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Original Article

Theoretical framework construction on care complexity in Chinese hospitals: A grounded theory study

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ABSTRACT

Objectives: This study aims to construct a theoretical framework to analyze risk factors and explore hospital nurses' perspectives on care complexity.**Methods:** The grounded theory method was adopted, and semi-structured in-depth interviews regarding the understanding of care complexity were conducted among the participants, including 31 nurses and nine doctors. In addition, data were coded and strictly analyzed in accordance with the coding strategy and requirements of grounded theory.**Results:** Our study reveals three factors that are closely related to care complexity, namely, (1) patient factors, including patients' condition, age, self-care abilities, compliance, social support systems, psychological conditions, expectations, and requirements; (2) nursing staff factors, including work experiences, education, knowledge and operational skills of caring, and communication skills; and (3) organization and equipment factors, including nursing workforce, nursing workload, support from multidisciplinary teams and ancillary departments, and the conditions of medical and hospital services. **Conclusions:** This study defines care complexity on the basis of its factors. Care complexity refers to the difficulty of nursing tasks during patient care plan implementation, which are affected by patients, nurses, and other factors in nursing and multisectoral, multidisciplinary cooperation. The framework can be beneficial for nursing education and for the improvement of the quality and efficiency of clinical nursing practice.© 2019 Chinese Nursing Association. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Nursing care varies considerably in patterns and dimensions, which can be affected by multiple factors. Caring is considered the core of clinical nursing practice [1], and care complexity, also known as nursing difficulty, refers to nurses' degree of subjective feelings in caring for patients. Given that caring first emerged as a concept in the 1950s, care complexity has been given considerable attention and studied extensively. However, the concept of care complexity has generally been confused with "intensity of nursing" and "nursing workload," which includes the severity of illness, nursing dependence levels, nursing complexity, and nursing hours

[2]. Previous studies [3–8] have evaluated the different aspects of nursing difficulty. Moreover, Jonge [3] described care complexity as the representation of the aspects of care delivery, namely, the involvement of multiple systems and specialties that require interdisciplinary communication to be effective. Furthermore, Guarinoni and Petrucci [4] corroborated that no clear distinction emerged between care complexity and nursing intensity and that their main factors include the general condition and clinical characteristics of patients. External factors, such as society and organization, have an important impact on care complexity. However, only a few studies in China have mentioned the concept of care complexity. Care complexity, which has a considerable impact on nursing efficiency and quality, is an objective phenomenon in the clinical context; hence, studying the factors that affect care complexity will contribute to improving the effects of nursing care and to promoting patient rehabilitation. Therefore, a study on care complexity is of utmost importance.

The shortage of nursing human resources is a common

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phenomenon in China. The lack of nurses [9,10] increases nursing workload, thereby causing serious nurse losses. Although nurses are exhausted from patient treatment and care, failure to observe patients' conditions will lead to increased incidences of complications and adverse care events [11,12], which will in turn increase the workload and care difficulties. In addition, the 2011 Trial General Hospital Accreditation Standards [13] clearly states the necessity to establish a performance appraisal system based on nursing workload, quality, and patients' satisfaction combined with nursing difficulties and technical requirements. Thus, care complexity is crucial in the performance appraisal of nurses. Among Chinese medical staff members, clinical frontline nurses shoulder the main responsibilities of the nursing care workload and have the deepest feelings about care complexity. Therefore, understanding care complexity in the Chinese health-care system is essential. Currently, most studies have focused on nursing operation technologies and difficulties of disease care, with limited studies on nursing work difficulties. The aspects and influencing factors of care complexity among Chinese nurses and the similarities and differences of care complexity between foreign countries have yet to be reported. Therefore, the present study aims to explore Chinese medical staff members' understanding of care complexity via in-depth inquiries. In addition, it aims to construct a theoretical framework to explore the risk factors in the Chinese health-care system to improve the quality and efficiency of nurses' clinical care and to provide references for improving nursing performance evaluation mechanisms.

2. Methods

2.1. Participants

A total of 40 experienced clinical medical staff members were selected through purposive and theoretical sampling, and the final sample included 31 nurses and nine doctors (Table 1). The inclusive criteria were the following: (1) doctors with bachelors' degrees or higher with at least a physician professional designation and who have engaged in clinical nursing for over 5 years; (2) nurses with associate's degrees or higher or a senior nurse designation or higher and who have been working in the current hospital for at least 5 years; and (3) participants who were willing to participate in this study. In addition, the contact information of the participants was obtained in advance with the help of hospital nursing staff members. All interviewees were informed of the purpose of the study,

and the dates and places of the interviews were determined (generally in a quiet place, such as a classroom or an office department) after their consent was obtained. Further, the 40 interviewees were from 22 clinical departments. Saturation was reached after 34 interview content cases, and six cases were collected by theoretical sampling.

2.2. Data collection

This study adopted the grounded theory method [14], which is a qualitative research approach. Its implementation process is similar to qualitative research; however, it required us to conduct an explanatory analysis of the actual situation based on pragmatism. Its main purpose is to build the theory based on the experience data by constantly comparing the data. Moreover, grounded theory not only emphasizes the systematic collection and analysis of empirical and factual phenomena but also focuses on the generalization and refinement of theories in terms of experience. Therefore, it was considered to effectively deal with the relationship between theory and experience. The present study aims to explore medical staff understanding and experience of care complexity and attempts to construct a practical theoretical framework of care complexity rooted in actual situations. Therefore, grounded theory is suitable for this research to carry out a qualitative study on care complexity.

Data were collected through 40 semi-structured in-depth interviews among clinical medical staff members from April 2015 to October 2015 based on the clinical field observations, and the sites and times for the interviews were set in advance to maintain data collection consistency. In addition, a semi-structural interview outline was developed to determine participants' experiences, thoughts, and understandings of care complexity in nursing care. The questions included, "What is your perspective on care complexity?," "What are the components of care complexity in nursing care?," "What do you think are the influencing factors of care complexity?," and "How is care cultivated?" The interviews were carried out individually. Before the interviews, the participants were informed of the purpose of the interviews, encouraged to ask questions, and asked to sign an informed consent. Further, live recordings and transcriptions were conducted during the interviews, and the interviewees were encouraged to express their own ideas about care complexity. In addition, we used the unified instructions to conduct a preliminary presentation of the interview topic and the guidelines. The emotions and behaviors of the interviewees were also carefully observed and noted, and the entire process was reviewed and studied carefully after each interview to check for inappropriateness, which could be improved in the next interviews. What's more, no new codes emerged after 34 interviews, suggesting the data collection saturation point. Each interview should last half an hour to an hour and a half to ensure the quality of the interview; those less than 30 min long were excluded. The entire process, including the interview contents and questionnaires, was confidential, and the data were analyzed qualitatively and coded precisely and objectively to ensure the privacy of the interviewees and the authenticity of the research. Ultimately, related items were classified into several categories, and the main theoretical framework of care complexity was initially formed.

2.3. Data analysis

Recorded materials were translated verbatim after the interviews, and the interviewees' pauses, emotions, and body language during the conversation were noted. Moreover, the interview data were segmented into substantive codes by two individuals according to the principles and coding steps of grounded theory

Table 1
Characteristics of the participants ($n = 40$).

Characteristic	n (%)
Sex	
Female	8 (20.0)
Male	32 (80.0)
Education	
Associate degree	9 (22.5)
Bachelor degree	22 (55.0)
Master's degree	9 (22.5)
Length of time on ward	
5–10 years	11 (27.5)
11–20 years	13 (32.5)
> 20 years	16 (40.0)
Professional title	
Primary nurse	5 (12.5)
Nurse-in-charge	15 (37.5)
Co-chief superintendent nurse	11 (27.5)
Resident doctor	1 (2.5)
Attending doctor	7 (17.5)
Chief physician	1 (2.5)

[14], including initial, focus, and axial coding. All substantive codes were further classified into several qualitative categories. The initial code and generics were obtained, and comparisons between data and between generics were continuously conducted. We then integrated the same generics, explored the associations between the various generics, and identified the primary and secondary generics, and our team members verified all the categories by reviewing the interview data to ensure accuracy and integrity. Thereafter, ideas or preliminary assumptions were written down in memos during data collection analysis to ensure that the true meaning of the interviewees was accurately grasped. Finally, the theoretical framework was constructed through verifications, comparisons, and discussions.

3. Results

By coding, refining, and inferencing, the study revealed three main factors that affected care complexity, namely, patient factors, nurse factors, and medical and hospital service factors. In addition, the care complexity theoretical framework was initially constructed on the basis of the three identified factors (Fig. 1), which included 15 different subcategories.

3.1. Patients

Patients receiving nursing care were generally designated as those with high-frequency recurrences. According to the interviewees, patients' condition, age, self-care abilities, adherence to medical suggestion, social support, mental state, and expectations

have considerable impacts on care complexity.

3.1.1. Patient condition and age

Patients' condition, including the severity of disease, the type of disease, comorbidities, and complications, is the core category of care complexity. For instance, patients with light illness conditions need less basic care, whereas patients with severe illnesses require considerable nursing care. As a nurse said *"For the severe disease with more complications, nursing care will be more complicated and requirement of service level will be higher."* Patients' age considerably influences patient mood and communication with medical staff members, thereby affecting patient condition. Young patients generally recover faster than older patients with similar illnesses. Compared with older patients, *"the faster metabolism and smoother communication"* of young patients lower care complexity. According to a clinical nursing professor, *"It is easier to care for younger patient than for older ones, and the care complexity is lower."* The advantages of young patients are their physical fitness and communication skills. Compared with older patients, younger patients recover faster from various diseases and have better defense mechanisms. Further, the language barrier is another problem in communicating with old patients who speak local dialects. *"You can only communicate with their families, and there is no way to communicate with them (patient)."*

3.1.2. Patient self-care abilities and adherence to medical suggestions

The poorer the patients' self-care abilities, the greater the nursing workforce and workload. Undoubtedly, patients with poor

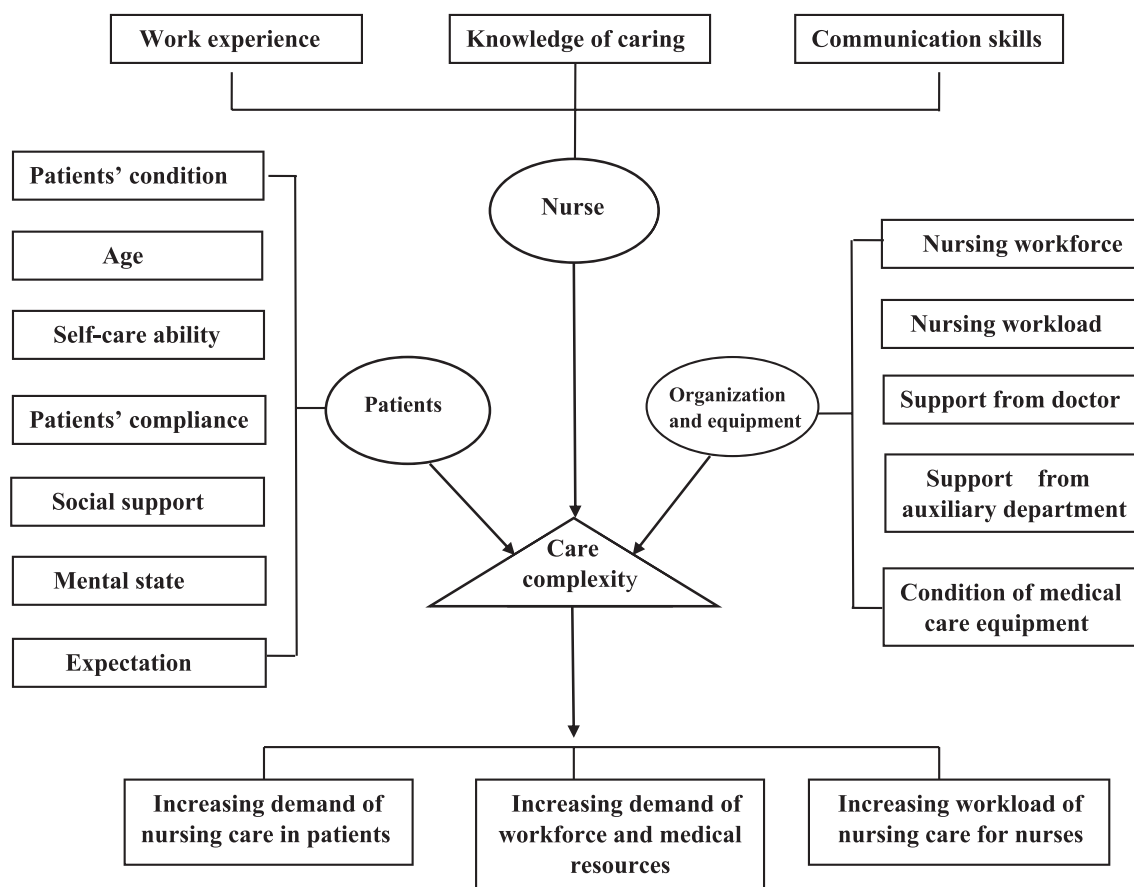


Fig. 1. Theoretical framework of care complexity under the Chinese health care system.

self-care abilities will increase care complexity. According to a clinical doctor, *“For patients with good self-care abilities, the basic nursing care will not be performed passively. However, for patients with poor self-care abilities, care complexity increases. For instance, patients with hemiplegia have no self-management abilities, which will definitely affect the difficulty of nursing care.”* Patients' adherence to medical suggestions is their degree of cooperation with nursing care. According to one of the clinical nurses, some patients will not do anything without doctors' and nurses' permissions. However, this situation was untrue for a few irritable patients. Patients' noncompliance would certainly increase care complexity difficulties.

3.1.3. Patient social support and mental state

Social support includes financial support and the physical presence of family members and relatives. Patients cooperate with the medical staff on nursing care when accompanied by family members and no economic burdens arise. In addition, care assistance from patients' relatives reduces the nursing workload, thereby reducing care complexity. Patients' mental state affects their expectations and communications with nurses, and those with high expectations generally have high nursing care requirements. When therapeutic effects are poor, patients vent their anger and complaints on nurses, which influences nursing care and increases care complexity.

3.2. Nurses

3.2.1. Work experiences

Numerous interviewees considered work experience as important to nursing work. A nurse with a rich working experience can obtain a satisfactory understanding of patients' conditions and can calmly deal with emergency situations. Moreover, a nurse with a rich working experience has excellent communication abilities, which reduce care complexity. According to an attending doctor, *“In our department, there are many young nurses. Due to lack of work experience, the young nurses can't comprehensively observe the patients' conditions. They may have improper operation of tough cases and basic operation skills.”* According to a chief physician, *“If you encounter some new nurses, she may not know where the breathing apparatus and rescue equipment are, let alone how to use them. It will be better if you encounter a nurse with a rich working experience. She can prepare the medicine you need, such as epinephrine, atropine.”* A rich working experience is crucial for nurses, especially for those involved in rescue, which is a race against time.

3.2.2. Knowledge of caring and operational skill levels

Knowledge of caring, which is closely related to educational background and mastered professional skills, is the knowledge a nurse needs in the caring practice. Care complexity links professional responsibilities, caring abilities, and humanity. According to a supervisor nurse, *“Care complexity in caring for patients varies greatly with the nurses' education background. Nurses with bachelor's degrees and solid health education do a good job in caring for patients. Nurses with associate's degrees can only work, but their communication abilities with patients are more or less weak.”* Moreover, according to an associate chief nurse, *“Nursing professional knowledge is essential for nurses. A nurse with good nursing professional knowledge can solve practical problems, answer questions professionally, and know their patients' conditions, which can contribute to the patients and solve more problems.”*

3.2.3. Communication skills

Communication between nurses and patients is the most important skill in nursing work. Communication skills and abilities

are important for decreasing care complexity, and communication links the patients, their family members, and the care team. According to a supervisor nurse, *“Communication with patients, for us, is a type of service. Communication skills provide a good service for patients and make our work go well. If you are introverted or don't like communicating, then you will face more difficulties.”*

3.3. Organization and equipment

3.3.1. Nursing workload and support from doctors

The analysis of the data corroborated that care complexity was closely related to a few departments and medical and hospital services. The nursing workforce and workload affect nurses' emotions and abilities to work efficiently. According to a chief physician, *“The high intensity of nursing is a challenge for nurses, physically and mentally. A heavy workload would obviously increase care complexity. For instance, caring for a patient from an ICU is a heavy workload. Given that the patient lies in bed all the time, the difficulty of nursing care itself is great.”* Doctors' support and cooperation are crucial for the smooth development of nursing care, especially when patients attribute their ill conditions to changes in nursing care. In addition, doctors can provide brief and reasonable explanations which can help eliminate misunderstandings and reduce care complexity. According to a senior nurse, *“For the same thing, for example, when a patient is dissatisfied with our nurses, it is useless for nurses to explain. The problem can be solved as long as the chief physician says a few words to the patients.”*

3.3.2. Support from logistics and ancillary departments

Patient treatments and nursing care that rely on the cooperation of various hospital departments are generally effective, and support from logistics and ancillary departments also reduces care complexity. According to a senior nurse, patients would become extremely angry with a nurse for logistic staff delays or for long waiting times for appointments for auxiliary examinations in other clinical departments. Medical and hospital service conditions are embodied in two aspects, namely, the number of apparatus and equipment and the technological advancement of the equipment. According to a resident doctor, *“Sometimes, the electrocardiograph monitors in our department are not enough, and we must borrow them from other departments, not to mention nursing care for other patients. Of course, some mechanized devices could reduce the workload of nurses, thereby reducing the workload and improving work efficiency.”*

4. Discussion

According to the theoretical framework, care complexity is mainly affected by patient, nurse, and medical and hospital service factors. Patients' functional status and age and communication skills, nursing education background, the severity of illness, the need for surgery, patients' social support and cooperation, and other special requirements have been used to evaluate the intensity of nursing [15], which are consistent with our results. Moreover, the intensity of nursing, which can be affected by various factors, is one of the aspects of care complexity. In addition to the patient and nurse factors, any subject directly or indirectly related to the nursing work will affect care complexity.

4.1. Patients as the key factors affecting care complexity

As the patients are the direct objects in nursing care, their situations are bound to affect nursing work. Patients' situation, age, and self-care abilities are related to care complexity [3,4,15,16], which is consistent with our results. In addition, old patients with

severe diseases have a high incidence of complications, which in turn aggravates their conditions, and patients with poor self-care abilities will increase the nursing workload and the difficulty of the nursing content, thereby increasing care complexity. Aside from the objective factors, such as patients' condition, self-care abilities, and age, patients' understanding and cooperation are ubiquitous obstacles in nursing work. For high-quality nursing services, nursing interventions should not be implemented mechanically and should provide holistic care for patients, including physiological, mental, and social support. Patients should cooperate with nurses and not accept care passively. Meanwhile, the nursing care process involves continuous interactions and communications between nurses and patients, which illustrate the importance of patient adherence to medical suggestions and the nurse–patient communication in nursing work [3]. Patient adherence to medical suggestions refers to the consistency between the patient's actions and the doctor's orders. Our findings affirmed that patients' adherence to medical suggestions is correlated to care complexity [17]. In addition, patients with poor compliance can considerably increase care complexity, and patients' social support [18] and mental state [19] have been proven to be associated with patient adherence to medical suggestions and nurse–patient communication. Further, patients are prone to anxiety and other negative emotions after hospitalization because of the change in the environment and fear of diseases. Emotional support from family members and financial support from relatives help in alleviating patients' negative emotions. In return, patients with positive moods can easily communicate with nurses and actively cooperate with nursing care.

4.2. *Quality of nursing staff determines care complexity in nursing patients*

Nurses are responsible for the nursing work, and their personal characteristics, working experiences, knowledge, and nursing and communication skills will have a certain impact on the care complexity. Our study confirmed a similar result with the research by Guarinoni [19]. Patients can receive effective nursing care when nurses have solid professional knowledge and numerous working experiences [20,21]. First, working experience affects the efficiency in dealing with patient situations. Nurses with rich working experiences can comprehensively observe and accurately judge patients' conditions, which can contribute to improving the patient rescue success ratio. Care complexity is lower for older nurses with rich working experiences compared with younger nurses. Second, professional knowledge and skills have a considerable impact on care complexity [19,22]. A skilled nurse with broad knowledge is confident, and patients are willing to trust and cooperate with her, thereby facilitating the smooth implementation of the nursing care. Third, nurse–patient communication is one of the most important processes in nursing care. Nurses' communication abilities help disease recovery and are vital to patient satisfaction [23], and each care operation in clinical work is accompanied by nurse–patient communication. In addition, nurses' satisfactory communication abilities contribute to establishing harmonious patient relationships, promoting patient understanding, and to reducing care complexity.

4.3. *Nursing workload and medical equipment as potential factors that cannot be ignored*

In contrast to previous studies on care complexity, the present research studies the perspective of medical staff members in China's top three hospitals. Our findings contended that nursing workforce and workload, as well as support from doctors and

auxiliary departments and the conditions of medical and hospital services, are important factors that influence care complexity. The aforementioned factors may correlate with the Chinese health system and the cultural context. Moreover, shortages in the nursing workforce are common in China, which result in an increase in the nursing workload and in energy drain. Nurses are exhausted from performing difficult tasks, which results in their failure to observe patients' conditions and to prevent complications and disease recovery. Further, the nursing workforce and workload are correlated with ICU patients' mortality [24,25]. Nurses with inadequate health education and nurse–patient communication skills due to shortages of human nursing resources will decrease patient satisfaction. In addition, support from multidisciplinary teams and other ancillary departments and sufficient and advanced equipment can enhance nursing work. Medical and hospital service conditions can affect nursing difficulty and intensity. According to one interviewed nurse, “Nurses often move the patient from one place to another or help patients stand up or change positions in beds.” Nursing care potentially results in physical exertion among nurses, which in turn increases the intensity of nursing care. The occurrence of low back pain is high among nurses, especially those in ICUs [26,27]. Therefore, sufficient and advanced mechanized equipment is essential.

4.4. *Hypothetical consequences of increased difficulty in nursing*

The interviewees recruited in this study included frontline clinical nurses, a head nurse, a nursing director, and doctors. The doctors', nurses', and nurse managers' understandings of care complexity were compared after the interviews. A general consensus emerged among the medical staff members on care complexity, and no obvious differences were observed in the influencing factors, which illustrate that nurses in China have cordial and cooperative relationships with doctors. Further, three assumptions were deduced from analyzing the factors influencing care complexity. First, increasing patient care complexity is a manifestation of patients' worsening conditions, which illustrates the increased demands for nursing care and communication. Additional medical actions and nursing interventions should be taken; second, increasing nurse care complexity implies increased nursing workload and intensity of nursing care; and third, increasing care complexity and nursing work increases the utilization of medical resources and nursing workforces. The relationships between the influencing factors of care complexity are complicated, and care complexity can be reduced if appropriate measures are taken and the advantages of the influencing factors are used.

4.5. *Care difficulty definition*

The concept of care complexity has never been defined precisely and accurately. To date, no study exists on the concept of care complexity in China. According to Jonge [2], care complexity is involved in multiple systems and disciplines during nursing care, and the complexity of patients' conditions may not be positively correlated with care complexity. Meanwhile, Guarinoni [3] validated that care complexity had two attributes, namely, immeasurability and uncertainty, which were affected by patient conditions, clinical and nursing characteristics, and social and environmental factors. The present study was based on in-depth interviews with 40 medical clinical staff members and the analysis of the influencing factors of care complexity. Care complexity is defined as the sum of the difficulties or hinderances in patient nursing care and is characterized by diversity and variability and mainly affected by patients, nurses, and other factors in nursing and

multisectoral, multidisciplinary cooperation. Furthermore, the diversity of care complexity is attributed to its various influencing factors, and the sources of difficulties during clinical work are patients, patient family members, nurses, doctors, and even other hospital departments. The variability of care complexity is consistent with the dynamic changes of its influencing factors, that is care complexity varies with the changes in patient conditions.

5. Limitations and recommendations

The present study was a preliminary exploration in the theoretical framework of care complexity. Further study is necessary to verify the correlations among the various factors in our study. In addition, the interviewees were limited to medical staff members from the top three hospitals in China, which may result to some extent in a biased conclusion. Nursing care work systems and hospital processes differ; thus, a cohort study with additional subjects recruited from different hospitals will provide reliable results.

This research studied the perspectives of medical staff members to theoretically understand care complexity, and follow-up studies can focus on care complexity in terms of different diseases, which can contribute to improving the theoretical framework.

6. Conclusions

Previous studies on care complexity have been based on literature reviews or the Delphi method. The present study adopted grounded theory and constructed a care complexity theoretical framework. Care complexity is closely correlated to three factors, namely, patients, nursing staff, and medical and hospital services. Moreover, our results can guide clinical medical staff members to comprehend the importance and difficulties of nursing care, which can contribute to improving work quality and efficiency.

Conflicts of interest

None declared.

Ethical approval

Ethical approval was obtained from the studied hospitals, and all participants provided informed consent prior to their inclusion in the study.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.ijnss.2019.03.011>.

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