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## Protocol for a systematic review of the effects of interventions to inform or educate caregivers about childhood vaccination in low and middle-income countries

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**Protocol for a systematic review of the effects of interventions to inform or educate caregivers about childhood vaccination in low and middle-income countries**

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## Abstract

**Introduction:** Despite their proven effectiveness in reducing childhood infectious diseases, the uptake of vaccines remains suboptimal in low and middle-income countries. Identifying strategies for transmitting accurate vaccine information to caregivers would boost childhood vaccination coverage in these countries. The purpose of this review is to assess the effects on childhood vaccination coverage of interventions for informing or educating caregivers about the importance of vaccines in low and middle-income countries.

**Methods and analysis:** Eligible study designs include both randomised controlled trials and non-randomised controlled trials. The latter are studies that allocated participants to interventions by non-random methods like alternation or use of birth dates. We will conduct a comprehensive search of both peer-reviewed and grey literature, available by 31 January 2015. We will search PubMed, Scopus, Cochrane Central Register of Controlled Trials, Web of Science, Cumulative Index of Nursing and Allied Health, prospective trial registries, and reference lists of relevant publications. Two authors will independently screen the search output, retrieve full texts of potentially eligible studies, and assess the latter against the pre-defined inclusion criteria. Disagreements between the two authors will be resolved through consensus and arbitration by the third author. We will pool data from clinically homogenous studies; defined by participants, interventions, and outcomes. We will assess statistical heterogeneity using the chi-square test of homogeneity (with significance defined at the 10% alpha-level) and quantify it using Higgins' inconsistency index.

**Ethics and dissemination:** The proposed systematic review will collect and analyse secondary data which are not associated with individuals. The review will make a significant contribution to the knowledge base of interventions for improving childhood vaccination coverage in low and middle-income countries.

**Protocol registration number:** PROSPERO, CRD42014010141

**Keywords:** Information, education, parents, caregivers, childhood vaccination, low and middle-income countries

## Strengths and limitations of the study

**Strengths:** This study will contribute to strengthen the evidence base on effective interventions for improving immunisation coverage in resource-constrained settings. We will use the GRADE system to ascertain the strength of the evidence base for each outcome.

**Limitations:** We will include non-randomised trials, which are prone to have a high risk of bias and are likely to produce evidence of low certainty. To mitigate this risk, we plan to conduct sensitivity analyses to assess the robustness of the findings to risk of bias; by excluding studies with a high risk of bias.

## Introduction

The use of vaccines during childhood has been one of the most effective public health interventions for combating infectious diseases.<sup>1</sup> Vaccination is vital not only in averting infections, it also mitigates the severity of disease and prevents some cancers (for example, cancers of the cervix and liver).<sup>2</sup> The Expanded Programme on Immunisation (EPI), established in 1974 by the World Health Organization (WHO), has greatly reduced the global burden of poliomyelitis, measles, tetanus, viral hepatitis B, diphtheria, and other diseases.<sup>3</sup> However, vaccination coverage remains low in many low and middle-income countries (LMICs). As a consequence, millions of children in such countries still die from diseases that could have been prevented with vaccines.<sup>2</sup> Low immunisation coverage in LMICs has been attributed to several reasons, including family characteristics, parental attitudes and knowledge, and inadequate information and communication.<sup>4</sup> In particular, poor understanding of vaccines and vaccination schedules is associated with low immunisation coverage in LMICs.<sup>5</sup>

A randomised controlled trial has suggested that caregiver concerns regarding childhood vaccines may be due to conflicting information parents receive about the safety and risks of vaccines.<sup>7</sup> Therefore, it is important that caregivers are directed to accurate information so that they can make informed decisions regarding childhood vaccinations.<sup>7</sup> The use of messages that address caregivers' concerns and beliefs may be an effective method for increasing compliance with vaccination schedules. Healthcare providers need strategies to successfully transfer vaccine-related information.<sup>8</sup> and to deal empathically and effectively with caregivers who have been exposed to anti-vaccination messages and question the need to vaccinate their children.<sup>9</sup>

Communication between and among providers and recipients of healthcare services has been highlighted as an emerging field of importance within the healthcare landscape.<sup>6</sup> Active engagement and effective communication between healthcare providers and recipients have been demonstrated as safe and efficient ways to improve a broad range of healthcare outcomes.<sup>10</sup> Informing and educating caregivers about the benefits of vaccination could empower them to undertake effective preventive health care in general, which in turn could increase vaccination coverage.<sup>11</sup> Therefore it is important to identify in LMICs relevant interventions for informing and educating caregivers about the importance of childhood vaccination. The purpose of this

review is to assess the effects of interventions to inform or educate caregivers about childhood vaccination in low and middle-income countries.

## Methods and analysis

The synopsis for this systematic review protocol is registered in the International Prospective Register of Systematic Reviews (<http://www.crd.york.ac.uk/PROSPERO>), registration number CRD42014010141.<sup>12</sup> We will include randomised controlled trials (RCTs), with randomisation at either individual or cluster level. For cluster RCTs, we will only include those with at least two intervention and two control clusters. In addition, we will include non-randomised controlled trials (non-RCTs), with allocation at either individual or cluster level. Non-RCTs are studies that allocated interventions by alternation between groups, by the use of birth dates or weekdays or by other non-random methods. For cluster non-RCTs, we will only include those with at least two intervention and two control clusters.

This review will focus on interventions to inform or educate caregivers about the importance of vaccination. These interventions may include information sessions, group classes, oral presentations, slide shows, seminars, workshops, printed materials (pamphlets, posters, and brochures), audio or video recordings, and one-on-one education. These interventions can be delivered either face-to-face, by mail (email, letters, or postcards), or through phone calls or mobile phone text messaging. Interventions aimed at reminding caregivers about vaccination sessions or recalling those who have missed vaccination visits are outside the scope of this review, and will be excluded. We will compare the information or educational interventions to no intervention, standard immunisation practices in the study setting, alternative interventions, or similar interventions implemented with different degrees of intensity. The participants of interest will be caregivers, defined as parents or other persons assuming the parental role, to whom information or education about vaccination is given. The primary outcome will be children vaccination status (as defined by the trial authors). Secondary outcomes include caregivers' knowledge of vaccination, caregivers' intention to vaccinate their children, caregivers' satisfaction with the intervention, and cost of the interventions.

We have developed a comprehensive search strategy for searching peer-reviewed and grey literature (Appendix 1). Sources of peer-reviewed literature to be searched include PubMed, Scopus, Cochrane Central Register of Controlled Trials (CENTRAL), ISI Web of Science (Science Citation Index), Cumulative Index of Nursing and Allied Health (CINAHL), and PDQ Evidence. We will include articles available by 31 January 2015. In addition, we will search for ongoing trials in the WHO International Clinical Trials Registry Platform and Clinicaltrials.gov, and check reference lists of relevant reviews and full-text articles assessed for eligibility.

Two review authors will independently screen the search outputs for potentially eligible studies. Full texts of potentially eligible studies will be retrieved and the two authors will independently assess them for eligibility against the study inclusion criteria. We will endeavour to translate potentially eligible studies published in languages other than English and French. Disagreements about the inclusion of studies will be resolved through discussion and consensus. If

disagreements are not resolved, a third author will arbitrate. Reasons for excluding potentially eligible studies will be provided.

Two authors will independently extract data using a pre-designed form and compare their results, resolving discrepancies by consensus and arbitration by a third author as required. In cases of missing or incomplete information in the included studies, we will contact study authors for further information. The two authors will independently assess the risk of bias in each included study using the following criteria: adequacy of random sequence generation and allocation concealment (for risk of selection bias); blinding of participants and personnel (for risk of performance bias); blinding of outcome assessors (for risk of detection bias); completeness of outcome data (for risk of attrition bias); and completeness of outcome reporting (for risk of reporting bias).

We will conduct data analysis using the latest version of the Cochrane Collaboration Review Manager statistical software (<http://ims.cochrane.org/RevMan>). Apart from cost of the intervention, the review outcomes are most likely to be reported as dichotomous data. We will express the results of each study, per dichotomous outcome, as a risk ratio and its 95% confidence intervals.<sup>13</sup> We will assess clinical heterogeneity by examining the homogeneity of participants, interventions, and outcomes among included studies; and pool data from studies judged to be clinically homogenous. Statistical heterogeneity in each meta-analysis will be assessed using the chi-squared test of homogeneity and quantified using the Higgins' I-squared statistic. We will define statistical heterogeneity at the 10% alpha level. If studies are clinically homogenous (in terms of study populations, interventions, and outcomes) and there is no significant statistical heterogeneity (i.e. heterogeneity  $P > 0.1$ ), we will pool the data across studies and estimate summary effect sizes using a fixed-effect model. If studies are clinically homogenous but there is significant statistical heterogeneity, we will pool data using the random-effects method; and assess the source of heterogeneity using subgroup analyses. We will conduct subgroup analysis only for the primary outcome (i.e. vaccination coverage), with subgroups defined by type of intervention (i.e. information or educational interventions). Sensitivity analyses will be performed to determine the robustness of the findings to study design (RCT versus non-RCT) and risk of bias (i.e. including and excluding studies with a high risk of bias); with emphasis on allocation concealment, blinded outcome assessment, and losses to follow-up (with a cut-off value of 25%).<sup>13</sup>

Ethics and dissemination

We did not seek ethical approval for this study because the data to be collected cannot be linked to individuals. The findings of the review will make a significant contribution to the knowledge base of interventions for improving childhood vaccination coverage in low and middle-income countries. The study will gather evidence on how vaccination information or education impacts childhood vaccine uptake. We anticipate that that this information will be useful to national and international stakeholders interested in improving the performance of childhood immunisation programmes in low and middle-income countries.



## Contributors

CSW conceived the study, LAL wrote the first draft of the manuscript, and all authors provided important intellectual input and approved the final version for publication.

## Competing interests

None

## Acknowledgements

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## APPENDICES

### Appendix 1. Search Strategies

#### PubMed

#7: (#5 OR #6)

#6: (#1 AND #2 AND #3) Filters: Randomized Controlled Trial

#5: (#1 AND #2 AND #3) Filters: Clinical Trial

#4: (#1 AND #2 AND #3)

#3: (Parent\* or Caregiver\* or guardian\* or Mother\*)

#2: (education\* or teaching or learning or instruction \* or training or skills)

#1: (Vaccination or immunization or immunisation or revaccination)

#### CENTRAL (Cochrane Central Register of Controlled Trails)

#1: (Vaccinat\* or Immuniz\* or Immunis\* or revaccinat\*):ti,ab,kw

#2: ( education\* or teaching or learning or instruction \* or training or skills)

#3: (#1 AND #2)

#### CINHAL

( vaccinat\* or Immuniz\* or Immunis\* or revaccinat\* ) AND ( education\* or teaching or learning or instruction \* or training or skills ) AND ( Parent or Caregiver or guardian or Mother)

#### ISI Web of Science (Science Citation Index)

#6: (#4 AND #5 )

#5: (randomis\* or randomiz\* or randomly      allocat\* or random allocat\*)

#4: (#3 AND #2 AND #1)

#3: (Parent or Caregiver or guardian or Mother)

#2: (education\* or teaching or learning or instruction \* or training or skills)

#1: (Vaccinat\* or Immuniz\* or Immunis\* or revaccinat\*)

PDQ EVIDENCE

(Vaccinat\* OR Immuniz\* OR Immunis\* OR revaccinat\*) AND (education\* OR teaching OR learning OR instruction \* OR training OR skills) AND (Parent OR Caregiver OR guardian OR Mother)

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\*Corresponding author

## Abstract

**Introduction:** Despite their proven effectiveness in reducing childhood infectious diseases, the uptake of vaccines remains suboptimal in low and middle-income countries. Identifying strategies for transmitting accurate vaccine information to caregivers would boost childhood vaccination coverage in these countries. The purpose of this review is to assess the effects on childhood vaccination coverage of interventions for informing or educating caregivers about the importance of vaccines in low and middle-income countries, as defined by the World Bank.

**Methods and analysis:** Eligible study designs include both randomised controlled trials (RCTs) and non-randomised controlled trials (non-RCTs). We will conduct a comprehensive search of both peer-reviewed and grey literature, available by 31 May 2015. We will search PubMed, Scopus, Cochrane Central Register of Controlled Trials, Web of Science, Cumulative Index of Nursing and Allied Health, prospective trial registries, and reference lists of relevant publications. Two authors will independently screen the search output, retrieve full texts of potentially eligible studies, and assess the latter against pre-defined inclusion criteria. Disagreements between the two authors will be resolved through consensus and arbitration by a third author. We will pool data from studies with homogenous interventions and outcomes, using random-effects meta-analysis. We will assess statistical heterogeneity using the chi-square test of homogeneity (with significance defined at the 10% alpha-level) and quantify it using Higgins' inconsistency index. We will explore the cause of any observed statistical heterogeneity using subgroup analysis, with subgroups defined by study design (RCTs versus non-RCTs) and type of intervention (information versus educational interventions).

**Ethics and dissemination:** The proposed systematic review will collect and analyse secondary data which are not associated with individuals. The review will make a significant contribution to the knowledge base of interventions for improving childhood vaccination coverage in low and middle-income countries.

**Protocol registration number:** PROSPERO, CRD42014010141

**Keywords:** Information, education, parents, caregivers, childhood vaccination, low and middle-income countries

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## Strengths and limitations of the study

**Strengths:** This study will contribute to strengthen the evidence base on effective interventions for improving immunisation coverage in resource-constrained settings. We will use the GRADE system to ascertain the strength of the evidence base for each outcome and report data in ‘Summary of Findings’ tables. We have written the protocol following the recently published PRISMA-P guidelines.

**Limitations:** We will include non-randomised trials, which are prone to have a high risk of bias and are likely to produce evidence of low certainty. To mitigate this risk, we plan to conduct sensitivity analyses to assess the robustness of the findings to risk of bias; by excluding studies with a high risk of bias.

## Introduction

The use of vaccines during childhood has been one of the most effective public health interventions for combating infectious diseases.<sup>1</sup> Vaccination is vital not only in averting infections, it also mitigates the severity of disease and prevents some cancers (for example, cancers of the cervix and liver).<sup>2</sup> The Expanded Programme on Immunisation (EPI), established in 1974 by the World Health Organization (WHO), has greatly reduced the global burden of poliomyelitis, measles, tetanus, viral hepatitis B, diphtheria, and other diseases.<sup>3</sup> However, vaccination coverage remains low in many low and middle-income countries (LMICs). As a consequence, millions of children in such countries still die from diseases that could have been prevented with vaccines.<sup>2</sup>

Low immunisation coverage in LMICs has been attributed to several reasons, including family characteristics, parental attitudes and knowledge, and inadequate information and communication.<sup>4</sup> In particular, poor understanding of vaccines and vaccination schedules is associated with low immunisation coverage in LMICs.<sup>5</sup> A randomised controlled trial has suggested that caregiver concerns regarding childhood vaccines may be due to conflicting information parents receive about the safety and risks of vaccines.<sup>6</sup> Therefore, it is important that caregivers are directed to accurate information so that they can make informed decisions regarding vaccination of their childhood.<sup>6</sup>

The use of messages that address caregivers’ concerns and false beliefs may be an effective method for increasing compliance with vaccination schedules. Healthcare providers need strategies to successfully transfer vaccine-related information<sup>7</sup> and to deal empathically and effectively with caregivers who have been exposed to anti-vaccination rumours and question the need to vaccinate their children.<sup>8</sup>

Communication between and among providers and recipients of healthcare services has been highlighted as an emerging field of importance within the healthcare landscape.<sup>9</sup> Active engagement and effective communication between healthcare providers and recipients are safe and efficient ways for improving a broad range of healthcare outcomes.<sup>10</sup> Informing and



educating caregivers about the benefits of vaccination could empower them to undertake effective preventive health care in general, which in turn could increase vaccination coverage.<sup>11</sup> Therefore, it is important to identify relevant interventions for informing and educating caregivers about the importance of childhood vaccination in LMICs.

The purpose of this review is to assess the effects on vaccination coverage of interventions to inform or educate caregivers about childhood vaccination in low and middle-income countries, compared to standard immunisation practices.

## Methods and analysis

The synopsis for this systematic review protocol is registered in the International Prospective Register of Systematic Reviews (<http://www.crd.york.ac.uk/PROSPERO>),<sup>12</sup> registration number CRD42014010141. We will include randomised controlled trials (RCTs), with randomisation at either individual or cluster level. For cluster RCTs, we will only include those with at least two intervention and two control clusters.

In addition, we will include non-randomised controlled trials (non-RCTs), with allocation at either individual or cluster level. Non-RCTs are studies that allocated interventions by alternation between groups, by the use of birth dates or weekdays or by other non-random methods. For cluster non-RCTs, we will only include those with at least two intervention and two control clusters. We will include only studies conducted in low and middle-income countries, as defined by the World Bank.<sup>13</sup>

This review will focus on interventions to inform or educate caregivers about the importance of vaccination. These interventions may include information sessions, group classes, oral presentations, slide shows, seminars, workshops, printed materials (pamphlets, posters, and brochures), audio or video recordings, and one-on-one education. These interventions can be delivered either face-to-face, by mail (email, letters, or postcards), or through phone calls or mobile phone text messaging. Interventions aimed at reminding caregivers about vaccination sessions for their children, or recalling caregivers who have missed vaccination visits, are outside the scope of this review and will be excluded. We will compare the information or educational interventions to no intervention, standard immunisation practices in the study setting, alternative interventions, or similar interventions implemented with different degrees of intensity.

The participants of interest will be caregivers (defined as parents, legal guardians, or other persons assuming the parental role) to whom information or education about vaccination is given.

The primary outcome will be children's vaccination status (as defined by the trial authors). Secondary outcomes include caregivers' knowledge of vaccination, caregivers' intention to vaccinate their children, caregivers' satisfaction with the intervention, and cost of the interventions.

We have developed a comprehensive search strategy for searching peer-reviewed and grey literature (See Appendix). Sources of peer-reviewed literature to be searched include PubMed,

Scopus, Cochrane Central Register of Controlled Trials (CENTRAL), ISI Web of Science (Science Citation Index), Cumulative Index of Nursing and Allied Health (CINAHL), and PDQ Evidence. In addition, we will search for ongoing trials in the WHO International Clinical Trials Registry Platform and Clinicaltrials.gov, and check reference lists of relevant reviews and full-text articles assessed for eligibility. We will include articles available by 31 May 2015.

Two review authors will independently screen the search outputs for potentially eligible studies. Full texts of potentially eligible studies will be retrieved and the two authors will independently assess them for eligibility against the study inclusion criteria. We will endeavour to translate potentially eligible studies published in languages other than English and French. Disagreements about the inclusion of studies will be resolved through discussion and consensus. If disagreements are not resolved, a third author will arbitrate. Reasons for excluding potentially eligible studies will be provided.

Two authors will independently extract data using a pre-designed pilot-tested data collection form and compare their results, resolving discrepancies by consensus and arbitration by a third author as required. The data to be extracted will include study design and methods, country setting (including income level as defined by the World Bank) and participant characteristics, intervention characteristics, study outcomes, and study funding sources. In cases of missing or incomplete information in the included studies, we will contact study authors for further information.

In multi-country studies involving both LMICs and high-income countries, we will only extract data from LMICs. However, if data are not reported by country income levels we will contact the study authors to request separate data for LMICs. If by the time the review is published we have not yet received such data, we will classify the studies as awaiting assessment; and endeavour to update the systematic review as soon as such data become available.

The two authors will independently assess the risk of bias in each included study using the following criteria: adequacy of random sequence generation and allocation concealment (for risk of selection bias); blinding of participants and personnel (for risk of performance bias); blinding of outcome assessors (for risk of detection bias); completeness of outcome data (for risk of attrition bias); and completeness of outcome reporting (for risk of reporting bias).<sup>14</sup> For each domain, we will classify the risk of bias as “low” if the criterion was adequately addressed, “unclear” if the information provided was not sufficient to make an informed judgement or “high” if the criterion was not adequately addressed.

We will then summarise the assessments and categorise the included studies into three levels of bias: low, moderate, and high risk of bias. Every study that is classified as low risk for all domains will be considered to be at low risk of bias. Any study that has a high risk of selection, detection or attrition bias will be categorised as having a high risk of bias. All other studies will be considered to have a moderate risk of bias.

We will conduct data analysis using the latest version of the Cochrane Collaboration Review Manager statistical software (<http://ims.cochrane.org/RevMan>). Apart from cost of the intervention, the review outcomes are most likely to be reported as dichotomous data. We will

express the results of each study as a risk ratio and its 95% confidence intervals (CI for dichotomous outcomes).<sup>14</sup>

We will pool the RRs and 95% CIs of studies with identical outcomes and interventions; using random-effects meta-analysis, because of anticipated heterogeneity of study designs and participants. We will include data from eligible cluster RCTs in relevant meta-analyses after controlling for the design effect, using the intra-cluster correlation coefficient (ICC) derived from the same or similar published cluster RCT.<sup>15,16</sup>

Statistical heterogeneity in each meta-analysis will be assessed using the chi-squared test of homogeneity and quantified using the Higgins' I-squared statistic. We will define statistical heterogeneity at the 10% alpha level; and assess the source of observed statistical heterogeneity using subgroup analyses.

We will conduct subgroup analysis only for the primary outcome (i.e. vaccination coverage), with subgroups defined by study design (RCTs versus non-RCTs) and type of intervention (information versus educational interventions). We have chosen each subgroup based on a specific hypothesis. Non-randomised studies are prone to selection bias and may over-estimate the efficacy of an intervention. Educational interventions (e.g. structured and interactive communication tools) may lead to a better understanding of the importance of immunisation by caregivers and thus be more effective at increasing vaccination coverage than passive provision of information.<sup>17</sup>

We will perform a sensitivity analysis to determine the robustness of the findings to risk of bias (i.e. including and excluding studies with a high risk of bias); with emphasis on allocation concealment, blinded outcome assessment, and losses to follow-up (with a cut-off value of 25%).<sup>18</sup>

We plan to use funnel plots to assess the possibility of publication bias across studies for every meta-analysis involving 10 or more studies.<sup>16</sup> Publication bias leads to funnel plot asymmetry; but when there are fewer than 10 studies in a meta-analysis, funnel plot tests are unreliable in differentiating between real asymmetry and the play of chance. Other causes of funnel plot asymmetry include delayed-publication bias, location bias, selective outcome reporting, poor methodological design, inadequate analysis, and fraud.<sup>16</sup>

We will use the GRADE approach to assess the certainty of the evidence for each outcome,<sup>19</sup> and present data in forest plots and "Summary of Findings" tables.<sup>20</sup> We have written this protocol following the recently released PRISMA-P guidelines,<sup>21</sup> and will report the review according to the PRISMA statement; including any available revisions or extended guidance.<sup>22,23</sup>

## Ethics and dissemination

We did not seek ethical approval for this study because the data to be collected cannot be linked to individuals. The findings of the review will make a significant contribution to the knowledge base of interventions for improving childhood vaccination coverage in low and middle-income countries. The study will gather evidence on how vaccination information or education impacts childhood vaccine uptake. We anticipate that that this information will be useful to national and international stakeholders interested in improving the performance of childhood immunisation programmes in low and middle-income countries.

**Contributors**

LA Lukusa led the development of the protocol, wrote the first draft, coordinated and integrated comments from co-authors, approved the final version for publication, and is the guarantor of the manuscript. NN Mbeye critically revised successive drafts of the manuscript, provided important intellectual input, and approved the final version for publication. FB Adeniyi critically revised successive drafts of the manuscript and approved the final version for publication. CS Wiysonge conceived the study, provided supervision and mentorship to LA Lukusa, critically revised successive drafts of the manuscript, provided important intellectual input, and approved the final version for publication.

**Competing interests**

None

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## APPENDIX

### Search strategy for PubMed

#7: (#5 OR #6)

#6: (#1 AND #2 AND #3) Filters: Randomized Controlled Trial

#5: (#1 AND #2 AND #3) Filters: Clinical Trial

#4: (#1 AND #2 AND #3)

#3: (Parent\* or Caregiver\* or guardian\* or Mother\*)

#2: (education\* or teaching or learning or instruction \* or training or skills)

#1: (Vaccination or immunization or immunisation or revaccination)

### Search strategy for CENTRAL (Cochrane Central Register of Controlled Trails)

#1: (Vaccinat\* or Immuniz\* or Immunis\* or revaccinat\*):ti,ab,kw

#2: ( education\* or teaching or learning or instruction \* or training or skills)

#3: (#1 AND #2)

### Search strategy for CINHALL

( vaccinat\* or Immuniz\* or Immunis\* or revaccinat\* ) AND ( education\* or teaching or learning or instruction \* or training or skills ) AND ( Parent or Caregiver or guardian or Mother)

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**Search strategy for ISI Web of Science (Science Citation Index)**

#6: (#4 AND #5 )

#5: (randomis\* or randomiz\* or randomly      allocat\* or random allocat\*)

#4: (#3 AND #2 AND #1)

#3: (Parent or Caregiver or guardian or Mother)

#2: (education\* or teaching or learning or instruction \* or training or skills)

#1: (Vaccinat\* or Immuniz\* or Immunis\* or revaccinat\*)

**Search strategy for PDQ EVIDENCE**

(Vaccinat\* OR Immuniz\* OR Immunis\* OR revaccinat\*) AND (education\* OR teaching OR learning OR instruction \* OR training OR skills) AND (Parent OR Caregiver OR guardian OR Mother)

**PRISMA-P (preferred reporting items for systematic review and meta-analysis protocols) 2015 checklist: recommended items to address in a systematic review protocol**

Section and topic	Item No	Checklist item	Page No
<b>Administrative information</b>			
<b>Title:</b>			
Identification	1a	Identify the report as a protocol of a systematic review	1
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	N/A
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number	2 & 4
<b>Authors:</b>			
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	1
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	7
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	N/A
<b>Support:</b>			
Sources	5a	Indicate sources of financial or other support for the review	7
Sponsor	5b	Provide name for the review funder and/or sponsor	7
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	7
<b>Introduction</b>			
Rationale	6	Describe the rationale for the review in the context of what is already known	3-4
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	4
<b>Methods</b>			
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	4
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	4-5
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	Appendix
<b>Study records</b>			
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	5
Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	5
Data collection process	11c	Describe planned method of extracting data from reports	5

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		(such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	5
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	4
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	5
Data synthesis	15a	Describe criteria under which study data will be quantitatively synthesised	5-6
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as $I^2$ , Kendall's $\tau$ )	6
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	6
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	N/A
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	6
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	6