PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (http://bmjopen.bmj.com/site/about/resources/checklist.pdf) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

| TITLE (PROVISIONAL) | Identifying Requisite Learning Health System Competencies: A Scoping Review |
|---------------------|--------------------------------------------------------------------------|
| AUTHORS             | McDonald, Paige; Phillips, Jessica; Harwood, Kenneth; Maring, Joyce; van der Wees, Philip |

VERSION 1 – REVIEW

| REVIEWER           | Clemente, Fabrizio
|                   | National Research Council, Institute of Crystallography |
| REVIEW RETURNED    | 15-Feb-2022 |

GENERAL COMMENTS

The paper presents a scoping review on Learning Health Systems (LHS).
The theme is of interest of BMJ Open.
The scoping review scheme is described with rigour.
However, the paper presents a serious limitations and a large revision work is required
As from the authors, LHS concept is quite new. To this, the review starts from 2013.
The theme of LHS needs to be introduced in a deep description and the effectiveness in continuous improvement must be evidenced.
The description at page 5 lines 13-27 seems to be very poor.
A generic scheme of LHS must be described in terms of system and process point of view (resources, stakeholders, data flow, etc.). Moreover, authors must expose the generic concept of “learning” in health system.
Even the results seems to be of value the paper suffer the above-mentioned limitation.
In my opinion, a deep background of LHS to be connected to the results/discussion is required.

| REVIEWER           | Kriachkova, Lilia
|                   | Dnipropetrovsk Medical Academy (DMA), Social Medicine and Health Management |
| REVIEW RETURNED    | 17-Feb-2022 |

GENERAL COMMENTS

This article is devoted to the current scientific problem of Learning health systems (LHS) specifications.
However, the question arises whether it is appropriate to use the term competencies, which is highly associated with medical personnel and organizations, in the name and description of this issue. Moreover, the use of this terminology concerning patients raises some doubts since patients' needs are often studied, and health care systems work for the sake of improving their health. The authors' article choice speaks
for itself: only 3 articles concerning patient level were selected for the analysis (p. 10, lines 19-35).

Regarding health systems, the authors should refer to the health system framework provided by the World Health Organization (https://www.who.int/healthsystems/strategy/everybodys_business.pdf, Page 6), or at least take these into account in the discussion. It is also a reasonable thing to do because the authors agree on the necessity of international cooperation on the LHS construction path.

The article does not describe the statistical methods and the statistical software tools that were used to summarize and synthesize data. The article indicates that frequency analysis was used (page 9, lines 36-51). However, there are no descriptions of the statistical methods used, and the results (Figure 4) require further clarification and revision.

It would be worth using statistical methods when determining the opinions' consistency provided by the experts who carried out the Scoping Review.

It is stated that "A framework of competencies across levels of analysis was drafted representing their interactions" (page 4, lines 3-6; page 16, lines 52-53), but only a list of competencies is provided in Figure 5.

There is no conclusion in the text of the article.

Strengths and weaknesses require further improvement since all the limitations were not mentioned, for example, the fact that the authors studied only English language publications and others.

The numeration of the appendices is not comprehensible, as the first in the text is Appendix 3 (page 6, line 52).

It is necessary to correct the graphical representations of the data: for example, Figure 2 is called "Frequency of published articles", but the Y-axis is called "number of published articles".

It would also be advisable to expand the visualization through generalized tables with the analysis of the set of competencies according to different authors.

In References there are no DOIs of the articles, the content of Appendix 1 ("Additional auxiliary references") is not clear.

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**REVIEWER**

Eder, Patrick Andreas
Zentrum für Telemedizin Bad Kissingen, Innovation Management

**REVIEW RETURNED**

21-Feb-2022

**GENERAL COMMENTS**

First of all, I want to congratulate the authors of this well-written paper on a job well done. Overall, the manuscript is well written and has a clear message. Nevertheless, there are some point that need to be further clarified:

(1) On page 7 in the methods section, the results for selecting each item are listed. However, according to the recommendations of the PRISMA statement, these should be reported in the results section (Item 14). In the methods section please describe the process for selecting sources of evidence, not the results.

(2) In the methods, reference is made to the procedure of a thematic analysis. It is not clear which methodology was actually used here. Presumably, thematic coding was done according to Braun & Clarke, which would be advisable to cite in this case.

Virginia Braun & Victoria Clarke (2006) Using thematic analysis in psychology, Qualitative Research in Psychology, 3:2, 77-101
(3) "Patient and Public Involvement" section is redundant and can be omitted.

(4) The authors state in the results that in most cases the studies were published and performed in the United States. Please specify this statement to a clear number. This statement should also refer directly to Figure 3.

(5) On page 19, line 35 inadvertently has two "--" instead of one "-".

(6) The authors state that they also examined, among other things, the study design and methodology of the included articles. No data on this can be found in the manuscript or in the appendix. It would be helpful for the reader if a classification is made by the authors as to which study designs were included to generate the synthesis.

(7) The authors state in the PRISMA checklist that no critical appraisal within sources of evidence was performed. If applicable, the authors should state in the limitations why no appraisal was performed.

https://knowledgetranslation.net/wp-content/uploads/2019/05/PRISMA-ScR_TipSheet_Item16.pdf

(8) Authors should use the PRISMA flowchart for new systematic reviews which included searches of databases and registers only template whenever possible. This can be found at: http://www.prisma-statement.org/PRISMAStatement/FlowDiagram

VERSION 1 – AUTHOR RESPONSE

1 The theme of LHS needs to be introduced in a deep description

Moreover, authors must expose the generic concept of “learning” in health system

A generic scheme of LHS must be described in terms of system and process point of view (resources, stakeholders, data flow, etc.)

Thank you for this feedback. We have added additional details in background on conceptualization and definition of learning.

1 and the effectiveness (of LHS) in continuous improvement must be evidenced

Thank you we added a statement in the first paragraph to address this.
|   | a deep background of LHS to be connected to the results/discussion is required | Thank you for this feedback. We have added additional information in the introduction and background section and aligned to our discussion section. |
|---|---|---|
| 2 | However, the question arises whether it is appropriate to use the term competencies, which is highly associated with medical personnel and organizations, in the name | Thank you for sharing this concern. However, we feel that we have clearly defined the terminology in our paper and provided a rationale for our application of these terms. In addition, we have added information related to patient-centered care as a justification for our terminology. |
|   | and description of this issue. Moreover, the use of this terminology concerning patients raises some doubts since patients' needs are often studied, and health care systems work for the sake of improving their health. The authors' article choice speaks for itself: only 3 articles concerning patient level were selected for the analysis (p. 10, lines 19-35). |   |
| 2 | Regarding health systems, the authors should refer to the health system framework provided by the World Health Organization ([https://www.who.int/healthsystems/strategy/everybodys_business.pdf](https://www.who.int/healthsystems/strategy/everybodys_business.pdf), Page 6), or at least take these into account in the discussion. It is also a reasonable thing to do because the authors agree on the necessity of international cooperation on the LHS construction path. | Thank you for this feedback. We have addressed your suggestion in our discussion section. |
| 2 | The article does not describe the statistical methods and the statistical software tools that were used to summarize and synthesize data. The article indicates that frequency analysis was used (page 9, lines 36-51). However, there are no descriptions of the statistical methods used, and the results (Figure 4) require further clarification and revision. It would be worth using statistical methods when determining the opinions' consistency provided by the experts who carried out the Scoping Review. |
|---|---|
| 2 | It is stated that “A framework of competencies across levels of analysis was drafted representing their interactions” (page 4, lines 36; page 16, lines 52-53), but only a list of competencies is provided in Figure 5. |
| 2 | There is no conclusion in the text of the article. |
| 2 | Strengths and weaknesses require further improvement since all the limitations were not mentioned, for example, the fact that the authors studied only English language publications and others. |

Thank you for your comments. We did not use a statistical approach to analysis; rather, we used descriptive analysis based on the numerical count of articles. We have modified the wording in the manuscript to avoid confusion.

Thank you for the comment and we agree that graphic our does not present a framework that adds significantly to understanding of LHS competencies. We decided to eliminate the graphic from the manuscript.

Thank you we added a conclusion.

Thank you for your comments. We are limited in the number of strengths/limitations that we can list in this section, based on publication guidelines; however, we added two that correspond to our inclusion/exclusion criteria.
| 2 | The numeration of the appendices is not comprehensible, as the first in the text is Appendix 3 (page 6, line 52). | Thank you for your comment. The numeration of the appendices has been corrected. |
|---|---|---|
| 2 | It is necessary to correct the graphical representations of the data: for example, Figure 2 is called “Frequency of published articles”, but the Yaxis is called “number of published articles”. | Thank you for your comment. The titles of the figures have been corrected. |
| 2 | It would also be advisable to expand the visualization through generalized tables with the analysis of the set of competencies according to different authors. | Thank you for this comment. We have considered the various options for presenting this data and do not find that additional analysis would add value at this time. |
| 2 | In References there are no DOIs of the articles | We have added the DOIs that are available. |
| 2 | the content of Appendix 1 | Thank you for this feedback. |
| 3 | (“Additional auxiliary references”) is not clear. | We have removed this appendix (which would have been Appendix #3 in the revision). |
| 3 | (1) On page 7 in the methods section, the results for selecting each item are listed. However, according to the recommendations of the PRISMA statement, these should be reported in the results section (Item 14). In the methods section please describe the process for selecting sources of evidence, not the results. | Thank you for this feedback. We have moved this information to the appropriate section. |
(2) In the methods, reference is made to the procedure of a thematic analysis. It is not clear which methodology was actually used here. Presumably, thematic coding was done according to Braun & Clarke, which would be advisable to cite in this case.

Virginia Braun & Victoria Clarke (2006) Using thematic analysis in psychology, Qualitative Research in Psychology, 3:2, 77-101

Thank you for this feedback. We have added a citation to this section for Creswell (2014) that aligns to our process.

(3) "Patient and Public Involvement" section is redundant and can be omitted. ***Note from Editor - Please disregard this recommendation. The Patient and Public Involvement section is a requirement for BMJ Open***

Thank you we disregarded this comment per editor guidance.

(4) The authors state in the results that in most cases the studies were published and performed in the United States. Please specify this statement to a clear number. This statement should also refer directly to Figure 3.

Thank you for your suggestion. We have added the number of articles published in the US to the abstract.

(5) On page 19, line 35 inadvertently has two "--" instead of one "-".

Thank you for noting this error. It has been corrected.
|   |   |
|---|---|
| (6) The authors state that they also examined, among other things, the study design and methodology of the included articles. No data on this can be found in the manuscript or in the appendix. It would be helpful for the reader if a classification is made by the authors as to which study designs were included to generate the synthesis. |
|   | Thank you for this valuable feedback. We have removed reference to evaluation of study design and methodology as is consistent with a scoping review. |
| (7) The authors state in the PRISMA checklist that no critical appraisal within sources of evidence was performed. If applicable, the authors should state in the limitations why no appraisal was performed. |
|   | Thank you for this comment. A critical appraisal of sources of evidence was not performed because this is a scoping review not a systematic review. |
| (8) Authors should use the PRISMA flowchart for new systematic reviews which included searches of databases and registers only template whenever possible. This can be found at: http://www.prisma-statement.org/PRISMAStatement/FlowDiagram |
|   | Thank you for noting this; however, this is a scoping review, so we used the modified version of PRISMA that is solely for scoping reviews (PRISMA-SCr). We felt this was more applicable than using the PRISMA flowchart for systematic reviews. |
| REVIEWER | Kriachkova, Lilia  
|          | Dnipropetrovsk Medical Academy (DMA), Social Medicine and Health Management |
| REVIEW RETURNED | 02-May-2022 |
| GENERAL COMMENTS | Authors made corrections to the article. Most of the recommendations have been followed. |