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COMPLIANCE WITH INFECTION CONTROL PROCEDURES AND EFFECTIVENESS OF INTERVENTIONS AT THANH NHAN HOSPITAL IN 2018 - 2020

Major: Public Health
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SUMMARY OF DOCTORAL THESIS

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RATIONALE

Nosocomial infections are one of the leading public health problems worldwide. Nosocomial infections occur after the patient is admitted to the hospital and are considered an important indicator of hospital quality, the ability to organize management and the ability to ensure patient safety of the medical facility. Nosocomial infections are spread by multiple routes through surfaces (especially hands), water, air, the gastrointestinal tract, and surgery. In particular, the role of health workers in the transmission of NCDs is significant. Many nosocomial infections are caused by transmission from one patient to another through health care workers, especially nurses.

Thanh Nhan Hospital is a class I general hospital of Hanoi with invested treatment equipment, but the treatment area is not synchronized, the number of patients is overloaded, as well as the position to perform well the hospital's infection control work is not appropriate. In addition, through internal assessment, the hospital's infection control system has not been systematically and regularly implemented. The compliance status of hospital-acquired infection control procedures among health workers in general and nurses in particular is still low. According to the monitoring report of Thanh Hospital's Infection Control Department, it is necessary to find out the status of compliance with the basic infection control procedures and implement appropriate interventions to improve the level of compliance with the infection control measures of the staff. health workers, especially nurses. The study: "Compliance with infection control procedures and effectiveness of interventions at Thanh Nhan Hospital in 2018-2020" was conducted with the following objectives:

1. Describe the compliance with some hospital infection prevention and control procedures and related factors at Hanoi Thanh Nhan Hospital in 2018-2019.
2. Identify some factors related to nosocomial infections at hospitals in 2018-2019.
3. Evaluating compliance of nurses with three basic procedures in the prevention of hospital-acquired infections at the study site in 2020.

NEW CONTRIBUTIONS OF THE THESIS

1. The thesis showed that the compliance with some infection control procedures such as hand hygiene, wound dressing change and peripheral venous catheterization of medical staff at Thanh Nhan hospital was insufficient.

2. The thesis showed a number of factors related to nosocomial infections such as age, gender, clinical department, surgical status and length of hospital stay.

3. Multimodal interventions were shown to be highly effective when improving nursing compliance with infection control procedures and improving nosocomial infections, enabling infection control practices to be integrated into hospital regulations.

STRUCTURE OF THE THESIS

The thesis has 136 pages, including: Proposal 02 pages; Chapter 1. Overview: 31 pages; Chapter 2. Research subjects and methods: 26 pages; Chapter 3. Research results: 42 pages; Chapter 4. Discussion: 31 pages; Conclusion: 02 pages, Recommendation: 01 page. The results of the thesis are presented in 31 tables and 11 tables. The thesis uses 165 references, including 28 Vietnamese and 137 English literature.

Chapter 1
OVERVIEW

1.1. The concept of hospital infection

Hospital-acquired infections: or healthcare-associated infections (HAIs) are infections that occur in healthcare facilities at least 48 hours after a patient's admission, but not was either incubating or symptomatic at the time of admission. Nosocomial infections include both hospital-acquired infections and occupational infections in health-care workers.

1.2. Status of compliance with some hospital infection control procedures among medical staff's

Enhancing compliance with infection control procedures, especially hand hygiene procedures, safe injection procedures, sterilization-sterilization procedures, wound dressing changes and peripheral venous catheterization procedures, closure role as the focus of

intervention programs to improve infection control capacity in hospital departments and units.

1.3. Epidemiological characteristics of nosocomial infections and related factors

Pathogens that cause HAIs can come from many different sources, causing different types of HAIs, including common types such as:

- Respiratory tract infections (including ventilator-associated pneumonia)
- Ssurgical site infection
- blood infection related Central-line catheterization
- Urinary tract infections during catheterization

In addition, some other hospital-acquired infections such as non-ventilator-acquired pneumonia, gastrointestinal infections, other primary bacteremia unrelated to catheter use, and other urinary tract infections unrelated to catheter use. HAIs can also be grouped according to the organ system affected such as ear, eye, nose, and throat infections, lower respiratory tract infections (including bronchitis, tracheitis, bronchiolitis, lung abscesses or edema without evidence of pneumonia), skin and soft tissue infections, cardiovascular infections, bone and joint infections, nervous system infections, and reproductive tract infections.

1.4. Multimodal intervention model in enhancing compliance with infection control procedures among healthcare workers

1.4.1. Multimodal strategies in infection control

The development of health worker training activities is the central intervention for the improvement of KS, however, the sustainable implementation and maintenance of the HCW improvement interventions requires a systematic approach with many involved parties. Current evidence supports a multimodal strategy in the development of infection control programs. A “Multimodal” strategy is defined as a strategy consisting of several elements or components (three or more; usually five) implemented in an integrated manner with the aim of improving outcomes and changing behavior. Because. In 2009, WHO published guidelines for the implementation and evaluation of hand hygiene programs in health facilities [20]. This guide identifies five components that need to be implemented specifically: alcohol-based hand sanitizer at the point of care or

performed by health workers, training and education, observational feedback and performance outcomes, and recommendations. reminders (e.g. posters) and administrative/environmental/institutional support. WHO guidelines have been widely disseminated around the world and are reported to have had a major impact on bacteriological control in hospitals. Later, the multimodal strategy was also disseminated by WHO and applied to other activities in improving the infection control processes of health workers.

The five most common components include: (i) system change (the availability of appropriate infrastructure and supplies to enable good practice of infection prevention and control); (ii) education and training of health care workers and key players (eg, managers); (iii) monitor infrastructure, practices, processes, results and provide data feedback; (iv) workplace reminders/contact information; and (v) change the culture within the facility or enhance the safe environment.

In infection control, a multimodal strategy typically includes a trio or more components (e.g. improving governance, leadership and accountability; educating and training service providers; examining, monitoring and evaluation; and effective communication) are done collectively and continuously to maximize outcomes and change behavior. The ultimate goal is to create an organizational culture and patient-safe environment that supports overall quality improvement.

1.4.2. In Viet Nam

In nosocomial infection prevention programs, hand hygiene (hand hygiene) is always an indispensable component, playing an important role in infection control. Hand hygiene is a part of body hygiene that is included in the general hygiene of the hygiene industry, it is considered that hand washing along with body, eye and mouth hygiene is a great achievement of mankind. Body biology is included in the common curriculum of citizenship education of countries around the world. In addition, other processes are also implemented such as enhanced sterilization - sterilization or safe injection.

1.4.3. Effectiveness of multimodal interventions in improving compliance with infection control procedures

The factors involved in infection control are: Encouraging healthcare workers to perform procedures; strengthen facilities; supervise the implementation of the HCW procedures. It can be confirmed that

nosocomial infections occur related to many factors including: people, hospital environment and patients. Therefore, an implementation of an infection control program also includes multimodal activities, with multi-sectoral mobilization and participation of all.

Chapter 2
SUBJECTS AND RESEARCH METHODS

2.1. Research subject, place and time

2.1.1. Research subjects

2.1.1.1. Patient

- Criteria for patient selection include:

+) The patient is in inpatient treatment

+) Have a hospital stay >48 hours

+) Present at the time of investigation.

Exclusion criteria include:

+) Patients with a hospital stay of less than 48 hours, patients treated on an outpatient basis.

+) The patient is incubating an infectious disease when admitted to the hospital, detection of this patient is mainly based on abnormal paraclinical signs such as X-ray, blood tests, etc., and clinical examination showing signs of the disease. infection

2.1.1.2. Medical staff for goals 1 and 2

Selection criteria include:

+) Directly examine, treat and care for patients

+) Present at the time of study

+) Agree to participate in the study

- Exclusion criteria

+) Those who are in school, on maternity leave, sick or refuse to participate.

2.1.1.3. Nurses for the goal 3

Selection criteria include:

+) Directly taking care of the patient

+) Present at the time of study

+) Agree to participate in the study

+) Participating in phase study

- Exclusion criteria

+) Those who are in school, on maternity leave, sick or refuse to

participate.

2.1.2. Place and time of study

The study was conducted at the clinical departments of Thanh Nhan Hospital, Hanoi

2.1.3. Research time

The study was conducted from January 2018 to September 2020.

2.2. Research Methods

2.2.1. Research design

- Phase 1: A cross-sectional descriptive study is applied, combining quantitative and qualitative data collection through in-depth interviews and group discussions.
- Phase 2: A before-after comparative trial study without a control group.
- Stage 3: Post-intervention assessment, combining quantitative and qualitative data collection through in-depth interviews and group discussions.

2.2.2. Study sample size

2.2.2.1. Sample size for objective 1

- The required sample size for the study is 229 medical staff. Plus 10% of the preventive health workers who did not agree to participate in the study or gave up, the total sample size was 252
- 03 focus group discussions were conducted with 15 health workers in clinical departments (5 health workers/call). Health workers were randomly selected from among the health workers invited to participate in the study.
- 02 in-depth interviews with) 1 representative of the head of the infectious disease department and) 1 representative of the hospital leadership. The convenient sampling method is applied.

2.2.2.2. Sample size and sample selection for objective 2

For objective 2, the study was conducted on all inpatients in clinical departments and met the inclusion and exclusion criteria. A total of 712 patients in 2018 (assessment August 29, 2018) and 751 patients in 2019 (assessment July 27, 2019).

2.2.2.3. Sample size and sample selection for objective 3

* Sample size and sample selection for patients

The study was conducted on all inpatients in clinical departments and met the inclusion and exclusion criteria. A total of 647 inpatients were

evaluated for hospital-acquired status in 2020 (assessment September 30, 2020).

* Sample size and sample selection for nurses

The total sample was 190 nurses, corresponding to the actual number of nurses selected in phase 1. Thus, all nurses in phase 1 were selected for the research phase 2 and 3.

* Sample size and sampling method for in-depth interviews and focus group discussions

- 03 focus group discussions were conducted with 15 health workers in clinical departments (5 health workers/call). Health workers were randomly selected from among the health workers invited to participate in the study.

- 02 in-depth interviews with 1) 1 representative of the head of the infectious disease department and 2) 1 representative of hospital leadership. The intentional sampling method is applied.

2.2.3. Research variable/indicator

2.2.3.1. Research variables and indicators for objective 1

* General information

* Variables on compliance with some infection control procedures by healthcare workers

2.2.3.2. Research variables and indicators for objective 2

* General information

* Variables and indicators of hospital infection

2.2.3.3. Research variables and indicators for objective 3

* Quantitative variables and indicators before and after intervention in nurses

* Qualitative information

2.3. Research implementation

2.3.1. Group organization and research implementation process

2.3.1.1. Organization of the study group

2.3.1.2. Intervention content

In this study, a multimodal approach was applied to improve compliance of three basic ER procedures including: hand hygiene, dressing change, and peripheral venous catheterization. . The core of the intervention includes 4 activities:

- Supplementing, completing and promulgating regulations on the process

- Equip necessary means and materials
- Training for supervisors and nurses
- Strengthen and improve the quality of process compliance monitoring activities.

2.3.2. Techniques and tools for collecting information

2.3.2.1. Observation practice

2.3.2.2. Evaluation of nosocomial infections

2.3.2.3. In-depth interviews and group discussions

2.4. Evaluation criteria used in the study

2.4.1. Determining research indicators on hospital-acquired infections

2.4.1.1. Investigation, clinical examination, detection of patients with UTIs

2.4.1.2. Microbiological testing, isolation and identification of bacteria

2.4.2. Determination of variables and indexes of hand hygiene research

2.5. Data management and analysis

The data was entered into Epidata software and analyzed using Stata 16.0 software. Qualitative information collected through in-depth interviews and group discussions was recorded and de-tape, synthesized through Microsoft Excel software. The contents are cited and aggregated according to the identified topics.

Chapter 3
RESEARCH RESULTS

3.1. Status of compliance with some infection control procedures at Thanh Nhan Hospital in 2018-2019

3.1.1. General information of medical staff

3.1.2. Actual situation of hand hygiene compliance of healthcare workers and some related factors

In this study, there were a total of 6 handwashing opportunities for healthcare workers, divided into two time points:

- Before contact with the sick person (including the period before contact with the sick person, before performing a clean, sterile, gloved procedure or procedure). A total of 13,258 observations prior to patient contact

- After contact with a patient (including after examining/caring for a patient, after contact with body fluids, after a procedure, after being in contact with the patient's surroundings). A total of 3286 observations were made after contact with the sick person.

Table 3.2. Hand hygiene compliance status

	No. of observation	**No. of compliance**	**Percentage**	**Correct compliance**	**Percentage**
Before contacting patient	13258	6681	50,4%	5126	38,7%
After contacting patient	3286	1504	47,4%	1225	37,3%
Total	16544	8185	49,5%	6351	38,4%

Hygiene compliance rate before contact with sick people was 50.4%, higher than after contact with sick people was 47.4%. The rate of compliance with the 6-step hand hygiene process before contact with the patient was 38.7%, and after contact with the patient was 37.3%. Overall, the hand hygiene compliance rate was 49.5% and 38.4% of health workers followed exactly 6 steps of hand hygiene. The rate of compliance with correct hand hygiene did not differ by gender, but there were differences according to professional qualifications, number of years of work, and infection control training.

The Department of Examination had the lowest hand hygiene compliance rate with 43.2%, followed by Odonto-Stomatology (46.9%) and Pediatrics (47.3%). Hand hygiene compliance rates were highest in the Departments of Urology (52.0%), Interspecialty (51.4%), and ICU (50.7%). The difference between departments was statistically significant ($p<0.05$).

When assessing the causes of non-compliance with hand hygiene, the most common cause was “complicated procedures” (24.6%), followed by “too many opportunities for hand hygiene”. hands” (21.4%) and not enough chemicals for hand hygiene (17.5%).

3.1.3. Actual status of medical staff's compliance with the wound dressing change procedure and some related factors

A total of 391 observation opportunities across 66 medical staff across the Departments of Surgery, ICU, Obstetrics and Oncology.

For the wound dressing process, the step with the lowest percentage of medical staff performing is removing gloves, cleaning hands (29.2%), preparing gauze and antiseptic solution (30.4%). and hand hygiene, wearing gloves (32.0%). Steps such as informing the patient have the highest failure rate. The rate of correct and complete compliance with the 16-step wound dressing change procedure among medical staff was 28.6%. There were no differences in compliance rates by gender, professional level, years of service and training status.

Medical staff in Orthopedic Department had the highest rate of correct and complete compliance with wound dressing procedures (31.8%), followed by Obstetrics (30.3%) and Neurosurgery (30.3%) ,2%). The difference between departments was not statistically significant with $p>0.05$.

Complex processes (28.8%), forgetting steps (21.2%) and insufficient tools and equipment (19.7%) are the 3 most common factors related to non-compliance wound dressing change.

3.1.4. Status of medical staff's compliance with peripheral venous catheterization procedures and some related factors

With the procedure of peripheral venous catheterization, this procedure is mainly performed in the Departments of Internal Medicine, Pediatrics and Internal Resuscitation. Therefore, the study conducted to evaluate the compliance level of the peripheral venous catheterization procedure in these departments. A total of 388 observation opportunities per 93 healthcare workers.

For the peripheral venous catheterization procedure, the step with the lowest percentage of medical staff is informing the patient (66.8%), instructing the patient (67.0%) and providing information (69.1%). Overall, the compliance rate for a full 16-step peripheral venous catheterization procedure among healthcare professionals was 65.7%. There was no difference in compliance rates by gender, qualification, and years of service. Health workers trained on KS adhere better than health workers who are not trained ($p<0.05$).

Medical staff in the Pediatric Department had the highest rate of correct and complete compliance with the procedure (72.3%), followed by Internal Resuscitation (69.8%) and Stroke (66.7%). The difference between departments was not statistically significant with p>0.05. The most common cause of non-compliance with peripheral venous catheterization was forgetting steps (32.3%), complicated procedures (22.6%), and finding it unnecessary to complete the procedure. (21.5%).

3.2. Some factors related to nosocomial infections at hospitals in 2018-2019

3.2.1. General information of the patient

3.2.2. Situation of hospital infections

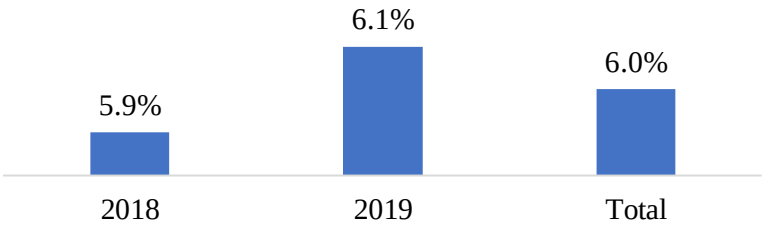

Figure 3.7. The incidence of hospital-acquired infections

The evaluation results showed that in 2018, there were 5.9% of inpatients with HAIs, increasing to 6.1% in 2019. Overall, there were 88/1463 patients with HAIs in 2 years (6.0%).).

All patients with NKBV had only 1 type of NKBV. The most common nosocomial infections were BV (31.0% in 2018 and 43.5% in 2019), followed by upper respiratory tract infections (26.2% in 2018 and 21.7% in 2019), hospital-acquired pneumonia. (including ventilator-associated pneumonia) (19.1% in 2018 and 8.7% in 2019). Skin and soft tissue infections accounted for the lowest rate with 4.8% in 2018 and 6.5% in 2019.

The density of hospital admissions/1000 days of hospital stay was 5.11. The density of 4 common bacterial infections including sepsis was 7.02; urinary tract infection is 6.61; wound infection was 10.26 and respiratory infection was 8.76.

Out of 88 cases of HAI, 36 were microbiologically tested, mainly blood cultures (29/36 cases) and sputum (5/29 cases). There

were 2 cases of urine culture. Of which, 18 cases (50%) tested negative. The positive rate in blood cultures was 55.2%; Sputum culture was 20.0% and urine culture was 100%. Among the positive samples, Pseudomonas aeruginosa accounted for the majority (41.7% in 2018 and 20.8% in 2019), followed by Klebsiella pneumoniae (0.0% in 2018 and 20.8% in 2019).

3.2.3. Some factors related to nosocomial infections

Patients aged 18-29 had a lower risk of UTI compared with patients < 18 years old (OR=0.17, 95%CI=0.03-0.99). Females, treated at the Department of Endocrinology and Urology, cardiovascular diseases, surgery and hospital stay are the factors related to the risk of UTI.

3.3. Effective interventions enhance compliance with some infection control procedures of nurses

3.3.1. Variable effectiveness in compliance with certain infection control procedures

3.3.1.1. Wound dressing change procedure

After the intervention, most of the steps in the wound dressing process were fully performed by the nurse.

Overall, the compliance with the wound dressing procedure more than doubled from 28.2% to 87.5%. The intervention efficiency was 210.7%. All departments had a significant increase in compliance, the highest was the Department of Surgery with 89.7%, followed by Neurosurgery (88.9%) and Orthopedic Trauma (88.6%)).

3.3.1.2. Procedure for placing a peripheral venous catheter

After the intervention, most of the steps of the peripheral venous catheterization procedure were fully performed by the nurse.

Overall, compliance with peripheral venous catheterization increased from 65.7% to 87.5%. The intervention efficiency was 33.2%. All departments had a significant increase in compliance, the highest was the Internal Medicine Department with 92.1%, followed by Gastroenterology (88.9%) and Internal Medicine (88.6%).

3.3.1.3. Hand hygiene procedure

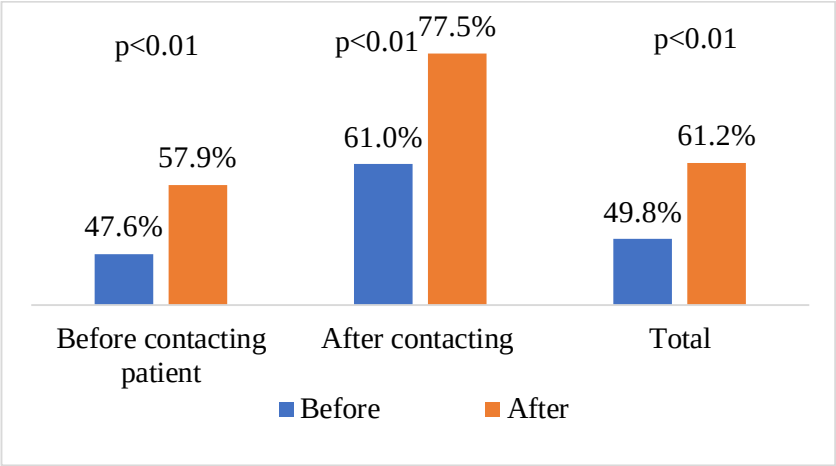

Figure 3.12. The rate of compliance with hand hygiene procedures before and after the intervention

After the intervention, the rate of adherence to hand hygiene before contacting patients increased from 47.6% to 57.9%. The intervention effect was 21.6. The rate of compliance with hand hygiene after contact with sick people increased from 61.0% to 77.5%. The intervention efficiency was 26.8%. Overall hand hygiene compliance rate increased from 49.8% to 61.2%. The intervention efficiency was 22.3%. The difference between before and after the intervention was statistically significant with p<0.05.

In general, the difference in hand hygiene rates between before and after the intervention in all departments is statistically significant (except the Department of Medical Examination and the Department of Emergency Medicine) with the intervention efficiency from 14.0% (Department of Rehabilitation). positive energy) to the Faculty of Interdisciplinary Studies (50.2%).

3.3.2. Effectively changing the situation of hospital infections

Table 3.30 Nosocomial infection status

Hospital-acquired infection	Before (n=1463)		After (n=647)		p-value	Effect size (%)
	n	%	n	%		
No	1375	94.0	633	97.8	<0.01	63.3
Yes	88	6.0	14	2.2		

The rate of hospital infections from 6.0% before the intervention decreased to 2.2% after the intervention (p<0.01), the effectiveness of the intervention reached 63.3%.

Table 3.31 Types of nosocomial infections before and after intervention

Đặc điểm	Before (n=1463)		After (n=647)		p-value
	n	%	n	%	
Surgical site infection	33	37.5	2	14.3	0.12
Blood infection	6	6.8	2	14.3	
Upper respiratory infection	21	23.9	7	50.0	
Hospital pneumonia	12	13.6	0	0.0	
Urinary tract infections	7	8.0	2	14.3	
Skin and soft tissue infections	5	5.7	1	7.1	
Other bacterial infections	4	4.6	0	0.0	

After the intervention, upper respiratory tract infection was the most common form of nosocomial infection (7/14 cases, 50.0%). There are still other types of hospital-acquired infections such as surgical site infection, blood infection, urinary tract infections and skin and soft-tissue infections, even though there are only 1-2 cases. Density of hospital admissions/1000 days of hospital stay decreased from 5.12 to 2.60. The intervention efficiency was 49.2%. The density of other infections also decreased such as sepsis decreased from 7.02 to 1.81; urinary tract infections decreased from 6.61 to 1.95; surgical site infections decreased from 10.26 to 0.70 and respiratory infections decreased from 8.76 to 2.55.

3.3.3. Qualitative research results after intervention

3.3.3.1. Changing the system and training of infection control in hospitals and clinical departments

3.3.3.2. Improved compliance with infection control procedures

3.3.3.3. Recommendations to ensure the sustainability of the intervention model

CHAPTER 4
DISCUSSION

4.1. Status of compliance with some infection control procedures by medical staff at Thanh Nhan Hospital

4.1.1. Hand hygiene compliance status

The study results showed that the hand hygiene compliance rate was 49.6% and 38.4% of health workers followed exactly 6 steps of hand hygiene. This rate is higher than some domestic and foreign studies. Through observation, the nursing practice of hand hygiene is still lacking. In fact, it is observed that health workers often do not wash the steps in the correct sequence, skip steps, and also do not perform enough times for each step because the routine hand washing process consists of 6 steps, each step requires health care workers. Do it at least 5 times. In fact, the routine handwashing procedure has been issued by the Ministry of Health and is posted at all hand washing points and in the wards, so all health workers can easily access it at the hospital, but they still practice it. wrong, so other means are needed to remind health workers to practice better to ensure effective hand washing. This is also consistent with the results when assessing the causes of non-compliance with hand hygiene procedures, the most common cause being “complicated procedures” (24.6%), followed by “ there are too many opportunities for hand hygiene” (21.4%) and not enough chemicals for hand hygiene (17.5%).

Notably, the rate of adherence to hand hygiene before contact with sick people was higher than after contact with sick people. Hygiene compliance rate before contact with sick people was 50.4%, higher than after contact with sick people was 47.4%. The rate of compliance with the 6-step hand hygiene process before contact with the patient was 38.7%, and after contact with the patient was 37.3%. In fact, after taking care of patients, nurses often wash their hands and then will touch something in the ward (maybe touching a blouse, touching a medical record, touching a patient's utensils). or the outer surfaces of medical instruments ...) as a result, their hands become contaminated with bacteria and possibly multi-antibiotic resistant bacteria. If nurses only wash their hands before touching the patient and not after providing care, they will not transmit the bacteria in the

hospital to the patient. Therefore, for the patient, handwashing by the nurse after caring for the patient should be emphasized in interventions to improve hand hygiene compliance.

The difference between departments was statistically significant ($p<0.05$). This difference may be due to the different status of equipping hand sanitizer solution for each department. According to the habit, health workers after each examination or treatment of a patient usually wash their hands with soap and water at the hand basin located outside the clinic or disinfect their hands with 70o alcohol available on the table. The lack of adequate arrangement of hand washing equipment causes trouble for health workers, so they choose the method of hand sanitizer with alcohol. Disinfecting hands by this method causes dry skin, peeling skin (because alcohol causes dehydration of hands) making them limit hand hygiene. Therefore, when they are equipped with hand sanitizer containing an emollient, they do not have to fear that their hands will be hurt, thus better complying with hand hygiene.

4.1.2. Compliance status of wound dressing change procedure

The results of this study show that the compliance status of medical staff with the wound dressing change procedure at Thanh Nhan hospital is low. The results also show that hand hygiene is also a flawed step while performing dressing changes. According to the recommendations of the Ministry of Health, hand hygiene helps to eliminate most of the microorganisms present in the hands, thus preventing the transmission of infectious agents from one patient to another, from one patient to another. instruments and medical personnel, from site to site on the same patient, and from healthcare worker to patient. This result has also been discussed and is consistent with the results on hand hygiene compliance of health workers in this study.

4.1.3. Compliance status with peripheral venous catheterization

In general, the rate of practice passing in most of the steps is at a high level of >90%. This may be because the steps in the procedure are all necessary to be able to perform this trick. This result is consistent with the results when evaluating factors related to non-compliance with the procedure, specifically, the most common cause related to non-compliance with the peripheral venous catheterization

procedure was forgetting steps (32.3%), the process is complicated (22.6%) and it is not necessary to do it completely (21.5%). It should be noted that catheterization is an invasive procedure, so health care workers need to fully inform and provide information to patients and family members so that they can prepare. Training and education play a very important role, when the results show that the medical staff trained in HAI has a compliance rate of 71.0% higher than 52.7% for peripheral venous catheterization procedures. of the untrained group. The difference was statistically significant with $p<0.05$. Therefore, clinical departments need to have direct on-the-job training guidance in the form of practice, update knowledge and strengthen supervision and inspection for medical staff at the department. In addition, the hospital also needs to strengthen the organization and development of training programs on the prevention of blood infection in patients with catheterization for the steps that have not achieved a high rate in the practice of peripheral venous catheterization.

4.2. Situation of hospital infections and some related factors

4.2.1. General characteristics of the studied patients

4.2.2. Some factors related to hospital infection at Thanh Nhan hospital 2018-2019

4.2.2.1. Situation of hospital infections

The evaluation results showed that, out of 1463 patients participating in the study, there were 88 patients with HAI. In general, the rate of hospital infections in 2 years is 6.0%, in 2018 there were 5.9% of inpatients with hospital-acquired infections, increasing to 6.1% in 2019. As a result, the rate of hospital-acquired hospital-acquired infections can be seen. Thanh Nhan is at a high level. This can be explained because Thanh Nhan Hospital is an upper-level hospital in Hanoi, accepting patients from many areas of Hanoi with many serious and complicated illnesses; Using more invasive diagnostic and therapeutic facilities, the number of patients is increasing day by day with constant overload, leading to an increase in hospital admission rate of Thanh Nhan hospital compared to previous years and higher than many other patients. other institute. In addition, according to a cross-sectional survey of hospital admissions at Thanh Nhan hospital in October 2017, the rate of hospital infections was 3.58%. Thus, when compared with an internal survey in 2017, the rate of hospital-

acquired hospital-acquired infections tends to increase. This is an alarming situation that causes a lot of difficulties for the infection control work. Therefore, infection control work should be promoted to solve the situation of hospital infections.

4.2.2.2. Situation of hospital infections by type of infection and by unit

4.2.2.3. Microbiological test results

4.2.4. Some factors related to nosocomial infections

A patient with an underlying nosocomial infection then has many risk factors. There are many groups of factors related to HAI, including factors related to the patient, to HAI and the level of antibiotic resistance of pathogenic bacteria in the study population. Many studies have shown that factors related to hospital-acquired infections in patients include: elderly patients, comorbidities, infection at admission... along with many other factors such as prolonged hospital stay, implementation of Invasive procedures, surgery or not are all important factors causing HAI.

This study is similar to previous studies in that surgical patients were in the group of patients with the highest risk of HAI. This may be because the nature of the treatment in these patients leaves them susceptible to exposure to nosocomial bacteria, thereby leading to nosocomial infections through the surgical sites. The finding also indicates that a prolonged hospital stay is associated with a higher likelihood of HAI, which is consistent with previous literature 141-143.

Long-term hospital stays, possibly due to disease severity as well as complexity of interventions, are factors that are significantly associated with nosocomial infections. In addition, such a long hospital stay may increase the susceptibility of patients to hospital-acquired bacteria and put them at risk for nosocomial infections. Duration of treatment is both a cause and effect of HAI. Prolonged hospital stay increases the risk of HAI because long-term hospital stays are all severe cases with many complications, including HAIs, whereas hospital-acquired infections prolong treatment.

Notably, patients treated at the Department of Endocrinology and Urology (OR=3.63, 95%CI=1.04-12.65) were more likely to have HAIs than those treated at other internal departments. This shows that the Department of Endocrinology and Urology is one of the

departments that need to implement the most comprehensive infection control intervention. Patients with urinary tract diseases are at high risk of HAI.

Research shows that people with heart-related conditions have the highest risk of hospital-acquired infections compared to people with other medical conditions. The reason may not be obvious; however, we suggest that this may be because these patients often require long hospital stay, thereby increasing the risk of nosocomial infections. The study's data also showed that these patients had a longer hospital stay than patients without the condition.

This study did not find an association between invasive procedure and HAI, showing that all patients undergoing invasive procedures have the same risk of HAI, so infection control needs to be considered for all. this patient.

4.3. Effective interventions enhance compliance with some infection control procedures of nurses

4.3.1. A multimodal approach to improving infection control practices

4.3.2. Effective behavior change implementation of infection control procedures

4.3.2.1. Wound dressing change procedure

In this study, most of the steps in the wound dressing procedure were fully performed by nurses. Thus, it can be seen that, compared with before the intervention, the status of non-implementation or incomplete implementation has improved significantly. Most of the steps that are not taken adequately are those that involve communication and education of the patient and family, and therefore have little effect on the likelihood of developing a HAI.

4.3.2.2. Procedure for placing a peripheral venous catheter

In this study, for the procedure of placing peripheral venous catheters, after the intervention, most of the steps were fully performed by nurses. Overall, compliance with peripheral venous catheterization increased from 65.7% to 87.5%. The intervention efficiency was 33.2%.

4.3.2.3. Hand hygiene procedure

In this study, with the hand hygiene process, after the intervention, the overall hand hygiene compliance rate increased from 49.8% to 61.2%. The intervention efficiency was 22.3%. The difference between before and after the intervention was statistically significant with $p<0.05$. Although significant improvements were reported, hand hygiene compliance rates did not achieve uniform and optimal levels of compliance. Reports from previous studies suggest that, to prevent cross-contamination of microorganisms in high-risk settings, good hand hygiene practices should be practiced in at least 60–80% of necessary cases 151, 152. Hand hygiene compliance rates in departments such as General Surgery, Other Surgery, Emergency, ICU, and Outpatient Department are still below 60%.

Although there was an increase in overall compliance, we did observe a significant improvement in compliance after patient exposure. This may be due to the habits of health workers, or when health workers come into contact with sick people, they remember that they need to wash their hands. This result is similar to some other studies in the world 146, 153. This needs to be clarified in further studies, however, it can be explained that due to inadequate interventions, or health care workers. inadequate intervention reception. Feedback from qualitative research shows that compliance with these regulations is still difficult due to the many steps and possible steps that may be missed by health workers, leading to improper hand washing. With a 12-month intervention period with such a level of compliance, we find it necessary to maintain as well as strengthen the technical supervision process to ensure that the hand hygiene of health workers is properly guaranteed. specified in the KSNK.

4.3.3. Effectively changing the situation of hospital infections

The rate of hospital infections from 6.0% before the intervention decreased to 2.2% after the intervention ($p<0.01$), the effectiveness of the intervention was 63.3%. After the intervention, upper respiratory tract infection was the most common form of nosocomial infection (7/14 cases, 50.0%). There are still other types of hospital-acquired infections such as skin and soft-tissue infections, even though there are only 1-2 cases. After the intervention, the

density of hospital admissions/1000 days of hospital stay decreased from 5.12 to 2.60. The intervention efficiency was 49.2%.

Thus, it can be seen that the intervention strategy has achieved certain effects. It is noteworthy that in the context of the implementation of the study, other than the intervention performed in this study, no intervention on bacteriophage was performed. Therefore, the change in the rate of HAIs can be attributed to the far-reaching impact of this intervention on the formation of knowledge, attitudes and habits of health workers, thereby reducing the risk of HAI for patient. The results of this study are similar to some other previous studies when applying a multimodal model to improve hospital-acquired infections. Thus, the study results help strengthen evidence on the role of multimodal interventions in improving adherence to infection control procedures and reducing hospital-acquired infections, thereby creating a foundation for hospital leaders to include in their routine operational plans. hospital and of the clinical departments at the hospital.

4.3.4. Qualitative research results and comments on the intervention

The results of in-depth interviews and group discussions show that one of the basic factors determining the success of the model is changing the biogas system, as well as ensuring continuous training and education for employees. health workers in clinical departments and in hospitals. Regular implementation of training activities has helped to ensure that health workers can be regularly updated on procedures and standards for procedures, which were lacking before the intervention due to limited human resources. In general, the opinion that the implementation of this intervention program is completely feasible and likely to ensure sustainability when clinical departments or hospitals routinely integrate these activities into activities. general hospital action. Zingg et al. have identified ten key factors that are essential for effective infection control in the day-to-day operations of any hospital, including: having an infection control organization or committee at the hospital level; workload of health workers, proper application of instructions; education and practice; multimodal and participatory prevention programmes, positive organizational culture; monitoring and feedback. These factors are

also consistent with the principles of the multimodal intervention model applied in this study. Therefore, overall, it can be seen that the hospital infection status has improved significantly, partly thanks to the improvement in compliance with the infection control procedures. Success in improving clinical practice and outcomes is largely due to the motivation of health workers to improve infection control practice. Infection prevention and control best practices are most successfully implemented when integrated within the hospital's own culture.

CONCLUSION

1. Status of compliance with some infection control procedures by medical staff at Thanh Nhan Hospital in 2018-2019 and some related factors.

- Hand hygiene compliance rate is 49.5% and 38.4% of health workers follow exactly 6 steps of hand hygiene.
- The rate of compliance with the wound dressing procedure with all 16 steps in medical staff is 28.6%. There was no difference between the groups.
- The compliance rate with a full 16-step peripheral venous catheterization procedure among healthcare workers is 65.7%.

2. Situation of hospital infections and some related factors at Thanh Nhan Hospital in 2018-2019.

- The rate of NKBV is 6.0%. Density of hospital admission/1000 days of hospital stay was 5.12.
- Age 18-29 is less likely to have HAI compared with patients < 18 years old (OR=0.17, 95%CI=0.03-0.99).
- Females (OR = 2.01, 95% CI = 1.17-3.45) are more likely to have HAI than men.
- Treatment in the Department of Endocrinology and Urology (OR=3.63, 95%CI=1.04-12.65) has a higher chance of getting HAI than those treated at other internal departments.
- Patients with cardiovascular diseases (OR = 3.60, 95% CI = 1.96-6.63) have a higher probability of developing HAI than patients without.
- Patients requiring surgery (OR = 7.82, 95% CI = 3.80-16.09) are more likely to have HAI than patients without surgery.
- Long hospital stay (OR = 1.07, 95% CI = 1.04-1.10) increases the

likelihood of HAI.

3. Effectiveness of interventions to enhance compliance with some infection control procedures of nurses at Thanh Nhan Hospital in 2018-2020.

- After the intervention, the compliance rate with wound dressing changed more than 2 times from 28.2% to 87.5%. The intervention efficiency is 210.7%
- The compliance rate for peripheral venous catheterization increased from 65.7% to 87.5%. The intervention efficiency was 33.2%.
- Overall hand hygiene compliance rate increased from 49.8% to 61.2%. The intervention efficiency was 22.3%.
- The rate of nosocomial infections from 6.0% before the intervention decreased to 2.2% after the intervention ($p<0.01$), the effectiveness of the intervention reached 63.3%.

RECOMMENDATION

Based on the results of this study, we would like to make the following recommendations:

1. Continuing to maintain training activities, briefings, sharing experiences on infection control and standardizing processes. Maintain supervision and training.
2. Diversify contents and forms of training, propaganda, and professional - long-term training of infectious disease control staff, focusing on emphasizing the importance of infection control work. Apply sanctions, reward/penalty regulations.
3. Continue to replicate research and evaluation of infection control activities at hospitals in the hospital system under Hanoi.

LIST OF PUBLICATION

1. **Tran Thanh Tu, Pham Minh Khue, Doan Ngoc Hai, Dao Quang Minh, Nguyen Thi Dung** (2021), ”**Point-prevalence of Hospital-Acquired Infections at Vietnamese Urban Hospital**”, *Online Journal of Health and Allied Sciences*, 20 (4), pg 1-6.

2. Tran Thanh Tu, Pham Minh Khue, Doan Ngoc Hai, Nguyen Thi Kim Dung (2021), "**Hand hygiene compliance in nurses at Thanh Nhan hospital in 2018-2019**", *Vietnam Medical Journal*, 509 (1), p. 368-372.

3. **Tran Thanh Tu, Pham Minh Khue, Doan Ngoc Hai** (2021), "**Effectiveness of multimodal interventions in improving hospital-acquired infections in Thanh Nhan hospital**", *Vietnam Medical Journal*, 508 (2) , p. 95-99