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Original Research Article

Nursing Quality Improvement Strategy to Reduce Healthcare-Associated Infections during Hospitalization: PDCA Method

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Abstract: Preventing healthcare-associated infections (HAIs) is one of the main issues of the six patient safety goals. Healthcare-associated infections have negative impacts, including increased length of stay, morbidity, mortality, and increased health care costs. The study aimed to examine head nurses' strategy in nursing quality improvement to reduce the healthcare-associated infection in public hospitals Aceh, Indonesia. A descriptive study and a cross-sectional study were conducted in 11 Aceh hospitals. A proportionally stratified random sampling technique recruited 117 head nurses and collected data through questionnaires and descriptive analyses. The result shows that the overall score of head nurses' strategy to reduce healthcare-associated infection was high (59,0%, M = 72,41, SD = 12.32). Nursing Quality improvement strategy of each step, including Plan (70,0%) and Do (55,6%), was high level, whereas Check (55,6%) and Act (49,6%) was moderate level. These findings indicated that head nurses' strategy in nursing quality improvement to reduce the healthcare-associated infection might increased morbidity, long-term disability, healthcare costs, hospital stay, and increased antimicrobial resistance. Consequently, head nurses' strategy in nursing quality improvement using the PDCA method was a quality improvement approach to secure patient safety while hospitalization.

Keywords: Health Care Associated Infection, Hospitalization, PDCA Method.

INTRODUCTION

Medical advances in healthcare have delivered lifesaving care to patients; however, several of these improvements come with the hazard of healthcare-associated diseases, such as infection (CDC, 2014). Healthcare-associated infections (HAIs) might result from using medical instruments, procedures, and nursing treatments (Premiersafetyinstitute, 2020).

Nowadays, healthcare-associated infections as part of patient safety goals are a prominent issue in healthcare and concern hospital managers (Lacanna, 2014). Healthcare-associated infections refer to the pre-condition of therapy in health care that results in the recovery of patients' conditions without harming them. Many scholars have stated that the prevention of harm and adverse events during hospitalization will keep patients safe.

Healthcare-associated infections (HAIs) threaten the patients' health and life and bring additional impact. Healthcare-associated infections (HAIs) represent a significant burden contributing to increased morbidity, healthcare costs, hospital stay, long-term disability, grown antimicrobial resistance, additional financial obligation, and even avoidable mortality (Allegranzi *et al*., 2011; Cassini *et al*., 2016).

The association between healthcare-associated infections and mortality was published in previous studies. Hessels and Larson (2016) mentioned that mortality because of healthcare-associated infections was approximately 99,000 patients' yearly deaths. Furthermore, Australian Commission on Safety and Quality in Health Care (ACSQHC, 2018) stated that hospital-associated infection frequently further rises in an extended hospital stay 18.1 days longer on average than patients without hospital-acquired. Besides, healthcare-associated infections are expensive to patients and hospitals as well. Marchetti and Rossiter (2013) calculated the cumulative payment of healthcare-associated infections to United stade hospitals was about $96 to $147 billion yearly. Osme *et al*., (2020) conclude that healthcare-associated infections contribute to a more extended stay (15 days) and an eight-fold increase indirect costs.

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A strategy to prevent these events must be developed to minimize the potential adverse effects of healthcare-associated infections (HAIs). Head nurses are the middle-level manager of the hospital. They play a key role in the health care management system to reduce healthcare-associated infections (HAIs) and improve patient safety at the inpatient ward level (Saint *et al*., 2010). In doing so, head nurses may utilize some instruments to manage the effective implementation of those purposes. Plan-Do-Check-Act (PDCA) method is the standard approach for health care to achieve quality and safety.

METHOD

A descriptive study was conducted to examine the head nurses' strategy in nursing quality improvement to reduce the healthcare-associated infection in public hospitals Aceh, Indonesia. The subjects of this study were head nurses who had worked in an in-patient ward and met the following criteria: (a) have been head nurses' for at least one year and (b) have completed at least a diploma in nursing. The sample size was 117, estimated according to the Yamane formula. A stratified proportional random sampling technique enrolled 117 head nurses in 11 of 21 hospitals. Hospitals in each region were then randomly selected, and those that met the eligibility criteria were approached.

The instruments used in the data collection were composed of two parts. The first part was the demographic questionnaire used to collect personal and professional data, including age, gender, religion, education, and years of work experience in the current field. The second part was the Head Nurse Strategy on Reducing Health Care-Related Infections (HIA), which consisted of an 18-item questionnaire displaying the use of the PDCA method. Each statement was evaluated on a five-point Likert scale, ranging from 1 (do not perform as indicated) to 5 (complete specifically as described in the article). Total and dimensional scores were calculated and presented as mean scores. Three experts validated the questionnaire. The internal consistency reliability was tested with a satisfactory coefficient of 0.92 for the full scale and 0.87 to 0.95 for the dimensional scales.

RESULT

Based on Table 1, the demographics of the subjects are as follows: 117 head nurses participated. The respondents' age of preponderance (53.8%) varied from 31 to 40 years, with an average of 34.39 years (SD = 6.19). Women were the most visible (76.1%), 100% of subjects were Muslims, and 72.6% had diploma degrees in nursing. Most respondents (61.5%) had performed head nurse duties for more than five years.

Table 1: Head Nurses Demographic Characteristic

Characteristics	n	%
Age (years)		
≤ 30	37	31,6
31 - 40	63	53.8
> 40	17	14.5
(M= 34.39, SD = 6.19, min-max = 24 - 53)		
Gender		
Male	28	23,9
Female	89	76,1
Religion		
Islam	117	100
Level of education		
Diploma	32	27.4
Bachelor	85	72.6
Position as head nurse		
≤ 5 years	45	38.5
> 5 years	72	61.5
(M=6,44; Me = 7, Mo = 7; min-max= 1-15)		

Table 2 shows the head nurses' strategy using PDCA method regarding decreasing number of HAIs while hospitalization (M = 3.71, SD = 0.79) was at a high level (59,0). Overall score of head nurses' strategy to reducing the healthcare-associated infection was high (59,0%, M = 72,41, SD = 12.32). Nursing Quality improvement strategy of each step, including Plan (70,0%) and Do (55,6%), was high level, whereas Check (55,6%) and Act (49,6%) was moderate level.

Table 2: Head Nurses' Strategy Applying PDCA Cycle

Category	f	%
PDCA Method in Reducing HAIs		
High	69	59,0
Moderate	48	41,0
Low	0	0
(Mean = 72,41, SD = 12.32)		
Plan		
High	82	70,0
Moderate	35	30,0
Low	0	0
DO		
High	65	55,6
Moderate	51	43,6
Low	1	0,9
Check		
High	50	42,7
Moderate	65	55,6
Low	2	1,7
Act		
High	55	47,0
Moderate	58	49,6
Low	4	3,4

DISCUSSION

The PDCA method as head nurses' strategy for reducing healthcare-related infections during hospitalization was high (59.0%, M = 72.41, SD =

12.32). Moreover, the nursing quality improvement strategy of each step, including Plan (70,0%) and Do (55,6%), was high level, whereas Check (55,6%) and Act (49,6%) was moderate level. This study indicated that the head nurse had arranged the ward by implementing personal protective management, compliance hand washing, and environmental disinfection. Even though the infection still occurs, it could be contributed by inadequate resources in any hospital. For this reason, the Ward Manager can use the Plan-Do-Check-Act (PDCA) method as a tool to guide the effective implementation of reducing the number of healthcare-related infections during hospitalization.

Healthcare-associated infections are infections resulting from caregiver therapy to patients during hospitalization. Nowadays, healthcare-associated infections (HAIs) have become a major preventable complication for inpatient care (Musuuza, Barker, Ngam, Vellardita, & Safdar, 2016). Therefore, the prevention and control of HCAIs are very complex, and nursing managers' strategies are required to address this significant patient hospitalization concern (Haque, Sartelli, McKimm, & Abu Bakar, 2018; Revelas, 2012). Chen *et al*. (2016) stated that hospitals quality control was proposed to enhance the quality of healthcare service by growing caregiver awareness of detecting and solving healthcare problems. Quality control was examined to improve hand hygiene compliance, and caregivers were encouraged to manage the hand hygiene program. PDCA cycle is the scientific method that enables to carrying out of nursing quality improvement activities.

According to the head nurse strategy, reducing healthcare-associated infections using the PDCA cycle can decrease the number of HAIs and promote its implementation smoothly. Ma, Hu, Hao, Liu, and Tian (2017) mention that when they come across a problem, they quickly enter a new PDCA circulation to continuously improve the quality of nursing care and deliver the best nursing service to patients in the implementation rule, reducing the frequency of HAIs.

These findings indicated that head nurses' strategy in nursing quality improvement to reduce the healthcare-associated infection could promote patients recovery quickly, reduce adverse, error, morbidity, mortality, and decrease medical costs. Therefore, head nurses' strategy in nursing quality improvement using the PDCA method ensured patient safety while hospitalized. Sokovic, Pavletic, and Pipan (2010) said that head nurses' strategy in utilizing the PDCA method indicates constantly looking for better improvement techniques to minimize HAIs. The PDCA method allows for two representations of restorative action and permanent.

The PDCA approach may be used to identify the need for improvements. The PDCA method might convey progress in the hospital setting, particularly in preventing healthcare-associated infection as part of patient safety to accomplish good quality. In addition, the PDCA method is visibility, which strengthens a permanent method for maintaining a process. At present, the PDCA method is a reference for the ISO 9001 standard. Following the PDCA model presents process enhancements as a frequent cycle in which the actions of Plan, Do, Check, and Act are all held in equal steel, making it possible to manage efforts to improve processes (Moradi, Jafari, Maleki, Naghdi, & Ghiasvand, 2015). The cycle indicates that process improvement is never finished and that past results guide future activities.

The major role of nurse leaders in nursing management is to achieve quality, especially concerning patient safety (Severinsson, 2013). The PDCA has proven to be an effective nursing quality management tool to improve patient outcomes (Garrett, Drake, & Holcomb, 2017). The PDCA cycle is a four-step model that facilitates change, typically described in a circle that represents no endpoint. It needs to be reiterated repeatedly to improve quality and monitor sustainability.

The study findings showed that the planning phases were high. It indicated that the head nurse had practiced the safety policy by carefully planning the safety activities. Plan phases consist of determining the safety objective, priorities, indicators and preparing a work program to achieve the objectives. Nurse leaders are developing an approach for reducing the risk of healthcare-related infections. The International Joint Commission (JCI, 2019) mentioned that good hand hygiene eliminates infections. Internationally acceptable hand hygiene guidelines are available from the World Health Organization (WHO), the United States Centers for Disease Control and Prevention (CDC), and many other national and international organizations. Measurable components of reducing the risk of healthcare-associated infections are 1) implementing an effective hand hygiene program and 2) developing policies and procedures that support the continued reduction of health-related infections.

The second stage of healthcare-associated infection was the DO phase. During this phase, the head nurse implements the plan and executes the HAIs process. Implementing the system may involve ensuring that the work is done appropriately, with trained and competent individuals: supervision as needed, maintaining training records, reminders about the training to be retrained. Head nurses are responsible for explaining the policy or protocol of HAIs for all staff nurses, such as hand washing before and after contact with the patient *(Haque M et al.*, 2020), correct use of personal protective equipment (Rebmann, Vassallo, & Holdsworth, 2021), environmental cleaning (Leas *et al*.,

2015; Wong *et al*., 2018) and clean linen handling (Butler, 2018; Cheng *et al*., 2015).

The third phase in reducing Healthcare-associated infection is the check phase. During the check phase, head nurses analyze and compare the results of Do steps against the measurable goal of the planning phase. During the check phase, the activities of the head nurses include monitoring, verifying, comparing the data to the objective, and periodically recording the data (Yanxia & Shiyu, 2016). Head nurses are responsible for monitoring the progress of reducing the risk of healthcare-associated infections.

As stated in the Statement of Purpose, the Act phase marks the culmination of planning, testing, and analysis to determine whether the desired improvement has been achieved. The aim is to take action on what has been learned. During the active phase, the program is evaluated, improved, and reorganized by the head nurses for the next cycle. Several studies regarding the PDCA cycle were conducted to reduce HAIs (Chen *et al*., 2016; Demirel, 2019). A survey conducted by Chen *et al.,* (2016) showed a significant improvement in hand hygiene compliance. The PDCA cycle was employed, and close observation was made that the number of disinfectants went up, public meetings were held, and the compliance rate went from 60% to 90%.

In our study, the PDCA cycle has been used to reduce HAIs. Head nurses have a unique opportunity to directly reduce healthcare-related infections by recognizing and implementing evidence-based procedures to prevent HAIs in patients and protect staff health. Clinical nurses are responsible for the direct prevention of infections by performing, monitoring, and following aseptic work practices. Provide informed collaborative environmental remediation surveillance to prevent the transmission of microorganisms from one patient to another and serve as the main resource for identifying and directing sick visitors or staff.

CONCLUSION

In conclusion, the PDCA method as a head nurse strategy for reducing HAIs is a continuous nursing process with continuous improvement. It can consistently reduce the number of HAIs for the patient while in the hospital to effectively support the patient's recovery and improve the quality of nursing care. Through this, head nurses have a better understanding of quality improvement methods with a high degree of satisfaction, so it is worthwhile to be promoted.

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