

SHORT COMMUNICATION



An effective method to summarise the outcomes of questionnaire-based studies in systematic reviews

Nitesh Tewari^a , Shubhi Goel^a, Partha Halder^b , Vijay Prakash Mathur^a and Sukeshana Srivastav^a

^aPediatric & Preventive Dentistry Department, Centre for Dental Education and Research, All India Institute of Medical Sciences, New Delhi, India; ^bCentre for Community Medicine, All India Institute of Medical Sciences, New Delhi, India

ABSTRACT

With an increased number of questionnaire-based knowledge, attitude, practice and other types of studies, there is a need to perform evidence-based research in such designs as well. The systematic reviews (SR) and meta-analyses (MA) of the questionnaire-based studies are difficult to conduct and summarise due to the wide variations in the questions included in each of them. The presentation of these reviews often leads to ambiguous conclusions, and meta-analysis is not possible due to wide heterogeneity. This paper aims to highlight a method known as the 'Knowledge-Attitude-Practice' or 'KAP' Heat Map, which was developed and validated for the effective presentation of the outcomes of varied questionnaires in systematic reviews.

ARTICLE HISTORY

Received 8 December 2021
Revised 7 March 2022
Accepted 9 March 2022

KEYWORDS

Construct; VisualMap; systematic review; questionnaire studies; knowledge; attitude; practice

Introduction

Systematic reviews (SR) and meta-analyses (MA) are regarded as the highest level of evidence and aim to summarise the outcomes of primary research studies on the backdrop of their risk of bias and heterogeneity [1]. Originally devised to improve the clarity of a clinician's judgement towards an intervention, the SRs have evolved to include almost every domain of clinical research [1]. As a result, the most popular resource serving as the best practise guideline for SRs continues to be the Cochrane Collaboration Handbook [2]. The diversification of this field has led to the development of recommendations for conducting and assessing the risk of bias in non-randomised interventional studies, observational cohort and case-control studies, and even animal and in-vitro experiments [3].

Since the studies often have variability in study designs and questionnaires, conducting systematic reviews is challenging [4]. It is difficult to arrive at a conclusion, when questionnaires having different numbers of questions with variations in the phrasing have been used [4–6]. We also faced similar problems when our team started working on three systematic reviews assessing the global status of knowledge regarding prevention and emergency management of traumatic dental injuries among its stakeholders [7–9]. This short communication aims to highlight a method known as the 'Knowledge-Attitude-Practice' or 'KAP' Heat Map, which we developed and validated for the effective presentation and analysis of the outcomes of varied questionnaires in SRs.

The KAP heat map background work

After conducting the different steps of a systematic review according to the best practices of the evidence based medicine [2,10], the extracted data has to be tabulated to identify the questions in each questionnaire (Figure 1). They were recorded in separate columns along with the responses of the participants. Since we were trying to assess the knowledge of the stake holders, the percentage of the study subjects who replied in affirmation/gave the desirable response was also recorded for each question [7–9]. For the questions with multiple responses, all the answers can be recorded for each study. Once the data extraction has been completed and approved by the reviewers, the rows representing the author and year, along with the questions, are copied to another sheet, which now serves as a visual-map. This primary visual-map had 105 [7], 98 [8], and 76 [9] columns in three of our projects. The process of development of the questionnaires starts with thorough literature search and identifying the hypotheses. In many cases, questions in different studies address the same issues but with different phrasing. Such questions were considered to have the same 'question stem'. This was decided by consensus amongst an expert committee. The results of questions in different studies, but considered to have the same question stem, could then be combined in the KAP heat map. The last row of the visual map can be used to record the number of studies that include a question-stem (Figure 1). In our work, the three question matrices had 68 [7], 53 [8], and 42 [9] columns.

It is further important to decide the questions to be included in the 'KAP Heat Map'. The expert group decided

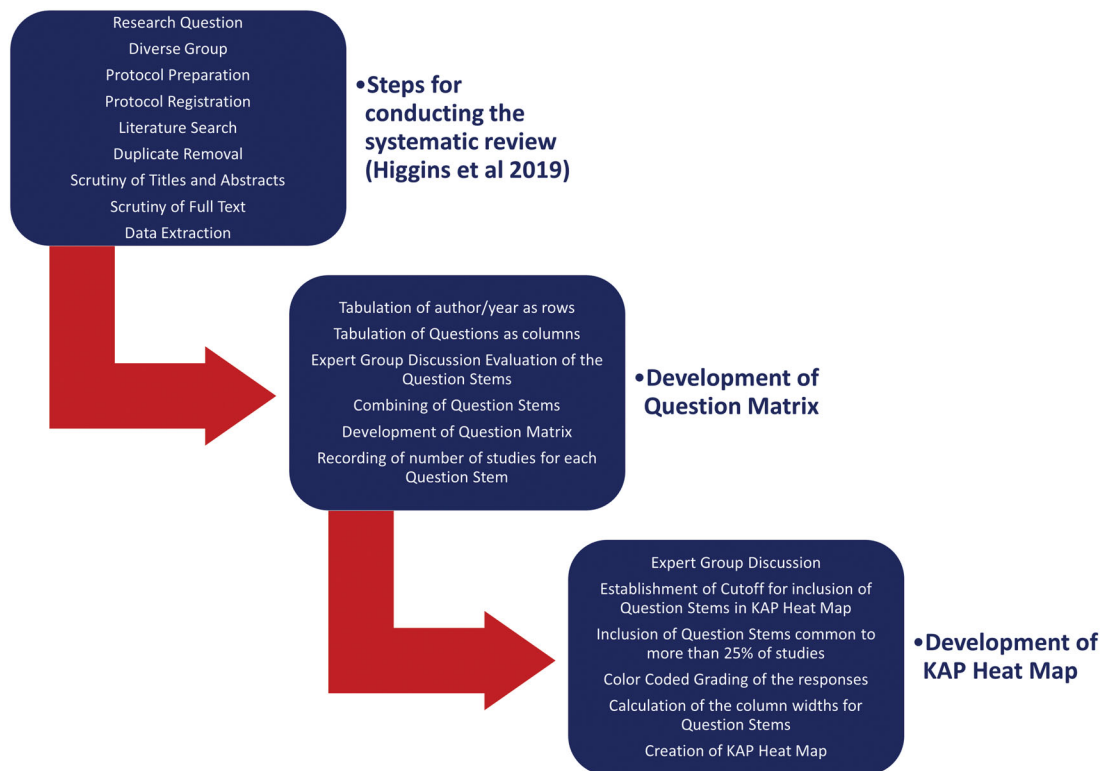


Figure 1. The flowchart describing the different stages of creation of KAP Heat Map.

that the question-stems common to more than 25% of the included studies or a minimum of three studies (whichever was more) could be compared and form the basis of the presentation. In our work, this resulted in 20 [7], 6 [8], and 6 [9] columns.

The KAP heat map

The KAP Heat Map has been named because of the multiple colours that depict the knowledge level and resemble the 'heat maps' used to illustrate 'gene expression' in molecular genetics. The visual map of MS Excel can be used to create a table in the MS PowerPoint software (Table 1). The rows and columns remain unchanged, while the width of a column can be adjusted to represent the number of studies that include a question stem. In our work, a constant of 1.5 mm was used to determine the column width for each stem [7–9]. Hence, the inclusion of a stem in three studies was represented by a column width of 4.5 mm. The colour codes were devised to depict non representation (blue), <25% correct/desirable responses (cream-shade), 25–50% (lemon-yellow shade), 51–75% (dark-yellow) and >75% (red). For the clarity of the presentations, the exact value of the responses was also mentioned in the coloured tiles (Figure 2) [7–9]. The questions with more than one response or piece of data can be presented by using a separate heat map without colours [11].

KAP-heat map in data presentation

The interpretation of this visual graphic is interesting. The presence of a large number of blue-coloured tiles represents

variability in question stems and a lack of the desired overlap of questions in the primary studies. This latter characteristic is also illustrated by the narrow columns of the map. The visible appreciation of red colour in the majority of the tiles reflects adequate responses/knowledge in the majority of the participants, while a large number of cream and lemon-yellow shades reflect poor/low levels. The KAP heat map can assist with the data presentation of a systematic review. A reviewer can use this graphic to explain the responses and later summarise the overall interpretation [7–9]. The heat map does not take into account the risk of bias in the primary studies, so the same can be discussed while describing its findings.

Discussion

The COVID-19 pandemic saw a considerable increase in the number of questionnaire-based studies being conducted and published. Perception, quality of life, and awareness studies play an important role in influencing health policies towards a domain of health sciences [5]. With a greater number of such studies in diverse areas, epidemiologists, community medicine experts, and policy makers will seek an evidence-based summary of the conclusions for a better understanding of the problems. Descriptive methods such as the KAP Heat Map can simplify the complexities of summing up multiple numbers of questionnaires [8]. This graphic has been developed according to the principles of qualitative research, establishing content validation and face validation. Content validity assesses whether a test is representative of all aspects of the issue under investigation. Face validity assesses whether a question subjectively addresses the issue

Table 1. The draft table for recording the questionnaire characteristics.

Author	Year	Type of assessment	Distribution	Language	Source	Number of questions	Type of questions	Validity of questionnaire	Reliability of questionnaire
[Author 1] ^{Citation}	XXXX	Knowledge	Telephonic	XXXXX1	Not Mentioned	XX	Objective	Content Validity by expert opinion, Pilot testing and Language validation	Internal consistency using Cronbach's alpha and Test-retest reliability using the Kappa coefficient
[Author 2] ^{Citation}	XXXX	Knowledge -Attitude	Not Mentioned	English and XXXXX1	Self-Designed	XX1	Objective and Subjective	Content Validity by expert opinion, Pilot testing and Language validation	Internal consistency using Cronbach's alpha
[Author 3] ^{Citation}	XXXX	Knowledge -Practice	Interview	XXXXX2	Not Mentioned	XX2	Objective	Content Validity	Internal consistency using Cronbach's alpha
[Author 4] ^{Citation}	XXXX	Knowledge -Attitude -Practice	E-mail/ electronic	XXXXX3	Previous Study with citation	XX3	Objective	Not Mentioned	Not Mentioned

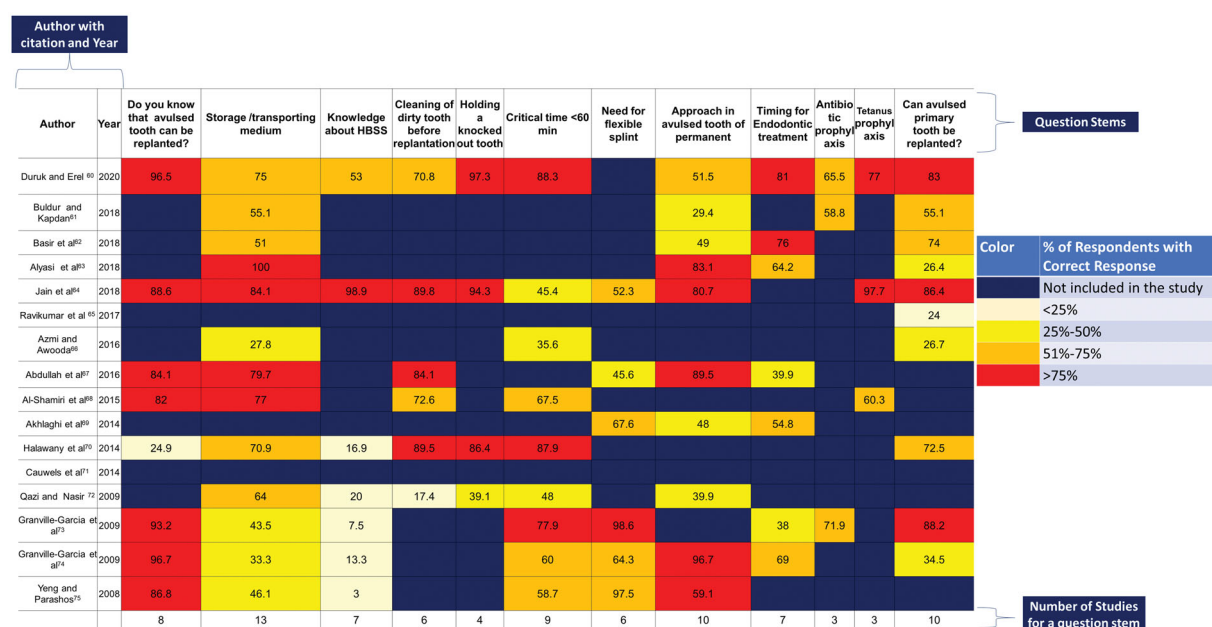


Figure 2. The KAP Heat Map and its features.

under investigation. Its efficacy has been proven in four projects till date where the data presentation could be performed concisely [7–9,11]. A visual evidence-map such as this follows a systematic approach to illustrate an issue, theme, or question [12]. They present the gaps in research and guide the researchers towards a more focussed, high-quality approach [12]. However, such maps were never used in EBM till 2002 and still lack scrutiny, reliability, and validation [12]. Miake-Lye et al. stressed the ambiguity in the way these visual evidence maps are reported [13]. Another limitation of this approach is the requirement for regular updates [12,13]. The KAP heat map is not a substitute for formal meta-analysis, which requires homogeneity, but is a useful way of graphically presenting the results of studies included in a systematic review. It also needs to be evaluated by reviewers and EBM experts in diverse fields of health

research. This was the reason our group envisaged writing this paper for a wider audience, beyond our specialty, so that a greater number of researchers would become aware of this strategy and use it in their domains.

Conclusion

The KAP Heat Map can be an effective way of combining the questions-stems reported in the diverse questionnaires of the primary studies and presenting them graphically in the systematic reviews of the questionnaire-based studies. It can further aid in the data presentation in the reviews.

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCIDNitesh Tewari  <http://orcid.org/0000-0002-6747-5110>Partha Halder  <http://orcid.org/0000-0002-4563-3675>**References**

- [1] Wormald R, Evans J. What makes systematic reviews systematic and why are they the highest level of evidence? *Ophthalmic Epidemiol.* 2018;25(1):27–30.
- [2] Higgins JPT, Thomas J, Chandler J, et al. *Cochrane handbook for systematic reviews of interventions.* 2019. version 6.0 ed [cited 2021 May 16]. <https://training.cochrane.org/handbook/current>.
- [3] Tewari N, Mathur VP, Kaur A, et al. Evidence mapping and quality assessment of systematic reviews in dental traumatology. *Dent Traumatol.* 2021;37(1):17–36.
- [4] Poudel P, Griffiths R, Wong VW, et al. Oral health knowledge, attitudes and care practices of people with diabetes: a systematic review. *BMC Public Health.* 2018;18(1):577.
- [5] Shelley A, Horner K. Questionnaire surveys - sources of error and implications for design, reporting and appraisal. *Br Dent J.* 2021; 230(4):251–258.
- [6] Lamidi-Sarumoh AA, Shohaimi S, Adam MB, et al. Systematic review of knowledge, attitude, and practices regarding dengue in Malaysia. *J App Pharm Sci.* 2018;8:80–91.
- [7] Tewari N, Sultan F, Mathur VP, et al. Global status of knowledge for prevention and emergency management of traumatic dental injuries in dental professionals: systematic review and meta-analysis. *Dent Traumatol.* 2021;37(2):161–176.
- [8] Tewari N, Goel S, Rahul M, et al. Global status of knowledge for prevention and emergency management of traumatic dental injuries among school teachers: a systematic review and meta-analysis. *Dent Traumatol.* 2020;36(6):568–583.
- [9] Tewari N, Johnson RM, Mathur VP, et al. Global status of knowledge for prevention and emergency management of traumatic dental injuries in sports persons and coaches: a systematic review. *Dent Traumatol.* 2021;37(2):196–207.
- [10] Liberati A, Altman DG, Tetzlaff J, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *PLOS Med.* 2009;6(7):e1000100.
- [11] Srivastav S, Duggal I, Duggal R, et al. Parental response to the feeding behavior problems in children with cleft lip and palate: a systematic review. *Spec Care Dentist.* 2021;41(5):559–571.
- [12] Snilstveit B, Vojtkova M, Bhavsar A, et al. Evidence & Gap Maps: a tool for promoting evidence informed policy and strategic research agendas. *J Clin Epidemiol.* 2016;79:120–129.
- [13] Miale-Lye IM, Hempel S, Shanman R, et al. What is an evidence map? A systematic review of published evidence maps and their definitions, methods, and products. *Syst Rev.* 2016;5:28.