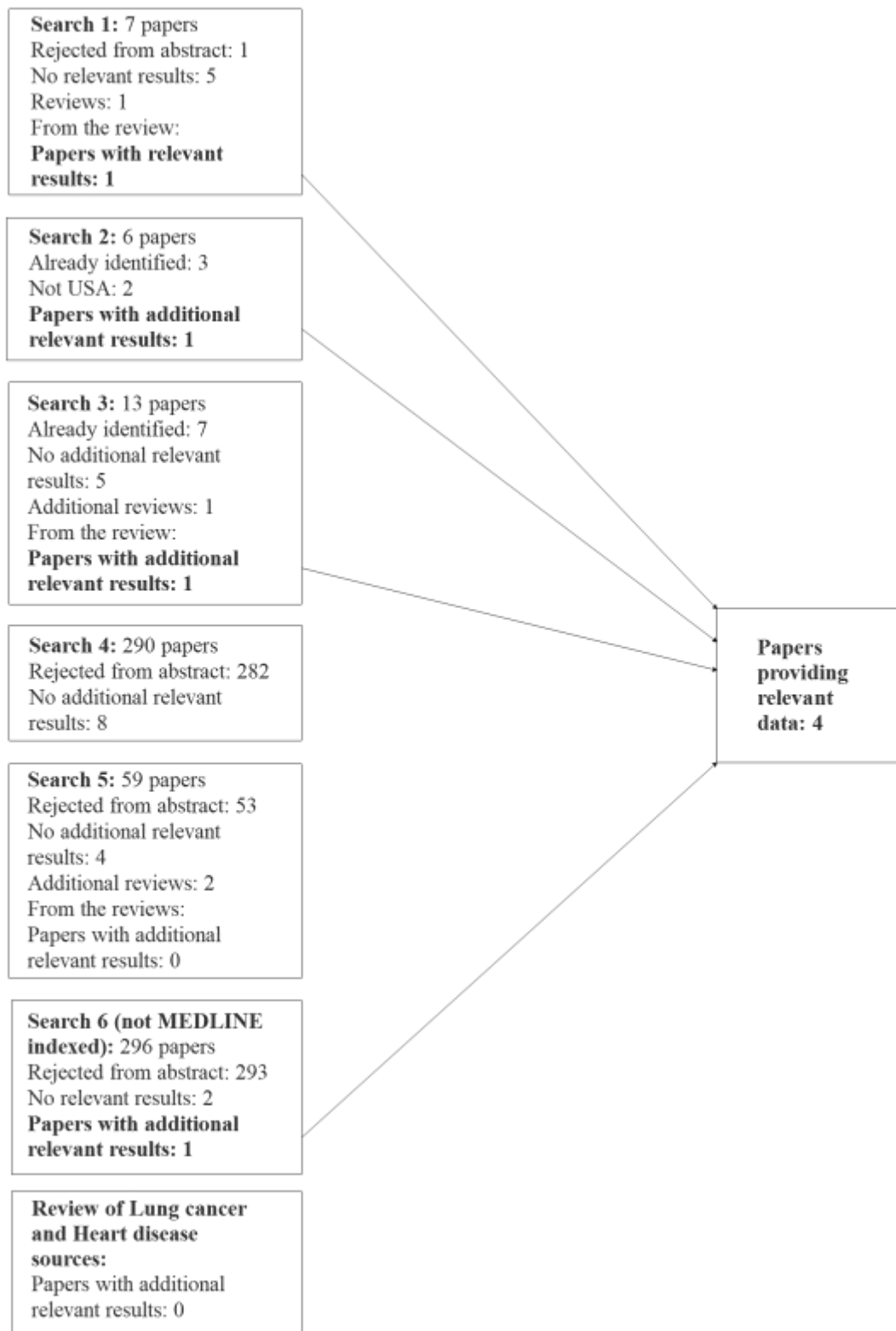
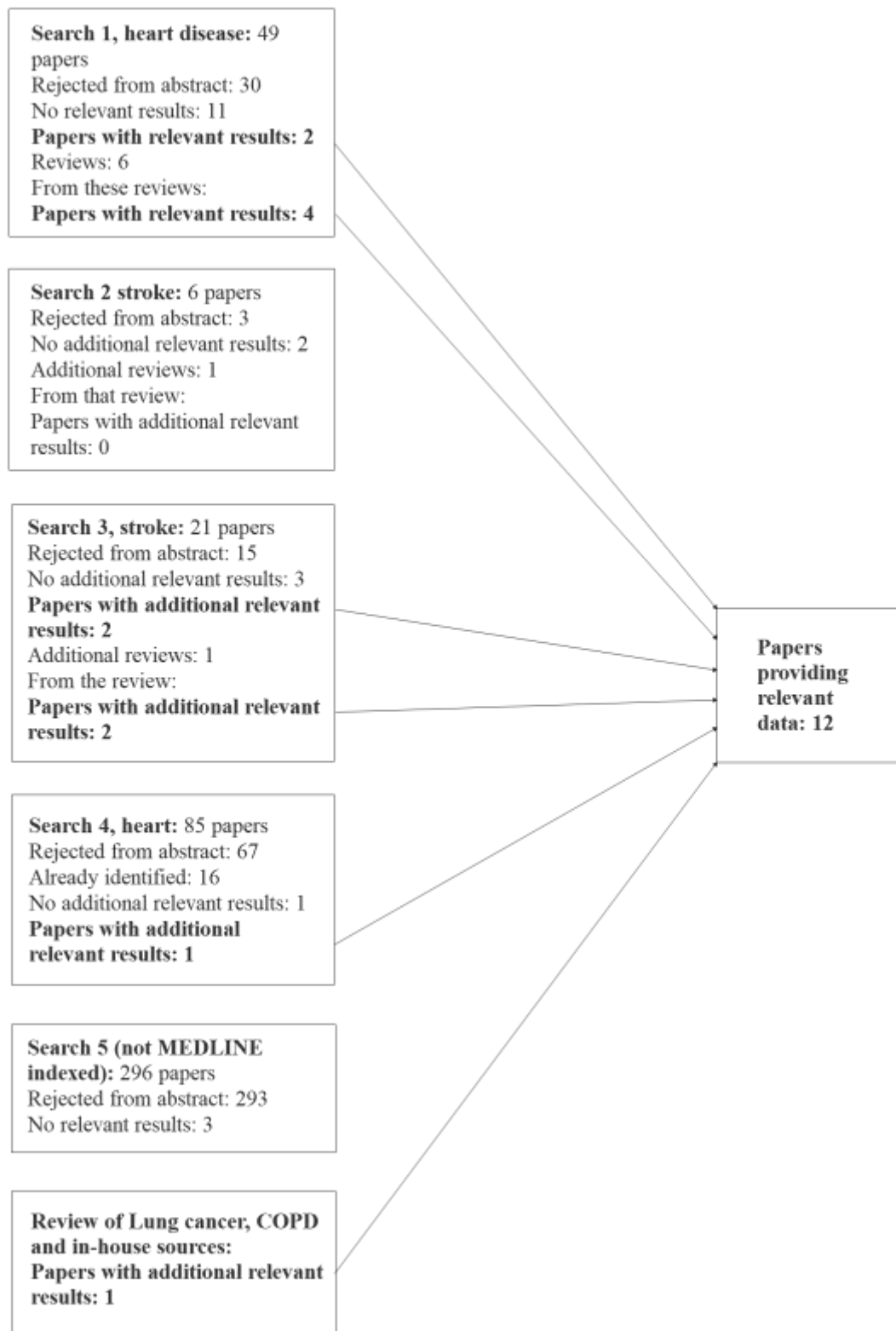


Figure 3 Heart disease, stroke and circulatory disease searches



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