



Core outcome sets in medical research

Jamie J Kirkham ,¹ Paula Williamson²

Jamie Kirkham and Paula Williamson outline the importance of core outcome sets in medical research, and make suggestions on how to identify, select, and develop them as well as highlight some of the barriers to their use

¹Centre for Biostatistics, The University of Manchester, Manchester Academic Health Science Centre, Manchester, UK
²MRC-NIHR Trials Methodology Research Partnership, Department of Health Data Science, University of Liverpool, Liverpool, UK
 Correspondence to: Professor Jamie J Kirkham, Centre for Biostatistics, The University of Manchester, Manchester Academic Health Science Centre, Manchester, UK; jamie.kirkham@manchester.ac.uk

Cite this as: *BMJMED* 2022;1:e000284. doi:10.1136/bmjmed-2022-000284

Received: 24 August 2022
 Accepted: 7 October 2022

Introduction

A core outcome set helps researchers to measure a consistent set of outcomes in studies of a health condition.¹ Examples of core outcomes sets for acute respiratory failure survivors and eczema are provided in [table 1](#). When a core outcome set has been agreed, it is hoped that researchers will use it in all studies for the particular condition for which it was developed, alongside any other outcomes if they wish.

The need for core outcome sets

When researching the same health condition, many studies can measure and report different outcomes or do not consider their relevance to a wider range of stakeholders such as patients and health service users. These problems (a form of avoidable research waste²) make evidence synthesis methods (eg, meta-analysis) very difficult to facilitate, such that conclusive recommendations about the effectiveness of interventions using patient centred outcomes cannot be made. Without core outcome sets, some important outcomes might be missing in some studies, and therefore evidence synthesis cannot immediately include results for those outcomes from all studies, potentially excluding thousands of patients who have provided their time and consent to contribute towards research as best as possible. Use of a core outcome set improves the consistency and quality of information about which interventions work or not, thus helping people make better choices about healthcare options.

How to find and assess existing core outcome sets

The COMET (Core Outcome Measures in Effectiveness Trials) Initiative provides a publicly available, free-to-use, and searchable repository of core outcomes sets that is kept updated through regular systematic review updates, citation alerts, and notifications from core

Table 1 | Examples of core outcome sets

Disease	Core outcome set
Acute respiratory failure survivors ¹³	Improving long term outcomes research for acute respiratory failure (https://www.improvelto.com/): physical function, cognition, mental health, survival, pulmonary function, pain, muscle or nerve function
Eczema ¹⁴	HOME Initiative (Harmonising Outcome Measures for Eczema; http://www.homeforeczema.org/): clinical signs, symptoms, long term control of flares, quality of life

outcome set developers (<https://comet-initiative.org/>). The database contains nearly 500 published studies on core outcome sets (and nearly as many ongoing studies) that can be searched by disease name as well as other key elements.

Assessing the quality of a core outcome sets can be tricky because methods for developing one often vary by health condition. Perhaps a good set is one that is routinely used, but this cannot be easily determined at the point at which it is first developed. To help users assess core outcome sets, a set of standards (COS-STAD; core outcome set standards for development) has been established to determine whether the set has been developed using reasonable methods.³ These recommendations focus on three key domains: the scope, the stakeholders, and the consensus process ([table 2](#)). Even if all standards are not met or the scope of the core outcome set is not an exact match to the study question, users should consider whether the recommended core outcomes (at least in part) are useful. Most core outcome sets so far have been developed for research, but researchers of a recent review observed a noticeable increase in the development of these sets that could be applied to research and routine care settings. In 2019, 12% of published core outcome sets were developed to apply to both, compared with 60% of ongoing core outcome sets registered in the COMET database.⁴ To help improve the uptake of core outcome sets further, researchers are encouraged to search for a relevant set for their study, and to specify why one was not used or partially used if one was available.

Planning a development study

As part of good research practice, developers of core outcome sets should register their study with the COMET Initiative, which will then be added to the database as an ongoing study.⁵ If no core outcome set is registered on the database, there is a good chance that it does not exist or is in the planning stages. Researchers might want to consider developing a core outcome set as part of feasibility work for a research study, and requires both planning and funding. A good starting point for developing a core outcome set is the previously

KEY MESSAGES

- ⇒ A core outcome set is a minimum set of outcomes that should be measured and reported in all clinical trials undertaken in a specific health condition
- ⇒ Implementation of core outcomes sets would improve the quality of evidence based knowledge worldwide, making it more useful to decision makers and reducing waste
- ⇒ Resources and initiatives are available to help researchers identify, find, and appraise core outcome sets for their research studies
- ⇒ Minimum standards for developing a core outcome set have been agreed, and a more comprehensive handbook on these issues is available

Table 2 | COS-STAD recommendations for core outcome sets³

Domain and item No	Minimum standard item
Scope	
1	Setting (eg, research, routine care, or both)
2	Health condition (eg, colorectal cancer)
3	Population (eg, all patients, localised or advanced cancer, women or children)
4	Intervention (eg, trials of all interventions, surgery only)
Relevant stakeholder(s)	
5	Those who will use the core outcome sets in research (eg, clinical trialists, industry)
6	Healthcare professionals with experience of patients with the condition (eg, clinical experts, practitioners, investigators with particular experience of the condition)
7	Patients with the condition or their representatives (eg, patients, public, participants who have experienced the condition, family members, carers)
Transparent consensus process	
8	Initial list of outcomes considered both healthcare professionals' and patients' views
9	A scoring process and consensus definition is described a priori
10	Criteria for including, dropping, or adding outcomes are described a priori
11	Care is taken to avoid ambiguity of language used in the list of outcomes

COS-STAD=core outcome set-standards for development.

mentioned COS-STAD recommendations (table 2).³ As well as for appraisal purposes, these recommendations also encourage developers to achieve at least the minimum set of standards for development. The COMET Handbook provides more detailed guidance.⁶ Specific initiatives exist for some healthcare conditions, such as OMERACT (outcome measures in rheumatology) for rheumatology⁷ and the CHORD COUSIN Collaboration (C3) for dermatology.⁸

Encouraging uptake of core outcome sets

The long term benefits of core outcome sets will only be achieved if they are used. The lack of awareness that such sets exist and the methodological rigour behind the development process are two main reasons why core outcome sets are not used.⁹ With informative articles such as this Methods Primer, as well as many other dissemination activities by key initiatives for core outcome sets more generally, we hope to raise the awareness of core outcome sets. However, a systems approach is needed, such that developers of core outcome sets can promote their own set through more active dissemination strategies and through post-development engagement with their relevant channels or networks and stakeholders to ensure that their set is used.⁴

A good example of successful uptake of a core outcome set is in rheumatoid arthritis, where over 80% of drug trials in this field are now using the full core outcome set.¹⁰ Potential methodological shortcomings in the development of core outcome sets can be overcome by adhering to relevant guidance such as COS-STAD. For example, stakeholder involvement (especially patient involvement) are frequently cited as the reason for not using a core outcome set. This factor is included as a minimum standard under the COS-STAD guidance, and in the latest review of core outcome set studies, 85% of studies now involve public representatives compared with 17% in 2014.¹¹ Implementation of a core outcome set requires the measurement instruments to measure the core outcomes. Selecting measurement tools is beyond the scope of this article, but a practical guide on how to select such tools for core outcomes is available.¹²

Conclusions

This article sets out the principles of why core outcome sets are needed and provides some information on how medical researchers can select and appraise existing core outcomes. It also provides some simple steps to consider regarding development. The COMET Handbook⁶ brings together a comprehensive discussion on current thinking and methodological research regarding the development, implementation, evaluation, and updating of core outcome sets.

Contributors JJK had the idea for this article, discussed it with PW, and wrote the initial draft. PW reviewed the draft and made revisions and additions. JJK and PW both approved the final version.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial, or not-for-profit sectors.

Competing interests We have read and understood the BMJ policy on declaration of interests and declare the following interests: JJK is the research methods lead for the CHORD COUSIN Collaboration (C3), and PW is a member of the COMET management group.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Provenance and peer review Commissioned; externally peer reviewed.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iD

Jamie J Kirkham <http://orcid.org/0000-0003-2579-9325>

REFERENCES

- Williamson PR, Altman DG, Blazeby JM, *et al*. Developing core outcome sets for clinical trials: issues to consider. *Trials* 2012;13:132. doi:10.1186/1745-6215-13-132
- Chalmers I, Glasziou P. Avoidable waste in the production and reporting of research evidence. *Lancet* 2009;274:86–9.

- 3 Kirkham JJ, Davis K, Altman DG, *et al.* Core outcome Set-STAndards for development: the COS-STAD recommendations. *PLoS Med* 2017;14:e1002447. doi:10.1371/journal.pmed.1002447
- 4 Williamson PR, Barrington H, Blazeby JM, *et al.* Review finds core outcome set uptake in new studies and systematic reviews needs improvement. *J Clin Epidemiol* 2022;150:154–64. doi:10.1016/j.jclinepi.2022.06.016
- 5 COMET Initiative: register new study. Available: <https://comet-initiative.org/About/SubmitNewStudy> [Accessed 15 Jul 2022].
- 6 Williamson PR, Altman DG, Bagley H, *et al.* The COMET Handbook: version 1.0. *Trials* 2017;18:280. doi:10.1186/s13063-017-1978-4
- 7 OMERACT Initiative: outcome measures in rheumatology. Available: <http://www.omeract.org/> [Accessed 15 Jul 2022].
- 8 CHORD COUSIN Collaboration (C3). Available: <https://www.c3outcomes.org/> [Accessed 15 Jul 2022].
- 9 Hughes KL, Clarke M, Williamson PR. A systematic review finds core outcome set uptake varies widely across different areas of health. *J Clin Epidemiol* 2021;129:114–23. doi:10.1016/j.jclinepi.2020.09.029
- 10 Kirkham JJ, Clarke M, Williamson PR. A methodological approach for assessing the uptake of core outcome sets using ClinicalTrials.gov: findings from a review of randomised controlled trials of rheumatoid arthritis. *BMJ* 2017;357:j2262. doi:10.1136/bmj.j2262
- 11 Gargon E, Gorst SL, Williamson PR. Choosing important health outcomes for comparative effectiveness research: 5th annual update to a systematic review of core outcome sets for research. *PLoS One* 2019;14:e0225980. doi:10.1371/journal.pone.0225980
- 12 Prinsen CAC, Vohra S, Rose MR, *et al.* How to select outcome measurement instruments for outcomes included in a "Core Outcome Set" - a practical guideline. *Trials* 2016;17:449. doi:10.1186/s13063-016-1555-2
- 13 Turnbull AE, Sepulveda KA, Dinglas VD, *et al.* Core domains for clinical research in acute respiratory failure survivors: an international modified Delphi consensus study. *Crit Care Med* 2017;45:1001–10. doi:10.1097/CCM.0000000000002435
- 14 Schmitt J, Spuls P, Boers M, *et al.* Towards global consensus on outcome measures for atopic eczema research: results of the HOME II meeting. *Allergy* 2012;67:1111–7. doi:10.1111/j.1398-9995.2012.02874.x