

# The construction and practice of a standardized nursing service system based on the designated hospital for the treatment of COVID-19 in China

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Coronavirus disease 2019 (COVID-19) is an infectious disease with fever, dry cough, and malaise as the main clinical manifestations [1, 2]. The public health safety of China is facing a great challenge [3]. To address the problems caused by COVID-19, according to the disease characteristics of the new coronavirus pneumonia, setting up the local hospital as a designated hospital for centralized isolation and treatment has become an important and effective initiative [4, 5]. However, at this stage, it is not possible to set up a hospital for the national COVID control program (NCCP), and there is no specific standard for the care service system of the designated hospital for NCCP, which cannot meet the current status of epidemic regularity.

Therefore, this study aims to construct a standardized nursing service system in the designated hospitals for NCCP, to provide nursing standards and a theoretical basis for the designated hospitals.

After reviewing the literature and consulting with experts from January to March 2021, the research team was established in April 2021, consisting of 12 members, including one expert in the field of standardization research, 2 chief nursing officers, one deputy chief nursing officer, 7 competent nursing officers, and one nurse practitioner. The main tasks of the team members were literature search, questionnaire production and distribution, statistical analysis, screening, determination, statistical analysis of questionnaire results, and construction of the final standard index system.

This study used “Corona Virus Disease 2019”, “standard system”, and “designed hospital” as English search terms in PubMed, Web of Science, The Cochrane Library, and other English databases. Meanwhile, we used “New Corona Pneumonia” and “Designated hospital” as Chinese search

terms in Chinese databases such as Wanfang Medicine, CNKI, Wipu Database, and the China Biomedical Literature Database. Seventy-five relevant articles were retrieved (26 articles and 6 articles in English).

The correspondence form includes 3 parts, (1) Letters to the experts. Introducing the purpose and significance of this study, and the method of completing the questionnaire; (2) Survey of experts' related conditions. Including the basic information of the experts, the basis of their judgment, and familiarity with each index; (3) Formation of the correspondence, from asking the experts to evaluating the importance of each first-, second-, and third-level indicator according to the Likert 5 scale, and giving guidance (1).

Based on the literature review, members of the research group discussed and identified 5 dimensions: "standardized work system", "standardized workflow", "standardized nursing service language", "standardized environmental signage", and "nursing service quality and safety assurance system". The 5 dimensions of "standardized work system", "standardized work process", "standardized nursing service language", "standardized environmental signage", and "nursing service quality and safety assurance system" were identified as the primary indicators, with 20 secondary indicators, and 170 tertiary indicators.

Inclusion criteria: (1) clinical nursing, nursing education, or nursing management in a tertiary hospital for  $\geq 10$  years; (2) bachelor's degree or above; (3) intermediate title or above; (4) understanding and agreeing to this correspondence. Exclusion criteria: experts who were "unfamiliar" or did not fill out the questionnaire actively, seriously, or with high quality were selected in one round of consultation.

The questionnaire was sent to the experts by e-mail in April 2021. Nineteen experts were consulted in the first round, and after the consultation, the research team added modified or deleted indicators based on the experts' opinions after review and discussion. The revised questionnaire was sent to the experts again, with an interval of 20 days between the 2 inquiries to avoid errors. At the end of the second round, the members again revised the questionnaire according to the opinions given by the experts and stopped the correspondence when the experts' opinions were gradually unified.

This study used Excel 2019, SPSS 25.0 software to analyse the data. The mean, standard deviation, variable coefficient (CV), perfect score rate, questionnaire return rate, expert authority coefficient, and Kendall's harmony coefficient were calculated. Yaahp 12.8 software was used to calculate the weights of each indicator, and hierar-

chical analysis was used to determine the weight coefficients of the entries.

The basic information of the experts is shown in Table I.

Nineteen questionnaires were sent out in both rounds, and 19 valid questionnaires were returned with 100% positivity. The familiarity degree of experts in this study is 0.853, which means that the experts' familiarity degree is good, and it is generally considered that  $Cr \geq 0.7$  is acceptable [6]. The degree of authority ( $Cr$ ) = (familiarity + judgment basis)/2, and the degree of authority in this study was 0.914. The degree of expert opinion coordination is usually expressed by Kendall's  $W$ . In this study, after 2 rounds of expert consultation, the Kendall's  $W$  of the first, second, and third level indicators were 0.046, 0.008, and 0.000, respectively, with statistically significant differences ( $p < 0.05$ ), indicating that the experts' opinions were relatively consistent and the degree of coordination was good (Table II).

After a round of correspondence, according to expert opinion, 3 additional tertiary indicators were added: "COVID-19 isolation ward management system", "resuscitation room environmental signage", and "fever clinic patients' nasal swab, pharyngeal swab collection operation procedures". Two tertiary indicators were revised: changing "Infection protection system in the ob-

**Table I.** Basic information of the experts consulted by letter ( $n = 19$ )

Parameter	Number of experts	Percentage (%)
Age [years]:		
30–39	4	21.05
40–49	6	31.58
50–59	9	47.37
Working time [years]:		
10–20	4	21.05
21–30	10	47.37
Greater than 30	5	26.32
Academic qualifications:		
Specialty	2	10.53
Undergraduate	11	57.89
Master and above	6	31.58
Title:		
Intermediate title	3	15.79
Associate senior title	12	63.16
Positive senior title	4	21.05
Fields of work:		
Care Management	14	73.68
Clinical Care	3	15.79
Nursing Education	2	10.53

**Table II.** Significance test of the degree of coordination of expert opinions

Projects	Kendall Harmonic coefficient	$\chi^2$	P-value
Tier 1 indicators	0.127	9.667	0.046
Secondary indicators	0.008	37.160	0.008
Tertiary indicators	0.098	323.480	0.000

servation ward, end-of-life treatment system in the observation ward” to “Infection protection system in the observation ward” and changing “Operating procedures for collection of pharyngeal/anal swabs from patients with neoconiosis” to “Procedure for collection of nasal and pharyngeal/anal swabs from patients with COVID-19”. After the second round of correspondence, and again based on expert opinions, the panel members deliberately discussed the addition of 4 tertiary indicators: “environmental signage for resuscitation rooms”, “environmental signage for testing”, “oral medication distribution for patients with neoconiosis operation procedure”, and “operation procedure of prone ventilation for patients with severe neoconiosis”; modification of one level-2 indicator: “standardized system for the treatment or admission of patients with neoconiosis” to “The standardized system for treatment and isolation wards for neoconiosis”, and the deletion of a level-3 indicator: “end-of-life treatment system in the hospital ward”. The finalized standardized nursing service system of the hospital for the treatment of NCCP included 5 primary indicators, 20 secondary indicators, and 176 tertiary indicators. The importance scores of the above secondary and tertiary indicators are above 4.5, and the coefficients of variation are less than 0.25. The composition of standard indicators at all levels is scientific and the results are reliable, which have certain scientificity and value.

At a time when the form of the National Covid Control (NCC) epidemic is still severe, the National Health Commission has put forward higher work standards and more practical work initiatives to reduce the occurrence of nosocomial infections in designated hospitals for NCC admissions, and to optimize various work processes and technical operation procedures in designated hospitals, and put forward higher work standards and more practical work initiatives for nursing services in medical institutions. Based on the guidance of national policies and guidelines related to the prevention and control of neo-crown, research on the management norms and programs of designated hospitals for the treatment of neo-crown has also begun. Previous studies have been conducted on staff management systems in isolation wards of NCC sentinel admission hospitals [7], infection protection for healthcare workers in NCC sentinel admission hospitals [8], and medi-

cal management in NCC sentinel admission hospitals [9]. During the same period, local norms for sentinel treatment of NCC pneumonia, fever clinic, pre-screening triage, and management of isolation wards have also been introduced, but norms and service standards for nursing services in NCC sentinel admission hospitals are still lacking. A comprehensive and unified nursing service standard is essential to standardize nursing staff work behaviours, improve nursing workflow, enhance nursing work quality, and reduce hospital infection [10]. Therefore, this study initially determined the standardized nursing service system in the COVID-19 sentinel admission hospital by Delphi method, analysed the index weights at all levels by hierarchical analysis, and constructed the system completely after the consistency test was passed, aiming to improve the quality of nursing service in the New Crown sentinel admission hospital in the future and provide reference for the sentinel admission hospital to carry out nursing service practice.

In this study, after reviewing relevant literature at home and abroad, drawing on the experience of nursing management in designated admission wards of New Crown in various regions, combined with China’s policy guidance, the primary indicators: standardized work system, standardized work flow, standardized nursing service language, standardized environmental signs and nursing service quality, and safety assurance standards, were formulated according to the requirements of New Crown management program, and the standards of primary indicators were standardized and refined on the basis of the primary indicators. The process makes the content of the first-level indicators more enriched, while the third-level indicators refer to specific nursing service behaviours. The system of indicators at each level reflects the nursing service standards that must be followed in the work of the sentinel admission hospital, meets the requirements of the sentinel admission hospital for nursing services, and adapts to the principles of nursing services in the designated hospitals, and the research content is more perfect. In addition, the results of expert consultation in this study have good reliability. The 19 experts selected for this study have 10 years or more of clinical nursing work experience, and most of them are engaged in nursing management field-related work and are familiar with the connotation of this field of

work, so the experts selected for this study have typical representativeness. Two rounds of expert consultation questionnaires have a recovery rate of 100.00%, among which 6 experts have proposed, and the remaining experts expressed positive opinions on the consultation items, which indicates that the consulting experts have a high degree of participation and recognition in this study. The expert Cr after the 2 rounds of consultation was 0.914, which indicates that the authority of the experts is good. Kendall's W was statistically significant for all levels of indicators in the results of the 2 rounds of expert consultation in this study, indicating relatively consistent and well-coordinated expert opinions. In this study, the Delphi method was applied, and the second round of correspondence was strictly completed according to the index construction requirements of the Delphi method, and the modified opinions guided by experts were expressed numerically by using hierarchical analysis, further quantifying the weight coefficients of indicators at all levels and conducting a consistency test on them, the results of which indicated that the index weights in the system constructed in this study were objective and scientific [11].

The index system constructed in this study is highly specialized, reflecting the similarities and differences between the nursing services of New Crown sentinel admission hospitals and general hospitals, and providing important technical support to further promote the quality improvement of nursing services in sentinel admission hospitals. The essential difference between the nursing services provided by New Crown sentinel admission hospitals and general hospitals is that the former starts from the epidemic situation, strictly implements the epidemic control system, zoning and grouping management, and avoids the occurrence of cross-infection. The workflow and system of nursing services in general hospitals can no longer meet the requirements of self-protection and epidemic prevention and control. This study starts from the current situation of the nursing service of the New Crown designated hospitals, and in response to the problem that there is no unified standard system for the nursing service of the New Crown designated hospitals in China, the nursing service standard index system constructed in this study emerges to meet the demand of the nursing service of the New Crown designated hospitals in a timely manner. For different hospitals and patient diseases, this study has taken into account in the design of indicators to adapt to the requirements of nursing service management in each hospital's New Crown sentinel admission ward, and plays an important role in standardizing the nursing service in the New Crown sentinel admission ward; at the same time, the specific

contents are clearly defined conceptually, which maximally ensures the consistency of the consulting experts' understanding of the indicators, and the indicators are specific and operable, which is easy for nursing staff to understand. The multidimensional indicators of nursing service in the New Crown designated admission hospitals were analysed through the consultation results, and among the 5 primary indicators, the weight of nursing service quality and safety assurance was larger at 0.3016, indicating that nursing service quality and safety assurance occupies an important position in the prevention and control of epidemics in the New Crown designated admission hospitals, which is consistent with the requirements of quality nursing and reflects the "people-oriented" service concept. This is in line with the requirements of quality care and reflects the concept of "people-oriented" services. Studies have shown that the construction of a unified system, workflow and safety and quality management is conducive to multiteam assistance, and homogeneous management, thus improving efficiency and quality and ensuring patient safety [12]. In addition, in terms of human resource management, scientific deployment of nursing human resources in the New Crown-admitted hospitals will directly affect the effect of standardization of nursing service practice, which is similar to the findings of Jing *et al.* [13]. The most weighted secondary indicator of nursing work system is the standardized system of rescue and isolation wards in the New Crown ward, with a weight of 0.4690, which indicates the lack of standardized system of rescue and isolation wards in designated hospitals at present, and precisely the high demand of medical and nursing for the standard of rescue and isolation ward system in the New Crown. At present, in the condition that the epidemic situation of New Crown is not optimistic, the fixed-point treatment isolation for febrile patients is the top priority, so setting up a reasonable standardized system of treatment isolation wards is a critical factor of the standardized system of nursing services in the fixed-point treatment hospital of New Crown, and it is also the basic guarantee of providing quality nursing service. Active and effective nursing management in isolation wards provides a reliable guarantee for the successful treatment of patients with new coronavirus pneumonia, which can effectively reduce the risk of infection among health care workers and ensure the smooth prevention and treatment of new coronavirus pneumonia, which is similar to the findings of Cao *et al.* [14]. Among the secondary indicators of standardized workflow, the weight coefficient of standardized process in the New Coronavirus Pneumonia Treatment Ward ranked first with a weight of 0.3412,

indicating that the indicators of standardized process in the COVID-19 Treatment Ward are an integral part of the standardized care service system in the New Coronavirus Pneumonia Treatment Ward. The above indicators link the hospital, nurses, and patients together in an orderly manner and form a complete management process framework, which can not only monitor nurses' nursing behaviours, but also detect problems early, intervene early, and serve patients better.

There have been more domestic studies on the psychological and ward management of nurses in neo-coronavirus designated hospitals, but there have been few studies on the standardization of clinical nursing service quality. The current recurrent epidemic in China and the numerous outbreaks of neo-coronavirus hospital infections have revealed problems behind these events that have forced medical institutions to be alerted to the fact that the closed-loop management of staff involved in the treatment of neo-coronavirus is not rigorous and the lack of a unified standardized nursing service plan for neo-coronavirus designated hospitals has posed a problem for the outpatient and emergency nursing services in neo-coronavirus designated hospitals [15]. The occurrence of nosocomial infections and nosocomial epidemics undoubtedly reflects many problems in the epidemic management systems and processes of hospitals. In addition, the nursing services in many regional Neonatal Intensive Care Units (NICUs) are not standardized, perhaps because the nursing groups are not systematically trained, the hospitals lack relevant related regulations and workflow, the standards of nursing services are not uniform, and the quality of nursing services varies, which is not conducive to the enhancement and improvement of the quality of nursing services in NICUs over time. This study uses the Delphi method to construct a standardized nursing service system for the New Crown sentinel wards, which can serve as a reference for the national policy and program, as well as a standard for the evaluation and assessment of nursing services in the New Crown designated hospitals, and better promote the development of the nursing industry.

In conclusion, the standardized nursing service system constructed in this study for the COVID-19 sentinel admission hospitals makes up for the lack of nursing service standards and is worthy of further clinical promotion. This study has now completed the first stage of index construction and will be followed by practical research with a view to conducting empirical research on the constructed index system, verifying the scientificity and practicality of this evaluation system in practical application, and gradually improving it.

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## Conflict of interest

The authors declare no conflict of interest.

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