Systematic Reviews of the Literature Are Not Always Either Useful Or the Best Way To Add To Science

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Systematic reviews are becoming more popular as a way of doing research; however, not all systematic reviews are clinically useful and sometimes another type of review (scoping, topical, or critical) would be of greater value to the clinical and scientific community. The different types of review and their use are described, illustrated by examples relevant to vascular surgery.

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INTRODUCTION

Systematic reviews appear to have become increasingly popular in the published literature as often they are considered important sources of clinical evidence. The reason for performing systematic reviews is to add information to what is known on a particular topic. However, all too often such reviews are not clinically useful. Some have estimated that >90% of systematic reviews are clinically useless, while others have suggested that the “gravy train” of systematic reviews constitutes research waste.1,2 The reasons for this include registered but unpublished reviews, duplicated or poor methodological reviews, or those addressing questions which are not clinically useful. Do they serve any other purpose? Perhaps they improve the citation or publication record of individual researchers or clinicians or are considered a necessary starting point to a thesis? The former is not a laudable reason, and the latter is a misplaced assumption, when perhaps another type of review, a scoping review, would better summarise the field and identify the knowledge gaps and opportunities for productive investigations. Other times they may add only incremental knowledge rather than new knowledge. In contrast, good quality reviews are valuable to clinicians and guideline committees and can enhance the impact factor of a journal. This may be one of the reasons underlying the steady increase in systematic reviews published in the European Journal of Vascular and Endovascular Surgery (Fig. 1).

Scrutiny of the metrics of the 20 systematic reviews published in 2018 indicate the wide range of utility of the reviews to both journal impact factor and clinicians, but six probably could be assigned to “the gravy train” and take up journal pages at the expense of original research.

The pyramids of clinical evidence all place systematic reviews of randomised controlled trials (RCTs) at the apex, with reviews conducted with support of the Cochrane Collaboration on top. Such reviews are a special feature of the Cochrane Collaboration. For Cochrane reviews there is a guaranteed rigorous search and review methodology, with emphasis on uncovering and reporting potential sources of bias. Therefore, most Cochrane reviews focus on synthesising the data from adequately powered RCTs and they can provide valuable additional information. The scientific quality of any systematic review of RCTs is only as good as the quality of the included studies: small, underpowered RCTs and those of poor methodological quality can provide very misleading results. This risk of misleading information is even stronger in systematic reviews of observational studies where there is inherent patient selection, reporting bias, and overestimation of treatment effects is common: these are the reviews most likely to be of limited clinical usefulness.3 For reviews focusing on long term outcomes, the number of patients lost to follow up should be assessed as part of the study appraisal. Patient loss to follow up is usually higher in observational studies than in randomised controlled trials, and this can limit the value of observational studies when synthesising evidence for longer term outcomes.

Here the discussion is when it is appropriate to consider undertaking a systematic review, with a few tips for success, when a scoping review would be better than a systematic review, and when a critical or topical review of recent evidence would be more appropriate.
WHAT IS A SYSTEMATIC REVIEW AND WHEN IS IT USEFUL?
A systematic review is used to marshal, appraise, and synthesize the evidence about a precise clinical question, for example, comparing the clinical effectiveness of two different operations for the same condition. A systematic review should follow standard rigorous methodology and reporting, and there are recommended approaches to review should follow standard rigorous methodology and different operations for the same condition. A systematic example, comparing the clinical effectiveness of two thesise the evidence about a precise clinical question, for careful de comparator, outcomes) for the review all require clear and minimise bias. The PICO (population, intervention, observational studies and/or small RCTs. To avoid bias from small studies, it can be helpful to use a minimum threshold for the number of patients as an inclusion criterion. In the absence of sufficient evidence, this would convert to a topical review.

1. To synthesise the evidence from adequately powered (large) RCTs, these are likely to be Cochrane reviews.
2. To synthesise the evidence from observational studies comparing the efficacy of treatments in situations where randomised trials are not possible, for example, the efficacy of e-cigarettes to promote and sustain smoking cessation.
3. To synthesise the evidence from RCTs and observational studies about a clearly defined important clinical question, to which the answer is not already known and there is no evidence of a similar review being in progress or recently published (by checking PROSPERO and other research registries as well as conference abstracts), for example, is carotid artery stenting still associated with lower stroke risk in asymptomatic patients given the advances in best medical therapy? Careful definition of the PICO in question and quality assessment of included studies are vital. If sufficient suitable studies are identified, meta-analysis should be provided as well as sensitivity analysis for the best quality studies, in cases where there is a wide range of study quality.
4. To investigate how outcomes have changed over time, to identify whether there has been improvement in outcomes and patient benefit. Meta-regression can be a useful tool. An example here is the recent updating of a 2010 systematic review evaluating the sex specific operative mortality from intact abdominal aortic aneurysm repair, given the advances in both endograft and imaging technology. Presentation of sensitivity analyses to compare information obtained from RCTs vs. observational studies may be illuminating.
5. To investigate how factors such as age, sex, ethnicity, and frailty influence clinical outcomes using evidence from both RCTs and observational studies, for example, the influence of age, sex, and contralateral occlusion on stroke and death after carotid endarterectomy or carotid stenting. Presentation of sensitivity analyses to compare information obtained from RCTs vs. observational studies may be illuminating.
6. To inform clinical practice guidelines about recent developments, for example, pre-emptive procedures to limit type II endoleak after aneurysm repair using evidence from observational studies and/or small RCTs. To avoid bias from small studies, it can be helpful to use a minimum threshold for the number of patients as an

THE TIMING OF SYSTEMATIC REVIEWS
The timing of systematic reviews is important, as the most cited and downloaded reviews address a still controversial topic for which sufficient evidence is available but which do not come too late to be useful, after clinical practice has changed. Illustration of this point comes from analysis of the citation and download rates to inform the provision of services for amputees following the COVID 19 pandemic or current prevalence of abdominal aortic aneurysm to inform the probable effectiveness of population screening programmes. To identify the range of reported outcomes, for example, for the development of Core Outcome sets or to identify the full range of procedure associated complications.

WHEN IS A SYSTEMATIC REVIEW EITHER NOT NEEDED OR UNHELPFUL?
There are several clear examples of when a systematic review is unlikely to be of clinical value.

1. When a recent systematic review is already available or in progress (check in PROSPERO and other research registries).
2. To answer questions that do not concern clinical effectiveness (PICO not applicable), for example what is

Figure 1. The increasing number of systematic reviews published in the European Journal of Vascular and Endovascular Surgery. Data show the number of systematic reviews published from 2010 to date on the vertical axis: the 2021 data show reviews recorded in Medline to end August 2021.
| Stages                          | Systematic                              | Scoping                               | Topical                                  | Critical                                  |
|--------------------------------|-----------------------------------------|---------------------------------------|------------------------------------------|-------------------------------------------|
| Question                       | Formulate the precise question          | Decide on the broad topic             | What is the current knowledge base?      | Is the new evidence robust?              |
| Checks before you start        | PROSPERO\textsuperscript{11} and other databases for existing or similar review | Medline search for reviews on the topic | Recent flagship scientific journals for similar reviews | Recent flagship scientific journals for similar reviews |
| Making the question more detailed | Inclusion and exclusion criteria for relevant studies | Not usually relevant                  | Only after initial review of the key literature | Not applicable |
| Search for evidence            | Use a minimum of two databases          | Use a wide range of databases (to include nursing, social sciences, etc., as necessary) | By keywords in Medline, grey literature including conference and foundation reports | By keywords in Medline or scientific literature conference proceedings for unpublished support |
| Select and extract evidence    | Use a minimum of two researchers        | Use a minimum of two researchers      | Guided by what you find and limit to the most pertinent reports | Guided by the new evidence               |
| Evidence quality               | Needs formal assessment. Sensitivity analysis of good quality studies | Not assessed                          | Validity of evidence needs discussion    | Must be assessed: key part of the critique |
| Outputs                        | Usually, data synthesis with meta-analysis | Tables of evidence with narrative synthesis | Key themes and issues                   | Narrative viewpoint and future data required |
| Reporting guidelines           | PRISMA\textsuperscript{a}              | PRISMA extension for scoping reviews\textsuperscript{17} | N/A                                      | N/A                                       |

\textsuperscript{a} PRISMA = not applicable.
the best method of measuring the size of large venous ulcers? This needs an overview of measurement methods.

3 To answer questions, where the answer is already known, for example, is the operative mortality for intact AAA repair in women lower after EVAR or open repair? The answer here can be derived from the interaction analyses in randomised trials and the systematic reviews of sex specific differences.

4 To use observational data to answer questions that can be answered only by RCTs, for example, what is the diameter threshold for repairing internal iliac aneurysms? This might be the subject of either a topical review if there are new data for the rupture of these aneurysms or a critical review of the literature.

5 To answer questions where there are no standard interventions or outcomes. An example is provided by the recent review of pre-habilitation interventions before elective aneurysm repair. A scoping review probably would have been more useful.

WHAT IS A SCOPING REVIEW AND WHEN IS IT NEEDED?

A scoping review is an exploratory but systematic literature search to find out how much is known about a broad topic or to discover gaps in the evidence, to provide a narrative review without formal meta-analysis. The question(s) being addressed is broader and less specific and also may be more complex and heterogeneous than that in a systematic review. Examples include “Do prisoners have adequate access to vascular services?” or “What is the evidence for shared decision making for critical limb ischaemia?”. It might be used to identify whether a systematic review was necessary. A scoping review can identify specific unanswered questions which can be addressed either with new original research or some that can be answered by a systematic review. At the start of a thesis or other piece of research work, a scoping review often is more useful and less labour intensive than a systematic review.

WHAT IS A TOPICAL REVIEW AND WHEN IS IT NEEDED?

A topical review is an up to date overview of a current hot topic. Topical reviews may present areas that are still developing rapidly and may provide an indication of the future direction of the field. Examples might include the value of high sensitivity troponin assays to guide the management of peripheral arterial disease or methods for measuring the size of large venous ulcers. As with the previous types of reviews they need to be systematic and thorough, but unlike systematic or scoping reviews, they are guided by the literature and make more use of conference abstracts and grey literature such as scientific and charitable foundation reports, and government or industry reports. The review should report not just specific outcomes but must include the key present and future issues and/or challenges, which need to be addressed. Therefore, such reviews may be needed by government bodies and industry, as well as keeping clinicians informed about emerging technologies and processes.

WHAT IS A CRITICAL REVIEW AND WHEN IS IT NEEDED?

A critical review is both an appraisal and a critique of new data on a topic, which may be either controversial or inconsistent with earlier findings and guidelines. A potential example is if a new, large series providing the diameter of ruptured internal iliac aneurysms indicates that the suggested intervention diameter criterion in clinical guidelines needs to be revised. A real example is the recent population based study from Denmark, which suggests that diabetes is not a factor that protects against the development of abdominal aortic aneurysm, although it may be protective of the development of more proximal aneurysms. The critical review then becomes a critique of the new study set in the context of a critique of the previous evidence (which did not come from population based studies).

HOW DO THE PROCESSES FOR THE VARIOUS REVIEW TYPES DIFFER?

The processes for these four different types of review are summarised and compared in Table 1. The varying types of review described have different purposes and methodology, but all should be thorough and systematic. There are some other specialist types of review, for example individual patient meta-analyses of randomised trials but these require full access to original data and specialist statistician input.

SO WHAT REVIEW DO YOU NEED?

The aim of this paper is to help you decide what kind of review you need to undertake and to discourage inappropriate systematic reviews, which are not likely to be clinically or scientifically useful and divert resources away from research productivity. Finding the gaps in the evidence, to which you can contribute original research, may often be more rewarding than a systematic review.

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CONFLICT OF INTEREST

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REFERENCES

1 Ionnadis J. The mass production of redundant, misleading and conflicted systematic reviews and meta-analysis. Millbank Q 2016;94:485–514.
2 Roberts I, Ker K. How systematic reviews cause research waste. Lancet 2015;386:1536.
3 Jepsen P, Johnsen SP, Gillman MW, Sorensen HT. Interpretation of observational studies. Heart 2004;90:956–60.
4 The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. Available at: https://www.equator-network.org/reporting-guidelines/prisma/ [Accessed 10 August 2021].
5 Kalkhoran S, Glantz SA. E-cigarettes and smoking cessation in the real-world and clinical settings: a systematic review and metaanalysis. Lancet Respir Med 2016;4:116–28.
6 Grootenboer N, van Sambeek MRHM, Arends IR, Hendriks JM, Hunink MGM, Bosch JL. Systematic review and meta-analysis of sex differences in outcome after intervention for abdominal aortic aneurysm. Br J Surg 2010;97:1169–79.
7 Pouncey AL, David M, Morris RI, Ulug P, Martin G, Bicknell C, et al. Editor’s Choice - systematic review and meta-analysis of sex specific differences in adverse events after open and endovascular intact abdominal aortic aneurysm repair: consistently worse outcomes for women. Eur J Vasc Endovasc Surg 2021;62:367–78.
8 Touze E, Trinquart L, Felgueiras R, Rerkasem K, Bonati LH, Meliksetyan G, et al. A clinical rule (sex, contralateral occlusion, age, and restenosis) to select patients for stenting versus carotid endarterectomy: systematic review of observational studies with validation in randomized trials. Stroke 2013;44:3394–400.
9 Chan WK, Yong E, Hong Q, Zhang L, Lingam P, Tan GWL, et al. Systematic review and meta-analysis of the prevalence of abdominal aortic aneurysm in Asian populations. J Vasc Surg 2021;73:1069–74.
10 Machin M, Ulug P, Pandirajan K, Bown MJ, Powell JT. Towards a core outcome set for abdominal aortic aneurysm: systematic review of outcomes reported following intact and ruptured abdominal aortic aneurysm repair. Eur J Vasc Endovasc Surg 2021;61:909–18.
11 National Institute for Health Research. PROSPERO, International prospective register of systematic reviews. Available at: https://www.crd.york.ac.uk/prospero/.
12 Bonner RJ, Wallace T, Jones AD, Scott DJ, Richards SH. The content of prehabilitative interventions for patients undergoing repair of abdominal aortic aneurysms and their effect on post-operative outcomes: a systematic review. Eur J Vasc Endovasc Surg 2021;61:756–65.
13 Matsushita K, Kwak L, Yang C, Pang Y, Ballew SW, Sang Y, et al. High-sensitivity cardiac troponin and natriuretic peptide with risk of lower-extremity peripheral artery disease: the Atherosclerosis Risk in Communities (ARIC) Study. Eur Heart J 2018;39:2412–9.
14 Degen H, Borst O, Ziegler M, Munoz A-K, Jamashi J, Walker B, et al. ADPase CD39 fused to glycoprotein VI-Fc boosts local antithrombotic effects at vascular lesions. JAH 2017;6:e005991.
15 Ye W, Wang N, Hu K, Zhang L, Pan C, Gong Y, et al. Bio-inspired microcapsule for targeted antithrombotic drug delivery. RSC Adv 2018;8:27253–9.
16 Obel LM, Diederischen AC, Steffensen FH, Frost L, Lambrechtsen J, Busk M, et al. Population-based risk factors for ascending, arch, descending and abdominal aortic dilations in 60–74 year-old individuals. J Am Coll Cardiol 2021;78:201–11.
17 Tricco AC, Lillie E, Zarin W, O’Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for scoping reviews (PRISMA-ScR): checklist and explanation. Ann Intern Med 2018;167:467–73.