

# Research Surgical Site Infection of the Gastrointestinal at the General Surgery Department at C Hospital in Da Nang

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**Abstract**— *Surgical site infections (SSI) are the most common adverse event and an important cause of death in surgical patients all over the world. SSI leaves serious consequences for patients such as prolonged hospital stay, increased mortality, and increased treatment costs. Good control of SSI significantly reduces the rate of nosocomial infections, thereby improving the quality of treatment and care of patients. Materials and methods: The study used a cross-sectional descriptive research method. The study was conducted from March to June 2017 on 52 study patients. Chi-square was used to find the relationship between surgical site infection and the characteristics of the study subjects. Result: Our study has shown that; 3.8% of patients have surgical site infection when surgery on the digestive system. Chi-square analysis found that patients with emergency surgery, comorbidities, and an ASA score  $\geq 3$  were associated with surgical site infection.*

**Keywords**— *Surgical site infection, digestive system.*

## I. INTRODUCTION

Nosocomial infections are undesirable consequences in medical examination, treatment, and patient care practices. Nosocomial infections increase morbidity, mortality, and prolong treatment time and especially increase treatment costs. Nosocomial infections occur at a high density in medical facilities that do not strictly follow basic aseptic practice procedures in patient care and treatment, and where knowledge and attitudes about control are not strictly adhered to. Infection control among healthcare workers is limited [1].

According to the national hospital infection surveillance system, surgical site infections are one of the three most common nosocomial infections, accounting for 14 - 16% [2]. Surgical site infections are the most common undesirable consequence, threat, and cause of death in surgical patients worldwide [3].

In the United States, surgical site infections rank second after nosocomial urinary tract infections. The rate of surgical patients with surgical site infections varies from 2% to 15% depending on the type of surgery. Every year, the number of patients with surgical site infections is estimated at about 2 million. In some hospitals in Asia such as India, Thailand as well as some African countries, surgical site infections occurred in 8.8% - 24% of patients after surgery [3].

In Vietnam, surgical site infections occur in 5% - 10% of the approximately 2 million people undergoing surgery each year. This rate is a threat to the patient's quality of life and life.

Therefore, it is necessary to implement synchronous and strictly preventive measures that can reduce 40% - 60% of surgical site infections [3]. Statistics on surgical site infections in Vietnam are less published. Specific studies on surgical site infections of the digestive system have not been mentioned yet. At Can Tho Central General Hospital, research by Tran Do Hung and Duong Van Hoanh (2013) [4] on surgical site infection and related factors, in postoperative patients over 915 inpatients at 3 departments: General Surgery, Trauma Surgery, and Neurosurgery, the rate of surgical site infection was 5.7%. In a study by Pham Van Tan (2016) [5] on 2861 patients at the surgical department of Bach Mai Hospital, the rate of patients with gastrointestinal tract infection was 3.6%. Another study by J. Blumetti (2007) of patients undergoing colon surgery showed a surgical site infection rate of 25.0% [6].

## II. OBJECTIVES

Department of General Surgery - C Hospital Da Nang is a department with many diseases, but there is no research on the state of surgical wound infection of the digestive system at the department. To better study the status of surgical site infections and related factors at the department, especially those of the digestive system, in order to promptly provide preventive measures and appropriate care to help minimize the risk of complications. Therefore, I carried out a research project: "Research surgical site infection of the Gastrointestinal at the General Surgery Department of C Hospital in Da Nang". With 2 objectives: (1) Determine the rate of surgical wound infection of the digestive system after gastrointestinal surgery at the Department of General Surgery - C Hospital in Da Nang. (2) Determining factors related to surgical site infection of the digestive system after gastrointestinal surgery at the Department of General Surgery - C Hospital in Da Nang.

## III. MATERIAL AND METHODS

### A. Research Design

Cross-sectional descriptive research method.

### B. Time and place of study

Time: From 03/2017 to 06/2017.

Data collection period is from March 2017 to June 2017.

Research location: Department of General Surgery - at C Hospital in Da Nang.

**C. Research Subjects**

Gastrointestinal surgery patients at the General Surgery Department of C Hospital in Da Nang from 3/2017 to 6/2017.

**D. Sample size**

The sample size was calculated according to the formula:

$$n = Z^2_{(1-\alpha/2)} \frac{P(1-P)}{d^2} \quad [1]$$

n: sample size.

$Z_{0.975}$  = value from the normal distribution = 1.96.

p: estimated rate of microbiological infections, estimated at 3.6% (based on research conducted by Pham Van Tan in 2016) [5].

d: desired precision 0.06.

So the sample size is 38 patients.

In fact, over a period of 3 months, I studied 52 patients.

**E. Sampling Method**

The sample was selected by the convenience sampling method.

**F. Sample Selection Criteria**

*Criteria for selecting patients*

Gastrointestinal surgery at the Department of General Surgery of C Hospital in Da Nang during the study period.

Patients agreed to participate in the study.

The patient underwent open surgery, and laparoscopic surgery.

*Exclusion Criteria*

The patient had undergone gastrointestinal surgery before, transferred to C Hospital in Da Nang for further treatment.

**G. Materials used for research**

Balanced clock

Height scale

**H. Steps to Conduct Research**

*Collecting patient information:* Through medical records, and face-to-face interviews with patients.

*Data collection tool:* The data collection form is built based on reference to the questionnaire of Pham Van Tan [5].

The data collection form consists of 4 parts:

Part A: Administrative part includes full name, age, gender, address, occupation, date of admission, total number of days in hospital, total number of days in hospital after surgery.

Part B: The specialized section includes reason for admission, preoperative diagnosis, preoperative condition, comorbidities, history of gastrointestinal surgery, duration of surgery, type of surgery, surgical classification, and classification. patient's condition according to ASA, surgical method, anesthetic/anesthesia method, preoperative antibiotic prophylaxis.

Part C: Post-operative care includes monitoring for post-operative fever, changing wound dressings, antibiotics for post-operative treatment, dietary guidelines, body hygiene, preventive hygiene, wound infection status, and assessment. rate of infection.

Part D: Result of endocarditis including endovascular status and

wound status assessment.

*I. Processing method:* After collecting data, data were coded and entered by Excel, then used according to medical algorithms by SPSS 16.0 software.

**K. Errors and error statistics**

Errors due to examination, face-to-face interviews with patients, and medical records.

As research is conducted by students, the direct contact, examination, and care of students are still limited.

**L. Research Ethics**

The study was carried out with the consent of the school and the scientific research committee of C hospital in Da Nang.

The study did not affect or disrupt the care and treatment of patients, and did not affect the patient's health and economy.

The study was only conducted with the consent of the patient and his family.

All patients' information is completely confidential.

Participants are clearly explained.

**M. Research Applicability**

This study aims to determine the rate and factors related to gastrointestinal SSI from which to develop effective intervention programs to reduce the rate of SSI of the digestive system at C Hospital in Da Nang.

Contribute to the development of a model of clinical nursing practice of evidence-based care. Contributing additional material and data on micro-infection for other studies in the future.

**IV. RESULTS AND DISCUSSION**

**A. Characteristics of the Research Object**

In order to find out about the status of SSI and the factors related to SSI of the digestive system, I conducted a study on endocarditis of gastrointestinal surgery at the Department of General Surgery - C Hospital in Da Nang from March to June in 2017. Currently, the department has 3 specialties: gastrointestinal surgery, thoracic surgery, and urology. With a total of 50 hospital beds, not including the number of socialized hospital beds. Daily, the flow of patients, their family members, medical staff, and a large number of students at the faculty has had a significant impact on hospital infections, including micro-infections.

Of the total 52 gastrointestinal surgery patients participating in the study, the majority (55.8%) of the subjects were  $\geq 60$  years old, followed by the subjects 20 - 60, accounting for 42.3%. The average age of the study subjects was  $60.04 \pm 19.33$  (Table I). Research results about my age are higher than those of author Bui Thi Lung [8] with the majority (61%) aged 18-60 and 37.7% aged  $>60$  years. This result is completely consistent with the fact that C Hospital in Da Nang is a central hospital with the task of providing care and treatment in the field of surgery for patients who are middle - senior officials, and families with regional policies. Central - Central Highlands. Therefore, elderly patients in the study are also a characteristic of the hospital. However, with the proportion of elderly patients accounting for 55.8%, it will significantly affect the process of surgery, treatment and prevention of SSI. Because the elderly

patients, the immune system is weakened, the body's resistance to the environment is poor, the ability to recover from the disease is lower than the young people, and the elderly often have comorbidities such as diabetes, hypertension are diseases that affect the wound healing process.

TABLE I. Characteristics of the Participants (n = 52)

Variables	Frequency	Percentage
<b>Age</b>		
<20	first	1.9
20 - 60	22	42.3
60	29	55.8
Age	60.04 ± 19.33	(19.87)
<b>Gender</b>		
male	23	44.2
Female	29	55.8
<b>Time in hospital</b>	17.02 ± 12.02	(4;65)
<b>BMI</b>		
Thin		17.3
Medium		59.6
Overweight		23.1
<b>Comorbidities</b>		
Have	18	34.6
No	34	65.4
Comorbidities		18
Diabetes		5
Other diseases		13
<b>Surgery history</b>		
Have	45	86.5
No	7	13.5
Surgery time	124.13 ± 78.04	(30;380)
<b>Type of surgery</b>		
Surgery session	35	67.3
Emergency surgery	17	32.7
<b>Classification of surgery</b>		
Clean	5	9.6
Clean	7	13.5
Infection	23	44.2
Dirty	17	32.7
<b>Surgical method</b>		
Open surgery	22	42.3
Laparoscopy	30	57.7
<b>ASA</b>		
1	19	36.5
2	24	46.2
3	7	13.5
4	2	3.8
5	0	0.0

Another characteristic of the study subjects was gender, the proportion of female patients (55.8%) was higher than that of male patients (44.2%). The results of this study are in contrast to the results of author Pham Van Tan (2016) [5] with the proportion of men and women being 55.7% and 44.3%. The results are also different from the study of Bui Thi Lung (2016) [8] with the proportion of men and women being 51.7% and 48.3%. This difference may be due to the characteristics of the sample and the study area. Although in the study, the percentage of female patients was higher than that of male patients, but the difference was not large. Therefore, the proportion of male and female patients still ensures the equal representation of gender for the study sample.

The patient's condition is also a feature of the study, the proportion of patients with average body condition accounted

for 59.6%, and patients with thin and overweight status accounted for a relatively high proportion of 17.3% and 23.1% in the study. research. The results of my study are equivalent to the study of author Bui Thi Lung (2016) [8] with the proportion of patients with lean, average, and overweight status of 13.2%, respectively. 72.2%, 14.6%. The percentage of overweight patients in the study was quite different compared with the study of the author Pham Van Tan [5], the proportion of overweight patients was 0.2%. This difference may be due to the large difference in the sample size, my study has a sample size of 52 patients, while Pham Van Tan's study has a sample size of 2861 patients.

Table I shows that, about 1/2 of the patients studied had comorbidities (34.6%), 1/7 of the patients had a history of gastrointestinal surgery (13.5%). Patients with comorbidities increase the duration of treatment, length of hospital stay before surgery, and decrease the body's resistance. Since then, combining many drugs to treat the disease, including antibiotics, is one of the causes of current antibiotic resistance in patients after surgery in particular and in medicine in general. Besides, patients with a history of gastrointestinal surgery affect the PT process.

#### B. Rate and Extent of Surgical Site Infection of the Digestive System

Through a study of 52 gastrointestinal surgery patients during 3/2017 - 6/2017 at the Department of General Surgery - C Hospital in Da Nang, the rate of BV was 3.8%, 100% of the patients had superficial SSI. SSI is a problem studied by many authors. In particular, gastrointestinal surgery has a higher risk of SSI than other types of surgery because when interfering with the gastrointestinal tract increases the risk of exposure to many types of bacteria and gastrointestinal surgery is often of the clean type or more. But the results of my research are relatively low compared to the studies of other authors in recent years in Vietnam.

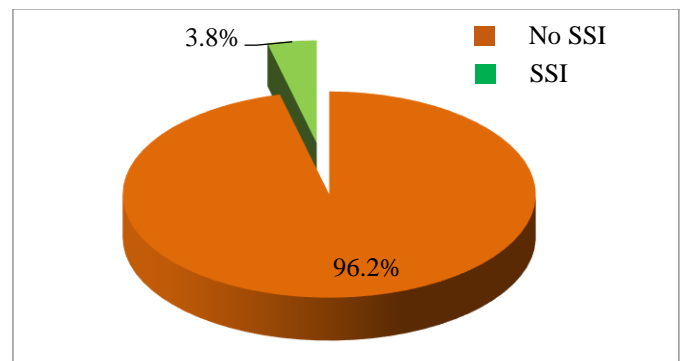


Fig. 1. Rate of surgical site infection

My research has similar results with the research results of author Pham Van Tan (2016) [5], the rate of SSI is 3.6%. This research is also consistent with research of developed countries. The prevalence of SSI in the United States [9] ranges from 2.0% to 5.0%, which equates to 300,000 to 500,000 SSI among the 16 million surgical patients annually.

However, my research results are much lower than other research results in the country. Research by author Le Tuyen Hong Duong (2012) [10] on the status of bacterial infection in surgery at the Central Hospital of Transport for the rate of SSI in clinical is 8.3%. Another study by Tran Do Hung and Duong Van Hoanh (2013) [4] at Can Tho Central General Hospital on the situation of endocarditis and related factors after surgery At the Department of Surgery of Can Tho Central General Hospital, through the study of 915 patients treated inpatients at 3 departments: General Surgery, Trauma Surgery and Neurosurgery, the rate of endocarditis was 5.7 %.

There is a difference in the rate of this SSI in my opinion: my research only focused on gastrointestinal endocarditis, an issue of little interest; while the studies of other authors in the country study all types of SSI in general. Therefore, the rate of SSI is higher. Another reason, the Department of General Surgery has a staff of experienced, enthusiastic, highly trained professionals at home and abroad, always well control the problem of infection at the department.

C. Factors related to surgical site infection of the digestive system

The rate of SSI in the patient group <60 years old accounted for 4.5% higher than the patient group ≥60 years old accounted for 3.4%, but the difference was not statistically significant with p>0.05. The results of this study by me are different in age group compared to the research results of author Pham Van Tan (2016) [5] at Bach Mai Hospital, the rate of SSI > 60 years old accounts for 3.7%, higher than the age group <60 years old accounts for 3.6%. The reason there is a difference in this age group, in my opinion: the first is that my research time is short, only 3 months of data collection; the second is that my sample size is small with only 52 samples; The third is Hospital C in Da Nang is a hospital under the Ministry of Health, so the care services as well as nursing care techniques are up to the standards set by the Ministry. Although there is a difference in the rate of SSI in the 2 age groups ≥60 and <60, neither of these two studies found a correlation between the rate of SSI and the age of the study. This result is similar to the research results of Tran Do Hung and Duong Van Hoanh (2013) [4]. From that, it can be seen that SSI is a concern for all ages, not just the elderly and children who have low immunity and reduced resistance compared to adults. Therefore, the issue of nursing care needs to be taken care of equally between the ages.

As well as other studies in the country on the status of SSI. My research also did not find an association between gender and SSI status. In my study, the rate of SSI in men (4.3%) was higher than that of women (3.4%). The results of this study are equivalent to the research results of Tran Do Hung and Duong Van Hoanh (2013) [4], the rate of SSI in men (6.1%) is high. than women (5%). My study is equivalent to the study of author Pham Van Tan (2016) [5], the rate of female SSI (3.7%) is higher than that of men (3.6%) but there is a difference between the two sexes. In the author's study, the author explains why women have a higher rate of SSI than men because men have better health conditions than women, so they have better resistance leading to reduced risk. have SSI. But this is just the author's subjective opinion, the author has not provided

evidence for this conclusion. Thereby, it can be seen that the difference between the rates of male and female SSI in the studies is not statistically significant, needs to be further researched and given valid evidences between men and women, the risk of SSI of Which gender is higher?

TABLE II. The relationship between surgical site infection and the characteristics of the study subjects

Characteristics	SSI		No		P
	n	%	n	%	
<b>Age</b>					
<60	first	4.5	22	95.5	>0.05
60	first	3.4	28	96.6	
<b>Gender</b>					
male	first	4.3	22	95.7	>0.05
Female	first	3.4	28	96.6	
<b>BMI</b>					
Thin	first	11.1	8	89.9	>0.05
Medium	first	3.2	30	96.8	
Overweight	0	0.0	twelfth	100.0	
<b>Comorbidities</b>					
Have	2	11.1	16	88.9	<0.05
No	0	0.0	34	100.0	
<b>Surgery history</b>					
Have	first	14.3	6	85.7	>0.05
No	first	2.2	44	97.8	
<b>Surgery time</b>					
<120	first	2.9	33	97.1	>0.05
120	first	5.6	17	94.4	
<b>Type of surgery</b>					
Surgery session	0	0.0	35	100.0	<0.05
Emergency surgery	2	11.8	15	88.2	
<b>Classification of surgery</b>					
Clean	0	0.0	5	100.0	
Clean	0	0.0	7	100.0	
Infection	first	4.3	22	95.7	
Dirty	first	5.9	16	94.1	
<b>ASA</b>					
<3	first	2.4	42	97.6	<0.05
3	first	12.5	8	87.5	
<b>Nutrition</b>					
Full	2	5.6	14	94.4	>0.05
Very good	0	0.0	16	100.0	

The rate of SSI in patients with thin status accounted for 11.1%, higher than the rate of patients with average status accounted for 3.2%, did not see the rate of SSI in overweight patients. This difference is not statistically significant with p>0.05. My research results are similar to those of author Pham Van Tan (2016) [5]. Both studies failed to demonstrate that physical status is associated with SSI status. In my study, patients with thin status had a high rate, which significantly affected the treatment results, increasing the risk of SSI later in life. Malnutrition is a risk factor that increases the susceptibility and severity of SSI due to its effects on both immunity and adaptation [11]. Therefore, it is necessary to treat and improve the patient's condition before performing surgery.

From the research results, I found that 2/18 patients in the study had diseases with the rate of SSI accounting for 11.1%, the results of this study were statistically significant with p<0.05. Of the 2 patients presenting with SSI, 1 patient had concomitant diabetes, which is a disease that increases the risk of SSI in surgical patients. Diagnosed as diabetes when blood



sugar levels are higher than prescribed, the body will not be able to use sugar, reducing the effectiveness of the immune system, the body's defense system to fight infections, immune cells work less efficiently, this makes the wound of patients slow to heal. According to research by Nguyen Thi Anh Tuyet [12], the SSI index is related to the accompanying medical history, the higher the risk index, the higher the SSI rate. My study has results equivalent to the research results of author Pham Van Tan (2016) [5], the rate of patients with comorbidities (5.3%) is higher than the rate of patients without comorbidities (3.1%), this result also proves the association between comorbidities and SSI. In fact, not all comorbidities increase the risk of SSI, only some diseases have been shown to be associated with SSI such as diabetes [13]. Therefore, nursing care needs to focus more on improving the patient's physical condition because the patients themselves have comorbidities that have weakened due to fighting against pre-existing diseases.

Table II shows that the rate of SSI patients with a history of gastrointestinal surgery (14.3%) higher than patients without a history of gastrointestinal surgery (2.2%), the difference was not statistically significant with  $p > 0.05$ . The results of this study are different from those of author Pham Van Tan (2016) [5], the rate of SSI in patients with a history of gastrointestinal surgery (5.3%) higher than patients without a history of gastrointestinal surgery (3.2%). The results of the author Pham Van Tan have demonstrated the relationship between SSI and the history of gastrointestinal surgery. This difference, in my opinion, is due to the small sample size of my study, patients admitted to the hospital are mainly for the first time having a disease requiring surgery. In fact, patients who have undergone surgery have left scars on the digestive system, hindering the surgical process, increasing the risk of intestinal adhesions after surgery, leading to a higher risk of SSI. Therefore, nursing care needs to pay close attention to these patients, in order to detect early signs of SSI, nurses need to encourage patients to exercise early as well as improve their physical condition with a healthy diet. reasonable maintenance.

The rate of endocarditis in patients with surgery time  $< 120$  minutes accounted for 2.9%, smaller than in patients with surgery time  $\geq 120$  minutes, accounting for 5.6%, the difference was not statistically significant with  $p > 0.05$ . The results of my study are equivalent to those of Dang Hong Thanh et al. (2012) [14], the rate of SSI in patients  $\geq 120$  minutes at risk of SSI 3.1 times higher than patients with PT time  $< 120$  minutes. However, both studies did not find an association with surgery. The longer the surgery time, the higher the risk of SSI, the higher the possibility of exposure to ambient bacteria. It is a favorable factor for bacteria to enter and cause a wound infection later.

Table II shows that the rate of septicemia only occurs in patients undergoing emergency surgery, but not in patients undergoing surgery. The results of the study demonstrated the relationship between the form of surgery and endocarditis with  $p < 0.05$ . The results of my study are equivalent to the research results of the author Pham Van Tan (2016) [5], the rate of emergency surgery was 7.0%, higher than that of patients undergoing surgery (2.1%). From the above 2 research results,

I can see that patients admitted to the hospital in the state of emergency surgery will not be well prepared physically and mentally, and will not be treated with antibiotics to prevent infection before to reduce the occurrence of infections. presence of bacteria in the body. In addition, patients with emergency surgery entering the hospital often have a classification of contaminated and contaminated surgery or higher, and are not well prepared for preoperative work such as enemas, hygiene, antibiotic treatment, and psychology. factors that increase the risk of SSI in patients undergoing surgery. In patients undergoing surgery, the risk of SSI occurs almost with very low or no risk.

The results of my study did not find an association between surgery classification and SSI status. In this study, the proportion of patients with dirty surgical classification at risk was 1.4 times higher than that of infectious surgery; while classifying clean and clean surgery, there is no rate of SSI. This result is completely consistent with the risk index issued by the Ministry of Health (2012) [1] on classification of SSI, the dirtier the surgery, the higher the risk of SSI. However, my research results are different from those of author Pham Van Tan (2016) [5] and research of Pham Thuy Trinh (2010) [15], both studies demonstrated an association between the type of surgery and the status of SSI. There is this difference, in my opinion my study has a low sample size; the state of micro-infection appeared only in contaminated and dirty surgery, not in clean and clean surgery; while the studies of other authors, in each type of surgery, the rate of SSI is different.

The condition of the patient before surgery is an important factor creating the success of an operation, and at the same time reducing the risks and complications after surgery, including the state of SSI after surgery. The more severe the patient's condition before surgery, the higher the risk of SSI. The results of my study showed that, patients with ASA score  $\geq 3$  (12.5) had a higher risk of SSI 5.2 times higher than patients with ASA score  $< 3$  (2.4). My study has demonstrated that the preoperative patients status is related to the SSI status. This result is similar to the study of Nguyen Quoc Anh and Nguyen Ngoc Bich [16], the patient group with ASA  $\geq 3$  had a higher rate of UTI 9.7%, which was statistically significantly higher than that of patients with ASA  $\geq 3$ . My results are also consistent with the ASA scale that the Ministry of Health (2012) gives on the guidelines for the prevention of SSI, the higher the ASA score, the greater the risk of post-operative SSI.

Table II shows that, 100.0% of patients with SSI had a complete diet for 5.6%, a very good diet did not have a SSI rate. Nutrition is an important and indispensable part for patients after surgery, nutrition contributes to promoting wound healing, increasing the body's resistance against dangerous agents that affect the incision. Due to the advantage that C Hospital Da Nang is a hospital specializing in caring for mid- and senior-level officials, government employees and students, they already have a good amount of knowledge about appropriate nutrition, which is the reason why my study 100.0% patients had adequate nutrition. However, the results of my study have not shown a relationship between nutrition and SSI status.

## V. CONCLUSION

Through the study of 52 patients undergoing gastrointestinal surgery at the Department of General Surgery - Da Nang C Hospital from March 2017 to June 2017, I drew the following conclusions:

The rate of surgical site infection of the digestive system at the Department of General Surgery - C Hospital Da Nang is 3.8%.

Surgical site infection only occurred in the group of patients with emergency surgery and comorbidities. The rate of surgical site infection in the group of patients with the ASA score  $\geq 3$  was 5.2 times higher than that in the group of patients with the ASA scale  $< 3$ .

## ACKNOWLEDGMENT

### *Towards the Hospital*

Hospitals should regularly organize intensive training courses on surgical care.

There should be studies on gastrointestinal surgical site infections in the long term to find out more about the relationship between gastrointestinal surgical site infections and related factors.

### *On the side of Surgical Care Nursing*

Nursing care needs to actively examine, detect and plan care for patients with comorbidities to prevent the risk of gastrointestinal tract infection in order to shorten hospital stay and treatment costs.

To improve the quality of care, nurses themselves need to regularly update their knowledge on how to care for and improve the patient's condition before surgery.

Quick, complete and accurate preparation of pre-operative procedures for patients with emergency surgery.

Nurses should apply a scale to assess the condition of the patient before surgery according to the ASA.

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