Construction of the evaluation index of nursing quality based on the main problems

Ye Jin[1], Jin Zheng[1*], Zongping Hu, Nan Wang, Jie Liu

1. Department of Respiratory and Critical Care Medicine, Sichuan Provincial People's Hospital, Chengdu 610000, China.
2. Nursing Department, Institute of Traditional Chinese Medicine, Sichuan Research Institute of Traditional Chinese Medicine, Chengdu 610031, China.
3. Director of Nursing Department of Chongqing Songshan Hospital, Chongqing 401120, China.
4. Chongqing 13th People's Hospital, Chongqing 400053, China.
5. Orthopedics of the First Affiliated Hospital of Chongqing Medical College, Nanping 400060, China.

Abstract: Objective To take the main problems of nursing quality as the guide, construct corresponding nursing quality inspection and evaluation indexes, and incorporate their application and incorporation quality into the weakness inspection at night and on holidays, so as to achieve the purpose of supervising nursing quality from the weakness. Methods The literature research method and expert consultation method were applied to construct the primary and secondary inspection evaluation indicators, and the secondary inspection indicators were tested for reliability and validity. Results The expert coordination coefficient (Kendall W) was 0.345; means ranged from 4.778 to 5.00; coefficients of variation (CV) 0.000% to 22.050%; the Kendall coordination coefficient test was used to test the consistency of the study evaluation, and the Kendall coordination coefficient test showed significance (p=0.000<0.05). The standardised Cronbach alpha coefficient was 0.926, which was greater than 0.9. Bartlett's test of sphericity (p=0.000<0.05), with a KMO value of 0.897, had a KMO value greater than 0.8. Conclusions Experts were consistent in their evaluations, and the quality of the check evaluation reliability and validity was high and well suited to extracting information.

Keywords: Major Quality of Care Issues; Weaknesses; Inspection and Evaluation Indicators

Introduction

Quality is the key to the survival and development of hospitals, and the quality of nursing services directly affects the overall quality of hospital services. Nighttime nursing quality is an important part of nursing service quality, but nighttime nursing work is characterized by many acute patients, rapid changes in their conditions, a large workload and a small number of nursing staff, etc., and is a weak link in nursing risk control [1]. How to focus on the main issues of nursing safety and quality in hospitals and implement good nursing services at night, on holidays and other weak links is an important part of improving the overall quality of nursing in hospitals. For this reason, many hospitals in China have established a general nursing duty system and a corresponding checking system, but the specific content of the checks, as well as the corresponding evaluation criteria, are rather arbitrary, making it difficult to hold precise identification of problems and quantitative evaluation of quality, with limited effect on quality improvement and risk control.

This study analyzes the hospital-wide nursing adverse events in 2022 between Sichuan Academy of Chinese Medicine (Sichuan Second Hospital of Traditional Chinese Medicine) and Sichuan Provincial People's Hospital by using Plato's principle, i.e. 80/20 principle [2], and finds that its main adverse events are inpatient falls, medication errors and catheter

slippage, which will be used as key indicators of nursing quality control in 2023 and included in the inspection content of night and holiday room checks in The inspection and evaluation index criteria for the corresponding problems were constructed on the basis of literature research and expert consultation, and reliability and validity tests were conducted.

1. Methodology

1.1 Literature analysis

Through Pub Med, Ovid, Google Scholar, Wanfang, Vipshop, China Knowledge Network and other Chinese and English databases, as well as the official websites of government departments in China and various provinces and cities, academic websites, and nursing quality control centres, we collected existing Chinese and English key words of inpatient falls, medication errors and catheter slippage risks at home and abroad, and listed them with theoretical basis and practical experience The four primary evaluation indicators of "general condition, fall prevention, safe medication administration and prevention of catheter slippage" and the corresponding 17 secondary inspection and evaluation indicators, initially formed the evaluation indicators of night and holiday nursing quality inspection.

1.2 Expert consultation

1.2.1 Inclusion and exclusion criteria for consulting experts

(1) Inclusion criteria: ① Hospital nursing managers; ② Voluntary participation in this study under the principle of informed consent.

(2) Exclusion criteria: ① Involuntary participation; ② Not involved in clinical care managers.

1.2.2 Examination and evaluation indicators expert consultation questionnaire, content setting

Two rounds of semi-open-ended consultation questionnaires were designed around the 17 secondary indicators mentioned above. The questionnaire was headed with the question "Do you agree with the content of the following hospital nursing visits at night and on holidays, and if you do not agree, please list your comments and suggestions for modification".

1.2.3 Expert consultation and analysis of inspection and evaluation indicators

In accordance with the principle of convenient sampling, the above-mentioned expert consultation questionnaire was imported into Questionnaire Star for online research, and 18 nursing experts from the hospital were consulted with their consent.

(1)Basic information of the experts, among the 18 experts, there was one master's degree, 16 undergraduate degrees and one specialist degree; two were chief nursing officers, eight were deputy chief nursing officers and eight were chief nursing officers; in terms of positions, two were directors of nursing departments, one was a nursing department officer and the remaining 15 were head nurses of clinical departments. Other basic information of the experts is shown in Table 1.

Table 1 Basic information of pension experts(n=18)

project	Sample size	Minimum value	Maximum value	Mean value	Standard deviation	Median
age	18	36.000	57.000	42.778	5.745	42.000
Nursing management years	18	2.000	15.000	9.111	4.086	9.500
Clinical years of care	18	13.000	38.000	21.389	6.335	19.500
Other relevant years of work	18	0.000	33.000	2.500	7.965	0.000

(2)Expert's degree of authority: The expert's degree of authority (Cr) is determined by the expert's judgement of the content of the interview (Ca) and familiarity with each indicator (Cs), Cr=(Ca+Cs) /2. The basis of judgement includes four

dimensions: practical experience, theoretical knowledge, reference to domestic and international sources, and personal subjective feeling, and each dimension is divided into large, medium and small according to the expert's self-evaluation, Each dimension is divided into three levels: large, medium and small. The degree of familiarity is expressed on a 5-point Likert scale and is divided into "very familiar", "relatively familiar", "generally familiar", "not very familiar" and "not familiar". Not very familiar", "Not familiar" and "Not familiar", respectively (1.0, 0.8, 0.5, 0.2, 0). See Table 2 for details.

Table 2 Expert judgment system quantitative table

Judgment basis	Expert self-evaluation		
	big	middle	small
Practical experience	0.5	0.4	0.3
Theoretical knowledge	0.3	0.2	0.1
Reference to national and international sources	0.1	0.1	0.1
Personal subjective perceptions	0.1	0.1	0.1

In the two rounds of expert interviews and consultations in this study, the index judgement factor for experts was 0.94, the familiarity factor was 0.91 and the authority factor for experts was 0.92. A Cr≥0.70 is generally considered to be an acceptable level of expert authority. Therefore, the degree of authority of experts in this study is good.

(3)Analysis of the degree of coordination between the two rounds of expert interviews: According to the first round of expert suggestions, one additional inspection indicator was added: "The department has fall prevention education materials that are easily accessible to patients/families", which initially formed 18 secondary inspection evaluation indicators. In the second round of the study, the mean, standard deviation and coefficient of variation of the importance of each indicator were calculated. The resultant coefficient of coordination (Kendall W) was 0.345; means ranged from 4.778 to 5.00; coefficients of variation (CV) 0.000% to 22.050%; the Kendall coefficient of coordination test was used to examine the consistency of the evaluations and the Kendall coefficient of coordination test showed significance (p=0.000<0.05), implying that the 18 evaluators' evaluations were correlated, i.e. indicating that the evaluations were consistent. The Kendall coefficient of coordination was 0.345, which ranged from 0.2 to 0.4, indicating that the degree of consistency of the evaluations was generally screened using the cut-off method. Entries that also met the mean importance assignment > 3.5 and coefficient of variation < 25.000% were retained, and the results met the retention criteria. See Tables 3 and 4 for details.

Tables 3 The importance and coefficient of variation of the second round of expert secondary inspection(n=18)

Secondary inspection index items	Mean values ± standard deviation	coefficient of variation(CV)
Nurses on duty are at their posts and behave in a proper manner	4.778±0.943	19.733%
The floor of the ward is clean and dry, the indoor and outdoor floors are smooth, the floor is non-reflective and anti-slip treatment	5.000±0.000	0.000%
No obstructions within the patient's range of movement	4.667±1.029	22.050%
Window restriction devices in wards and public areas are intact	4.778±0.943	19.733%
Uniform and adequate lighting in wards, no glare, night lights at night, appropriate lighting level	4.778±0.943	19.733%
Handrails, anti-slip mats and other auxiliary facilities are provided in toilets, bathrooms and corridors, with anti-slip and fall prevention signs	4.778±0.943	19.733%
Patients' beds, chairs, trolleys, walkers, etc. function well	5.000±0.000	0.000%
Warning signs are in place for patients at high risk of falling	4.778±0.943	19.733%
Patients at high risk of falls are supported or assisted in their activities	4.778±0.943	19.733%
Patients/families are aware of fall risks and precautions	4.778±0.732	15.323%

Secondary inspection index items	Mean values ± standard deviation	coefficient of variation(CV)
Patients/families are aware of the need to stay in bed or sit within half an hour of taking medication that has a side effect of postural hypotension	4.778±0.732	15.323%
No expired or spoiled medication in the unit	4.778±0.732	15.323%
Nurses on duty strictly follow the doctor's orders and the checking system to dispense medication and implement treatment	4.778±0.943	19.733%
Patients/relatives are aware of the purpose of medication, how to take medication and precautions	4.778±0.943	19.733%
Patients' catheters are within the expiry date and the name of the catheter and the risk of unplanned extubation are clearly marked	4.778±0.943	19.733%
Patient's catheter is properly and securely fixed and dressings used for fixation are clean and dry	5.000±0.000	0.000%
Patients/families are aware of the purpose of catheterisation and the precautions for catheter care	4.778±0.943	19.733%
Health education materials on fall prevention are available in the unit	5.000±0.000	0.000%

Tables 4　　Kendall W Coordination coefficient analysis results

Evaluator (judges)	Evaluation object (contestant)	Kendall Coordination coefficient	The statistic is χ^2 values	p
18	18	0.345	105.424	0.000

1.3 Secondary inspection and evaluation index reliability and validity test

The study team applied the previously constructed secondary inspection evaluation index to carry out inspections at night and on holidays in our hospital between February and June 2023. The inspections were conducted once a week during the first and second half of the night and once a week on each statutory holiday, with on-site inspections and interviews with nurses, patients and accompanying staff on duty. The inspection experts are the head nurses and ward nursing quality control nurses, and each team of two experts inspects all inpatient units in the hospital, so the inspection records are filled in on the questionnaire star, checked with the nurses on duty in the unit inspected, and submitted online. The departments inspected covered 16 inpatient departments such as internal medicine, surgery, geriatrics, gynaecology, intensive care medicine analysis unit and blood purification unit. A total of 167 inspection evaluations were conducted. The inspection results were also analyzed for reliability and analysis.

1.3.1 Reliability analysis

Reliability analysis is used to examine the reliability and accuracy of responses to quantitative data (especially for attitude scale questions). Firstly, if the alpha coefficient is higher than 0.8, the reliability is high; if the value is between 0.7 and 0.8, the reliability is good; if the value is between 0.6 and 0.7, the reliability is acceptable; if the value is less than 0.6, the reliability is poor; secondly, if the value of CITC is lower than 0.3, the item can be considered for deletion; thirdly, if Third: if the value of "deleted alpha coefficient" is significantly higher than the alpha coefficient, consider deleting the item and re-analyzing it; Fourth: summarize the analysis. As a result, the standardised Cronbach alpha coefficient was 0.926, which is greater than 0.9, thus indicating a high quality of confidence in the study data. It can be used for further analysis. See Table 5 for details.

Tables 5 Cronbach Confidence analysis　(n=167)

name	Total correlation of the correction items(CITC)	Item deleted α coefficient	Cronbach α Coefficient

name	Total correlation of the correction of the items(CITC)	Item deleted α coefficient	Cronbach α Coefficient
Nurses on duty are at their posts and behave in a proper manner	0.506	0.926	
The floor of the ward is clean and dry, the indoor and outdoor floors are smooth, the floor is non-reflective and anti-slip treatment	0.538	0.925	
No obstructions within the patient's range of movement	0.303	0.929	
Window restriction devices in wards and public areas are intact	0.564	0.924	
Uniform and adequate lighting in wards, no glare, night lights at night, appropriate lighting level	0.502	0.925	
Handrails, anti-slip mats and other auxiliary facilities are provided in toilets, bathrooms and corridors, with anti-slip and fall prevention signs	0.593	0.923	
Patients' beds, chairs, trolleys, walkers, etc. function well	0.294	0.928	
Warning signs are in place for patients at high risk of falling	0.796	0.918	
Patients at high risk of falls are supported or assisted in their activities	0.772	0.918	
Protective bed rails are in place for patients at risk of falls, with bed stops 35cm above mattress height.	0.739	0.919	0.926
The unit has fall prevention information materials that are easily accessible to patients/families	0.806	0.918	
Patients/families are aware of fall risks and precautions	0.826	0.917	
No expired or spoilt medication in the unit	0.284	0.929	
The nurse on duty strictly follows the doctor's orders and the checking system to dispense medication and implement treatment	0.649	0.922	
Patients/families are aware of the purpose of medication, how to take medication and precautions	0.749	0.919	
Patients' catheters are within their expiry dates and the names of the catheters and the risk of unscheduled withdrawal are clearly marked	0.681	0.921	
Patient's catheter is properly and securely fixed and dressings used for fixation are clean and dry	0.705	0.920	
Patients/families are aware of the purpose of catheterisation and the precautions for catheter care	0.768	0.919	

Normalized Cronbach α coefficient: 0.926

1.3.2 Validity analysis and validation

(1)Validity analysis: Validity analysis is used to examine the soundness of the design of quantitative data (especially the attitude scale questions). If this value is higher than 0.8, then the data is suitable for extracting information (good validity from the side); if this value is between 0.7 and 0.8, then the data is suitable for extracting information (good validity from the

side); if this value is between 0.6 and 0.7, then the data is suitable for extracting information (fair validity from the side); if this value is less than 0.6, then the data is not suitable for extracting information (fair validity from the side); if this value is less than 0.6, then the data is not suitable for extracting information (fair validity from the side). If this value is less than 0.6, the data is not suitable for extracting information (average validity from the side) (if there are only two questions; the KMO is 0.5 in any case); second: then the correspondence between the question items and the factors is analysed; if the correspondence is generally consistent with the psychological expectations of the study, the validity is good; third: if the validity is poor; or if the correspondence between the factors and the question items is seriously inconsistent with the expectations If the validity is not good, or if the correspondence between the factor and the question item is not as expected, or if the correspondence between the item and the factor is less than 0.4 (sometimes 0.5), then the item can be considered for deletion; fourth: there are common criteria for deletion; first, the correspondence between the item and the factor is less than 0.4 (sometimes 0.5); second, the correspondence between the item and the factor is seriously deviated; fifth: repeat the above 4 steps from 1 to 4; until the KMO is reached; and the correspondence between the item and the factor corresponded to the factors in general as expected, which ultimately indicated good validity; sixth: summarize the analysis. See Table 6 for details.

Tables 6 Results of the validity analysis of the secondary inspection indicators(n=167)

name	Factor load coefficient				Common degree (factor variance)
	Factor 1	Factor 2	Factor 3	Factor 4	
Nurses on duty are at their posts and behave in a proper manner	0.173	0.821	0.084	0.296	0.799
The floor of the ward is clean and dry, the indoor and outdoor floors are smooth, the floor is non-reflective and anti-slip treatment	0.421	0.787	-0.177	0.185	0.862
No obstructions within the patient's range of movement	0.055	0.192	0.042	0.772	0.638
Window restriction devices in wards and public areas are intact	0.213	0.390	0.225	0.724	0.772
Uniform and adequate lighting in wards, no glare, night lights at night, appropriate lighting level	0.397	0.781	-0.177	0.145	0.819
Handrails, anti-slip mats and other auxiliary facilities are provided in toilets, bathrooms and corridors, with anti-slip and fall prevention signs	0.600	0.184	-0.076	0.494	0.643
Patients' beds, chairs, trolleys, walkers, etc. function well	-0.017	0.737	0.177	0.065	0.579
Warning signs are in place for patients at high risk of falling	0.762	0.243	0.366	-0.028	0.775
Patients at high risk of falls are supported or assisted in their activities	0.823	0.145	0.275	0.000	0.774
Protective bed rails are in place for patients at risk of falls, with bed stops 35cm above mattress height.	0.764	0.211	0.287	-0.050	0.712
The unit has fall prevention information materials that are easily accessible to patients/families	0.844	0.050	0.182	0.303	0.841
Patients/families are aware of fall risks and precautions	0.855	0.080	0.203	0.261	0.847
No expired or spoilt medication in the unit	-0.067	0.695	0.258	0.087	0.561
The nurse on duty strictly follows the doctor's orders and the checking system to dispense medication and implement treatment	0.687	0.179	0.237	-0.011	0.560
Patients/families are aware of the purpose of medication, how to take medication and precautions	0.779	-0.039	0.222	0.355	0.784
Patients' catheters are within their expiry dates and the names of	0.409	0.126	0.830	0.044	0.874

name	Factor load coefficient				Common degree (factor variance)
	Factor 1	Factor 2	Factor 3	Factor 4	
the catheters and the risk of unscheduled withdrawal are clearly marked					
Patient's catheter is properly and securely fixed and dressings used for fixation are clean and dry	0.427	0.120	0.828	0.074	0.888
Patients/families are aware of the purpose of catheterisation and the precautions for catheter care	0.544	0.015	0.699	0.276	0.861
Characteristic root value (before rotation)	8.357	2.754	1.353	1.124	-
The rate of variance interpretation %(before rotation)	46.426%	15.300%	7.518%	6.246%	-
Cumulative variance interpretation rate %(before rotation)	46.426%	61.726%	69.243%	75.489%	-
Characteristic root value (after rotation)	5.789	3.348	2.559	1.892	-
The rate of variance interpretation % (after rotation)	32.159%	18.601%	14.219%	10.511%	-
Cumulative variance interpretation rate % (after rotation)	32.159%	50.760%	64.979%	75.489%	-
KMO price	0.897				-
Bartlett Spherical value	2586.427				-
df	153				-
p price	0.000				-

Note: color in the table: blue indicates the absolute load coefficient greater than 0.4, red indicates the common degree (common factor variance) less than 0.4.

The KMO value is used to determine the suitability of the information extracted, the commonality value is used to exclude unreasonable research items, the variance The KMO value was used to determine the suitability of the data for information extraction, the commonality value was used to exclude unreasonable items, the variance value was used to indicate the level of information extraction, and the factor loading coefficient was used to measure the relationship between the factors (dimensions) and the items. In addition, the KMO value is 0.897, which is greater than 0.6, and the data can be effectively extracted information. In addition, the variance explained values of the four factors were 32.159%, 18.601%, 14.219%, 10.511% respectively, and the cumulative variance explained after rotation was 75.489%>50%. Meaning that the information content of the study term can be effectively extracted. Finally, please combine the factor loading coefficients to check whether the correspondence between the factors (dimensions) and the study items is as expected, if it is, then it is valid, if not, then it needs to be readjusted. If the absolute value of the factor loading coefficient is greater than 0.4, it means that there is a correspondence between the option and the factor.

(2)Validity validation: If the KMO and Bartlett tests are used only for validity, i.e. without regard to the correspondence between the dimensions and the items analysed, the variance explained, etc. Firstly: analyse the KMO value: if this value is higher than 0.8, it indicates that it is very suitable for information extraction (a side note of good validity); if this value is between 0.7 and 0.8, it indicates that it is more suitable for information extraction (a side note of good validity); if this value is between 0.6 and 0.7, it indicates that information extraction is possible (a side note of average validity); if this value is less than If this value is less than 0.6, the information is harder to extract (a side reflection of low validity); second: validity analysis requires a Bartlett test (corresponding p-value needs to be less than 0.05); third: if only two items are analysed, the KMO is 0.5 in any case. results, Bartlett sphericity test (p=0.000<0.05), the KMO value is 0.897. With a KMO value greater than 0.8, the study data is well suited to extracting information (a good side reaction to validity). See Table 7 for details.

Table 7 KMO and Bartlett's test

KMO price		0.897
Bartlett Sphelicity test	Approximate chi square	2586.427

	df	153
	p price	0.000

2. Conclusion

The problem-oriented construction of secondary indicators for checking and evaluating the quality of nursing care in weak areas such as nighttime and holidays on the basis of literature research and expert consultation not only has pride of place better quality expert synergy, but also has better reliability and validity and is suitable for checking and evaluating relevant quality of care issues.

3. Discussion

3.1 Focusing on the main issues

The Pareto principle[3-4] was proposed by the Italian economist Pareto, also known as the two-eight principle and the law of least effort. Pareto's research found that, in general, 80% of an operator's efforts do not create benefits and effects, or do not directly create benefits and effects; while 80% of his gains come from only 20% of his efforts, and the other 80% of his efforts bring only 20% of the results. The Law of Two Eights suggests that there is a general imbalance between inputs and outputs, efforts and rewards, causes and outcomes, whereby a small, critical part of the organisation usually dominates the output, profit and loss, and success or failure of the whole organisation[5]. The core idea of Pareto chart analysis, also known as ABC classification and primary and secondary factor analysis, is to distinguish the primary and secondary factors among the many factors that determine a thing, i.e. to identify the few key factors that play a decisive role in a thing and the many secondary factors that have less influence on a thing, so as to determine the management approach in a differentiated manner [6-8]. Second Hospital of Traditional Chinese Medicine and Sichuan Provincial People's Hospital 2022 full-year nursing adverse events, focusing on the main problems, as a basis for the study of weaknesses in the quality of care process inspection and control indicators, will change the previous method of generalized investigation, so that the inspection always focus on the main problems, on quality improvement is worth looking forward to.

3.2 Objectivity of evaluation indicators

Quality is derived from the Latin word qualis, meaning nature. Along with the industrial revolution and the development of the commodity economy, quality has taken on an increasingly important role in people's social life. Joseph M. Juran, a famous American master of quality management, likened quality to a "dam" that protects people's health, safety and even social peace, and used the phrase "living behind a dam" to illustrate the importance of quality to human social life; Comrade Jiang Zemin proposed that "the quality of products reflects the quality of the nation in an important way"[9]. At present, with the development of China, the state has put forward the policy of high-quality development, which shows that quality occupies a crucial position in the production and life of society. How to establish objective quality evaluation indicators is a prerequisite for objectively evaluating the quality, and nursing quality, as a part of medical quality, is no exception. There are many foreign studies on the evaluation of quality in healthcare, covering various aspects, from the evaluation of the quality of sessions to the examination of the quality of healthcare outcomes, the factors influencing the quality of healthcare, and even the evaluation of the quality of treatment for a specific disease, etc. For example, Kenneth L examined and evaluated the quality of care for outpatients in rural and urban Tanzania [10], Rogowski et al. used hospital quality indicators to evaluate very low birth weight babies [11], Peterson et al. used procedure counts to mark the quality of coronary artery bypass grafting procedures [12], Rosenthal et al. Nauceur and Tolga studied the differences in quality between public and private hospitals [14-15], Gavriel et al. studied the impact of organisational structure on quality [16], and Stephen et al. studied the impact of individual health service contracts on quality [17]. China currently proposes a performance assessment for public hospitals and has constructed an assessment index system, establishing indicators for the coverage of quality care services, and national and provincial quality control centres have established corresponding evaluation index standards, but there is a lack of process quality evaluation indicators for weak links from the main quality issues, and the lack of reliability and validity tests makes the effectiveness of the evaluation questionable. The evaluation indicators in this study are

problem-oriented, based on literature research and expert consultation, and have been tested in practice, and the indicators have a certain degree of objectivity and are worth promoting.

3.3 Limitations of the evaluation indicators

This study only started from the actual situation of Sichuan Second Hospital of Traditional Chinese Medicine and Sichuan People's Hospital, and the consultation experts were only limited to this hospital, the examination departments lacked paediatrics, obstetrics and other departments, and the main patients involved were mainly adult and elderly inpatients, so the application of evaluation indicators, there are still some limitations, and the follow-up needs to further enrich the content of indicators or establish specialist evaluation indicators.

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