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Effectiveness of using online surveillance in reporting healthcare-associated infections

Ida Ayu Md Vera Susiladewi

Regional Branch of the Indonesian National Nurses Association of Denpasar, Bali
Corresponding author email: verasusila11@gmail.com

Ni Putu Emy Darma Yanti

Regional Branch of the Indonesian National Nurses Association of Denpasar, Bali

Ni Komang Ayu Resiyanthi

Regional Branch of the Indonesian National Nurses Association of Denpasar, Bali

I Ketut Sudiarta

Regional Branch of the Indonesian National Nurses Association of Denpasar, Bali

Abstract---The aim of this study was to investigate the feasibility of using online surveillance form in reporting healthcare associated infections. This research is a quantitative research with a pre-experimental one group pre-test – post-test design method. The intervention given is giving the form manually and giving the form online. Respondents in this study were Infection Prevention and Control Link Nurses in the inpatient, intensive, and operating rooms at the Bali Mandara General Hospital with a total of 37 nurses. Data collection was carried out from January 2020 to December 2021 using the healthcare associated infections reporting form developed by the hospital infection control team. Data were analysed using paired T-test with 95% confidence level. Phlebitis reported significantly increase after the application of online surveillance form. The nurses' compliance on filling the form both device-related and surgical site infection surveillance as the enactment of online form is 100%, with on time reporting increasing from 73,2% to 98,8%. Nurses assume that the accessible and simplicity of the online forms encourage them to fill the forms completely. Delays in reporting surveillance still occur and need encouragement from supervisor to improve compliance.

Keywords---Healthcare Associated Infections, nurses' compliance, online surveillance, reporting surveillance.

Introduction

Quality service is a reflection of a continuous process oriented towards satisfying results. In the development of an increasingly critical society, the quality of hospital services is not only highlighted from the clinical medical aspect but also from the patient safety aspect and the aspect of the service provider, because the estuary of hospital services is service (1). Quality improvement is a program that is structured objectively and systematically to monitor and assess the quality of services and the reasonableness of care for patients, in providing services to the community, all existing service units and all hospital employees are committed to providing quality services and care for the safety of patients, visitors, community and employees who work in hospitals (2).

Healthcare Associated Infections (HAIs) are the most common complications in health services. Healthcare-Associated infections (HAIs) are a major source of morbidity and mortality and are the second most prevalent cause of death globally (3,4). Besides being able to result in death, patients who experience HAIs must be treated for longer so that patients have to pay more hospital fees. A study in China reported that 14.94% (895) hospitalized lower respiratory tract infection (LRTI) patients experienced extended hospital stays and increased treatment costs (5).

There is overwhelming evidence that the implementation of surveillance as part of Infection Prevention and Control (IPC) contributes to a 25-57% reduction in HAIs. Surveillance reduce the incidence of HAIs by detecting changes in trends or distribution of the infections. Furthermore, surveillance data of HAIs is used to measure success of IPC programs, to identify areas for improvement, and meet public reporting mandates and pay for performance goals (6,7).

The report on the incidence of HAIs by the World Health Organization (WHO) in 2019 states that one hundred million patients in the world are affected every year. The prevalence of HAIs in developed countries ranges from 3.5-12%, while in developing and low-income countries it ranges from 5.7-19.1% (8).

Methods

The design of this study was a quasi-experimental with a pre-test and post-test approach without a control group to determine the effect of using online forms in reporting HA on IPCLN surveillance reporting at the Bali Mandara Regional General Hospital. The population in this study were Infection Prevention and Control Link Nurses at Bali Mandara Hospital. The sampling technique used is total sampling. Respondents in this study were Infection Prevention and Control Link Nurses in the inpatient, intensive, and operating rooms at the Bali Mandara General Hospital with a total of 37 nurses. The intervention carried out in this study was the use of online forms in reporting healthcare-associated infections. The intervention was carried out for one year and respondents reported healthcare-associated infections data in their respective units once a month. Data collection was carried out from January 2020 to December 2021 using the healthcare associated infections reporting form developed by the hospital infection control team. Data were analyzed using paired T-test with 95%

confidence level. This research is ethically worthy by the Research Ethics Commission (KEP) of FK UNUD and is stated with the number 210/UN.14.2.2.VII.14/LT/2022.

Results

The HAIs reporting data analyzed in this study came from 14 treatment rooms in Bali Mandara Hospital diantaranya: 1) Kasuari Room, 2) HD Room, 3) Cempaka Room, 4) Sandat Room, 5) Jepun Room, 6) ICU Room, 7) ICCU Room, 8) HCU Room, 9) NICU Room, 10) Perinatology Room, 11) VK, 12) Polyclinic, 13) IGD, dan 14) Kemotherapy Room. The HAIs reporting variables used and analyzed are: 1) Date, 2) Patient, 3) UC, 4) IVL, dan 5) Time Reporting.

Table 1.
Average Value of HAIs Reporting Variables Before and After Using Online Form (n=14)

Variable	Measurement	Mean	SD	Min-Max
Date	Paper-based	100	0	100-100
	Online Form	100	0	100-100
Patient	Paper-based	67.29	15.03	32-89
	Online Form	100	0	100-100
UC	Paper-based	76.79	3.07	72-82
	Online Form	100	0	100-100
IVL	Paper-based	76.79	3.07	72-82
	Online Form	100	0	100-100
Time Reporting	Paper-based	72.14	3.59	67-79
	Online Form	100	0	100-100

Table 1 describes the average value of the HAIs reporting variable after using the online form the whole becomes 100.

Table 2
HAIs Reporting Variable Normality Test Results Before and After Using the Online Form Using Shapiro-Wilk Test (n=14)

Variable	Kolmogorov Smirov Test (p-value)
Patient	0,261
UC	0,496
IVL	0,496
Time Reporting	0,321

Table 2 explained that the normality test of HAIs reporting variables including Patient, UC, IVL, and Time Reporting got a p-value > 0.05 which means the data is normally distributed. The different test used to see the difference between the pre-test and post-test data is the paired T-test.

Table 3
Changes in HAIs Reporting Variable Values Before and After Using the Online Form (n=14)

Variable	Measurement	Mean + SD	Z Score	p-value
Patient	Paper-based	-32,71±15,03	-8,14	0,000
	Online Form			
UC	Paper-based	-23,21±3,07	-28,31	0,000
	Online Form			
IVL	Paper-based	-23,21±3,07	-28,31	0,000
	Online Form			
Time Reporting	Paper-based	-26,57±2,98	-33,37	0,000
	Online Form			

Table 3 describes the results of statistical tests getting p-value = 0.000 (<0.05) with a value of Z = -8.14 to -33.37 which means that statistically there is a significant difference between the values of the HAIs reporting variable before and after using the online form.

Discussion

This study emphasizes the use of online forms in the process of reporting the incidence of infection at the Bali Mandara Hospital. Based on the results of the study, it showed that there was an increase in nurses' compliance in reporting the incidence of infection. There was 14 rooms included in the study, namely: 1) Kasuari Room, 2) HD Room, 3) Cempaka Room, 4) Sandat Room, 5) Jepun Room, 6) ICU Room, 7) ICCU Room, 8) HCU Room, 9) NICU Room, 10) Perinatology Room, 11) VK, 12) Polyclinic, 13) IGD, dan 14) Kemotherapy Room showed the average value was 100.

Infection is a disease caused by pathogenic microbes and is very dynamic. The mechanism of transmission of pathogenic microbes to susceptible hosts can occur through direct transmission and indirect transmission (9). While, nurses have the unique opportunity to directly reduce and report HAIs through recognizing and applying evidence-based procedures to prevent HAIs among patients and protecting the health of the staff (10).

Infection control practitioners (ICPs) is typically assigned to perform ongoing surveillance of infections for specific wards, calculate infection rates and report these data to essential personnel, perform staff education and training, respond to and implement outbreak control measures, and consult on employee health issues (10). Combined use of large data resources and new technologies will solve many existing medical problems and provide better evidence for decision-making in current big data era (11).

HAIs are still a major health threats worldwide. Traditional surveillance methods involving manual surveillance by ICPs for data collection processes are laborious, inefficient, and generate data of variable quality. The impact of Surveillance and Interaction Platform System (SIPS) for HAIs surveillance was

evaluated and compared to manual survey in tertiary general hospitals. Surveillance and Interaction Platform System (SIPS) significantly improved ICPs efficiency and HAIs monitoring effectiveness, but there were shortcomings such as untimely maintenance and high cost (12). In China, HCAI data was directly and manually reported by participating healthcare facilities. The collected data often lacked validity, resulting poor data quality, unreliable comparisons, and gaps (11).

All trusts should have dedicated IC teams, but are likely to have different levels of completeness and accuracy in their IC reporting, which may also vary over time; however, the types of errors we identified would plausibly occur at other sites as well (13). Far computer-assisted surveillance of HAI has not reached a mature stage, it is yet to be used routinely in most healthcare settings. Although progress is being made towards a digital infrastructure for the learning health system, it is, in our opinion, not likely that EASS of HAI will be implemented globally within the next decade. A data-driven and decision-supported healthcare system, including infection control surveillance, requires next generation electronic health records systems, clinical ownership and a good and close working relationship between infection control professionals and medical information specialists (14).

Automated surveillance of HAIs has the potential to improve quality and efficiency of surveillance efforts. These developments and the increasing importance of public reporting force us to go back to the drawing board. Fully automated surveillance may address these challenges at the cost of clinical ownership and the ability to drive quality improvement. In addition, the implementation of automated surveillance systems in practice is complicated by practical challenges regarding the availability of high-quality data, EHR standardization, and specialized IT and infection control personnel (15). There was significant change for documentation before and after system applications. Besides, the data shows nurses' satisfaction as system user was increased. This result suggested to migrate the manually medical record to electronic-based documentation (16). The electronic surveillance has made a keynote in many of the literatures from several developed countries. The literature indicates that electronic surveillance improves validity, minimizes the time spent on compilation and dissemination of surveillance data, to provide space for improvement in infection prevention activities along with taking prompt actions on matters arising from HAI surveillance (17).

Driven by the increased availability of electronic patient data, electronic HAI surveillance systems use more data, making systems more sensitive yet less specific, but also allow systems to be tailored to the needs of healthcare institutes' surveillance program (18). The HAI surveillance is critical to any infection control program. It is one of the most important infection control measure. This review emphasizes the importance of active surveillance in healthcare highlighting more on advanced electronic surveillance system to comply for monitoring and controlling HAIs (17). The study showed that electronic surveillance performed significantly better than manual surveillance while saving almost 85% of the personnel resources. It detected twice as many HAI episodes correctly, while generating five times less false positives. As a

result, sensitivity and kappa scores were more than twice as high for electronic surveillance as they were for manual surveillance (19).

Conclusion

There is a significant difference between the value of the HAIs reporting variable before and after using the online form. Reporting using online forms has an effect on increasing nurse compliance in reporting HAIs. Therefore, reporting of HAIs using online forms must be maintained and used as a standard method in conducting data surveys.

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