Complexity of care: a concept analysis

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Key words: Concept analysis, complexity of care, nursing, patient classification system
Parole chiave: Complessità assistenziale, analisi concettuale, infermieristica, sistema di classificazione dei pazienti

Abstract

**Background:** In spite of the high number of tools designed to measure the complexity of care, there is still great diversity in the meaning of this concept.

**Methods:** The study was carried out using the concept analysis method as described by Beth Rodgers; 27 international papers were selected using PubMed, Web of Science and CINAHL data sets, without any time constraints.

**Results:** A number of similar concepts relating to multiplicity, intensity of care and workload were selected. The antecedents were classified according to personal and clinical features of patients, the characteristics of care, the social and organizational features; the tools that emerged measure the risk of complexity of care. Among the consequences, those that emerged were related to patients, operators and organization. The two attributes of complexity of care are connected with measurement, on the one side, and uncertainly, on the other.

**Conclusions:** As difficult as it is to define complexity of care, the analysis states that its classification should be targeted at redefining hospital organization.

Background

Early attempts to classify patients by complexity of care (Patient Classification System) date back to the 1960s (1). The study of care complexity measurement methods still plays an important role in the nursing discipline -more specifically, in its organization.

A brief analysis of tools to measure care complexity revealed that the many means built for this purpose stem from the different meanings attributed to this term and its frequent use as a synonym for care intensity or nursing workload.

Even though several attempts have been made to define the differences among these terms in order to obtain a unequivocal meaning of care complexity (2-4), to date this professional category does not seem to have yet been assigned a single and clear definition.

The aim of this work was to report an analysis of the concept of complexity of care.

In common parlance, ‘complexity’ refers to a being or an entity composed of many elements that relate to and influence one another. Consequently, it is usually
maintained that what is complex may not be understood through an analytical and reductionist approach. Indeed, contrary to the claims of classical science, the whole turns out to be radically different and/or bigger than the mere sum of its parts (5). Over the last decade, the study of complexity has expanded remarkably, giving rise to what is commonly defined as ‘complex systems theory’, whereby a ‘complex system is an open system, formed by several elements that interact in a non-linear fashion and constitute a single, organized and dynamic entity, capable of evolving and adapting to the environment’ (6). According to this theory, complex systems are characterized by 1) a large number of elements included and 2) a large number of interconnections between them, being non-linear, powerful, and complex (e.g. the physiology of neurons in the nervous system).

The term ‘care complexity’ has been widely used in international healthcare ever since attempts to define and quantify the cost of disease and its treatment began. In fact, it is quite clear that in order to achieve an accurate economic assessment of a hospital stay, it is necessary to know the cost determinants and, more specifically, the amount of resources the patient has used during the hospitalization. This is correlated with care complexity (4, 7-10).

The term ‘care complexity’ has come to be used quite frequently in the nursing discipline as well, especially since the recent past. The problem with defining complexity of care in the nursing profession arose halfway through the last century, when the early tools for workload evaluation (the New York method, John Hopkins method, and Rhys Hearn method) were designed to calculate the number of nursing staff needed in each ward. Today, the purpose of defining complexity of care is rather wider than the above application. Several Italian hospitals, for example, are currently applying an organizational method based on the complexity of care paradigm in which patients are classified by means of different measurement methods (11-14) within a category defining the complexity level. Accordingly, patients are no longer assigned to wards based on the traditional medical specialty rationale. This reorganization effort is not merely targeted to human resources optimization; rather, it pursues the higher goal of providing better-quality care.

As in Italy, tools for measuring complexity of care (or those aimed at patient classification) are increasing in number internationally over time. This increase leads to the question of why no single method is in common use. Upon a close examination of the issue, it becomes clear that each of these tools varies according to the definition of ‘complexity of care’. Indeed, the term is often replaced by ‘intensity of care’, ‘intensity of treatment’, ‘workload’, ‘acute care’, etc. as though they were synonyms.

Thus, the absence of a univocal meaning attributed to the term ‘complexity of care’ highlights the need for a conceptual analysis to rigorously define its use and clarify the concept.

Ordinary definitions of concepts are found in the dictionary, but ordinary or everyday concepts are not the same as scientific concepts. Scientific concepts are a different entity in that a degree of precision is required in order for the conceptual label to encompass a unit of meaning that is used consistently within a scientific discipline (15) so a concept analysis is necessary to define the use into environment care.

Methods

The study was carried out using the concept analysis method as described by Beth Rodgers.
Evolutionary concept analysis according to Beth Rodgers

Concept analysis is a technique used to identify the attributes, properties, and features of a subject; its purpose is to increase the understanding of a concept beyond the mere definition provided in a dictionary (16) by means of an inductive methodology.

Clarifying a concept is a necessary step in developing useful knowledge and later applying it to nursing science. Hence, many authors recommend this type of analysis as the first step in developing a theory that is suitable to be used and tested (17, 18).

Nursing science has resorted to different methods to analyse the concepts that are most relevant for this discipline; the most notable methods, among others, are Wilson, 1963 (19), Walker & Avant, 2005 (20), and Rodgers 1989 (21).

Rodgers’ theory distances itself from Walker & Avant’s, maintaining that concepts are constantly developing and being redefined. The meaning of a ‘concept’ is strongly influenced by a number of factors - both internal and external to the same concept - which better define its meaning and determine its continued development. A concept is not a fixed, unchanging element that is true per se, but rather something strongly dependent on the context; it is in its application that it changes and becomes (21).

One of the strong points of Rodgers’ method is its systematic and clear approach to its different phases (17).

The first phase consists of selecting the subject of the analysis and collecting the relevant material. This phase deserves particular attention because the correct selection of the sample guarantees the completeness of the analysis (21).

The second phase is based on the actual analysis. In this phase, every source is read, first superficially and then with particular focus on the following: the context of the concept, similar terms (expressing the concept idea with a different wording), correlated terms (words that share common features with the concept but do not show exactly the same characteristics), antecedents (events or phenomena that correlate as antecedents to the concept), examples (practical cases taken from hard data, which are not found in all conceptual analyses), consequences (the result of using a concept in a practical situation), and attributes (groups of features which constitute the true definition of a concept). In Rodgers’ theory, attributes constitute the heart of conceptual analysis.

The product of each study is noted separately at first and later compared, highlighting similar and correlated traits, antecedents, attributes, examples, and consequences.

The data are considered saturated the moment findings begin to repeat and the subsequent data do yield no further content.

In the last phase, the author provides insights for developing questions and hypotheses in light of subsequent studies. Indeed, Rodgers believes that there is no such thing as a final definition of a concept; rather, it is precisely the purpose of every study to stir interest in the direction of the concept development process and to promote the development of knowledge in the nursing profession.

Research was carried out on the concept of ‘complexity of care’ (‘complexity of care’, ‘care complexity’, and ‘nursing complexity’) using PubMed, Web of Science, and CINAHL, which were deemed to be sources important to healthcare research and, more specifically, the discipline of nursing.

This search produced a sample of 27 papers, to which two Italian book chapters relating to ‘complexity of care’ measurement tools were added. The material was chosen after a quick scan of a larger number of...
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articles, from which a sample was selected based on the frequency (in numeric terms) of appearance of the concept subject. We stopped scanning the papers when similar and correlated terms, antecedents, attributes, and consequences started repeating themselves quite frequently.

Even though our search was not limited in terms of specific dates of publication, the date of publication of the examined material ranges from 1997 to 2012.

Results

Similar Concepts And Correlated Terms

Similar concepts are phrases used to describe the concept of complexity of care in other terms. In our review, we highlighted similar concepts that referenced the idea of multiplicity: diversity of care, co-morbidity and multi-problematic status, case-mix, and density of care. Other similar concepts detected were severity, workload, and intensity of care (Table 1).

Correlated terms are words or phrases with something in common with the principle of complexity of care and are found to be associated with it, though they do not share the same features. Terms referring to the ideas of ‘difficult’ and ‘complex’ (complex care, advanced operator competencies, commitment, and treatment difficulty) are often used in combination with the complexity of care principle.

Length of stay (LOS) - which in turn correlates with several variables - is in many cases reported as the only indicator of complexity, so much so that it is used as a synonym for it. In other words, complexity is considered to be determined exclusively by the number of days the patient spends in the hospital.

Antecedents

We identified antecedents that may be grouped as follows (Table 2).

Patients’ personal characteristics: personal demographic data, age (advanced age appears in a remarkable number of

<table>
<thead>
<tr>
<th>Similar or correlated concepts</th>
<th>References</th>
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<tr>
<td>Correlated terms referring to difficulty</td>
<td>Complex care, advanced operator competences, commitment, treatment difficulty</td>
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<tr>
<td>Similar concepts referring to multiplicity</td>
<td>Diversity of care, co-morbidity and multi-problematic status, case-mix</td>
</tr>
<tr>
<td>LOS</td>
<td>LOS</td>
</tr>
<tr>
<td>Care intensity/density</td>
<td>Care intensity/density</td>
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<td>Workload</td>
<td>Workload</td>
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Table 1 - Similar concepts and correlated terms within the «complexity of care» concept
papers), lifestyle, personal ability, and knowledge regarding making independent choices.

Clinical features: medical diagnosis, diagnostic/therapeutic/care uncertainty, chronic status, physical function/disability, cognitive function, malnutrition, illness severity, symptom severity, diagnostic instability, complications, multiple-pathology picture, geriatric syndromes, ICU/emergency hospitalization, and criticality.

Characteristics of care: the need for nursing care in terms of both quantity and quality. Quantity includes diagnoses, interventions, nursing outcomes, and single nursing activities such as family support. It also includes the intensity of care, commitment to care, and expertise. Residence in nursing homes prior to hospitalization and the provision of residential services by relevant healthcare providers are also frequently mentioned antecedent characteristics.

Social features: elements associated with the individual’s social status, including social dysfunction, residential instability, and the presence or absence of a support

Table 2 - Antecedents of the «complexity of care» principle

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<tr>
<th>Antecedents</th>
<th>References</th>
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<tbody>
<tr>
<td>Patients’ personal characteristics</td>
<td>Goossen 1999 (8), Molleman 2008 (27), Bollini 2011 (14), de Jonge 2001 (B) (24), Pagliusco 2006 (31), Silvestro 2009 (12), Lessard 2007 (32)</td>
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<tr>
<td>Social features</td>
<td>Kruizenga 2005 (28), Benedict 2006 (7), Pagliusco 2006 (31), Molleman 2008 (27), Silvestro 2009 (12), Bollini 2011 (14)</td>
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<tr>
<td>Organizational features</td>
<td>Goossen 1999 (8), Kruizenga 2005 (28), Welton 2006 (10), Pagliusco 2006 (31), Lobo 2008 (38), van Langenberg 2010 (34)</td>
</tr>
<tr>
<td>Tools for complexity of care risk measurement</td>
<td>Goossen 1999 (8), Huyse 2001 (36), Kruizenga 2005 (28), Pagliusco 2006 (31), Lobo 2008 (38)</td>
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network or caregivers. This also includes the sociocultural context of living conditions as well as the progress and status of technological development; it is quite evident that technological advances cannot but affect the complexity of care.

Organizational features: healthcare setting and staff, need for care coordination, level of technology, healthcare service offering, and average case-mix.

Tools for complexity of care risk measurement: NMDSN (Nursing Minimum Data Set) (8), INTERMED (39), COMPRI (Complexity Prediction Instrument) (36).

Attributes

The attributes that emerged from our study may be essentially divided into two groups: the first pertains to classification variables such as measurement, objectivity, predictability, and classification itself and the second comprises the opposite, addressing elements of change, including instability, variability, uncertainty, subjectivity, and perception (Table 3).

If complexity of care is, on the one hand, objectively measurable and classifiable (collecting variable data and, from them, deriving a quantity that allows placement of the individual in a group of subjects sharing similar data values), on the other it is something extremely variable, involving continuous personal instability; hence, it is extremely difficult to reliably quantify. In this case, subjectivity and perception make assigning a person to a stable class a difficult exercise.

These two groups of attributes express two antithetical characteristics within the same concept and, consequently, complicate its definition.

Consequences

Consequences are the result of using a concept in a practical setting (17). Consequences, like antecedents and attributes, may also be divided into broad groups (Table 4).

Patient-related: needs that derive from the complexity of care, more specifically after discharge; these may be medical, nursing (physical, educational, relational), therapeutic, or diagnostic. This also includes reduced quality of life deriving from complexity of care as well as Activities of Daily Living (ADL) constraints, multi-dimension vulnerability, anxiety, behavioural problems, requests for care, and actual LOS.

Operator-related: conflict within the medical team and with the patient,

Table 3 - Attributes of the «complexity of care» concept

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<th>Attributes</th>
<th>References</th>
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<tr>
<td>Uncertainty-related</td>
<td>De Jonge 2001 (A) (23), Huyse 2001 (36), Lacour-Gayet 2004 (40), Kruizenga 2005 (28), Sieben-Hein 2005 (37), Lessard 2007 (32), Molleman 2008 (27), Galimberti 2012 (26)</td>
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complicated relationships, burnout, and communication barriers. When in the presence of patients with high complexity of care, operators tend to experience difficulties in relation to increased demands for teamwork, making the job more challenging and demanding (37). Furthermore, patients are often in a state of anxiety, which in turn makes communication more difficult.

Organization-related: in most of the literature we reviewed, these generally included costs, resource allocation, and benchmarking possibilities. Indeed, complexity of care dictates a higher or lower demand for resources both generally, in economic terms, and specifically, in terms of staff allocation. Moreover, complexity is directly correlated with the nursing workload, the variables that determine it, and the quality of care, in addition to the need for multi-disciplinary management including collaboration and consulting. Therefore, related competencies must be increasingly specific: care planning, care timing, and the option to assign some care activities to support staff according to the Professionalizing Care Model (MAP). The Patient Classification System (PCS) is one of the consequences and, normally, one of the aims of measuring complexity of care, though another consequence is also the uncertainty that derives from complexity of care. Hence, given the intrinsic variability of complexity (as previously described in the Attributes), measurement must be ongoing. Among the consequences, LOS may be considered an objective variable, which is why it is listed among the antecedents for determining complexity and not the consequences.

**Conclusion**

The results of this study seem to confirm the variability of the definitions of ‘complexity of care’ currently found in the literature. Therefore, it is reasonable to attribute this
variability to the variability associated with the methods of measurement and consequently, their application. According to Rodgers’ evolutionary concept analysis method, the meaning of a concept varies depending on the context and the culture in which it has developed and is located. Hence, this study should have identified different meanings for different disciplines. It is interesting to note that this distinction did not surface in this study. The identity of meaning across the different disciplines ought to trace back to the fact that the concept is multi-disciplinary per se; as such, it should be linguistically shared among the different professions that regularly use similar terms. Complexity itself, one could say, is a complex concept given its scope of application to varied and diverse areas of knowledge and conceptual variability. Indeed, if complexity is defined by a number of elements interconnecting in a non-linear fashion, such a non-linear quality emerges precisely in some of the elements included in Rodgers’ analysis. As proof of this principle, this study sheds light on some terms that are used differently in the analysed papers in the form of ‘similar terms’, ‘attributes’, ‘antecedents’, or again, ‘consequences’. In any case, if ‘complexity should be defined clearly, it would be evident that the term would no longer be complex’, as E. Morin quite pertinently noted (1993) (5).

Among the similar concepts (words used as an alternative to the term ‘complexity of care’), there is an issue relating to the complexity/intensity (10, 14, 22, 38) of the terms. From a semantic standpoint, the term ‘complexity’ refers to not only a quantitative but also a qualitative principle while the term ‘intensity’ has a strictly quantitative meaning. In truth, the literature review shows that there is not always a clear distinction; the terms are often used to express the same idea within the concept. This implies an idea relating to the complexity concept in the form of something that may be measured in simplistically quantitative terms, exactly like intensity.

Regarding issues used for reference to determine complexity of care, it is interesting to note that for some authors, these derive exclusively from the individual and his/her general and clinical characteristics (23, 29, 37). For others, ‘external’ factors are more important, such as those relating to the context and the organizational choices (10). Further, others believe that all the above mentioned personal, clinical, social, and organizational factors interact to determine complexity of care (2, 12, 13, 28).

The attributes of complexity of care (the features that form the definition of the concept) show a very specific antithesis: while complexity cannot be quantified and reduced to an objective value, there is measurability and, most importantly, the possibility of classifying complexity of care (18 out of 29 studies attribute objective terms to complexity of care). The idea of classifying complexity is all the more interesting given its implications for organizational challenge and the opportunity for improved resource allocation, the tasks operators must complete in a complex setting, and the possibility of proper management. It should be remembered, for these purposes, that complexity of care is often connected with organization, both in terms of antecedents and consequences (Fig 1).

Through conceptual analysis, we confirm the variability in the definition of ‘complexity of care’ as presented in the literature. In this situation, the main use of ‘complexity’ as applied to healthcare seems to refer to the quantitative measurement of contextual elements (in which care operates) as well as organizational variables: the analysis of complexity as a tool targeted at improving the economics and management of the care process. Although our results confirm
the importance of this application, they also support the idea that the concept of complexity should be used and developed in other ways. Specifically, in its ability to encapsulate the qualitative and non-linear characteristics of phenomena, complexity should first focus on the subjects of care and their classification as a necessary and logically antecedent passage of the strategic definition of hospital reorganization tools. This ‘complexity of the subjects of care’ should then precede any ‘organizational complexity’.

Riassunto

La complessità assistenziale: un’analisi concettuale

Background: Sebbene in ambito sanitario e nella disciplina infermieristica in particolare il termine di complessità assistenziale sia utilizzato sin dalla metà del secolo scorso e sebbene siano ormai molteplici gli strumenti per la sua misurazione, si evidenzia una eterogeneità nel significato del concetto stesso che spesso viene sostituito con termini che in realtà non sono propriamente sinonimi.


Risultati: Si sono evidenziati in particolare concetti simili che richiamano la molteplicità, l’intensità assistenziale e il carico di lavoro. Gli antecedenti sono stati classificati in base alle caratteristiche personali e cliniche dei pazienti, alle caratteristiche assistenziali, a quelle sociali e dell’organizzazione e sono emersi strumenti che misurano il rischio di complessità assistenziale. Tra le conseguenze sono emerse quelle legate al paziente, agli operatori e all’organizzazione. I due attributi della complessità assistenziale risultano essere connessi alla misurazione da un lato e all’incertezza dall’altro.

Conclusioni: Pur nella difficoltà di una definizione di complessità assistenziale l’analisi indica che la sua clas-
sificazione dovrebbe trovare finalità nella ridefinizione dell’organizzazione ospedaliera.

References


