Journal of Clinical and Nursing Research, 2022, Volume 6, Issue 6
http://ojs.bbwpublisher.com/index.php/JCNR
ISSN Online: 2208-3693
ISSN Print: 2208-3685

Reengineering Surgical Patient Transfer and Handover Process in Operating Room

Guimei Zhang[1]*, Liqun Xu[2], Yuxiang Han[3]

[1]Anesthesiology Department, The Third People's Hospital of Shenzhen, Shenzhen 518112, Guangdong Province, China

[2]Intensive Care Unit, Harbin Medical University Cancer Hospital, Harbin 150081, Heilongjiang Province, China

[3]Department of Interventional Ultrasound, Harbin Medical University Cancer Hospital, Harbin 150081, Heilongjiang Province, China

***Corresponding author:** Guimei Zhang, zhangguimei816@163.com

Abstract: *Objective:* To reform the transfer process of surgical patients, standardize the transfer process, and improve the quality of safe transfer; unify the intrahospital transfer process to achieve standardized management; ensure patient safety, improve work efficiency, and reduce the occurrence of adverse events. *Methods:* A transfer team was formed, a handover record sheet for surgical patients was designed, and the workflow and specifications for handover and transfer of surgical patients were formulated. *Results:* After using the re-designed handover record sheet for surgical patients and improving the procedure for transferring surgical patients, the accuracy of surgical patient handover was ensured, the handover and transfer time was shortened, and the surgical turnover rate improved. *Conclusion:* By designing and reforming the service model, it is possible to change and standardize the transfer process of surgical patients and improve the quality of safe transfer, the operating room management system so that it is more rational and humanized, the management model, the working environment, as well as the overall quality and efficiency of operating room nursing.

Keywords: Transport; Surgical patients; Process; Work efficiency

Online publication: November 25, 2022

1. Introduction

The "Notice on Further Deepening Quality Nursing and Improving Nursing Services" was put forward to strengthen the awareness of humanistic care and the communication between nurses and patients. In such context, nurses should be more aware of humanistic care and provide active services, observe the "patient-centered" concept, respect and protect the privacy of patients, as well as provide love, psychological support, and humanistic care to patients; hospitals, on the other hand, should always regard medical treatment, nursing quality, safety, and service as the focus of management. At the same time, high-quality nursing services can be implemented, the involvement of family members can be reduced, and the satisfaction of patients can be improved with the development of the visitation system. "Safety" is the standard to better protect patients and reduce adverse transport events. Patient handover is the process of transferring patients, patient information, treatment equipment, and professional responsibilities from one person or care team to another [1]. Preoperative handover is the process of transferring a surgical patient from the ward to the operating room before surgery. Studies have shown that only 27% of patient information is passed on to the operating room staff during preoperative handover [2]. In addition to inadequate information transfer,

the preoperative handover often involves patient identity information errors or inconsistencies, insufficient preoperative preparations, unmarked or incorrectly marked surgical sites, and incomplete medical records, all of which bring risks to the operation and may even lead to serious consequences [3]. Surgical patient handover is an important link related to patient safety. It is also a key link in the quality management of operating room nursing. In clinical work, there are many problems, such as incomplete handover, irregular handover forms, and the lack of emphasis on such procedures [4]. Studies have shown that surgical handover faults are second only to technical defects as the main cause of adverse surgical events [5]. The operating room is a complex technological environment, and the quality of operating room nursing directly affects the smoothness of the procedure and the prognosis of patients [6]. With the overload of procedures in operating rooms, optimizing the handover process of surgical patients, strengthening the seamless management of the entire process, and relieving the tension of transfer and handover have become urgent issues to be considered [7]. According to the Statistical Bulletin for China's Health and Wellness Development in 2018, there are many existing medical institutions that do not have normative requirements or standardized procedures for the safe transfer of patients in anesthesiology departments, resulting in increased time consumption and low transfer efficiency of patients undergoing surgery in these departments. A lot of medical resources are wasted, and at the same time, incidents such as falling from beds and accidental detachment of transported patients occur from time to time, which directly or indirectly affect the prognosis of surgical patients [8,9]. By establishing and optimizing the service connotation, the workflow of patient transfer is transformed in order to standardize the transfer process and improve the quality of safe transfer; the in-hospital transfer process is unified, and standardized management is achieved; patient safety is ensured, work efficiency is improved, and adverse events are reduced. At the same time, it is important to ensure that every nurse recognizes the gradual improvement of norms, which make out work more orderly rather than increasing the workload, as well as the continuous improvement of quality management as the eternal pursuit. In August 2017, our hospital (Harbin Medical University Cancer Hospital) officially carried out the reconstruction of the transfer and handover process of surgical patients to ensure the safety of surgical patients, improve both patient and doctor satisfaction, reduce the occurrence of nursing errors, improve surgical turnover rate, protect patient privacy, and transform the original patient transfer process. The effect from the reconstruction is good.

2. Materials and methods

2.1. Clinical data

The average daily surgical volume in our hospital is 80–100 cases, with an annual surgical volume of nearly 30,000 cases. From August to December 2017, 11,400 surgeries were carried out in our hospital's operating room, and from January to August 2018, 18,533 surgeries were carried out in the operating room.

2.2. Methods

In order to reduce the occurrence of adverse events and ensure patient safety, guidance was provided for the transfer and handover of surgical patients; and the indications, contraindications, necessary supplies, methods, and handover precautions of patient transfer were clarified [10].

With the participation and guidance of the Nursing Department, the surgical patient transfer team consists of the head nurse of the operating room, the head nurse of the ward, the head nurse of the intensive care unit (ICU), the head nurse of the anesthesiology department, the head nurse of the nursing service center, and the nursing backbone to evaluate the original process, build a new process, and change the old process. The head nurse of the operating room is responsible for organizational management, theoretical guidance, coordination, and command; the head nurse of the operating room formulates the procedures and specifications for picking up patients in the operating room as well as the checklist for the handover between

the operating room and the ward, the nursing service center, and the ICU. The head nurse of the ICU formulates work plans and ICU-related procedures and specifications, including the ICU handover content checklist. Ward Head Nurse 1 formulates the transfer system, the procedures, and the specifications of patients returning to the ward after surgery; Ward Head Nurse 2 develops ward transfer procedures and specifications for ICU transfer as well as the checklist for in-and-out ward transfer; Ward Head Nurse 3 is responsible for ward transfer to the operating room and the patient handover process specification; The head nurse of the anesthesiology department is in charge of communication between the resuscitation room and the anesthesiology department; the head nurse of Nursing security center is in charge of coordinating the nursing security center and other departments. The team members are responsible for on-site investigation and designing a reasonable and practical flow chart, which can be jointly implemented by the ward nurses, nursing service personnel, and operating room nurses.

From January to August 2018, the surgical patient transfer and handover record sheet was implemented, and the work flow for the safe transfer and handover of patients in the operating room was formulated. Trainings were carried out in batches, and issues were raised at any timepoint. The project team formulated the improvement content and trained the respective personnel of the ward. The head nurse and the assigned team leader executed the process. The project team interpreted the process of the head nurse and the assigned team leader and assigned the head nurse to supervise and the project team members to be under the guidance of clinical departments, weekly project team members, and the head nurses of the implementation department. The assigned team leader implemented a series of safety improvement measures, such as weekly feedback sessions in the department.

2.2.1. Designing the surgical patient transfer and handover record sheet

In the past, only five items were included in the handover of surgical patients: medical records, medical clothes, imaging materials, chest and abdomen belts, and medicines. There were no surgical patient handover record sheets. There were only two facets: entering and leaving the room. When a patient is pushed to the recovery room, the handover between the operating room and the recovery room needs to be recorded separately, and the steps are complicated. In order to improve the accuracy of patient transfer and handover as well as the safety management of surgical patients during the perioperative period, the transfer team redesigned and formulated an "Operating Room Patient Handover Record Sheet" by reviewing literatures and referring to the experience of other hospitals. Pre-ward to operating room, and operating room or recovery room to ward after surgery involve 2 stages but with 3 aspects.

(1) There are 11 items to be considered when transferring a patient from the ward to the operating room before surgery. The basic information includes the patient's ward, name, bed number, age, gender, hospital number, and operating room; the above information confirms that the operation process is checked in three stages by three parties. Stage 1: the access to the operating room is checked by the nursing service center with the operating room nurse. Stage 2: after the surgery, the transfer to the post-anesthesia care unit (PACU) is checked by the PACU nurse. Stage 3: the patient's return to the ward is checked by the PACU/surgical department. The nurses in the ward will check with the nurses in the ward/ICU. Patient identification includes medical records, wristbands, surgical site identification, patient's state of consciousness, skin integrity, handover of conventional pipelines and scales such as the carrying pipelines, and preoperative medication status; the items brought in, imaging materials, hospital gowns, chest and abdominal belts, *etc*. are also checked; the handover time between the nurse in the ward and the nursing service center, as well as the nursing service center and the nurse in the operating room is noted down, with signatures from both parties after checking.

(2) After surgery, from the operating room to recovery and PACU, the operating room nurse's identification of the patient, the patient's state of consciousness, skin integrity, carrying pipelines, which include

drainage tubes and anesthesia pumps in addition to conventional pipelines, the name and remaining amount of blood products brought into the operating room before the completion of infusion, the name of the drug in the postoperative intravenous infusion, the drip rate, the name and remaining amount of the drug brought into the operating room, the items brought into the operating room, and the record sheet are handed over to the PACU nurse in the anesthesia and recovery room. If there is a "√," it is not necessary to fill in; special matters should be filled in the relevant column.

(3) After the surgery, the patient will be directly returned to the ward from the operating room or PACU. If the patient is returned to the ward from the PACU, the postoperative information will be filled in by the PACU nurse. The information related to the patient's return to the ward/ICU will be filled in by the circuit nurse. If the patient was originally planned to be sent to the PACU is in a good state of recovery or returned to the ward as directed by the doctor, "√" should be marked in the corresponding column.

(4) The first column should be filled in by the nurse in the ward, and the patient-receiving personnel in the operating room should check and sign accordingly. The second column should be filled in by the operating room nurse and checked and signed by the recovery room nurse. The third column should be filled in by the operating room nurse or the recovery room nurse. The nursing service center personnel will send a patient personnel to check the signature and then with the ward nurse; if there is no error, the ward nurse will sign.

2.2.2. Formulating the work flow and standardizing the safe transfer and handover of surgical patients

In the past, preoperative patients are notified by the roving nurse in the operating room to inform the ward of the preoperative preparations. The customer service center staff receives the call, fills out the handover record sheet, pushes the transfer bed, carries the handover record sheet to the relevant department to pick up the patient, checks the patient's belongings, fills in the handover record sheet item by item, transfers the patient to the transfer room, checks the patient information and carry-on items with the staff in the transfer room, and assists the patient to the transfer room on a flat vehicle in a clean area. After the surgery, the patient is moved from the flat vehicle in the clean area to an external transfer bed, the customer service center staff and the anesthesiologist or surgeon send the patient back to the operating room with the medical records, and subsequently move the patient from the external transfer bed to the hospital bed; this is a complicated process. The numerous transfer links increase the probability of adverse events during the transfer process. Therefore, the workflow and specifications for the transfer and handover of surgical patients are formulated based on the actual situation.

(1) Before the transfer, the roving nurse in the operating room confirms the information of the patient and informs the ward. The ward nurse must confirm that the preoperative preparation for the patient has been completed and fill in the surgical patient handover record sheet. The transfer personnel should confirm the patient's information with the ward nurse, check the items that need to be brought into the operating room when handing over, sign after checking, and transfer the patient to the operating room. When the patient enters the preoperative waiting room or operating room, the nurse should confirm the operation, the patient's information and belongings, record, and sign.

(2) Before leaving the operating room after the surgery, the nurse should confirm that the pipeline is unobstructed, properly fixed, and fill in the "Surgical Patient Handover Form." According to the patient's whereabouts, the nurse should prepare to transfer the equipment and notify the receiving department and the patient's family members. The transfer personnel will then push the patient to the transfer room, and the medical staff and the nursing service center personnel will jointly move the patient to the hospital bed. The surgeon will send the patient back to the operating room, handover, and sign item-by-item with the ward nurse at the bedside according to the items in the "Surgical Patient Handover Record Sheet."

2.2.3. Carrying out systematic training

In order to ensure the effective implementation of procedures and specifications for the handover and transfer of surgical patients, systematic training is carried out. In order to ensure the effective development and implementation of this work, the transfer team is divided into four batches: the first batch consists of 7 departments, the second batch consists of 8 departments, the third batch consists of 18 departments, and the fourth batch consists of 12 departments. Implementing the special-person responsibility system, the assigned team leader of the department is fully responsible for the transfer in the department and the training and supervision of the nurses' operation in the department. In order to ensure that the work achieves the expected goals, the head nurse of the department and the transfer team will explain based on the standardized preoperative and postoperative transfer and handover process, including the concept and importance of transfer and handover safety, the use and storage methods of the patient handover record sheet, the skills of safe transfer, the implementation of procedures, the practice of the transfer process, and the precautions during the transfer process. At the same time, the nurses in the department are required to summarize the number of transfers once a week, and during the transfer, if there are any problems, the members of the transfer team will follow-up and evaluate the problems immediately and make corrections in a timely manner.

2.2.4. Implementing weekly feedback and monthly summary

A regular summary mechanism is established for timely feedback on the transfer and handover of surgical patients. Problems in the transfer process are recorded, and the reasons for these problems are identified in a timely manner. At the end of each month, the transfer team will hold a transfer summary meeting within the surgical department. The number of patients transferred and handed over each month, the existing problems and the reasons for the analysis, *etc*., are given feedback and compared with those of the previous month in order to formulate specific rectification measures. Each operating department is followed-up every month, the staff of each department is encouraged to share their opinions and suggestions for the transfer and handover of patients, the results are compared with the follow-up results of the previous month, and the problems that have achieved rectification effects are given regular feedback. If the goals are still not achieved, continue to find the cause, revise the process, and run trial operations until the expected goal is achieved, so that the patient transfer and handover process can be linked together. Everyone is responsible to provide constant updates and maximize the safety of surgical patients by putting patient safety first.

2.2.5. Management requirements for handover records of surgical patients

The checklist for the handover of surgical patients is generated by the ward and stored in the ward. The transfer from the ICU to the operating room is kept by the ICU, while the transfer from the operating room to the ICU is kept by the operating room. A special file box is set up in the ward. The file box is placed in a fixed position at the nurse station. Blank handover record sheets are placed at a specific area for easy access. The handover record sheet in use is placed on the first page of the medical record and kept in the file box. The head nurse regularly checks and supervises to ensure that the handover record sheet is accessible and complete.

2.3. Evaluation criteria

The accuracy of surgical patient handover is ensured by using the redesigned handover record sheet for surgical patients and improving the procedure of picking up and receiving surgical patients. Bedside handover not only meets the psychological needs of patients and their family members, but also conforms to the concept of overall nursing. Through observation and comparison of the time to pick up patients before

and after transport and the handover management measures with the time to deliver patients after improved postoperative transport procedures, there may be improvement.

3. Results

3.1. Comparison of the time of receiving patients before and after implementing the surgical patient handover record sheet

(1) The average time of receiving patients before implementing the surgical patient handover record sheet is 10–15 minutes/case, and the total time is 11,400–17,100 minutes, which is approximately equal to 1,900 hours–28,500 hours.
(2) The average time of receiving patients with the use of the surgical patient handover record sheet is 10 minutes/case, and the total time is 18,533 minutes, which is approximately equal to 3,088 hours.
(3) Saving a total of 1,900 minutes for the same number of surgeries equates to about 79 days.

3.2. Comparison of patient delivery time before and after improving the transport process

(1) Before improvement, 5–7 points/case, and the total time is 57,000–79,800 minutes, which is approximately equal to 950–1,330 hours.
(2) After improvement, 3–5 minutes/case, and the total time is 55,599–92665 minutes, which is approximately equal to 926–1,544 hours.
(3) Saving a total of 237 minutes for the same number of surgical cases equates to about 9.9 days.

4. Discussion

In 2016, the National Institutes of Health (NIH) has emphasized in the nursing risk management guidelines that the key to the safe management of surgical patients is handover [11]. According to Wang Zhongqing *et al*. [12], a positive correlation exists between the risk of safety adverse events in transported patients and the duration of the transfer and handover process. Arranging an active response to the event and the progression of the disease in a short period of time would be challenging, and in severe cases, it may be life-threatening. Snehal *et al*. [13] have pointed out that reducing the duration of the transfer process can effectively reduce the incidence of adverse events, which is of great significance to the prognosis and recovery of patients. There are objective safety hazards when transferring and handing over surgical patients, but some risk factors can be prevented or reduced through human factors [14]. The establishment of a multidisciplinary collaborative management model for the perioperative transfer route can effectively ensure the safety of the transfer and handover of surgical patients and reduce the incidence of adverse events [15].

Using the surgical patient handover record sheet provides patients with a full range of seamless services, reduces nursing error, and improves the satisfaction of both patients and doctors toward the nursing work in the operating room. The reengineering of the patient transfer process is an important measure to carrying out humanized and personalized care in the operating room, which reflects the “patient-centered” service concept. The entire process is carried out by professionals to prevent the patient’s family members from participating in the transfer. The process of lifting patients ensures the safety of patients after surgery and reduces the occurrence of adverse events, such as tube detachment. At the same time, it shortens the transfer time and the waiting time of patients, family members, and doctors, and speeds up the turnover rate of the operating table. The operating room work involves many personnel and departments, and its efficiency is often affected by a combination of factors. Among them, the transfer mode plays a decisive role in the surgical volume and efficiency. There are many reasons for the transfer of patients, including patient factors, anesthesia factors, and nurse factors [16]. It has been reported that the handover of surgical patients is the second largest cause leading to adverse surgical events [17]. Zhang Daiying *et al*. [18] have pointed out that the process of transferring patients for surgery is time-consuming and prone to errors; additionally,

improper management may affect work efficiency and nursing safety. Therefore, more and more attention has been paid to the safety of transporting patients in the operating room. The safety of preoperative and postoperative transport and handover of surgical patients has become an important part of the nursing work in the operating room. The continuous improvement and optimization of safety management measures and processes based on the characteristics of the nursing work in the operating room is the key to ensuring the safety of patient transfer and handover. In order to improve patient safety in the process of patient transfer and handover as well as reduce the occurrence of adverse nursing events, our hospital conducts a multifaceted investigation and analysis of the hidden safety hazards in the transfer of surgical patients through multi-departmental collaboration and redesigns the transfer process based on the analysis. The implementation of the handover record sheet and redesigning the patient transfer process; the formulation of surgical patient transfer specifications, and the implementation of scientific drills and system training in batches; as well as the addition of summary feedback and other links are considered safe and effective. The use of surgical patient handover record sheets and the formulation of the work flow, norms, and training measures for the safe transfer and handover of patients have enabled the standardization of nurses to strictly check and fill in the content on the record sheet and the requirements of the transfer and handover work flow, as well as earnestly implement the handover work process. Previously, only simple contents such as medical records, medical uniforms, imaging materials, chest and abdominal belts, medicines, *etc*. were handed over by patients. The lack of procedures led to irregular behaviors and negligence at work, which in turn resulted in the occurrence of adverse nursing events. Adding a summary and feedback link enables nurses to understand the unsafe factors in patient transfer and handover in a timely manner so as to allow timely rectification and correction to minimize the occurrence of adverse nursing events and improve the safety of patient transfer and handover.

The reengineering of surgical patient transport process is a dynamic and constantly updated process. Li Aiping *et al*. [19] have pointed out that the satisfaction of patients and their family members with the quality of nursing service is the most intuitive and effective indicator for evaluating the quality of nursing service. Strengthening the process of the transfer and handover work can improve the patient safety management level, and with the incorporation of the feedback link, the shortcomings found in the work can be put forward so as to provide constructive feedback in a timely manner [20]. Every operating room nurse should be well-trained in asking questions and identifying problems, so as to provide a favorable basis for the continuous improvement of the process. In that way, each nursing service process would be safer; more reasonable, scientific, and effective; and would better meet the needs of both patients and surgeons by comprehensively improving the surgical turnover rate and ensuring patient safety.

Disclosure statement

The authors declare no conflict of interest.

References

[1] Wang X, Wang N, Zhang L, et al., 2020, Prognostic Value of Depression and Anxiety on Breast Cancer Recurrence and Mortality: A Systematic Review and Meta-Analysis of 282,203 Patients. Mol Psychiatry, 25(12): 3186–3197.

[2] Luthan SF, Youssef CM, 2004, Human, Social and Now Positive Psychological Capital Management: Investing in People for Competitive Advantage. Organizational Dynamics, 33(2): 143–160.

[3] Wang J, Fang Y, Wang R, et al., 2021, The Mediating Effect of Psychological Capital Between Perceived Stress and Fear of Cancer Recurrence in Breast Cancer Patients. Journal of Nursing, 36(1): 76–79.

[4] Zheng J, Chen A, Li C, et al., 2018, Action Research on the Standardized Process of ICU Bedside Shift Transfer. Journal of Nursing, 33(12): 48–51.

[5] Zhang X, Zhang Y, Zhu L, et al., 2016, The Effect of Modular Scenario Training on Improving the Handover Quality of Surgical Patients. Chinese Journal of Modern Nursing, 22(10): 1386–1389.

[6] Chen Y, 2015, Application Effect of PDCA Cycle in Nursing Safety Management in Operating Room. PLA Nursing Journal, 32(23): 70–72.

[7] Chen R, Li J, Zhang J, et al., 2020, Design and Application of Surgical Patient Transfer System Based on Information Technology. China Medical Equipment, 35(4): 93–95 + 105.

[8] Li R, 2019, "2018 Statistical Bulletin on the Development of China's Health and Wellness" Was Released. Journal of Traditional Chinese Medicine Management, 27(10): 2.

[9] Guibourg B, Marcorelles P, Uguen A, 2018, Validation of a Pneumatic Tube System to Transport Surgical Pathology Biopsy Samples. Clin Chem Lab Med, 56(4): 99–100.

[10] Chinese Nursing Association Operating Room Professional Committee, 2021, 2021 Edition Operating Room Nursing Practice Guidelines, People's Health Publishing House, Beijing, 104.

[11] Wu Y, Wang X, Zhang H, et al., 2011, Investigation and Analysis of the Operation Time of a Hospital. China Medical Records, 12(9): 42.

[12] Arriaga AF, Elbardissi AW, Regenbogen SE, et al., 2011, A Policy-Based Intervention for the Reduction of Communication Breakdowns in Inpatient Surgical Care: Results from a Harvard Surgical Safety Collaborative. Ann Surg, 253(5): 849–854.

[13] Zhang D, He Y, 2012, Risk Assessment and Verification of Transport Patients for Surgery. Journal of Nursing, 27(4): 48–49.

[14] Mohamed BA, Fahy BG, 2019, The Elderly Emergency Surgical Patient: Risk Factors That Alter Perioperative Management. J Clin Anesth, 58(17): 121–122.

[15] Wang Z, Shao W, Liu W, et al., 2017, Design and Application of Closed-Loop Management System for Surgical Patient Transfer. Chinese Digital Medicine, 12(1): 75–76.

[16] Snehal B, 2014, Role of Transport Bone Distraction Osteogenesis in Neocondyle Genesis for Temporomandibular Joint Surgical Defects: A Case Report. Egypt J Oral Max Surg, 5(1): 16–22.

[17] Finn EB, Campbell Britton MJ, Rosenberg AP, et al., 2019, A Qualitative Study of Risks Related to Interhospital Transfer of Patients with Nontraumatic Intracranial Hemorrhage. J Stroke Cerebrovasc Dis, 28(6): 1759–1766.

[18] Guo Y, Lu H, Li J, et al., 2018, Application of Self-Made SBAR Mode Handover Sheet in the Transfer and Handover of Patients Undergoing General Anesthesia. PLA Nursing Journal, 35(4): 74–76.

[19] Li A, Cai L, Dai Y, et al., 2018, Evaluation and Analysis of Multiple Modes of Continuous Nursing on Improving the Satisfaction of Discharged Patients. China Sanitation Standard Management, 9(18): 148–151.

[20] Zhu Y, 2017, Analysis and Management Countermeasures of Safety Hazards in Hospital Transport of Critically Ill Patients in Cardiology Department. Journal of Traditional Chinese Medicine Management, 25(7): 97–99.