



# Abductive reasoning in nursing: Challenges and possibilities

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## Abstract

Abduction, deduction and induction are different forms of inference in science. However, only a few attempts have been made to introduce the idea of abductive reasoning as an extended way of thinking about clinical practice in nursing research. The aim of this paper was to encourage critical reflections about abductive reasoning based on three empirical examples from nursing research and includes three research questions on what abductive reasoning is, how the process has taken place, and how knowledge about abductive reasoning based on the examples can inform nursing research and clinical practice. The study has a descriptive and explorative approach using a convenience sample of three empirical studies from nursing research. The three studies illustrate different ways to enter the abductive reasoning process in steps. They represent new caring models, which offer visual and cognitive maps for expanding nursing research, education and thus informing care. Therefore, we suggest that abductive reasoning may be beneficial for different ways of knowing and demonstrates scientific innovation to shed new light on health phenomena, which can help researchers and practitioners to gain a broader and deeper understanding of nursing care inquiry. However, more studies are needed to broaden this scope.

## KEYWORDS

abductive reasoning, deduction, hypothetico-deductive method, induction, nursing care, nursing research

## 1 | INTRODUCTION AND BACKGROUND

Abduction, deduction and induction are different forms of inference in science. Among these, deduction and induction are often used in the nursing literature. Induction means the process of reasoning from specific empirical observations to more general rules, and deduction is the process of developing specific predictions from general principles (Polit & Beck, 2004).

Abduction, which can be regarded as a precondition of scientific work in general, is, however, mostly neglected in nursing research, reflecting that nurse researchers are relatively indifferent towards

the concept (Lipscomb, 2012). According to Mirza, Akhtar-Danech, Noesgaard, Martin, and Staples (2014), abductive reasoning is the process of generating hypotheses, theories or explanations and precedes deductive and inductive inference (p. 1981). This definition is consistent with that of Blaikie (2018), who states that abduction is distinct from induction and deduction. In research, abduction is not restricted to or associated with any methodology. However, placing abduction in qualitative research enables the identification of the three interlinked issues of abduction, induction and deduction (Lipscomb, 2012). Abduction in qualitative research is grounded in the language and meanings of social actors (Ong, 2012). Accordingly,

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the meanings, motives and interpretation cover what people use in their everyday life (Blaikie, 2010). Moreover, several authors have proposed abductive ways of thinking as forms of reasoning and important initial step as part of qualitative data analysis for increasing and developing nursing research further (Eriksson & Lindström, 1997; Lipscomb, 2012; Mirza et al., 2014; Råholm, 2010).

Abduction represents a type of combination or synthesis of deduction and induction and can be considered as an equally important issue for research. According to Eriksson and Lindström (1997), the triad of abduction, induction and deduction can be regarded as the basis for developing the epistemology of caring science, in which abduction may enable the synthesising of abstraction and implement deeper patterns of understanding. As earlier stated, the intention of abduction is to recognise and create a context of meaning. The interpretation of underlying patterns is therefore a fundamental idea. Whereas induction can produce a general truth from several data and deduction does the opposite, that is explains something from a general rule, abduction goes one step further by interpreting a special case in terms of a superordinate hypothetical pattern (Eriksson, 1997).

Abductive reasoning is also a form of creative inference, which involves the integration and justification of ideas to develop new knowledge (Mirza et al., 2014). It was re-introduced by Peirce, Hartshorne, Weiss, and Burks (1960), who considered abduction to be the operation of thoughts that makes a complex reality comprehensible (Eriksson & Lindström, 1997; Mirza et al., 2014). Råholm (2010) emphasises that the notion of abductive reasoning is important and may form the basis for scientific knowledge within nursing research. She describes abduction as the first stage of inquiry where hypotheses are invented, explicated through deduction and verified through induction (Råholm, 2010). Abduction allows one to conceive ideas from vague and possible phenomena, whereas deduction and induction allow for the consequent processing of such ideas (Mirza et al., 2014, p. 1982).

In the next, we illustrate abductive reasoning with two examples, one about validating a medical diagnosis and one with focus on decision-making in handling traffic jam. Both deal with an incomplete list of observations about the situation and draw an inference from these observations. The example of validating a medical diagnosis is about how abductive reasoning can be used in four stages. First, an incomplete and surprising set of observations and symptoms emerges, which requires an explanation because they do not follow an accepted hypothesis. Second, a new hypothesis to predict these observations and symptoms is adopted through abduction. Third, this process proceeds by deduction to the most likely explanation of the hypothesis. Fourth, when tests verify the predictions repeatedly, the results are placed among scientific results through induction within a diagnosis that explains the symptoms in the best way.

Daily decision-making is the other example of abductive reasoning illustrated in four stages. First, you are stuck in the traffic on the main road and see ambulances and police lights ahead. This encompasses a set of surprising observations, and an explanation is needed to clarify the acute situation. Second, to predict the acute

situation you formulate a new hypothesis abductively. Third, there is an exit coming up and you could take an alternative back road and then return to the main road later after the accident and avoid this. At the same time, you listen to the traffic report on the radio. By taking all information at hand, the process of decision-making continues by deduction to the most likely explanation of the hypothesis. Consequently, you make the best decision based on all the observations and choose to stay on the main road and wait for the accident to clear. Fourth, this choice is understood as a hypothetico-deductive evaluation based on immediate and extended understanding.

There is a link between abduction and hermeneutics through the hermeneutic circle. The hermeneutic circle describes the process of understanding the human and social particulars as such and refers to the whole of frame giving it a certain meaning, leading to a new dimension of interpretation or frame (Gadamer, 2004). This link claims that human understanding in the broad sense is always based on pre-empirical interpretation and that this interpretation gives meaning to one's experiences. Both abduction and hermeneutics can lead gradually to a deeper understanding. However, there is a crucial difference between these two. The spiral movement between parts and the given whole generates hermeneutical understanding, which implies reading between the lines, whereas abduction involves a dialectic process that moves between theory-laden empiricism and empirically laden theory, which implies reading beyond the lines (Eriksson & Lindström, 1997). Consequently, abduction and hermeneutics can differ or come apart, meaning one can accept abduction without taking up hermeneutics.

Although several authors note the benefits of abductive reasoning in nursing, there seems to be a lack of practical guidelines about how to understand and implement this approach in nursing research. According to Mirza et al. (2014), abductive reasoning has received mainly philosophical attention and remains a vague concept in nursing. Only a few articles have used qualitative content analysis to demonstrate the abductive leap, and this lack of understanding may be a challenge for the future (Graneheim, Lindgren, & Lundman, 2017). Moreover, little attempts have been made to introduce the idea of abductive reasoning in nursing research as an extended way of thinking about clinical practice and clinical reasoning (Mirza et al., 2014, p. 1981). The aim of this paper is therefore to encourage critical reflections about abductive reasoning based on three empirical examples from nursing research. To elucidate practical nursing guidelines of abductive reasoning, the following research questions were asked: (a) What is abductive reasoning? (b) How has the process taken place in the three examples? (c) How can knowledge about abductive reasoning based on the examples inform nursing research and clinical practice?

## 2 | METHODS

The study is descriptive and explorative by encouraging critical reflections about abductive reasoning in nursing research. It used

a convenience sample of three empirical studies of nursing research. The first example is a study aimed at increasing the understanding of and acquiring knowledge about the nature of dignity (Kaldestad, 2018). The second example is a study that explored longing and its implication for health (Ueland, 2013). The third example is a study aimed at increasing the understanding of caring in a transcultural perspective (Wikberg & Eriksson, 2008). Data from the examples were analysed searching for the abductive steps. In the next section, each example is described along with its purpose, method and findings. The three example studies are summarised in Table 1.

### 3 | FINDINGS

#### 3.1 | Example 1

The aim of the study was to increase the understanding of and acquire knowledge about the nature of dignity from the caring science perspective (Kaldestad, 2018). The methodological approach involved ontological hermeneutics (Gadamer, 2004). Hermeneutics is both a methodology and an interpretive philosophy, in which the understanding of human beings is a key element and an acknowledged approach for seeking to understand deep structures and ontological knowledge. Time and space for contemplation are required to allow ontological knowledge to emerge from the material (Gadamer, 2004).

##### 3.1.1 | Methods

After the concepts and context were decided, old classic texts dealing with dignity by Oratio from 1486 and interpreted by Cassirer (1942) were read following hermeneutics. The researcher's pre-understanding was based on her earlier work as a nurse in geriatric care. For the empirical research, the author entered private homes of individual families and through dialogue gained insight into how 10 adults over 65 years old experience dignity in life related to

home-based care. Based on this background, the hermeneutical interpretation increased the author's pre-understanding gradually by or as abductive leaps as the texts play together. According to Gadamer (2004), such abductive leaps are independent of human control. That is, something new, which has been hidden, comes to the surface and melds together with pre-understanding. This is called 'fusion of horizon' reflecting that understanding happens when our present understanding or horizon is moved to a new understanding or horizon by an encounter and the old and new horizons are combined into something of living value (Gadamer, 2004).

#### 3.1.2 | Findings

The research culminated in four themes about dignity: holiness, freedom, truth and beauty, where holiness symbolises the innermost core of dignity (Kaldestad, 2018). These findings helped to deepen the core of caring science theory and indicated that, when human beings are violated, it is not dignity that is violated, but the human boundaries described as 'sacred space'. A one-sided occupation that inhibits dignity can hide the dignity that belongs to every human being and is unchangeable. The study contributed towards a broader understanding of dignity as a term and the ontological and scientific knowledge within the context of caring for older people.

#### 3.2 | Example 2

The study aim was to explore longing from the caring science perspective and its implication for health (Ueland, 2013). The overall purpose was to develop a theory model of longing based on theoretical and empirical studies. The design of the study was explorative, and the ontological hermeneutics of Gadamer (2004) was chosen to guide the understanding. The meeting between the researcher, text and hermeneutical circle involved an infinite movement between

**TABLE 1** Steps in the abductive reasoning process described in three examples

Examples	Step I: Abduction	Step II: Induction and deduction	Step III: Hypothetico-deduction	Step IV: Abductive reasoning
1: Kaldestad (2018)	Pre-understanding of the phenomenon of dignity Classic texts Preliminary hypothesis	Empirical data collection and analysis (hermeneutical)	Hypothetical evaluation	Abductive model
2: Ueland (2013)	Pre-understanding of the phenomenon of longing Classic texts Preliminary hypothesis	Empirical data collection and analysis (hermeneutical)	Hypothetical evaluation	Abductive model
3: Wikberg and Eriksson (2008)	Pre-understanding of the phenomenon of transcultural caring Theory and literature search Preliminary hypothesis	Systematic data search and qualitative content analysis (hermeneutical)	Hypothetical evaluation	Abductive model

parts and the whole, and towards the fusion of horizons relating to the research objective.

### 3.2.1 | Methods

Initially, the research process began openly with the title 'Longing from a caring perspective'. To gain deeper pre-understanding of what longing is, the researcher read old classic works by Augustine from 400 and selected writings of Kierkegaard edited by Hollander (1923). Thereafter, dialogues with nine women (ages 39–69) who had recovered from cancer took place. After the interpretation of these, the researcher wondered whether longing could be a force in suffering. Thereafter, a new leap occurred to see longing as a force in health.

### 3.2.2 | Findings

The results of the study were presented in a theoretical model derived from all three materials. Through the process of abduction, this theoretical model provided an extended understanding of the dimensions of longing as a force in suffering and health. Longing was given an extended meaning as movements in health and suffering, which are linked to the source of inner love, and how this link is redeemed, innovated and gives power to life. The study contributed to increased understanding of longing as a broader concept. The theoretical model of longing can provide insight into critical pathways to health in suffering and can increase health professionals' readiness to meet the patient's existential struggle. Further research might investigate how the model can be meaningful within different contexts.

## 3.3 | Example 3

The aim of this study was to increase the understanding of caring from a transcultural perspective and to develop the first outline of a theory (Wikberg & Eriksson, 2008). The initial theoretical perspective included Eriksson's theory of caritative caring (Eriksson, 1992).

### 3.3.1 | Methods

Wikberg and Eriksson (2008) demonstrated the use of abductive reasoning in nursing using several steps to develop a model for intercultural caring. First, references in previous works 'by e.g.' Campinha-Bacote (1991) and Kim Godwin, Clark, and Baron (2001) were searched systematically in international databases together with additional literature on caring by the same theorists. The method for analysing the material was qualitative content analysis, which was used deductively to answer the first research question as it searched for caring in transcultural theories: 'What is caring and how is caring described by the authors?' Because a very wide frame of the structure was used, the categories were formed inductively

and classified into quotations, keywords, subcategories, categories and themes. Thereafter, all categories were compared according to the caritative theory by Eriksson (1992) to answer the second research question, 'Is caring emanating from the theories compatible with caring in Eriksson's caritative theory?' The model was created by first comparing the categories according to the caritative theory and then by abduction. The abductive leap occurred after the results of the content analysis were compared with the caritative theory, resulting in a deeper understanding of the intercultural caring phenomena. Abductive reasoning was used to answer the third research question, 'What kind of pattern evolves in the comparisons between the theories discovered by the content analysis and the caritative theory?'

### 3.3.2 | Findings

A model for intercultural caring was generated abductively. The study integrated the transcultural aspect of caring with Eriksson's (1992) caritative theory and created new knowledge as an intercultural model. This new model can be used as a visual and cognitive map for understanding in transcultural nursing research, education and care.

## 3.4 | Summary of the three studies

The three examples above illustrate different ways to enter the abductive reasoning process with movements between parts and the whole providing abductive leaps and a deeper understanding of the phenomena under investigation. A summary of these studies is presented in Table 1. The authors of the first two examples started by exploring the phenomena under investigation in classic texts and comparing the results with their own pre-understanding, which gradually appeared as abductive leaps that led to a preliminary hypothesis (Step I). In this context, abduction can be considered as an implicit premise. Step I in the third example started from the theoretical perspective, which included Eriksson's theory of caritative caring, and compared this with the perspective gained from texts on caring by transcultural theorists and references in previous works, leading to a preliminary hypothesis. In this example, abduction reflected an explicit condition. The results of the content analysis were compared according to the caritative theory of Eriksson and the patterns that evolved in this comparison were understood as abductive leaps. In all three studies, empirical confirmation was sought in Step II. Hypothetical evaluation or the use of the hypothetico-deductive method by combining inductive and deductive principles was performed in Step III, whereas abductive models were created through abductive reasoning in Step IV.

## 4 | DISCUSSION

### 4.1 | What is abductive reasoning?

In our view, the link between abduction, induction and deduction must be emphasised when doing science. This interrelated link seems to be connected but is not identical, and it is therefore important to understand the theoretical assumptions forming the basis of abduction. Peirce et al.'s (1960) pragmatic orientation asserts that the criterion of a good theory is not whether it is true, but whether it is useful. Behind this statement lies a deeper premise that all observations and experiences must be theory-laden. This means that no observation is neutral but will always be influenced by theory. Construction of theories becomes part of human understanding and cognition itself, and this leaves no room for neutral experience. Therefore, theory itself should not be regarded as some rational and conscious scientific process aiming at 'seeking the truth'. Instead, one must assume that everybody is capable of initially constructing 'their own theories' to handle reality itself (Peirce et al., 1960). Our standpoint is that no single true theory can refer to an outer objective reality but only to several different 'private' theories representing various perspectives. As such, the justification for each theory is its usefulness.

The idea of theory-laden observations was further developed by Hanson (1958). Considering the triad of abduction, induction and deduction, Hanson rejected both induction and deduction; induction for not producing explanations but only summarising from the data, and deduction for assuming if true knowledge should be reached by testing theoretical hypotheses empirically. His concept of theory-laden observations should imply data always being interpreted as meaning from the very start, which is also consistent with hermeneutics. Thus, we find it useful to link Hanson (1958) to the concept of abduction; that is, we think that theoretical patterns should be considered the core of science, which means that abduction is preferred when launching scientific work.

The question about abduction is also a question of pragmatism, which is about making ideas clear and opening new ways of thinking and thereby finding a way to discover meaningful underlying patterns (Eriksson & Lindström, 1997). Peirce et al. (1960) draws parallels between abduction and pragmatism. His version of pragmatism suggests that the significance of the theory lies in its usefulness, which leads to actions because the hypotheses are meaningful. Accordingly, this link between abduction and pragmatism can broaden our understanding of scientific usefulness and of the difference between valid or not valid findings.

Moreover, we suggest that a significant link to the concept of abduction is the philosophy of hermeneutics and the idea or method of the hermeneutic circle, as described in our three examples in nursing research. That is, through our interpretations of these studies, the gradual increase in the researchers' pre-understanding may be understood as abductive leaps. We also believe that human knowledge in the broad sense is always founded on pre-empirical interpretations, which give basic meaning to experiences and practice.

However, concerning the hermeneutic idea itself, a certain distinction should be made between hermeneutics as ontology and as a method. Traditional hermeneutics is methodologically oriented. However, understanding hermeneutics as a primary and 'outer' method requires one to distinguish between reflecting on and interpreting the subject and the interpreted object or world, which suggests a certain dualism. The so-called ontological turn in hermeneutics tries to address this dualism by redefining hermeneutics, not as an essential or certain method, but as an original way of living or 'being'. This fundamental mode or manner of human existence, this so-called being in the world, stands as the ontological condition of humans.

### 4.2 | How has the abductive reasoning process taken place in the three examples?

We believe that abduction should be considered some sort of a 'starting point' for the research process itself. As shown in Table 1, abduction is illustrated in the first step and includes the basic elements of pre-understanding of the phenomena and the preliminary hypothesis. This first step constitutes the basis for the rest of the abductive reasoning process. Step II seeks empirical confirmation, and Step III includes the hypothetical evaluation or the use of the hypothetico-deductive method itself. Taking this perspective, we find it impossible to assume that the hypothetico-deductive method can stand alone or operate solely on its own terms. This is also consistent with Hanson's (1958) view. He states that the core of science is represented by abduction and not by the hypothetico-deductive method, because science incorporates both induction and deduction into one superior concept as a next step. Step IV makes way for further abductive reasoning by developing theoretical models, illustrating the final step in the process of abductive reasoning by generating theories.

### 4.3 | How can knowledge about abductive reasoning based on the three examples inform nursing research and clinical practice?

The foundation in all three examples is a specific caring science tradition. As mentioned above, to widen their pre-understanding, Kaldestad (2018) and Ueland (2013) focused on clinical experiences and work of classic texts, whereas Wikberg and Eriksson (2008) started with the caring theory (Step I in Table 1). Step I illustrates the formulation of the preliminary hypothesis, Step II comprises empirical data collection and confirmation, Step III encompasses the hypothetical evaluation, and Step IV includes creating abductive models (Table 1). All these steps seem to constitute the whole or parts of the research project. In this way, we believe that our method, as illustrated by our chosen examples and the stepwise process, can inform nurse researchers and contribute to the process of contributing new knowledge in nursing practice.

The findings from the three chosen examples offer practical guidelines, including new ways of thinking and deeper understanding of complex phenomena such as dignity, longing and transcultural caring by creating models abductively. Ueland's (2013) theoretical model of longing provides insight into the critical pathways leading to health in relation to suffering, and this model may be useful for improving health professionals' readiness to meet the patient's existential struggle. As suggested by Ueland (2013), the findings represent a model for holistic health understanding, which may be transferred to different contexts to grasp what is at stake and to help the professionals understand the patient's perspective and the type of help needed. Kaldestad (2018) wrote that all people are born with dignity, although this feeling may be lost during illness. Listening closely to the patient's whole life story and expression of suffering may help to console the patient. As indicated by Kaldestad (2018), dignity can be created when something new is created in each situation. The findings of Ueland (2013) and Kaldestad (2018) indicate that patients may express feelings of alienation during illness, and it is important for nurses to listen to these expressions of suffering and find new ways to console patients. Wikberg and Eriksson (2008) emphasised that a patient's cultural background and acculturation can influence the type of caring. Their intercultural caring model highlights the importance of cultural competence and organisation of caring to alleviate suffering and promote health and well-being. Their findings indicate that caring is seen as a complex whole and involves both the family and the community. Based on these examples, consequences for nursing outlined indicate how abduction can reveal a deeper and more complex understanding of nursing phenomena, which might be difficult and diffuse to detect.

Abduction placed in qualitative research refers to the process of constructing theories from everyday activities (Ong, 2012). It also represents an important fundamental precondition for scientific understanding needed to develop nursing research further (Eriksson & Lindström, 1997; Lipscomb, 2012; Mirza et al., 2014; Råholm, 2010). This may offer new possibilities in clinical nursing practice. At the same time, nursing researchers should be aware of Cowles (2020) who presents abduction in a novel way. As we understand Cowles (2020), scientific method should focus more on a simple and specific outline to be filled in with details of actual behaviour rather than a set of rules for right thinking.

## 5 | CONCLUSIONS

This paper is one of only a few to encourage critical reflections about abductive reasoning and is based on three empirical study examples from nursing research. All three examples indicate that complex phenomena cannot be reduced to exact terms but must be understood broadly, as illustrated in the abductive processes. The three examples also represent new caring models, which offer visual and cognitive maps for expanding nursing research, education and informing care. In this way, abductive reasoning may be conducive to

different ways of knowing and demonstrates scientific innovation to shed new light on health phenomena. Moreover, this may allow researchers and practitioners to gain a broader and deeper understanding of nursing care. Thus, abductive reasoning may be a useful issue when seeking in-depth knowledge in nursing science to enrich and extend the capacity of both nursing and health care inquiry. However, more studies are needed to broaden this scope.

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## CONFLICT OF INTEREST

None.

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