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Descriptive analysis of non-randomized studies included in Cochrane Reviews regarding their availability in PubMed

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Background and Objectives

Randomized controlled trials (RCT) are relatively easy to identify due to the availability of well-performing, validated search filters. This does not hold true for non-randomized studies (NRS). There are many uncertainties regarding the identification of NRS in bibliographic databases within the context of systematic review elaboration (Reeves 2011, Glanville 2017).

Our objective was to describe the percentage of NRS indexed in PubMed and to analyze the results according to topic, type of intervention and study design by investigating a comprehensive set of Cochrane Reviews (CR) including NRS.

Reeves BC, et al. Chapter 13: Including non-randomized studies. Cochrane Handbook for Systematic Reviews of Interventions: version 5.1.0. (2011)
Glanville J, et al. Quasi-experimental study designs series – paper 8: identifying quasi-experimental studies to inform systematic reviews. J Clin Epi, 2017, 89(9):67-76.

Methods

We developed an extensive reference set for search filter performance testing comprising 2873 studies classified as NRS (Hausner 2017). CR including NRS were identified via the Cochrane Database of Systematic Reviews up to 20 October 2016. For the generation of the reference set we screened all CR evaluating NRS according to predefined inclusion criteria. For example, the **CR had to evaluate an intervention on a health-related question** and had to include study types beyond RCT or controlled clinical trials. In addition, **only CR including fewer than 65 studies were considered** in order to avoid bias related to a few CR containing many studies.

A total of 271 CR from 41 different Review Groups were eligible for data extraction. The citations of the studies included in each CR were identified via the reviews' bibliographies and the corresponding PubMed identification numbers extracted from PubMed. The **studies were classified according to type of intervention** (Rehfuess 2013) **and study design** (using the classification scheme by Hartling 2011 specifying 11 different types of NRS).

Hausner E, et al.: Identifying and assessing study filters in searches for non-randomised intervention studies. Poster. Global Evidence Summit, Sept 2017.
Rehfuess EA, Akl EA: Current experience with applying the GRADE approach to public health interventions: an empirical study. BMC Public Health, 2013, 13:9.
Hartling L, et al.: Testing a tool for the classification of study designs in systematic reviews of interventions and exposures showed moderate reliability and low accuracy. J Clin Epi, 2011, 64(8):861-71.

Results

Analysis per **Cochrane Review Group**

Cochrane Review Group	CR	Studies	Indexed in PubMed
Effective Practice and Organisation of Care Group	55	366	89%
HIV/AIDS Group	26	220	96%
Injuries Group	23	350	53%
Gynaecological, Neuro-oncology and Orphan Cancer Group	20	249	97%
Public Health Group	14	175	71%
Work Group	10	101	93%
Colorectal Cancer Group	9	165	97%
Fertility Regulation Group	9	84	99%
Tobacco Addiction Group	8	116	94%
Pain, Palliative and Supportive Care Group	8	88	86%
Musculoskeletal Group	8	73	97%
Acute Respiratory Infections Group	7	107	97%
Epilepsy Group	7	50	96%
Infectious Diseases Group	6	88	70%
Childhood Cancer Group	5	93	99%
Stroke Group	4	67	97%
Developmental, Psychosocial and Learning Problems Group	4	62	73%
Drugs and Alcohol Group	4	27	81%
Metabolic and Endocrine Disorders Group	4	25	92%

Analysis per **type of intervention**

Type of intervention	CR	Studies	Indexed in PubMed
Clinical	54	638	94%
Behavioural/Education	53	456	91%
Health systems	48	406	90%
Pharmaceutical	44	517	94%
Environmental	22	354	49%
Health policy	16	199	84%
Occupational	12	121	87%
Nutrition	8	95	87%
Vaccination	7	101	97%

Note:
Cochrane Review Groups and types of Intervention were only analyzed if at least 4 CR and 20 studies were available.

Orange highlights refer to ≤ 84% indexing in PubMed.

Analysis per **study design**

Non-randomized study design	CR	Studies	Indexed in PubMed
Quasi-randomized controlled trial (including controlled clinical trials)	67	216	89%
Controlled before-after study	104	634	71%
Interrupted time series (with comparison group)	31	83	80%
Prospective cohort study	84	384	95%
Retrospective cohort study	72	436	97%
Non-concurrent cohort study	13	34	91%
(Nested) case-control study	36	207	95%
Cross-sectional study	17	152	89%
Non-comparative study (e.g. case report or case series)	22	249	91%
Before-after study	41	257	82%
Interrupted time series (without comparison group)	45	221	83%

As a reference: 84-92% RCT included in CR of different topics have been found to be indexed in PubMed, according to:
- Halladay CW, et al. Using data sources beyond PubMed has a modest impact on the results… J Clin Epidemiol. 2015, 68(9):1076-84.
- Hartling L, et al. The contribution of databases to the results of systematic reviews… BMC Med Res Methodol. 2016, 16(1):127.
- Metzendorf MI, et al. Selective searching for high-quality health-related evidence syntheses… Poster. Global Evidence Summit, Sept 2017.

The following results emerge with respect to:

- Cochrane Review Groups: NRS are less likely to be available in PubMed for the following groups **Injuries, Public Health, Infectious Diseases, Developmental, Psychosocial and Learning Problems, Drugs and Alcohol**.
- Type of intervention: NRS are less likely to be available in PubMed for **environmental and health policy interventions**. NRS are very likely to be available in PubMed for **clinical**, **pharmaceutical** and **vaccination interventions**.
- Study designs: NRS which are less likely to be available in PubMed are **before and after studies** (with and without comparison group) and **interrupted time series** (with and without comparison group). NRS which are very likely to be available in PubMed: **cohort** and **case-control studies**.

Conclusion

The availability of NRS included in Cochrane Reviews in the bibliographic database PubMed is relatively good. There are some exceptions to this with respect to topic (Cochrane Review Group), intervention type, and specific study design (detailed above). In these cases, we recommend to place special emphasis on searching multiple databases sources.

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