Development and Application of Nursing Risk Management Evaluation System

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Abstract. Objective: to construct an integrated nursing risk management assessment system, standardize nursing risk assessment and management process, and improve the implementation rate of nursing risk assessment and nursing safety quality. **Methods:** a special team was set up to construct an integrated nursing risk management and assessment system, including management personnel, clinical nurses and information engineers, to analyze the problems existing in the old nursing risk assessment and design an integrated nursing risk management and assessment system. Results: the integrated nursing risk management assessment system was applied in all wards of the hospital from July 2019 to September 2019, and 25,778 cases were evaluated. It has the advantages of intelligence, integration, convenient operation, historical score query, guiding standard management of high-risk patients. **Conclusion:** the intelligence, integration and standardization of the integrated nursing risk management assessment system can improve nursing efficiency, standardize nursing risk management, improve nursing staff satisfaction, and reduce the incidence of nursing adverse events in high-risk patients.

Keywords. Nursing risk, integration, assessment system, risk management

1. Introduction

With the development of the society, people have higher and higher requirements on the quality of nursing services. Nursing safety is an important indicator to measure the quality of nursing services [1], as well as an important link to prevent medical accidents. It is also the foundation for the survival and development of a hospital. Modern nursing management should not be limited to the post-analysis and, but should move forward risk management and pay attention to the role of nursing high-risk early warning management in nursing safety incidents [2,3]. Through the analysis, early warning of nursing safety incidents, the risk prevention measures of nursing safety were proposed to ensure the safe operation of hospital nursing work [4].With the convenience of information technology, the efficiency of nursing safety management can be improved to help nurses identify, evaluate, assess and deal with the existing and potential nursing risks of patients, which can improve nurses' ability to control nursing risks and reduce the occurrence of nursing adverse events.

Wu qian and others investigated 352 clinical nurses from 110 grade 2-3 hospitals in China. Results the main problems existing in the clinical use of the risk assessment form

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for inpatients were "too much risk assessment content, too complicated, and the workload of nurses was too large". The clinical nurses suggested that "the hospital should establish an information-based assessment system for automatic data collection" and "multidisciplinary cooperation for risk control" [2].

The nursing department of our hospital and the information center jointly developed an integrated nursing risk management evaluation system, which can not only meet the needs of nursing staff for nursing business processing, but also assist the quality control of managers to provide support for the improvement of nursing quality in the hospital. Since the hospital was officially put into use in July 2019, it has achieved good results. Now the report is as follows.

2. Data and Methods

2.1. The General Information

Our hospital is a class A grade 1 general hospital with more than 2 000 beds and 31 nursing units. In 2018, the total number of hospital bed days was more than 800,000. Since 2014, the nursing record module in HIS(Hospital information system) has been embedded into the ADL ability, pressure sore risk, falling risk and UEX(Unplanned extubation) risk assessment scales, strengthening the management of high-risk patients and playing a very important role in clinical nursing quality and safety management. However, the risk assessment process and management still exist some problems: such as the lack of information integration and sharing, inconvenient history score query, only scores of nursing record, no safety management standard in the system, etc. Under the leading of the nursing department and the guiding of the nursing information management committee, after experts consulting, training, nursing information management committee independently researched and developed a nursing assessment system. After 6 months the system officially launched in July 2019, achieved good effect.

2.2. Methods

2.2.1. Establish a High Risk Assessment System for Inpatient Care

2.2.1.1. Setting Up a Special Working Group for the Integration of Nursing Risk Management Assessment System

The nursing information team is composed of the leaders of the hospital and the nursing department, the clinical nursing managers, the clinical first-line nurses, and the information center engineers. Under the leadership of the nursing department, the nursing information construction work was completed, and the nursing information software system was independently developed. Each major department has a core group of members, which is served by a senior head nurse, and each department has an information liaison. According to the Chinese Hospital Association's 2019 version of the "Patient Safety Target", the team conducts full-scale quality control of nursing safety incidents on the premise of ensuring patient safety, and promotes the high-risk assessment of inpatients from the hospital leadership to improve the hospital risk management system. Supported by the Nursing Department and the Nursing Information Group, the homogenization training and assessment among all nursing staffs about the

high-risk assessment scales was finished to ensure that the nursing staff can make a correct assessment for patients.

2.2.1.2. Analysis of Existing Problems

Since 2014, the nursing record module in HIS system has been embedded into the ADL ability, pressure sore risk, falling risk and UEX risk assessment scales, strengthening the management of high-risk patients and playing a very important role in clinical nursing quality and safety management. However, the risk assessment process and management still exist some problems: such as the lack of information integration and sharing, inconvenient history score query, only scores no nursing measures of nursing records, no safety management standard, etc.

2.2.1.3. Design an Integrated Nursing Risk Management Assessment System

The integrated nursing risk management evaluation system is developed by our hospital. The used Information technology is Delphi, sql sever, Java., .net. The system shared partial data with His. It can be logged in at any terminal on the hospital's local area network. The module section includes basic information: including department, name, gender, age, bed number, level of care, whether it is critically ill/seriously ill, diagnosis, hospitalization number, etc., generated automatically by the network system. Function block: including adding, deleting, query, saving function keys; Assessment block: including record date, evaluation project, evaluation score, evaluation result, nursing measures, nurse signature. Management block: indicating the risk management standardization of each evaluation item, such as the timing of evaluation, frequency of assessment, risk level and corresponding scores, interventions, etc. The evaluation scales include: ADL assessment scale (Barthel index rating scale), Braden pressure sore assessment scale, MORSE falling assessment scale, unplanned extubation assessment, VTE assessment, Health self-assessment questionnaire (PHQ-9), And Health Self-Assessment Questionnaire (GAD-7); Children falling assessment scale.

2.2.2. Implementation of High Risk Assessment for Inpatient

2.2.2.1. Intelligent, Guided Data Reporting

Guide the nurses to select relevant information item by item according to the form. After the nursing staff conducts the evaluation, the system automatically give the evaluation score and risk level, and provides the coping strategies for the nursing risk. The nursing staff can select the nursing measures suitable for the individual patient. After the evaluation is completed, the scores and nursing measures records will be generated on the nursing record sheet to guide the nurses to complete the implementation of the high-risk patient care measures; for those patients with high risk scores, they will be automatically imported into the electronic shift report. It's convenient to hand over, pay attention to and care the high-risk patients. Managers can also extract high-risk patient information and implement quality control in a targeted manner.

2.2.2.2. Early Warning Push and Implementation of Measures

All nursing staff participates in the risk management of high-risk patients, and form a trinity high-risk patient risk management system. Nursing staff conducts risk assessment for newly admitted patients. After the data is collected, the system automatically generates assessment scores and risk levels, identifies high risk patients. Nurses implement preventive measures. The ward continuous quality management team and the head nurse are responsible for supervising the implementation measures for high-risk patients.

2.2.2.3. Establishing Pressure Sore Managemen

"Sunshine Hospital" project, pulmonary embolism and deep vein thrombosis prevention and treatment MDT (Multiple disciplinary team) collaborative group ensure that special high-risk patients are pushed to the appropriate professionals for professional management. Take the "Sunshine Hospital" project as an example. Initial evaluation: The newly admitted patients completed the PHQ-9/GAD-7 score within 24 hours from the ward receiving nurse. When PHQ-9/GAD-7 score ≥5-9 points, or the third item of sleep score ≥2 points on the PHQ-9 scale, and the ninth item of the suicide item score ≥1 points on the PHQ-9 scale, the psychological care group nurse will conduct a re-evaluation. After the identifying report, the doctors in charge will be reported. The doctors will issue a formal order of psychological assessment with psychiatric class C scale. Then, the professional psychological assessor of the psychological testing room conducts the evaluation, and the evaluation result is returned to the ward of the patient in a formal inspection report. The doctor in charge invites the psychosomatic doctors to conduct consultation and treatment according to the results of the psychological assessor's evaluation. The psychological assessment report is classified into medical record files.

2.2.3. Statistical Method

Statistical method compared the risk evaluation rate, the adverse events and the nurses' satisfaction before and after the new assessment system. SPSS22.0 statistical software package was used to describe the enumeration data in numbers and percentage, and X^2 test was used for intergroup comparison. The measurement data were described as (x ± s) and t test was performed. P<0.05means there is difference.

3. Results

The implementation rate of Risk Assessment, incidence of adverse events in high-risk patients, score ratio of nursing risk-related records, average assessment and record time were compared before and after the application of the system (April-June 2019) and July-September 2019. The results are in Table 1.

Table 1. Comparison of indexes before and after the application of the new nursing assessment module

Time (2019)	high-risk evaluation rate (evaluation case/admission case)	falling incidence in high-risk patients (occurrences/high-risk cases)	Pressure sore incidence in high-risk patients (occurrences /high-risk cases)	Incidence of unplanned extubation (occurrences /total days of indwelling)	record quality control score ratio	Mean time for risk nursing recording (m)
April-June	96.5 (21293/22061)	0.09% (24/27104)	2.73% (28/1024)	0.04% (19/52933)	90%	11.88±0.82
July-Septe mber	98.17% (21859/22266)	0.05% (17/32899)	1.39% (14/1006)	0.03% (15/50385)	95%	4.58±0.71
x2/t	115.51	2.98	5.08	0.91	29.06	T=19.61
P	<0.005	>0.05	<0.05	>0.05	<0.005	<0.05

As can be seen from Table 1, after the application of the system, the implementation rate of risk assessment and the quality control score of nursing risk management records (100% of the total number of qualified items/examination items) were higher than before the application of the system, the difference was statistically significant (P & Lt; 0.005); The incidence of pressure sore, mean assessment time and recording time in high risk patients were lower than that before the system application, the difference was statistically significant (P & Lt; 0.05), the incidence of falling down bed and unplanned extubation in high risk patients was lower than that before the system application, but the difference was not statistically significant (P & GT; 0.05).

4. Discussions

4.1. The application of the integrated nursing risk management assessment system has realized the risk feed-forward control and reduced the incidence of adverse events in the nursing of high-risk patients.

Through the feed-forward control of high-risk patients, adverse events can be reduced, and the quality of nursing safety can be improved [4]. Dai Xuemei etal's research shows that the closed-loop early warning evaluation system for high risk inpatients improves nurses' anticipation of nursing risks. The above studies are consistent with the results of this study. The integrated nursing risk management evaluation system in this study selects high-risk patients through risk assessment, and the nursing staff provides timely care according to the measures provided by the system, and scientifically prevent the occurrence of adverse events. The quality of care is improved by the well acquiring patient information when the nurse is carrying out the nursing plan [5]. The system enables the nursing staff to obtain comprehensive information on patients safety management at the same interface, and effectively implement risk management. After reading the high-risk patient list in the shift report generated automatically through the system, managers check and promote the implementation of the safety measures, find out the problems in time to analyze and rectify, and finally form the safety of care, thus reducing the occurrence of nursing adverse events.

4.2. The integrated nursing risk management evaluation system is intelligent and integrated to improve the nursing efficiency and satisfaction.

Intelligentization is the trend of China's medical information development [6]. The risk assessment system reported in the past literatures has realized the electronization of the nursing evaluation scale, which has improved the efficiency of nursing staff to a certain extent, but lacks system intelligence [1,3]. The integrated nursing risk management evaluation system has intelligent integration function, automatically calculates the total score and gives risk classification, finishes records, identifies high-risk patients and imports electronic shift reports to show early warnings, reminds responsible nurses and nursing managers to focus on high-risk patients management. Sun Xiao also implemented intelligent scoring and warning functions for the nursing risk management of critically ill patients, which improved the management quality of critically ill patients [7]. The safety management software reported by Xue Shuilan also has an automatic total score and warning function [8]. However, they do not have the function of automatically

importing high-risk shifts and nursing records, and there are no standard preventive management measures and related management practices.

Deng Juan and others mentioned that the integrated nurse workstation greatly improved the efficiency of nursing management and made the management of nursing quality more scientific and effective [5]. The evaluation system is independently researched and developed by the hospital. Through the early demonstration of the MDT team, the clinical demand data is collected, combined with the nursing safety management norms, and the convenience of the nursing staff is fully considered. The integrated evaluation system is designed and the operation is simple. From the nurse workstation, the scores and nursing measures are checked in one interface, and the score results and measures are automatically imported into the nursing record form, which saves the writing time of the nursing staff and improves the standardization and timeliness of record. The integrated nursing risk management evaluation system has a query function, which can display the patient's previous scores on the same interface, so that the nurse can easily understand the dynamic changes of the patient. Based on the advantages, the evaluation module improves the convenience and speed of the operation of the nursing staff, save the writing time, improves the compliance of the nursing staff, and improves the implementation rate of the high-risk assessment of patients.

4.3. Integrated nursing Risk Management Assessment System regulates high-risk patient management.

Different from the existing researches [1-10], the evaluation system sets risk management specification prompts on the same interface, such as evaluation frequency, scores of various risk levels, scoring standards, etc, to ensure junior nursing staff can also regulate high-risk patients management. The system presents standard preventive measures in one interface, the caregiver only needs to check and implement measures, the system can automatically import the score results and measures into the nursing record form, ensuring timely and standardized nursing records.

5. Conclusion

In summary, Integrated nursing risk management assessment system realizes information intelligence, realizes risk feedforward control management of nursing risk, realizes standardized nursing risk management and nursing records, fits clinical nursing thinking, and is easy to operate and improve nursing risk assessment execution, improve nursing staff satisfaction and reduce the incidence of adverse events in the care of high-risk patients.

Acknowledgements

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