Directed qualitative content analysis: The description and elaboration of its underpinning methods and data analysis process

Abstract

Background: Qualitative content analysis is consisted of conventional, directed and summative approaches for data analysis. They are used for the provision of descriptive knowledge and understandings of the phenomenon under study. However, the method underpinning directed qualitative content analysis is insufficiently delineated in international literature.

Aim: This paper aimed to describe and integrate the process of data analysis in directed qualitative content analysis.

Methods: Different international databases were used to retrieve articles related to directed qualitative content analysis. A review of literature led to the integration and elaboration of a stepwise method of data analysis for directed qualitative content analysis.

Findings: The proposed sixteen-step method of data analysis in this paper is a detailed description of analytical steps taken in directed qualitative content analysis that covers the current gap of knowledge in international literature regarding the practical process of data analysis. An example of the team members' motivation for cardiopulmonary resuscitation based on the Victor Vroom's expectancy theory was also presented.

Conclusion: The directed qualitative content analysis method proposed in this paper is a reliable, transparent and comprehensive method for qualitative researchers. It can increase the rigor of data analysis, make the comparison of the findings of different studies possible and yield practical results.

Keywords: qualitative content analysis, directed content analysis, deductive content analysis, qualitative research.

Introduction

Qualitative content analysis (QCA) is a research approach for the description and interpretation of textual data using the systematic process of coding. The final product of data analysis is the identification of categories, themes and patterns (Elo and Kyngäs, 2008; Hsieh and Shannon, 2005; Zhang and Wildemuth, 2009). Researchers in the field of healthcare commonly use QCA for data analysis (Berelson, 1952). QCA has been described and used in the first half of the 20th century (Schreier, 2014). The focus of QCA is the development of knowledge and understandings of the study phenomenon. QCA as the application of language and contextual clues for making meanings in the communication process requires a close review of the content gleaned from conducting interviews or observations (Downe-Wamboldt, 1992; Hsieh and Shannon, 2005).

QCA is classified to conventional (inductive), directed (deductive) and summative methods (Hsieh and Shannon, 2005; Mayring, 2000; Mayring, 2014). Inductive QCA as the most popular approach of data analysis helps with the development of theories, schematic models or conceptual frameworks (Elo and Kyngäs, 2008; Graneheim and Lundman, 2004; Vaismoradi et al., 2013, 2016), which should be refined, tested or further developed by using directed qualitative content analysis (Elo and Kyngäs, 2008). Directed qualitative content analysis is a common method of data analysis in healthcare research (Elo and Kyngäs, 2008), but insufficient knowledege is available about how this method is applied (Elo and Kyngäs, 2008; Hsieh and Shannon, 2005). This may hamper the use of directed qualitative content analysis by novice qualitative researchers and account for a low application of this method compared with the inductive method

(Elo and Kyngäs, 2008; Mayring, 2000). Therefore, this paper aimed to describe and integrate methods applied in directed qualitative content analysis.

Methods

International databases such as PubMed [including Medline], Scopus, Web of Science and ScienceDirect were searched for retrieving articles related to QCA and directed qualitative content analysis. The use of keywords such as 'directed content analysis', 'deductive content analysis' and 'qualitative content analysis' led to 13738 potentially eligible articles. Applying inclusion criteria such as 'focused on directed qualitative content analysis' and 'published in peer-reviewed journals', and removal of duplicates ended with 30 articles. However, only two of these articles dealt with the description of directed qualitative content analysis in terms of the methodological process. Ancestry and manual search within these 30 articles revealed the pioneers of description of this method in international literature. Therefore, more search on articles written and published by the method's pioneers led to 4 more articles and one monograph dealing with directed qualitative content analysis (Figure 1).

Lastly, the authors of this article integrated and elaborated a comprehensive and stepwise method of directed qualitative content analysis based on the commonalities of methods discussed in the included articles. Also, the experiences of the authors of this paper in the field of qualitative research were incorporated into the suggestion of a stepwise method of data analysis for directed qualitative content analysis (Table 1).

Findings

While the included articles about directed qualitative content analysis were the most cited ones in international literature, none of them provided sufficient details with regard to how conduct the data analysis process. This might hamper the use of this

method by novice qualitative researchers and hinder the application of this method by nurse researchers compared with inductive qualitative content analysis.

The methods suggested for directed qualitative content analysis in international literature

The method suggested by Hsieh and Shannon (2005)

Hsieh and Shannon (2005) developed two strategies for conducting directed qualitative content analysis. The first strategy was consisted of reading textual data and highlighting those parts of the text that, at the first impression, appeared to be related to the predetermined codes dictated by a theory or prior research finding. Next, the highlighted texts would be coded using the predetermined codes.

As for the second strategy, the only difference lied in starting the coding process without primarily highlighting the text. In both analysis strategies, the qualitative researcher should return to the text and perform reanalysis after the initial coding process (Hsieh and Shannon, 2005). However, the authors of this paper believe that this strategy provides an opportunity for recognizing missing texts related to the predetermined codes and also newly emerged ones. It also enhances the trustworthiness of findings.

As an important part of the method suggested by Hsieh and Shannon (2005), the term ‘code’ was used for the different levels of abstraction, but a more precise definition of this term seemed crucial. For instance, they stated that "data that cannot be coded are identified and analyzed later to determine if they represent a new category or a subcategory of an existing code." (p. 1282)

It seemed that the first word ‘code’ in the above sentence indicated the lowest level of abstraction, that could be achieved instantly from raw data. However, the word

‘code’ at the end of the sentence referred to a higher level of abstraction, because it represented a category or subcategory.

Furthermore, the interchangeable and inconsistent use of the words ‘predetermined code’ and ‘category’ could be confusing to novice qualitative researchers. Moreover, Hsieh and Shannon (2005) did not specify exactly which parts of the text whether highlighted, coded, or the whole text should be considered for the reanalysis of the text after the initial coding process. Such a lack of specification run the risk of missing the content during the initial coding process, especially if the second review of the text was restricted to highlighted sections. One final important omission in this method was a lack of an explicit description of the process through which newly codes during the reanalysis of the text were emerged. Such a clarification was crucial, because the detection of subtle links between newly emerging codes and the predetermined ones was not straightforward.

The method suggested by Elo and Kyngäs (2008)

Elo and Kyngäs (2008) suggested ‘structured’ and ‘unconstrained’ methods for directed qualitative content analysis. Accordingly, after determining the ‘categorization matrix’ as the framework for data collection and analysis during the study process, the whole content would be reviewed and coded. The use of the unconstrained matrix allowed the development of some categories inductively by using the steps of ‘grouping’, ‘categorization’ and ‘abstraction’. The use of a structured method required a structured matrix upon which data was strictly coded. Hypotheses suggested by previous studies often were tested using this method (Elo and Kyngäs, 2008).

The authors of this paper believe that the label of ‘data gathering by the content’ in the unconstrained matrix path can be misleading. It refers to the data coding step rather than data collection. Also, in the description of the structured method, there is an

obvious discrepancy with regard to the selection of the portions of the content that fits or does not fit the matrix. "...if the matrix is structured, only aspects that fit the matrix of analysis are chosen from the data…"; "… when using a structured matrix of analysis, it is possible to choose either only the aspects from the data that fit the categorization frame or, alternatively, to choose those that do not." (Elo and Kyngäs, 2008, p. 111-2).

Figure 1 in the Elo and Kyngäs's article (2008, p. 110) clearly distinguished between the structured and unconstrained methods. On the other hand, the first sentence in the above quotation clearly explained the use of structured matrix, but it was not clear whether the second sentence referred to the use of structured or unconstrained matrix.

The method suggested by Zhang and Wildemuth (2009)

Considering the method suggested by Hsieh and Shannon (2005), Zhang and Wildemuth (2009) suggested an eight-step method as follows: (i) preparation of data,(ii) definition of the unit of analysis, (iii) development of categories and the coding scheme, (iv) testing the coding scheme in a text sample, (v) coding the whole text, (vi) assessment of the coding's consistency, (vii) drawing conclusions from the coded data and (viii) reporting methods and findings (Zhang and Wildemuth, 2009). Only in the third step of this method as the description of the process of category development, Zhang and Wildemuth (2009) briefly made a distinction between the inductive versus deductive content analysis methods. On the first impression, the only difference between the two approaches seemed to be the origin from which categories were developed. In addition, the process of connecting the preliminary codes extracted from raw data with predetermined categories was not described. Furthermore, it was not clear whether this linking should be established from categories to primary codes or *vice versa*.

The method suggested by Mayring (2000, 2014)

Mayring (2000, 2014) suggested a seven-step method for directed qualitative content analysis that distinctively differentiated between inductive and deductive methods as follows: (i) determination of the research question and theoretical background, (ii) definition of the category system such as main categories and subcategories based on the previous theory and research, (iii) definition of the guidelines for coding considering definitions, anchor examples and coding rules, (iv) reading the whole text, determining preliminary codes, adding anchor examples and coding rules, (v) revision of the category and coding guideline after working through 10-50 percent of data, (vi) reworking data if needed or listing the final category and (vii) analyzing and interpreting based on the category frequencies and contingencies.

Mayring suggested that coding rules should be defined to distinctly assign the parts of the text to a particular category. Furthermore, indicating which concrete part of the text served as typical examples also known as 'anchor samples' and belonged to particular categories was recommended for describing each category (Mayring, 2000; Mayring, 2014). The authors of this paper believe that these suggestions help clarify directed qualitative content analysis and enhance trustworthiness.

While the term 'preliminary coding' was used, Mayring (2000, 2014) did not clearly express whether these codes were inductively or deductively created. In addition, Mayring was inclined to apply the quantitative approach implicitly in steps 5 and 7, which was incongruent with the qualitative paradigm. Furthermore, nothing was stated about the possibility of the development of new categories from the textual material: "…theoretical considerations can lead to a further categories or rephrasing of categories from previous studies, but the categories are not developed out of the text material like in inductive category formation ...." (Mayring, 2014, p. 97).

Integration and clarification of methods for directed qualitative content analysis

Directed qualitative content analysis took different paths when the categorization matrix contained concepts with higher level versus lower level abstractions. In matrices with low abstraction levels, linking raw data to pre-determined categories was not difficult, and suggested methods in international nursing literature seemed appropriate and helpful. For instance, Elo and Kyngäs (2008) introduced "mental well-being threats" based on the categories of 'dependence', 'worries', 'sadness' and 'guilt' (Elo and Kyngäs, 2008). Hsieh and Shannon (2005) developed the categories of 'denial', 'anger', 'bargaining', 'depression' and 'acceptance' when elucidated the stages of grief (Hsieh and Shannon, 2005). Therefore, the low level abstractions easily could link raw data to categories. The predicament of directed qualitative content analysis began when the categorization matrix contained the concepts with high levels of abstraction. The gap in the connection between highly abstracted categories and raw data should be bridged by using a transparent and comprehensive analysis strategy. Therefore, the authors of this paper integrated the methods for directed qualitative content analysis outlined in international literature and elaborated them using the phases of 'preparation', 'organization' and 'reporting' proposed by Elo and Kyngäs (2008). Also, the experiences of the authors of this paper in the field of qualitative research were incorporated into the suggestion of this stepwise method of data analysis. This suggested method was presented using the example of the team members' motivation for cardiopulmonary resuscitation (CPR) based on the Victor Vroom's expectancy theory. In this example, interview transcriptions were considered the unit of analysis, because interviews were the most common method of data collection in qualitative studies (Gill et al., 2008) .

Suggested method of directed qualitative content analysis by the authors of this paper

This method was consisted of 16 steps and three phase described below: preparation phase (steps 1-7), organization phase (steps 8-15) and reporting phase (step 16).

- The preparation phase

1. The acquisition of general skills

In the first step, qualitative researchers should develop skills including self-critical thinking, analytical abilities, continuous self-reflection, sensitive interpretive skills, creative thinking, scientific writing, data gathering and self-scrutiny (Elo et al., 2014). Furthermore, they should attain sufficient scientific and content-based mastery on the method chosen for directed qualitative content analysis.

In the proposed example, qualitative researchers can achieve this mastery through conducting investigations in original sources related to the Victor Vroom's expectancy theory. Main categories pertaining to the Victor Vroom's expectancy theory were ‘expectancy’, ‘instrumentality’ and ‘valence’. This theory defined ‘expectancy’ as the perceived probability that efforts could lead to good performance. ‘Instrumentality’ was the perceived probability that good performance led to desired outcomes. ‘Valence’ was the value that the individual personally placed on outcomes (Vroom, 1964; Vroom, 2005).

2. Selection of the appropriate sampling strategy

Qualitative researchers need to select the proper sampling strategies that facilitate an access to key informants on the study phenomenon (Elo et al., 2014). Sampling methods such as purposive, snowball and convenience methods (Coyne, 1997) are used with the consideration of maximum variations in terms of socio-demographic and phenomenal characteristics (Sandelowski, 1995). The sampling process ends when information ‘redundancy’ or ‘saturation’ is reached. In other words, it ends when all

aspects of the phenomenon under the study are explored in details and no additional data is revealed in subsequent interviews (Cleary et al., 2014).

In line with this example, nurses and physicians who were the members of the CPR team should be selected given diversity in variables including age, gender, the duration of work, number of CPR procedures, CPR in different patient groups and motivation levels for CPR.

3. Deciding on the analysis of manifest and/or latent content

Qualitative researchers decides whether the manifest and/or latent contents should be considered for analysis based on the study's aim. The *manifest content* is limited to the transcribed interview text, but *latent content* includes both the researchers' interpretations of available text and participants' silences, pauses, sighs, laughter, posture *etc* (Elo and Kyngäs, 2008). Both types of contents are recommended to be considered for data analysis, because a deep understanding of data is preferred for directed qualitative content analysis (Thomas and Magilvy, 2011).

4. Developing an interview guide

The interview guide contains open-ended questions based on the study's aims, followed by directed questions about main categories extracted from the existing theory or previous research (Hsieh and Shannon, 2005). Directed questions guide how to conduct interviews when using directed or conventional methods. The following open-ended and directed questions were used in this example:

An open-ended question was '*What is in your mind when you are called for performing CPR?'*

The directed question for the main category of 'expectancy' was '*How does the expectancy of the successful CPR procedure motivates you to resuscitate patients?'*

5. Conducting and transcribing interviews

An interview guide is used to conduct interviews for directed qualitative content analysis. After each interview session, the entire interview is transcribed *verbatim* immediately (Poland, 1995) and with utmost care (Seidman, 2013). For instance, two recorders should be used to ensure data backup (DiCicco-Bloom and Crabtree, 2006). More details can be found concerning skills required for conducting successful qualitative interviews (Edenborough, 2002; Kramer, 2011; Schostak, 2005; Seidman, 2013).

6. Specifying the unit of analysis

The unit of analysis may include the person, program, organization, class, community, state, country, interview and diary written by researchers (Graneheim and Lundman, 2004). The transcriptions of interviews are usually considered a unit of analysis when data is collected using interviews.

In this example, interview transcriptions and filed notes were considered the unit of analysis.

7. Immersion in data

The transcribed interviews are read and reviewed several times with the consideration of the following questions: *"Who is telling?" "Where is this happening?" "When did it happen?" "What is happening?" and "Why?"* (Elo and Kyngäs, 2008).

These questions help researchers get immersed in data and become able to extract related meanings (Elo et al., 2014; Elo and Kyngäs, 2008).

- The organization phase

8. Developing a formative categorization matrix

A formative matrix of main categories and related sub-categories is deductively derived from the existing theory or previous research (Mayring, 2000; Mayring, 2014). The prominent feature of this formative matrix is the derivation of main categories from

existing theory or previous research along with the potential emergence of new main categories through the inductive approach (Elo and Kyngäs, 2008).

In the provided example, the formative matrix was consisted of ‘expectancy’, ‘instrumentality’, ‘valence’ and other possible main categories developed as the result of an inductive qualitative content analysis study (Table 2).

9. Theoretical definition of the main categories and sub-categories

Derived from the existing theory or previous research, the theoretical definitions of categories should be accurate and objective (Mayring, 2000; Mayring, 2014). As for this example, ‘expectancy’ as a main category was defined as the subjective probability that the efforts by an individual led to an acceptable level of performance (effort–performance association) or led to the desired outcome (effort–outcome association) (Van Eerde and Thierry, 1996; Vroom, 1964).

10. Determination of the coding rules for main categories

The coding rules as the description of the properties of main categories are developed based on theoretical definitions (Mayring, 2014). The coding rule contributes to a clearer distinction between the main categories of the matrix thereby improves the trustworthiness of the study. For example, the following rules were extracted from the theoretical definition of ‘expectancy’ as the main category of this study example:

- Expectancy in the CPR was a subjective probability formed in the mind of the rescuer.
- This subjective probability should be related to the association between the effort–performance or effort–outcome relationship perceived by the rescuer.

11. The pre-testing of the categorization matrix

The categorization matrix should be tested using a pilot study. This is a required step particularly if more than one researcher is involved in the coding process. In this step, qualitative researchers should independently and tentatively encode the text and

discuss about difficulties in the use of the categorization matrix and differences in the interpretations of the unit of analysis. The categorization matrix may be further modified as a result of such discussions (Elo et al., 2014). This also can increase inter-coder reliability (Vaismoradi et al., 2013) and the trustworthiness of the study.

12. Choosing and specifying the anchor samples for each main category

An anchor sample is an explicit and concise exemplification or identifier of a main category selected from meaning units (Mayring, 2014). An anchor sample for 'expectancy' as the main category of this example was as follows: "… the patient with advanced metastatic cancer who requires CPR … I do not envision a successful resuscitation for him."

13. Performing the main data analysis

Meaning units related to the study's aims and categorization matrix should be selected from the reviewed content. Next, it is summarized (Graneheim and Lundman, 2004) and given preliminary codes (Mayring, 2000; Mayring, 2014) (Table 3).

14. The inductive abstraction of main categories from preliminary codes

Preliminary codes are grouped and categorized according to their meanings, similarities and differences. The products of this categorization process are known as 'generic categories' (Elo and Kyngäs, 2008) (Table 3).

15. The establishment of links between generic categories and main categories

The constant comparison of generic categories and main categories results in the development of a conceptual and logical link between generic and main categories, nesting generic categories into the pre-existed main categories and creating new main categories. The constant comparison technique is applied to data analysis throughout the study (Zhang and Wildemuth, 2009) (Table 3).

- The reporting phase

16. Reporting all steps of directed qualitative content analysis and findings

It includes the description of the details of data analysis and the enumeration of findings (Elo and Kyngäs, 2008). Findings should be systematically presented in a way that the association between the raw data and the categorization matrix is clearly found and easily followed. The detailed descriptions of the sampling process, data collection, analysis methods, and participants' characteristics should be presented. The trustworthiness criteria adopted along with the steps taken to fulfill these criteria should also be outlined. Elo et al. (2014) developed a comprehensive and specific checklist for the reporting of QCA studies.

Trustworthiness

Multiple terms are used in the international literature regarding the validation of qualitative studies (Creswell, 2013). The terms 'validity', 'reliability', and 'generalizability' in quantitative studies are equivalent to 'credibility', 'dependability' and 'transferability' in qualitative studies, respectively (Polit and Beck, 2013). These terms along with the additional concept of confirmability were introduced by Lincoln and Guba (Lincoln and Guba, 1985). Polit and Beck added the term 'authenticity' to the list. Collectively, they were the different aspects of trustworthiness in all qualitative studies (Polit and Beck, 2013).

To increase the trustworthiness of the study, researchers should thoroughly delineate the three phases of the study as 'preparation', 'organization' and 'reporting' (Elo et al., 2014). Such details are needed to show in details how categories are developed from data (Elo and Kyngäs, 2008; Graneheim and Lundman, 2004; Vaismoradi et al., 2016). To accomplish this, appendices, tables and figures may be used to depict the reduction process (Elo et al., 2014; Elo and Kyngäs, 2008). Furthermore, an honest account of different realities during data analysis should be provided (Polit and Beck, 2013). The authors of this paper believe that adopting this

sixteen-step method can enhance the trustworthiness of directed qualitative content analysis.

Discussion

Directed qualitative content analysis is used to validate, refine and/or extend a theory or theoretical framework in a new context (Elo and Kyngäs, 2008; Hsieh and Shannon, 2005). The purpose of this paper was to provide a comprehensive, systematic, yet simple and applicable method for directed qualitative content analysis to facilitate its use by novice qualitative researchers.

Despite the current misconceptions regarding the simplicity of QCA and directed qualitative content analysis, knowledge development is required for conducting them (Elo and Kyngäs, 2008). Directed qualitative content analysis often is performed on a considerable amount of textual data (Pope et al., 2000). Nevertheless, a few studies have discussed the multiple steps taken to conduct it. In this paper we integrated and elaborated the essential steps taken by international qualitative researchers on directed qualitative content analysis such as ‘preliminary coding’, ‘theoretical definition’ (Mayring, 2000; Mayring, 2014), ‘coding rule’, ‘anchor sample’ (Mayring, 2014), ‘inductive analysis in directed qualitative content analysis’ (Elo and Kyngäs, 2008) and ‘pretesting the categorization matrix’ (Elo et al., 2014). Moreover, the authors added a detailed discussion regarding ‘the use of inductive abstraction’, and ‘linking between generic categories and main categories’.

Conclusion

The importance of directed qualitative content analysis is increased due to the development of knowledge and theories derived from QCA using the inductive approach and the growing need to test theories. Directed qualitative content analysis proposed in this paper is a reliable, transparent and comprehensive method that can

increase the rigor of data analysis, make the comparison of the findings of different studies possible and yield practical results.

Declaration of Conflicting Interests

The authors declares that there is no conflict of interest.

Key points for policy, practice and/or research

- In this paper, essential steps taken by international qualitative researchers in the field of directed qualitative content analysis were described and integrated.
- A detailed discussion regarding the use of inductive abstraction, and linking between generic categories and main categories was presented.
- The sixteen-step method of directed qualitative content analysis proposed in this paper is a reliable, transparent, comprehensive, systematic, yet simple and applicable method. It can increase the rigor of data analysis and facilitate its use by novice qualitative researchers.

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Table 1. The suggested steps for directed content analysis

Steps	References
Preparation phase	
1. Acquiring the necessary general skills	**Elo et al. (2014), Thomas and Magilvy (2011)**
2. Selecting the appropriate sampling strategy	**Inferred by the authors of the present article from the Elo et al.'s (2014) article**
3. Deciding on the analysis of manifest and/or latent content	**Elo and Kyngäs (2008)**
4. Developing an interview guide	**Inferred by the authors of the present article from the Hsieh and Shannon's (2005) article**
5. Conducting and transcribing interviews	**Elo and Kyngäs (2008), Graneheim and Lundman (2004)**
6. Specifying the unit of analysis	**Graneheim and Lundman (2004)**
7. Being immersed in data	**Elo and Kyngäs (2008)**
Organization phase	
8. Developing a formative categorization matrix	**Inferred by the authors of the present article from the Elo and Kyngäs' (2008) article**
9. Theoretically defining the main categories and sub-categories	**Mayring (2000), Mayring (2014)**
10. Determining coding rules for main categories	**Mayring (2014)**
11. Pre-testing the categorization matrix	**Inferred by the authors of the present article from the Elo et al.'s (2014) article**
12. Choosing and specifying the anchor samples for each main category	**Mayring (2014)**
13. Performing the main data analysis	**Graneheim and Lundman (2004), Mayring (2000), Mayring (2014)**
14. Inductive abstraction of main categories from preliminary codes	**Elo and Kyngäs (2008)**

15. Establishment of links between generic categories and main categories	**Suggested by the authors of the present article**
Reporting phase	
16. Reporting all steps of directed content analysis and findings	**Elo and Kyngäs (2008), Elo et al. (2014)**

Table 2. The categorization matrix of the team members' motivation for CPR

Motivation for CPR			
Expectancy	Instrumentality	Valence	Other inductively emerged categories

CPR: Cardiopulmonary resuscitation

Table 3. An example of steps taken for the abstraction of the phenomenon of expectancy (main category)

Meaning unit	Summarized meaning unit	Preliminary code	Group of codes	Sub-cat
The patient with advanced heart failure: I do not envision a successful resuscitation for him	No expectation for the resuscitation of those with advanced heart failure	Cardiovascular conditions that decrease the chance of successful resuscitation	Estimation of the functional capacity of vital organs	Scientific est life cap
Patients are rarely resuscitated, especially those who experience a cardiogenic shock following a heart attack	Low possibility of resuscitation of patients with a cardiogenic shock			
When ventricular fibrillation is likely, a chance of resuscitation still exists even after performing CPR for 30 minutes	The higher chance of resuscitation among patients with ventricular fibrillation	Cardiovascular conditions that increase the chance of successful resuscitation		
Patients with sudden cardiac arrest are more likely to be resuscitated through CPR	The higher chance of resuscitation among patients with sudden cardiac arrest			
			Estimation of the severity of the patient's complications	
			Estimation of remaining life span	
				Intuitive estim chances of s resuscit
				Uncertain estima
				Time consid resuscit

CPR: Cardiopulmonary resuscitation

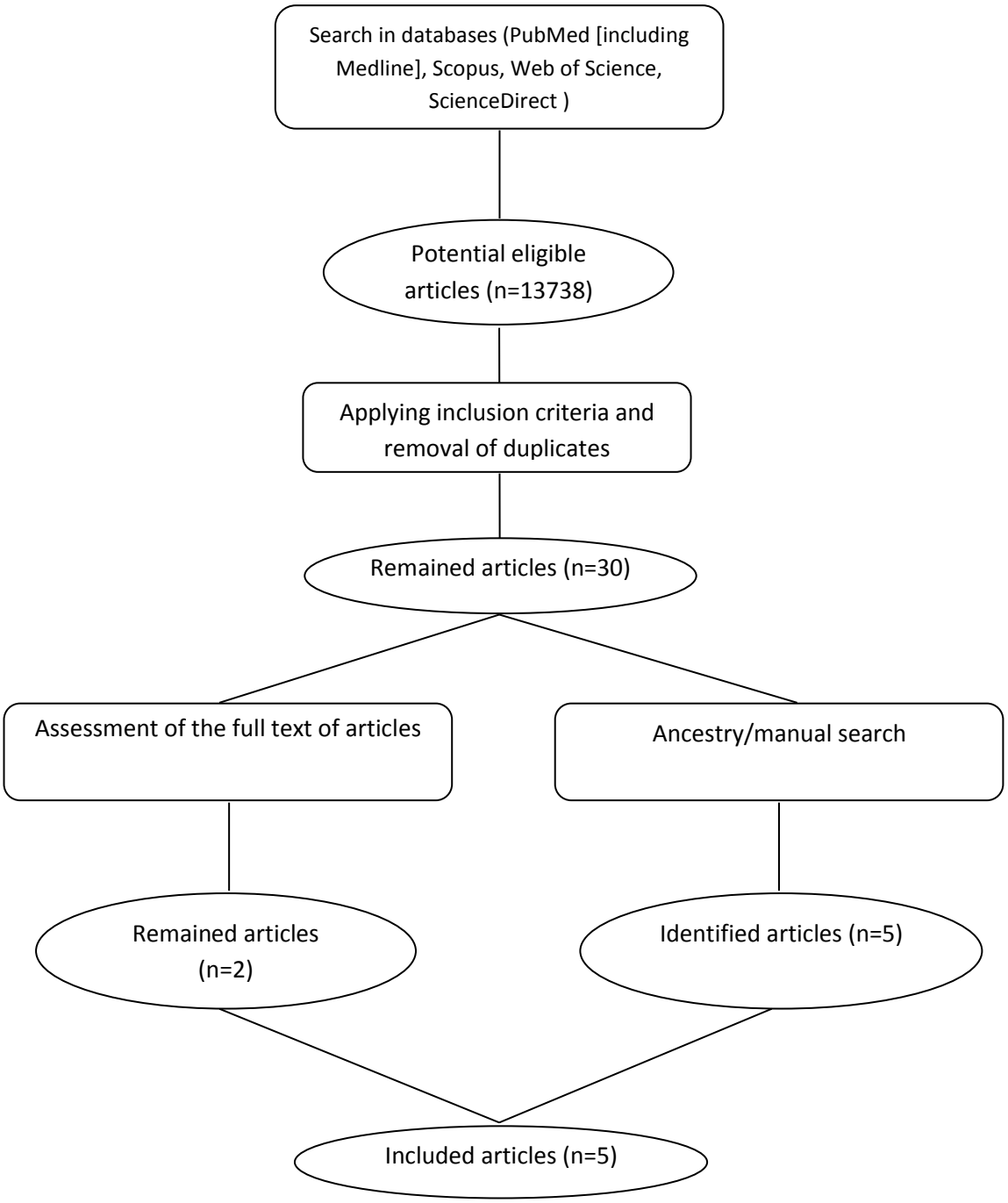

Figure 1: The search strategy for the identification of articles