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Abstract

Background: The article aims to investigate the suitability of Cochrane handbook for the preparation of systematic reviews of public health importance. **Methods:** The information about various aspects of a systematic review was extracted from all 39 Cochrane public health systematic reviews, independently by three reviewers. This was carried out by means of a data extraction form and was examined if the methodological constructs used by the reviews have been furnished in the Cochrane handbook. **Results and Discussion:** It was observed that17 (44%) of the 39 reviews adopted meta-analysis and 20(52%) of the systematic reviews used the risk of bias assessment tool other than that mentioned in the handbook. **Conclusion:** The Cochrane handbook is not an effective comprehensive source of information for the preparation of systematic reviews of public health importance.

Keywords: Systematic reviews, Cochrane collaboration, Public Health Systematic reviews, Cochrane handbook.

BACKGROUND

The present scenario of healthcare system is dominated by evidence-based or evidence-informed rather than eminence based decision-making. The "evidence based healthcare relies on a combination of best available research, clinical expertise and client needs" (Wagenaar, 1999). Systematic reviews and meta-analysis are known to produce the highest form of evidence in healthcare research. In a systematic review, a focused research question is selected, all the procedures are explicitly defined in advance through a well-structured protocol, all the available research articles on the concerned topic are selected by a thorough literature search, selected articles are assessed for quality, and the results from the articles are combined in a narrative manner or by a meta-analysis. Thus, it helps to interpret the results of individual studies in the context of other research that has been done, enabling to arrive at a firm conclusion about the effectiveness of an intervention (Nair, Ravishankar and Lewis, 2014).

The Cochrane collaboration, named after the British epidemiologist Archie Cochrane, came into existence in 1973, and is one of the leading collaborations focused on preparing and publishing high quality systematic reviews. It is a non-profit international organization of over 50,000 specialists across 53 review groups in healthcare, responsible for globally disseminating up-to-date and accurate information about the effects of healthcare. The Cochrane systematic reviews account for a transparent appraisal with a strong methodological framework. Cochrane review methods group provide methodological assistance that plays a major role in the production of the "Cochrane Handbook of Systematic Reviews of Interventions". The handbook contains necessary methodological guidance to authors for the preparation of Cochrane intervention reviews. The Cochrane handbook version 5.0.1 is the recent edition, and has been edited by Higgings and Green, 2008. It is updated periodically to inform recent advances in the review methodology.

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Systematic reviews that involve questions pertaining to public health are challenging. This is because such questions are usually broad, multi-faceted and attempt at addressing wide policy-based enquiries, where a wide range of interventions exist. In addition, the studies pertaining to public health interventions are prone to large amounts of heterogeneity (Ravishankar et al., 2014). It is difficult to have a single yardstick to measure the effectiveness of public health interventions. The Cochrane Public Health Group (CPHG) that came into existence in April 2008 produces Cochrane reviews on the effects of population-level public health interventions. Presently the CPHG comprises of 39 systematic reviews.

The aim of this study was to explore the relevance of Cochrane handbook for the preparation of systematic reviews of public health importance i.e., to examine whether the methods furnished in the handbook are sufficient for preparing public health systematic reviews.

METHODS

Thirty-nine Cochrane public health systematic reviews were collected from the Cochrane database for systematic reviews. Three independent reviewers undertook the task of extracting the information from the systematic reviews. Each Cochrane public health systematic review was given a unique code, along with the reviewer code. The reviewers critically examined a set of three reviews each, and independently developed a data extraction form. Further, with several rounds of discussion, the data extraction forms of all the three reviewers were combined, and suggestions and comments by the experts were incorporated to obtain a comprehensive data extraction form.

The following details were extracted from the selected public health systematic reviews; study title, objective, population, intervention, comparison, outcome, number of studies included, study design, risk of bias assessment, logic model, GRADE (Grading of Recommendations Assessment, Development and Evaluation) approach, PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), number of studies included in

meta-analysis along with the type of model adopted, heterogeneity assessment, subgroup analysis, funnel plot, sensitivity analysis, and the reason(s) for not performing meta-analysis.

The selected reviews were equally divided among three reviewers to assess and extract the data. The reviews allocated to each reviewer were exchanged and with other reviewers in order to check the accuracy of the extraction. Agreement between the reviewers were checked, and disagreements were discussed and resolved.

RESULTS

The information extracted from the 39 Cochrane public health systematic reviews has been summarized in Table 1.

Risk of Bias

Out of the 39 systematic reviews, all reviews carried out risk of bias assessment. The Cochrane handbook provides a detailed assessment tool for assessing risk of bias in Randomized Controlled Trials (RCTs). Risk of bias assessment tool, mentioned in Cochrane handbook, is not recommended for other study designs. Only 10 out of 39 systemic reviews had followed the Cochrane handbook when their systematic reviews included RCT's, but the rest (29 reviews) have adopted other tools for assessing quality as they felt that Cochrane handbook was not providing sufficient information. The other tools adopted by the reviewers are EPOC (Cochrane Effective Practise and Organization of Care), EPHPP (Effective Public Health Practice Project), CBRG (Cochrane Back Review Group), Risk of bias assessment tool by Hamilton, GATE (Graphical Appraisal Tool for Epidemiological Studies) and NICE (National Institute for Health Care Excellence). Some of the reviewers have modified the Cochrane risk of bias tool by adding items from different tools.

Meta-analysis

Only 17 (44%), out of 39 reviews, adopted meta-analysis. The common reasons quoted by the authors for not attempting meta-analysis were; insufficient data, heterogeneous participants, nature and duration of intervention and outcomes, diversity of study designs, disparity of studies and paucity (even

Table 1. Summary of the information extracted from public health systematic reviews (N=39)

Items	Summary
Comparison group	17 (44%) reviews specified the comparison group
Risk of bias (ROB)	All reviews assessed ROB 10 (26%) reviews adopted Cochrane collaboration's tool 20 (52%) reviews adopted other tool 5 (13%) reviews adopted a hybrid tool; Cochrane handbook tool modified with other tool
Logic model	3(8%) reviews adopted logic model
GRADE	10 (26%) reviews adopted GRADE approach
PRISMA	6 (16%) reviews adopted PRISMA chart
Meta-analysis	17 (44%) reviews adopted meta-analysis 3 (8%) reviews reported meta-analysis with a single study 15 (39%) reviews did not adopt meta-analysis
Type of model	3 (8%) reviews used only fixed effects model 7 (18%) reviews used only random effects model 7 (18%) reviews used both fixed and random effects model
Heterogeneity	Heterogeneity has been assessed in case of meta-analysis using Chi-square and I^2 statistics. All reviews have assessed heterogeneity.
Subgroup	7 (18%) out of seventeen (44%) reviews with meta-analysis adopted subgroup analysis
Funnel plot	5 (13%) reviews used funnel plot
Sensitivity analysis	7 (18%) adopted, 13 (34%) not adopted and 15(39%) not applicable
Other approach	Out of 15 (39%) reviews, which did not attempt meta-analysis, thirteen (34%) reviews followed narrative approach. Two reviews adopted qualitative synthesis

non-availability) of studies. Narrative synthesis was adopted as an alternative approach in majority of the reviews due to failure in carrying out a quantitative meta-analysis. Qualitative synthesis was attempted in only two reviews.

Logic models, GRADE approach and PRISMA chart

Logic models illustrate how an intervention is designed to achieve its desired outcomes. However, only three (8%) reviews adopted logic model. GRADE approach is used to assess the quality of evidence and strength of recommendations of a systematic review. Only 10 (26%) reviews adopted GRADE approach. PRISMA diagram provides an idea of the flow of information through several stages of a systematic review. It maps out the number of hits, titles and abstracts screened, studies included and excluded and the reasons for exclusions. Out of the 39 systematic reviews, only six (16%) have adopted PRISMA diagram.

Funnel Plot

Even if comprehensive search strategies ensure that all relevant studies are captured in a systematic review, they cannot eliminate the threat of publication bias. Cochrane handbook recommends funnel plot to determine publication bias. However, only five out of 39 reviews used funnel plot.

DISCUSSION

The Cochrane collaboration is a pioneering organization involved in evidence consolidation and global dissemination of the evidence generated. The Cochrane systematic reviews are regarded as benchmark for systematic reviews as their preparation is based on a robust methodological framework. The "Cochrane Handbook for Systematic Reviews of Interventions" provides all necessary methodological constructs essential for framing a systematic review of clinical interventions.

The evidence consolidation of public health interventions is prone to several difficulties due to diverse population, nature and duration of interventions, evaluation of outcomes and also the influence of contextual factors.

It was found from the study, that the authors of public health systematic reviews had adopted several methodologies, other than those mentioned in the Cochrane handbook. Hence, the handbook does not provide comprehensive information on

methodologies that are relevant for the preparation of public health systematic reviews, particularly for risk of bias assessment. This may be attributed to the fact that the public health systematic reviews are dominated by the inclusion of non-randomized studies, which are prone to poor quality of methodology.

Recommendations

It is observed that logic models, GRADE approach and PRISMA chart that enhances the quality of a review have been adopted in only three (8%), 10 (26%) and six (16%) reviews respectively. Therefore, it may be recommended to adopt logic models to formulate a focused question, GRADE approach to assess the quality of evidence and strength of recommendations, and PRISMA chart to have high reporting standards.

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