

A Protocol for a Systematic Review of the Effectiveness of Interprofessional Education Interventions in Pre-Licensure Health Professions Education

Mohammad Azzam (✉ mazzam3@uwo.ca)

University of Western Ontario: Western University <https://orcid.org/0000-0002-6473-8747>

Anton Puvirajah

Western University

Protocol

Keywords: Interprofessional education, interprofessional collaborative practice, pre-licensure education, systematic review

Posted Date: February 1st, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-177760/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background: A growing body of research demonstrates that interprofessional education (IPE) has the potential to lead to successful interprofessional collaborative practice (IPCP). In turn, IPCP has potential to mitigate the negative effects associated with an underfunded and shrinking healthcare workforce and population growth. Nonetheless, over the past decade, there has been a lack of systematic reviews that have examined the effectiveness of IPE in preparing pre-licensure health professions students for IPCP. The purpose of this paper is to provide a protocol for a systematic review that will explore and identify (1) whether IPE interventions in the past decade have addressed the shortcomings of past interventions, (2) the effectiveness of recent IPE in preparing students for IPCP, and (3) current knowledge gaps within the field.

Methods: We used the Cochrane Collaboration and the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) guidelines to articulate this protocol. Furthermore, we used the Population, Intervention, Comparison, Outcomes, and Study Design (PICOS) framework to formulate our research questions, “What are the major trends and findings of IPE implementation studies conducted over the last decade (2010–2020)?” and “How do the trends and findings of IPE studies conducted over the last decade compare with IPE studies in the decade prior?”

Discussion: The systematic review is ongoing. We expect to complete it by September 2021. This systematic review will provide a useful synthesis of best practices in the implementation of IPE between 2010 and 2020 as well as their effectiveness in preparing health professions students for IPCP.

Systematic review registration: We submitted this protocol with PROSPERO on January 19th, 2021.

Background

According to the World Health Organization (WHO, 2006), healthcare systems worldwide have been struggling to adequately meet the needs of their patient populations, mainly due to underfunded and shrinking healthcare workforce (WHO, 2006, 2010) and population growth (Van Bavel, 2013). Interprofessional education (IPE) and interprofessional collaborative practice (IPCP) have been proven to mitigate these effects with aim of providing high quality healthcare and best possible individual health outcomes (Hammick et al., 2007; Lemieux-Charles & McGuire, 2006; Zwarenstein et al., 2005). As such, the WHO (2010) has been promoting IPE, which occurs when “two or more [health] professions learn about, from and with each other to enable effective collaboration and improve health outcomes,” (p. 13), whereby the implementation of IPE is “a key step in moving health systems from fragmentation to a position of strength” (p. 10).

Several previously published systematic reviews (e.g., Abu-Rish et al., 2012; Lapkin et al., 2013; Zhang et al., 2011) have examined and provided valuable syntheses of IPE implementation from a total of 117 studies that were collectively conducted over more than a decade; between 1999 and 2011. These reviews, which are discussed in more detail below, outlined several shortcomings as well as offered

explicit recommendations for future research and practice. One decade later, many questions regarding the status quo of IPE implementation remain unanswered, including but not limited to: What are the IPE-relevant best practices in preparing pre-licensure health professions students for IPCP upon graduation? What theoretical and conceptual frameworks have been employed to guide the implementation of IPE? Have IPE facilitators developed interventions that mandate participation of students from various health professions whereby long-term outcomes are assessed? Have IPE interventions been enhanced to include various health professions? In addition to the widely investigated short-term student learning outcomes, have IPE interventions been evolved to emphasize long-term programmatic, patient-oriented, and facilitator-oriented outcomes, as well?

The purpose of this paper is to provide a protocol for a forthcoming systematic review of relevant literature published between January 1st, 2010 and December 31st, 2020. In so doing, we will attempt to seek answers to the questions presented above. Answering these questions through research-informed undertakings is important to understand the effectiveness of IPE and identifying the best practices that lead to IPCP, and eventually to improved health systems and individual health outcomes (Hammick et al., 2007; Lemieux-Charles & McGuire, 2006; Zwarenstein et al., 2005).

Methods

This protocol is informed by the elements of the Cochrane Collaboration (Higgins et al., 2019), which divides the general methods for conducting systematic reviews into three main stages: (1) Preparatory Steps; (2) Search of the Literature; and (3) Analysis. Furthermore, we consulted the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) checklist (Moher et al., 2015) and its supplementary pedagogical “elaboration and explanation” document (Shamseer et al., 2015), which describe 17 items that should be included in any protocol (see Additional File 1 for the completed PRISMA-P checklist). The use of these resources in articulating this protocol ensures that we provide the rationale for the forthcoming systematic review (Moher et al., 2015) and fully report key findings consistently (Shamseer et al., 2015), establishes the review as a legitimate, independent research study, and reduces author bias (Gupta et al., 2018).

Preparatory Steps

Developing the Research Question. A well-formulated research question is critical for performing an effective literature search, defining the scope of the systematic review, and identifying the population of researchers, educators, and students to which the findings are most relevant (Gupta et al., 2018). Hence, using the parameters delineated in the “PICOS framework” (Liberati et al., 2009), we developed the following research questions, “What are the major trends and findings of IPE implementation studies conducted over the last decade (2010–2020)?” and “How do the trends and findings of IPE studies conducted over the last decade compare with IPE studies in the decade prior?”

Evaluating the Quality of the Systematic Review. Evaluating the quality of our review is two-fold (Gupta et al., 2018). First, the feasibility of the review must be assessed. As such, we confirm that the required

resources and expertise to conduct this are available, including the dedicated time commitment by the authors as well as the funding required for successful completion.

Second, the research must be significant to the field. Previously published systematic reviews (Abu-Rish et al., 2012; Lapkin et al., 2013; Zhang et al., 2011) have collectively examined a total of 117 studies that were conducted between 1999 and 2011. In so doing, these reviews have highlighted that most participants reported positive attitudes for IPE, enhanced understanding of interprofessional knowledge and skills, and increased appreciation for IPCP. Nonetheless, we describe below several shortcomings in the design, implementation, and evaluation of these interventions (1999–2011).

Lack of Theoretical Underpinnings. Most interventions prior to 2010 were not widely guided by neither guided nor supported by theoretical and conceptual frameworks. Furthermore, even when some researchers employed some form of framework to guide their interventions, they were only ambiguously described. The integration of theory and practice enables the effective development of IPE interventions, identifies the specific learning objectives, and facilitates the assessment of learning outcomes (Clark, 2006). Hence, it is crucial that IPE interventions are guided through theoretical or conceptual frameworks. These frameworks are usually instituted within social constructivist perspectives, through which researchers can interpret how student learning occurs within one's social environment, where social interactions during IPE interventions help shape each student's attitudes, beliefs, and skills, (Vygotsky, 1978), ultimately leading to students making meaning of their experiences (Creswell & Poth, 2018).

Lack of Research Rigour. Most interventions lacked rigour of their study design and methodology. One example is that many researchers relied solely on quantitative methods to implement their interventions and report their findings. Researchers within the IPE field are increasingly encouraged to employ qualitative or mixed methods approaches when implementing their interventions to enable them to report a wider array of critical findings. The fact that qualitative and quantitative approaches to research are inherently different indicates that each brings distinctive qualities to the research process; thus, we believe that both approaches can complement one another. While quantitative methods may be interested in the generalizability and outcomes of meaning-making by examining the functional relationships of operational variables, qualitative methods delineate the meaning-making process to provide rich, thick descriptions of how and why people make meaning of their experiences (Merriam & Tisdell, 2016). Indeed, "no single method can grasp the subtle variations in ongoing human experience," (Denzin & Lincoln, 2011, p. 12), where the interplay which results from the integration of both qualitative and quantitative approaches "can bring accounts of social phenomena to progressively greater levels of clarity," (Cupchik, 2001, para. 33). Other examples of inadequate research rigour include the use of small samples of convenience and the employ of post-test-only surveys.

Unrepresentative of All Health Professions. Most IPE interventions largely included medical and nursing students as major participants, with minimal participation from other health professions. For instance, Abu-Rish et al. (2012) reported that approximately two-thirds of the interventions they reviewed involved students from nursing and one other profession, where medicine dominates over all other professions.

Furthermore, Lapkin et al. (2013) and Zhang et al. (2011) also reported that in the interventions they each reviewed, approximately half included nursing and medical students alone. These findings indicate that, at the very least, the outcomes of more than half of all the interventions can neither necessarily be generalized to nor representative of all health professions.

Short-term Interventions with Potentially Temporary Effects. Interventions were predominantly short-lasting and, therefore, lacked evidence of the effectiveness of IPE in the long-term. For instance, Abu-Rish et al. (2012) demonstrated that approximately three-fifths of interventions were offered once, whereby the vast majority lasted for durations between 6 hours and one 12 weeks. These tendencies restrict the development of best practices that provide evidence for the long-term effectiveness of IPE in preparing health professions students for successful IPCP, leading to improved health outcomes. Thus, researchers are encouraged to implement longer-term interventions and to evaluate the outcomes of such interventions longitudinally (Lawn, 2016), even after participants have graduated and entered the healthcare workforce.

Exclusive Emphasis on Student Learning Outcomes. Interventions generally reported student learning outcomes including increased positive attitudes towards IPE, student satisfaction with IPE, and gains in proficiency of IPE-relevant skills and competencies. Nonetheless, most interventions failed to report outcomes other than those of student learning, such as programmatic, facilitator-oriented, and patient-oriented outcomes. Assessing these outcomes provides understandings of the perceptions of not just student participants, but of all the main stakeholders as well; thus, leading to enhanced design, delivery, and implementation of future IPE interventions.

Other shortcomings include the lack of administrative support, insufficient funding, inadequate faculty development, and logistical difficulties when scheduling interventions that include numerous health professions. Our review is relevant to the subject matter to the extent that it builds on these existing systematic reviews. We will attempt to reveal whether recent studies (2010–2020) have enhanced the implementation of IPE interventions, in part, by addressing the above-mentioned shortcomings. In so doing, we will determine how effective such interventions are in preparing health professions students for IPCP as well as identify potential best practices.

Establishing the Inclusion and Exclusion Criteria. Through working with an expert member of the Canadian Interprofessional Health Collaborative (CIHC), we established our inclusion and exclusion criteria. For feasibility purposes, we will exclude search results that were not peer-reviewed, were written in a language other than English, or were published prior to 2010.

The first of three inclusion criteria mandates that the identified study must involve the health professions in a health education setting. In this study, we will examine the implementation of IPE worldwide; therefore, we adopted a universal definition for “health professionals,” which the WHO (2006) describes as “all people primarily engaged in actions with the primary intent of enhancing health” (p. xvi). This definition encompasses not only those professions specialized in physical health, but those specialized in mental and social health, dental health, and ocular health, as well.

Furthermore, we will focus on pre-licensure education, as opposed to both pre-licensure and post-licensure education. Therefore, the second inclusion criterion is that the study must involve pre-licensure health professions students. In North America, pre-licensure education in the health professions occurs at both the undergraduate level (e.g., as is in medicine, nursing, and social work) and the graduate level (e.g., physical therapy, occupational therapy, and pharmacy).

Lastly, the study must describe an interprofessional intervention. IPE interventions may have diverse methodological approaches; as such, no restrictions for inclusion apply for either the type of study design or the presence (or lack thereof) of comparison groups. Furthermore, in accordance with the WHO's (2010) definition of "interprofessional education," an intervention must involve students from "two or more [health] professions," whereby the outcomes of students learning "about, from and with each other" (p. 13) are reported. Hence, all types of systematic reviews (including scoping and meta-analyses), articles describing IPE-relevant curricula, abstracts, and instrument validation studies will be excluded.

Registering the Review. Registration of the review mitigates unnecessary duplication of studies, increases transparency, and reduces bias (Gupta et al., 2018). This protocol has also been submitted for registration with the International Prospective Register of Systematic Reviews (PROSPERO) on January 19th, 2021.

Search of the Literature

Selecting the Databases. We consulted with two academic librarians with expertise in systematic review searching from the Teaching and Learning Team at our institution to help us identify the databases for the search processes. With their guidance, we selected four electronic databases: (1) Cumulative Index to Nursing and Allied Health Literature (CINAHL); (2) the Education Resources Information Center (ERIC); (3) PubMed; and (4) Scopus. These databases were chosen because they offer a wide array of studies in health and health education.

Conducting and Evaluating the Quality of the Search. With the librarians' guidance, we generated the appropriate search terms using the established inclusion criteria in preparation for completing the search of the electronic databases. The generic search strategy is presented in Table 1 (see Additional File 2 for the search strategy on CINAHL). We consulted with the librarians and successfully conducted an evaluation of the search strategy. We have yet to filter the studies—the next stage in our systematic review.

Table 1
<i>General Search Terms for Search of Databases</i>
1. (“interprofession*” OR “inter-profession*” OR “health profession*” OR “health occupat*” OR “healthcare profession*” OR “health care profession*” OR “health and social care profession*”) AND
2. (“education” OR “collaborat*” OR “collaborat* practice” OR “teamwork*” OR “practice”) AND
3. (“implement*” OR “simulat*” OR “workshop*” OR “interven*”)

Filtering the Studies. Following the database search, identified articles will be uploaded onto Covidence (Veritas Health Innovation Ltd, 2021) to be filtered according to the modified PRISMA flowchart (Moher et al., 2009) illustrated in Fig. 1. Once duplicates are removed, we will independently filter the studies according to the inclusion and exclusion criteria. Initial screening and evaluation of the titles and abstracts will be followed by an evaluation of the full texts of the remaining studies. Finally, we will compare our results and resolve any disagreements by discussion until consensus is reached and if necessary, have a third researcher adjudicate the final judgement.

Analysis

Extracting the Data. We will extract and tabulate the data on Covidence (Veritas Health Innovation Ltd, 2021) in preparation for data analysis. We developed a data extraction checklist for documenting the major elements, attributes, and procedures reported in the included studies. Our checklist is comprised of a total of 44 items that we categorized into the following seven domains: (1) Details of Publication; (2) Study Profile; (3) Characteristics of Intervention; (4) Demographics of Students/Participants; (5) Demographics of Educators/Facilitators; (6) Methods and Procedures; and (7) Outcome Measures (Table 2).

Table 2

Data to be Extracted from Included Articles (As Applicable)

Details of Publication

- Title of article
-
- Name(s) of author(s)
-
- Year of publication
-

Study Profile

- Research purpose(s)
-
- Research approach
-
- Research design
-
- Theoretical and/or conceptual framework(s)
-
- Recruitment strategies of participants
-
- Strategies for faculty development
-
- Administrative support received for the study
-
- Limitations of the study
-
- Challenges encountered by the researchers
-
- Barriers encountered by the researchers
-

Characteristics of Intervention

- Jurisdiction/Regulatory authority/Country where study was conducted
-

- Institution(s) where intervention was conducted
-

- Health professions included
-

- Subject area for intervention conducted
-

- Year(s) when intervention was conducted
-

- Duration of intervention
-

- Frequency of intervention
-

- Educational strategies
-

- Description of intervention development
-

- Developers of intervention
-

- Incentives given to participants and facilitators
-

- Type of participation (mandatory vs. optional)
-

Demographics of Students/Participants

- Number of participants involved per health profession
-

- Age range, median age, and mean age of participants
-

- Sex/gender of participants
-

- Level and year of study of participants
-

Demographics of Educators/Facilitators

- Number of facilitators involved per health profession
-

- Roles and responsibilities of facilitators
-

- Qualifications of facilitators
-

- Age range, median age, and mean age of facilitators
-

- Sex/gender of facilitators
-

- Number of years of facilitators' experience
-

Methods and Procedures

- Instruments for data collection
-

- Evaluation of instruments for data collection
-

- Instruments for data analysis
-

- Types of analyses conducted
-

Outcome Measures

- Student learning outcomes
-

- Programmatic outcomes
-

- Patient-oriented outcomes
-

- Facilitator-oriented outcomes
-

Evaluating Quality of Included Studies. We will utilize the Mixed Methods Appraisal Tool (MMAT; Hong et al., 2018) to independently to evaluate the quality of the included studies. The MMAT is useful for assessing the quality of all research approaches including completely quantitative and qualitative studies as well as both randomized and non-randomized studies. The tool has been well-established, verified for reliability and content validity, and used in dozens of systematic reviews.

Evaluating the quality of each study using the MMAT involves several stages. Initially, we will respond with either “Yes” or “No” to two screening questions, (1) “Are there clear research questions?” and (2) “Do the collected data allow to address the research questions?” Then, we will respond to one of several sets of questions, depending on the type of research approach. If incomplete or discrepant data were reported for any given question, we will respond with “Can’t tell” and either consult the study protocol (if publicly available) or contact the study investigators for clarification using open-ended questions. We will resolve any disagreements by discussion until consensus is reached and if necessary, have a third researcher adjudicate the final judgement. Then, we will provide a detailed presentation of our evaluation, possibly perform a sensitivity analysis, and report findings in publication. Lastly, we will assess the strength of the body of evidence using the Grading of Recommendations, Assessment, Development, and Evaluations (GRADE) approach (Brozek et al., 2009).

Analysis and Synthesis. We expect the extracted studies to be heterogeneous and have methodological diversity in interventions, research approaches, instrumentation, and data collection and analysis. As such, undertaking a meta-analysis of the extracted studies is neither appropriate nor feasible within our review. Alternatively, guided by Ryan (2013) and Popay et al. (2006), we will use narrative synthesis to organize and present the data obtained from our review in responding to our research question. Our narrative synthesis will go beyond providing summaries and primary characteristics to include a comparative analysis of differences and similarities of extracted studies and the emergence of salient themes and patterns (e.g., design of the study, nature of study participants, characteristics of intervention, outcomes sought or measured, etc.). The narrative synthesis will also include an analysis of relationships within and between studies as well as their outcomes and the factors affecting those outcomes.

Discussion

The systematic review is ongoing. We are now in the process of conducting the search of electronic databases and expect to complete the review by September 2021. The key findings from this study will allow us to identify best practices of IPE implementation, as well as its effectiveness in health professions education programs and its impacts on IPCP. We will also scrutinize the strengths, weaknesses, and challenges of the included studies as well as the limitations of our systematic review itself. Furthermore, we will examine and compare our results with those of previously published reviews to identify whether included studies have addressed the IPE-relevant shortcomings since. Finally, we will discuss potential contradictory findings, recognize gaps in the literature, and offer recommendations for future research and practice.

List Of Abbreviations

WHO: World Health Organization (WHO)

IPE: Interprofessional education (IPE)

IPCP: Interprofessional collaborative practice (IPCP)

PRISMA-P: Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols

PICOS: Participants, Intervention, Comparison, Outcomes, and Study Design

CIHC: Canadian Interprofessional Health Collaborative

PROSPERO: International Prospective Register of Systematic Reviews

CINAHL: Cumulative Index to Nursing and Allied Health Literature

ERIC: Education Resources Information Center

MMAT: Mixed Methods Appraisal Tool

GRADE: Grading of Recommendations, Assessment, Development, and Evaluations

Declarations

Ethics Approval and Consent to Participate

Not applicable.

Consent for Publication

Not applicable.

Availability of Data and Materials

The search strategies of individual electronic databases for the current study are available from the corresponding author upon request.

Competing Interests

The authors declare that they have no competing interests.

Funding

Not applicable.

Authors' Contributions

MA is the guarantor and the corresponding author of this article. MA drafted the manuscript. Both authors contributed to the development of the inclusion and exclusion criteria, the search strategy, the data extraction criteria, and the strategy for the evaluation of included studies. AP provided statistical expertise. Both authors read, provided feedback, and approved the final manuscript.

Acknowledgements

We would like to thank librarians Denise Horoky and David Le Sauvage from Western Libraries for their guidance in the search methods and for reviewing the search strategy presented in this protocol. We would also like to thank Ruby Grymonpre from the CIHC for her expertise in the subject matter and assistance in establishing our inclusion and exclusion criteria.

References

Abu-Rish E, Kim S, Choe L, Varpio L, Malik E, White AA, et al. Current trends in interprofessional education of health sciences students: a literature review. *Journal of Interprofessional Care*. 2012;26(6):444–51.

Brozek JL, Akl EA, Alonso-Coello P, Lang D, Jaeschke R, Williams JW, et al. Grading quality of evidence and strength of recommendations in clinical practice guidelines: part 1 of 3. An overview of the GRADE approach and grading quality of evidence about interventions. *Allergy*. 2009;64(5):669–77.

Clark PG. What would a theory of interprofessional education look like? Some suggestions for developing a theoretical framework for teamwork training. *Journal of Interprofessional Care*. 2006;20(6):577–89.

Creswell JW, Poth CN. *Qualitative inquiry & research design: choosing among five approaches*. 4th ed. Los Angeles, CA: SAGE Publishing; 2018.

Cupchik G. Constructivist realism: an ontology that encompasses positivist and constructivist approaches to the social sciences. *Forum, Qualitative Social Research*. 2001;2(1).

Denzin N, Lincoln Y. Introduction: the discipline and practice of qualitative research. In: Denzin N, Lincoln Y, editors. *The Sage handbook of qualitative research*. 4th ed. Thousand Oaks, CA: SAGE Publishing; 2011. p. 1–19.

Gupta S, Rajiah P, Middlebrooks EH, Baruah D, Carter BW, Burton KR, et al. Systematic review of the literature: best practices. *Academic Radiology*. 2018;25(11):1481–90.

Hammick M, Freeth D, Koppel I, Reeves S, Barr H. A best evidence systematic review of interprofessional education: BEME Guide no. 9. *Medical Teacher*. 2007;29(8):735–51.

Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA, editors. *Cochrane handbook for systematic reviews of interventions*. 2nd ed. Chichester, UK: John Wiley & Sons; 2019.

Hong QN, Pluye P, Fàbregues S, Bartlett G, Boardman F, Cargo M, et al. Mixed methods appraisal tool (MMAT), version 2018. 1148552, 2018.

Lapkin S, Levett-Jones T, Gilligan C. A systematic review of the effectiveness of interprofessional education in health professional programs. *Nurse education today*. 2013;33(2):90–102.

- Lawn S. Moving the interprofessional education research agenda beyond the limits of evaluating student satisfaction. *Journal of research in interprofessional practice and education*. 2016;6(2).
- Lemieux-Charles L, McGuire WL. What do we know about health care team effectiveness? A review of the literature. *Medical Care Research and Review*. 2006;63(3):263–300.
- Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gøtzsche PC, Ioannidis JPA, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *Journal of clinical epidemiology*. 2009;62(10):1–34.
- Merriam SB, Tisdell EJ. *Qualitative research: a guide to design and implementation*. 4th ed. San Francisco, CA: Jossey-Bass; 2016.
- Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS medicine*. 2009;6(7):e1000097.
- Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic reviews*. 2015;4(1).
- Popay J, Roberts H, Sowden A, Petticrew M, Arai L, Rodgers M, et al. Guidance on the conduct of narrative synthesis in systematic reviews: a product from the ESRC Methods Programme. 2006. Available from: <https://doi.org/10.13140/2.1.1018.4643>
- Ryan R. Cochrane Consumers and Communication Review Group: data synthesis and analysis. Cochrane Consumers and Communication Review Group; 2013. Available from: <https://cccr.org/cochrane.org/sites/cccr.org/files/public/uploads/Analysis.pdf>
- Shamseer L, Moher D, Clarke M, Ghersi D, Liberati A, Petticrew M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. *BMJ*. 2015;349(g7647).
- Van Bavel J. The world population explosion: causes, backgrounds and projections for the future. *Facts, views & vision in ObGyn*. 2013;5(4):281–91.
- Veritas Health Innovation Ltd. Covidence. 2021. Available from: <https://www.covidence.org/>
- Vygotsky L. Interaction between learning and development. *Readings on the development of children*. 1978;23(3):34–41.
- World Health Organization. *The world health report 2006: working together for health*. 2006. Available from: https://www.who.int/whr/2006/whr06_en.pdf?ua=1

World Health Organization. Framework for action on interprofessional education & collaborative practice. 2010. Available from:

https://apps.who.int/iris/bitstream/handle/10665/70185/WHO_HRH_HPN_10.3_eng.pdf?sequence=1

Zhang C, Thompson S, Miller C. A review of simulation-based interprofessional education. *Clinical simulation in nursing*. 2011;7(4):117–26.

Zwarenstein M, Reeves S, Perrier L. Effectiveness of pre-licensure interprofessional education and post-licensure collaborative interventions. *Journal of interprofessional care*. 2005;19(1):148–65.

Figures

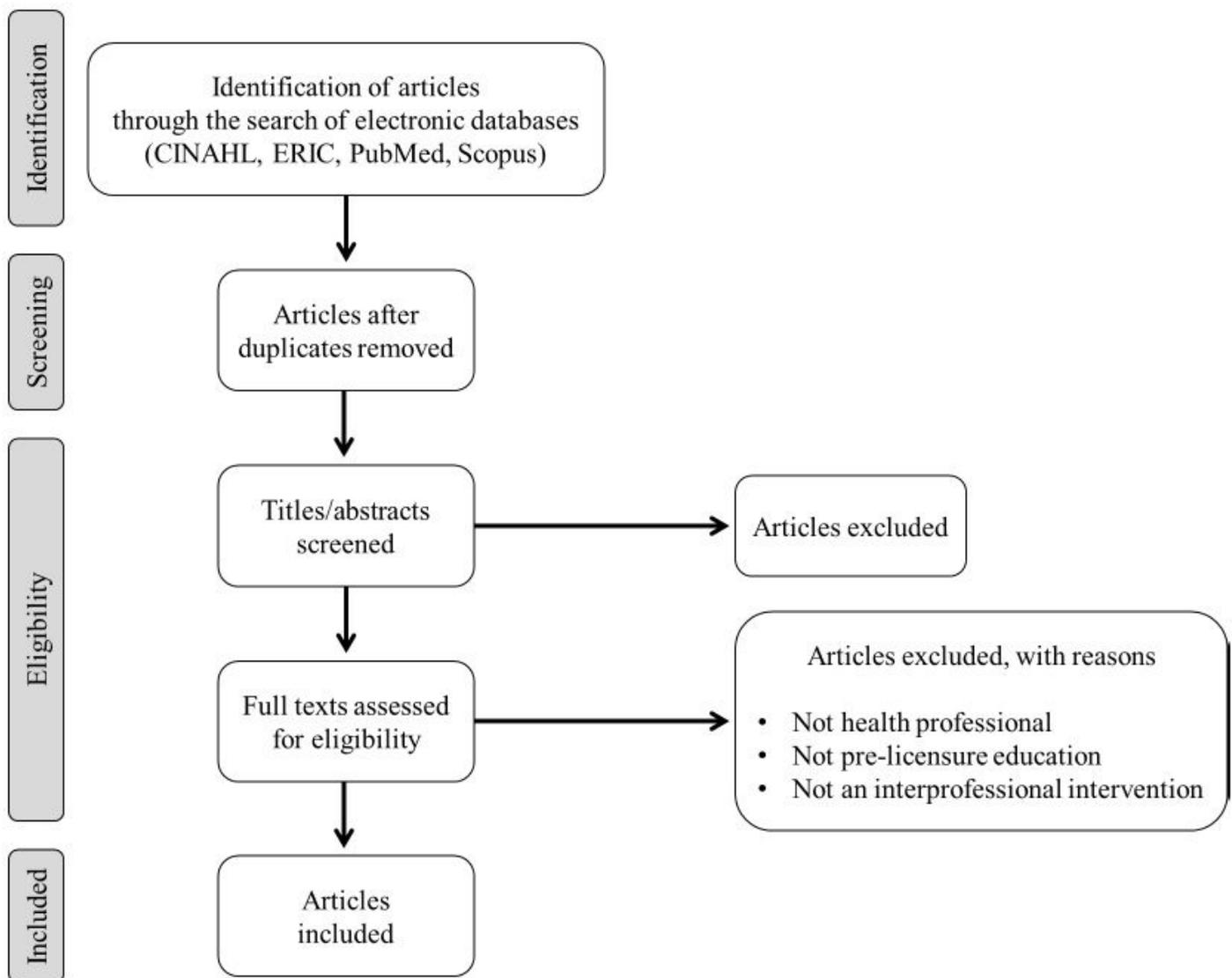


Figure 1

A PRISMA flowchart illustrating the filtration of studies. Adapted from Moher et al. (2009). Notes: CINAHL: Cumulative Index to Nursing and Allied Health Literature; ERIC: Education Resources Information Center.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [AdditionalFile1.docx](#)
- [AdditionalFile2.docx](#)