

# THE EFFECTS OF 5S MODEL ON HOSPITAL SERVICE AT CAN THO UNIVERSITY OF MEDICINE AND PHARMACY HOSPITAL, 2022

Nguyen Van Nguyen<sup>1\*</sup>, La Ngoc Quang<sup>2</sup>, Nguyen Van Tap<sup>3</sup>, Nguyen Quynh Truc<sup>4</sup>,  
Nguyen Hoang Thien Thu<sup>5</sup>

<sup>1</sup>FOB Cosmetic Vocational Education Center - 14/4 - 14/6, Ly Tu Trong Street, Ninh Kieu, Can Tho city, Vietnam

<sup>2</sup>Hanoi University of Public Health - 1A Duc Thang Road, Duc Thang Ward, North Tu Liem district, Hanoi, Vietnam

<sup>3</sup>Nguyen Tat Thanh University - 300A Nguyen Tat Thanh Street, Ward 13, District 4, Ho Chi Minh city, Vietnam

<sup>4</sup>Pham Ngoc Thach University of Medicine, Ho Chi Minh City - 02 Duong Quang Trung street, District 10, HCMC, Vietnam

<sup>5</sup>District 11 Health Center - 72A Street 5, Binh Thoi Residence, Ward 8, District 11, Ho Chi Minh City, Vietnam

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## ABSTRACT

The 5S model is the beginning of a quality enhancement initiative to improve safety, efficiency, or other patient-centered aspects. Applying 5S on all types of equipment is to improve the quality of Can Tho University of Medicine and Pharmacy Hospital. It is believed to have some positive effects to the working environment since items are arranged in order, creating more spacious area.

**Objective:** The study aimed to evaluate results of applying 5S on all types of facilities at Can Tho University of Medicine and Pharmacy Hospital after 1-year intervention.

**Method:** The pre-post study design was applied, sampling all 166 equipments in use at Can Tho University of Medicine and Pharmacy Hospital.

**Results:** The results showed that the intervention process achieved positive changes in all 5 types of equipment. After 12 months of intervention, the effectiveness index ranged from 20.24% to 42.65%.

**Conclusion:** Thus, the applied 5S intervention methods have shown certain effectiveness in quality improvement in hospital.

**Keywords:** 5S, intervention, facilities, quality, Can Tho University of Medicine and Pharmacy hospital.

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\*Corresponding author

Email address: nvnguyen2412@gmail.com

Phone number: (+84) 908 302 929

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## 1. INTRODUCTION

In recent years, along with socio-economic development, the medical industry has rapidly expanded to meet the demands of patients for the advanced healthcare services. Recognized the importance of systemic changes to achieve this goal, Vietnam’s Ministry of Health has introduced a set of hospital quality criteria as a standard for hospitals to improve the quality of their medical examination and treatment facilities. One of the new criteria is to implement 5S at the hospital to improve the healthcare environment, in which 5S stands for “Sort”, “Set in order”, “Shine”, “Standardize” and “Sustain” [1],[2]. The 5S management method is recognized as the foundation of the lean healthcare method, by eliminating all elements that do not create value helping to maximize the level of added value. Several implementation studies in low- and middle-income countries to identify measurable changes in applying 5S management methods, including: improved processes, increased capacity, and shorter stays than for patients in the emergency department [1]; reduce drug dispensing cycle time at the inpatient pharmacy [2]; reduces the rate of postpartum infection and stillbirth [3]. The intervention research by Vijay P.Pandya in India showed that all 5 areas of 5S were improved, the highest being “Sort” and “Set in order” [4].

Can Tho University of Medicine and Pharmacy Hospital has a specialized medical staffs in many fields with modern machines and equipments. Can Tho University of Medicine and Pharmacy Hospital is currently focusing on implementing the quality management system. Up to now, the Hospital has not

had any research evaluating the effectiveness of 5S intervention.

## 2. METHODS

### 2.1. Research subjects

The hospital’s system of facilities and equipment includes injection carts, records, medicine cabinets, resrooms, and beds.

### 2.2. Location and time

The study was conducted from January 2022 to December 2022 at Can Tho University of Medicine and Pharmacy Hospital.

### 2.3. Research design

Intervention research. We use a combined quantitative and qualitative design. The quantitative part aims to evaluate the change in knowledge and practice of 5S of medical staff, evaluate the level of 5S compliance of 5 types of facilities including medical injection trolley, medicine cabinets, medical records, hospital beds, resrooms. The qualitative part aims to analyze factors that affect the knowledge and practice of 5S of medical staff, find favorable factors and difficult factors when implementing 5S at the Hospital.

### 2.4. Sample size

We organize independent evaluation sessions by observing 5 types of equipment: medical injection trolley, medicine cabinets, medical records, hospital beds and resrooms periodically 3 times before intervention and 3 times after intervention.

No.	Type of equipment	Number of samples
1	Medical injection trolley	36
2	Medicine cabinets	10
3	Medical records	12
4	Resrooms	9
5	Hospital beds	99
<i>Total</i>		166 samples



The study evaluated all 166 equipment samples currently used at the hospital in 3 phases: before intervention, 6 months after intervention and 12 months after intervention. The total sample size of 3 evaluations is 498 plays.

## 2.5. Sampling

Total population sampling.

## 2.6. Research variables

Variables on the level of 5S compliance of 5 types of equipment: medical injection trolley, medicine cabinets, medical records, hospital beds, resrooms. Evaluation on each S1, S2, S3, S4, S5 is achieved for each type of equipment according to a 5-level Likert scale.

## 2.7. Data collection tools

Regarding 5S assessment for 5 types of facilities, the study conducted a separate checklist for each type of facility. Research and develop a toolkit to assess knowledge and practice 5S according to the Delphi method (expert group discussion), and process using statistical methods, based on the specific regulations of each type of facility material:

**Medical Injection Trolley:** Research and develop a checklist to evaluate the level of 5S achievement of injection vehicles and items on injection vehicles according to National Standard TCVN 6731:2000 [5]. TCVN 6731:2000 was compiled by the Technical Committee for Standards TCVN/TC150 “Medical equipment”, proposed by the Directorate for Standards, Metrology and Quality, and issued by the Ministry of Science and Technology [5]. This standard was converted in 2008 from a Vietnamese Standard with the same number to a National Standard according to the provisions of Clause 1, Article 69 of the Law on Standards and Technical Regulations and Point a, Clause 1, Article 6 of Decree No. 127/ 2007/ND-CP dated August 1, 2007 of the Government detailing the implementation of a number of articles of the Law on Standards and Technical Regulations [6]. Accordingly, injection vehicles must meet regulations on durability and rust resistance. The study references models for arranging equipment and improving injection carts from hospitals that have successfully deployed them such as Hoan My Saigon General Hospital and Trung

Vuong Hospital [7]. From there, build a 5S model on the injection cart and a separate checklist to evaluate effectiveness.

**Medicine cabinet:** According to Circular 22/2011, medicine cabinets need to have a book to monitor preservation and control, a book to monitor temperature and humidity at least twice (morning, afternoon) a day and to monitor product import and export. Medicines, flammable chemicals, vaccines, biological products are stored in separate warehouses, inventory of medicines and chemicals (mixing, disinfection) at the Pharmacy Department is done once a month [8]. Self-defense, anti-storm and flood medicine stocks and other stocks are inventoried quarterly and there are regulations on rotation of these medicines; - Inventory of medicines on duty at clinical departments every 3 months [8] . The study conducted the development of a checklist to monitor 5S activities at the medicine cabinet of each clinical department, accompanied by a checklist of drug management activities for each department.

**Medical records:** Medical records are important documents that must be kept and preserved well in accordance with the law on archives. Inpatient and outpatient medical records are archived for at least 10 years, medical records of labor accidents and daily-life accidents are archived for at least 15 years, medical records of deceased patients are archived for at least 20 years. . According to Decision 1895/1997/QĐ-BYT on promulgating hospital regulations, the Head of General Planning Department specifically assigns specialized officials to preserve medical records and HSBA must fully record all information. specified in the record book. Medical records are placed in cabinets or on shelves, with measures: moisture-proof, fire-proof, anti-glue, anti-mouse, anti-termites and other insects. Medical records are numbered sequentially according to specialty, or according to the international disease catalog to preserve, store and provide documents quickly and conveniently [9].

**Resroom:** Based on Criterion A2.2. Patients have access to clean restrooms and adequate facilities, within the set of 83 criteria of the Ministry of Health. Research to develop a 5S assessment checklist for resrooms by referring to the checklist of criteria for evaluating

hospital hygiene issued by the Ministry of Health and the Department of Medical Examination and Treatment Administration issued in 2015 [10], hygiene guidelines environment in medical examination and treatment facilities in 2017 [11].

**Hospital bed:** A maximum required treatment room must not exceed 04 beds and must ensure the construction floor area per bed as prescribed in National Standard TCVN:2012[12]. Accordingly, the area of a special service room must be at least 12 m<sup>2</sup> wide and a room with 4 beds must be at least 28 m<sup>2</sup> wide. In the service room there must be an emergency hospital bed, bedside cabinet, bed support table, ventilator, oxygen tank, electric syringe pump, infusion machine, television, refrigerator, air conditioner, water heater.

**2.8. Analyze research data**

Data were analyzed using STATA 14.0 software.

Descriptive statistics include mean, standard deviation for quantitative variables and frequency, percentage for qualitative variables.

**2.9. Ethics in research**

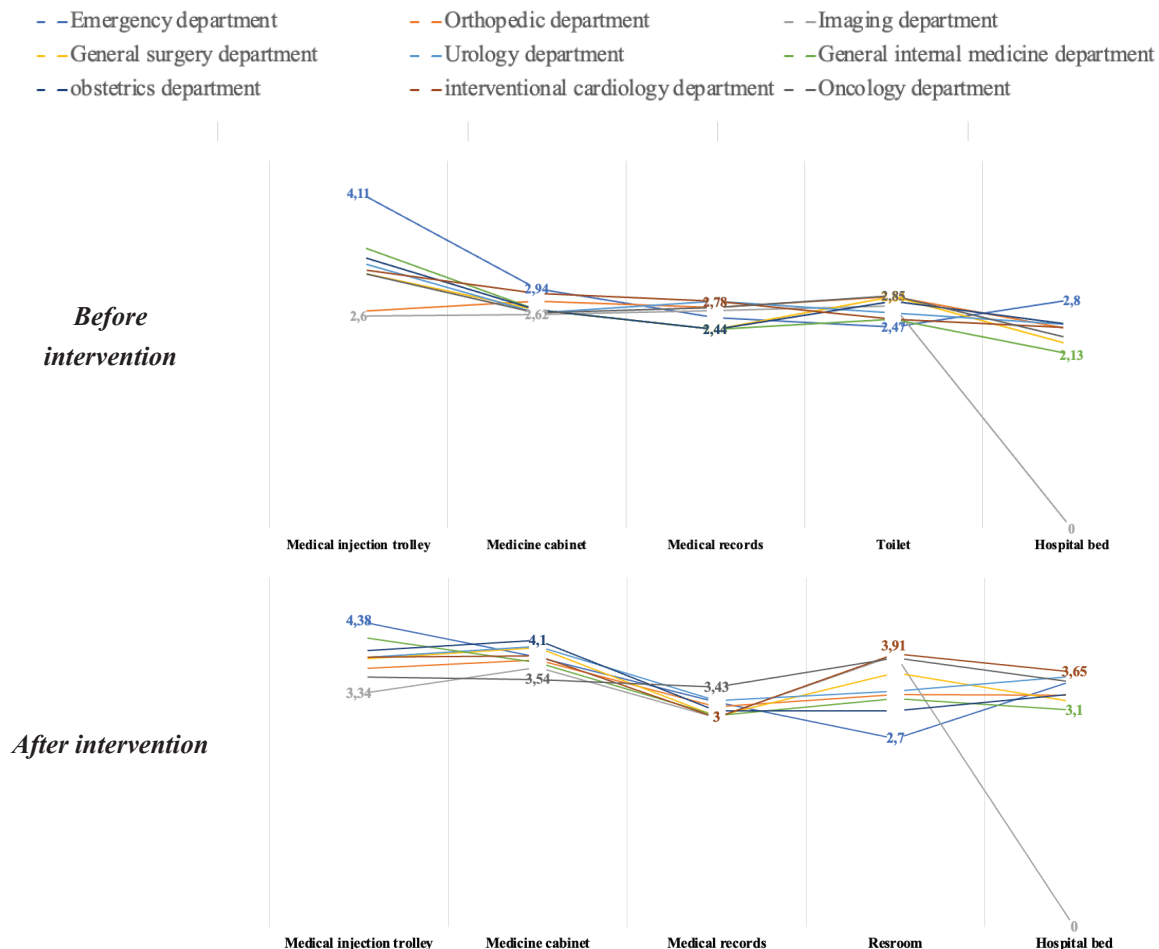
The study was approved by the International Review Board of Hanoi University of Public Health No. 378/2020/YTCC-HD3 dated August 25, 2020.

**3. RESULT**

**3.1. Characteristics**

The study conducted intervention activities such as training, process development, and 5S pilot intervention on various types of hospital equipment/facilities. Conduct evaluation in 3 phases: before intervention, 6 months and 12 months after intervention

*Chart 1 . Diatribution of 5S average score of 5 types of quipment pre – post intervention*

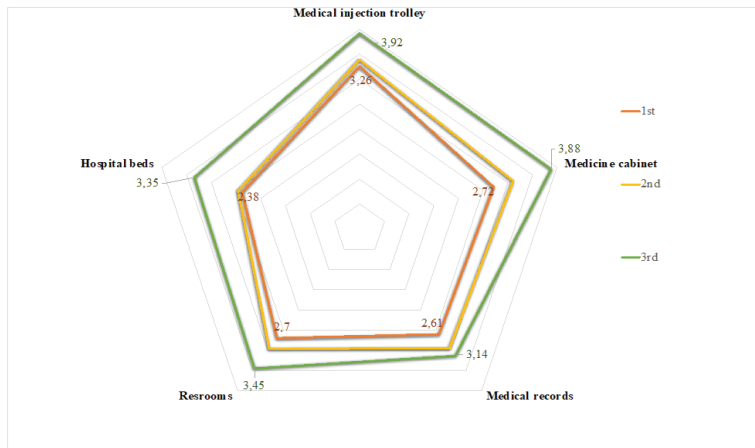


The chart shows the distribution of 5S average score in 9 departments according to 5 types of equipment before and after the intervention. This shows that the overall average score was highest in Injection vehical in both the pre- and post-intervention periods.

After the intervention, the chart shows an increase in the average 5S score for each type of equipment.

Specifically, the 5S injection score ranged from 2.6-4.31 before the intervention, then after the intervention it increased to 3.34-4.38 points; Medicine cabinet was increased from 2.62-2.94 to 3.54-4.1 points; The profile was raised from 2.44-2.78, to 3.0-3.43 points; resroom was grew from 2.47-2.85 to 2.7-3.91 points and hospital bed before intervention from 2.13-2.80, then after intervention increased to 3, 1-3.65 points.

**Chart 2. Compare the average change in 5S scores after intervention**



The chart shows the change in the average 5S score in 3 evaluations: before intervention, after 6 months of intervention and after 12 months of intervention.

Accordingly, the average 5S score increased in all 5 types of equipment.

**Table 1. Effective intervention of 5 types of equipment after 12 months**

Trang thiết bị	1st Before intervention	2nd After 6 months	3rd After 12 months	Efficiency index (%) After 6 months	Efficiency index (%) After 12 months
Medical injection trolley	3,26	3,39	3,92	3,99	20,24
Medicine cabinet	2,72	3,11	3,88	14,34	42,65
Medical records	2,61	2,95	3,14	13,03	20,31
Resrooms	2,70	2,96	3,45	9,63	27,78
Hospital beds	2,38	2,46	3,35	3,36	40,76

The results showed that the intervention process achieved positive results in all 5 types of equipment.

After 12 months of intervention, the effectiveness index ranged from 20.24% to 42.65%.

#### 4. DISCUSSION

Before the intervention, the 5S assessment scores for the 5 types of equipment were still low, mainly at 2-3 on a 5-point scale. This result is lower than the research by author Truong Thi Thanh Thuy at the Department of Examination at Binh Thanh Hospital, Ho Chi Minh City give 5S scores ranging from the lowest “Sort” with 2.2 points, the highest in “Sustain” factor 4.2 points, “Shine” 4.1 points [13]. The initial survey shows that the distribution of 5S average scores of 9 departments according to the 5 highest types of equipment in medical injection trolleys, the remaining types of equipment have a score distribution in the range of 2-3 points. and there is not too high a difference in departments and fields of 5S. The results are different from Truong Thi Thanh Thuy’s research, showing that the basic limitation in implementing 5S is the uneven distribution of 5S common scores [13]. The first factor “Sort” is still not focused, the score is the lowest and the difference is high with the remaining 4 factors [13]. Therefore, to effectively implement 5S, the hospital board of directors as well as department/department leaders need to train and improve staff knowledge. Complement systematically, step by step, each field.

The study showed a change in the average 5S score over 3 assessments. Accordingly, the average 5S score increased in all 5 types of equipment and in each area of 5S. After the intervention, the average 5S score for all types of equipment increased from 2.42 to 3.13 to 3.86 points. The results showed that the intervention process achieved positive results in all 5 types of equipment. The efficiency index ranges from 19.46% to 41.39%.

**Medical injection trolley:** Among the 5 areas, S3 has a score almost higher than the remaining 5 areas. The Emergency Department has the highest rating among the 9 departments surveyed, focusing mainly on level 4 and having an even distribution in 5 areas. The Department of Orthopedics and Traumatology and Diagnostic Imaging have the lowest average 5S score, ranging from 2-3 points. After intervention, 5S score increased from 3.21 points to 3.85 points. Similar to the 5S implementation process of Trung Vuong Hospital [7]. The study conducted screening and classification

of tools on the medical injection trolley; Use only the necessary tools in sufficient quantities at the time they are needed on the medical injection trolley. After that, the departments arrange the necessary tools and supplies on the injection cart according to the frequency of use, in a neat order and in the right place “easy to see - easy to find - easy to get”. At the beginning of the shift, the medical injection trolley is cleaned before arranging equipment to prepare for a process of patient care. At the end of the shift, medical staff will clean the entire medical injection trolley and disinfect surfaces. Next, the departments always continuously ensure 3S: no unnecessary tools, no clutter and no dirty things. After successfully deploying 5S to implement medical injection trolley, the hospital continues to deploy 5S in arranging medicine cabinets, tool cabinets and working rooms.

**Medical cabinet:** The average 5S score fluctuates quite evenly, from 2-3 points. Field S2 has the lowest average score among the 5 fields, distributed across all 9 surveyed faculties. After intervention, 5S score increased from 2.73 points to 3.86 points. Al-Aearah’s research in Jordan shows that the effectiveness of 5S helps reduce medication distribution time to inpatients by more than 45% [2]. Based on the “5S Principles in Healthcare”, the Department reviews and evaluates the current status of staff’s daily activities during patient care and treatment. Develop an implementation plan and launch a program to conduct general cleaning and screening of unnecessary medical items and supplies; prepare a list of proposed materials and equipment to serve the plan. Then, healthcare worker arrange and rearrange medical instruments and medical supplies in each department’s medicine cabinet to be neat, clean, scientific, easy to use and periodically evaluate the implementation of 5S.

**Medical records:** Similar to medicine cabinets, the average 5S score fluctuates quite evenly, from 2-3 points. Field S2 in the medical records has a difference between departments, ranging from 2.11 to 2.89 points. Accordingly, the study noted that the department has not done a good job of arranging stackable items in a reasonable manner (by type, by size...). However, in general, departments have implemented activities such as labeling, rearranging, and specifying locations for



items and medical records. After intervention, 5S score increased from 2.62 points to 3.13 points. The survey showed that before the intervention, searching for any medical records from the last 5 years, sometimes lasting more than 60 minutes, still could not be found, but now after sort, positions are redistributed each year, color convention for each type of medical record, the search is shorter, usually about 5 minutes and maximum only about 15-30 minutes.

**Resroom:** The average 5S score fluctuates quite evenly, from 2-3 points. The lowest average score is in field S4, similar to other faculties in this field. The resroom is a place used by many people, so the floor is often slippery, wet, no antiseptic solution is provided, lack of paper, old facilities...so apply 5S in the bathroom. Cleaning must be carried out seriously, with a specific daily cleaning schedule assigned, and must be disseminated to all patients, relatives and staff to jointly maintain shine. After intervention, 5S score increased from 2.7 points to 3.45 points. This shows that the initial intervention has had some effectiveness. Hospitals need to continue to implement and maintain 5S in restrooms to contribute to increasing patient/relative satisfaction when using hospital services.

**Hospital beds:** The average score of 5S is higher in area S3. After intervention, 5S score increased from 2.42 points to 3.41 points. The set of 83 criteria for evaluating hospital quality has included the 5S model in one of the evaluation standards, shown in Chapter A3, subsection A3.2 on the content of Patients being examined and treated in departments and rooms. neat and tidy [9],[10]. Therefore, implementing 5S on hospital beds contributes to changing the quality of treatment and service quality of patients, especially for inpatients with long-term treatment. The study conducted a reference to hospital bed models at Ho Chi Minh City hospitals, thereby building a checklist to monitor the 5S implementation process at Can Tho University of Medicine and Pharmacy Hospital.

## 5. CONCLUSION

The results showed that the intervention process achieved positive results in all 5 types of equipment.

After 12 months of intervention, the effectiveness index ranged from 20.24% to 42.65%. Thus, the applied 5S intervention methods have shown certain effectiveness in improving the quality of the Hospital.

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