



Infection Control Risk Assessment Incidence of Infection at PKU Muhammadiyah Gamping Hospital

Zhara Nurazizah Azwar¹, Elsy Maria Rosa²

^{1,2}Master in Hospital Administration, University of Muhammadiyah Yogyakarta, Yogyakarta

ARTICLE INFO	ABSTRACT
Published Online: 09 June 2022	Background: The risk of infection in hospitals is a significant problem worldwide because it can prolong the length of patient care days and can cause patient death. Indonesia is one of the countries that have a high prevalence of infection, regarding several factors that influence the incidence of infection, and risk management to maintain the stability of the incidence of HAIs so that it does not increase by using ICRA tools which can later occur in every hospital unit. Methods: This research uses exploratory descriptive studies with quantitative and qualitative approaches. The number of informants was as many as 9 people consisting of leaders and employees, and a sample of 78 patients with purposive sampling technique. The research instrument is infection risk assessment data, interview guidelines and document review. Data analysis is descriptive analysis related to the incidence of infection and qualitative analysis. Results: The incidence of infection at PKU Muhammadiyah Yogyakarta Hospital in 2020 was phlebitis cases with a prevalence of 3.19% and a prevalence of SSI cases of 0.93%. The risk factors for the infection that occur in its application are the incidence of infection, namely service procedure factors, nursing factors and patient factors.
Corresponding Author: Zhara Nurazizah Azwar	Conclusion: The incidence of infection is relatively high, the workforce can increase awareness, knowledge, and competence of the workforce in carrying out service actions, management can carry out regular monitoring and evaluation, provide adequate tools, and provide regular training.
KEYWORDS: Infection Control Risk Assessment, the incidence of infection	

I. PRELIMINARY

The risk of infection in hospitals, commonly known as nosocomial infections or hospital-acquired infections (HAIs), is a significant problem worldwide. HAIs are the most common complications in health services. Infection is the most common hospital-acquired effect affecting approximately 5 to 10% of hospitalized patients in developed countries and is a major burden in low-income countries [1]. HAIs can prolong the patient's length of stay up to 4-5 days and can also cause death in patients [2], [3].

In 2005, the World Health Organization (WHO) through the World Alliance for Patient Safety reported that SSI occurs in 2% to 5% of 27 million patients who undergo surgery each year and is 25% of the number of infections in health care facilities [4]. Research conducted by Anderson in America shows that 2-5% of the 15 million patients who undergo surgery each year, namely 300,000-500,000 experience SSI [2]. 75% of healthcare patients who died had been diagnosed with surgical site infection [3]. In Indonesia, a research report conducted at 11 hospitals in DKI Jakarta in 2004 showed that

9.8 percent of inpatients had a new infection during treatment. SSI prevalence in Indonesia ranges from 5.1% - 8% of the total operative procedures [5].

Hospital National Patient Safety Goals based on Joint Commission International that the achievement of patient safety is to reduce the risk of HAIs. One of the tools to manage the risk of HAIs infection in hospitals is using ICRA (Infection Control Risk Assessment) [6]. Lardo, et al. explained that the Infection Control Risk Assessment (ICRA) is an essential tool in planning, developing, monitoring, evaluating, and considering the various stages and levels of infection risk, namely Ventilator-Associated Pneumonia (VAP). The planning-based ICRA approach determines the risk of infection, relies on optimal and continuous surveillance so that the ICRA concept and its development will form a continuous process of infection control improvement [7].

Some of the reasons include that Indonesia is one of the countries that have a high prevalence of infection, regarding several factors that influence the incidence of infection, and

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what kind of risk management should be done to maintain the stability of the incidence of HAIs so that it does not increase by using ICRA tools. Which can later occur in every hospital unit including PKU Muhammadiyah Gamping Hospital, the authors are interested in conducting further research on Infection Control Risk Assessment (ICRA) Incidence of Infection at PKU Muhammadiyah Gamping Hospital and find out more about risk factors and management risk that will be applied so that it can be used in order to reduce the incidence of HAIs at PKU Muhammadiyah Gamping Hospital.

II. METHOD

The type of research used is descriptive exploratory research with quantitative and qualitative approaches focusing on the prevalence of the infection that occurs, analyzing the incident

using ICRA and finding out the officers' recommendations to reduce the incidence of infection at PKU Muhammadiyah Gamping Hospital. The research subjects were informants consisting of the Management of Infection Prevention and Control (PPI), the Head and the inpatient care staff of PKU Muhammadiyah Gamping Hospital as many as 9 people. The number of samples in this study were 78 patients related to the incidence of SSI infection as many as 12 patients and the incidence of phlebitis infection as many as 66 patients with purposive sampling technique. The instruments to be used are secondary data, infection risk assessment (ICRA), interview guidelines, and document review. The first step is a descriptive analysis related to the number of infections. Then a qualitative analysis was carried out.

III. RESULT

Analyzing the incidence of infection based on (HAIs Identification, HAIs Infection Control Risk Assessment Program and Risk Assessment) at PKU Muhammadiyah Gamping Hospital.

Table 1. Grading Infection Control Risk Assessment

Identificati on of problem	PROBABILITY					RISK/IMPACT (HEALTH,FINACIAL,LEGAL,REGULATORY)					Current systems/preparedness					Scor e
	EXPEC IT	LIKELY	MAYBE	RARE	NEVER	Catastrop ic Loss (life/limb/ function/fi nancial	Seriou s Loss (Functi on/fina ncial/le gal	Prolon ged length of stay	Moderat e clinical/f inancial	Minim al cilinic al financi al	None	poor	Fair	Good	Solid	
	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	
Plebitis	5						4							2		30
ISK/UTI			1					3						2		6
SSI		3						3						2		18
VAP					1				2					2		4
IADP					1				2					2		4
Dekubitus		2							2					2		8

Grading Infection Control Risk Assessment HAIs in this study were in the frequent category, namely phlebitis and the relatively frequent category was SSI. This shows that phlebitis and SSI occupy the riskiest position in the incidence of infection in hospitals.

Based on the results of the phlebitis case analysis, it shows that the probability is in the expect it category, the impact is in the severe loss category, and the system assessment is in the excellent category. This illustrates that the probability/frequency assessment is in the frequent category with a frequency of more than 6-12 times per year, the impact is extensive/severe injury and loss of motor/sensory/psychic or intellectual function and is not related to disease, and the

assessment system description is regulation. Yes, facilities exist but are not consistently implemented.

The results of the SSI case analysis show that the probability is in the likely category, the impact is in the prolonged length of stay category, and the assessment system is in a good category. This illustrates that the probability/frequency assessment in the class is rather frequent with a frequency of more than 4-6 times per year, the impact is moderate injury, reduced motor/sensory/psychic or intellectual function and is not associated with disease, each case prolongs treatment, whereas The assessment system description is that regulations exist, facilities exist but are not consistently implemented

Tabel 2. Risk Assessment in cases of phlebitis and SSI

Possibility	Dampak				
	<i>Insignificant</i>	<i>Minor</i>	<i>Modarete</i>	<i>Mayor</i>	<i>Calastrofic</i>
More often 5				Phlebitis	
Often 4			SSI/ SSI		
Possible 3					
Rarely 2					
Never 1					

Risk assessment in phlebitis and SSI cases showed that phlebitis cases in the red zone were extreme, while SSI in the yellow zones was high. Based on the ICRA analysis that has been done, the evaluation that needs to be done in cases of phlebitis is to immediately analyze the RCA in the BOD and inform the president's director. Meanwhile, in the case of SSI can be evaluated by analyzing detail & urgent (RCA) by senior management.

The risk factors for the infection that occurs in its application are based on phlebitis cases

IPCLN informants explained that the risk of infection in cases of phlebitis that occurs is due to the lack of sterilization at the time of the stabbing procedure, inappropriate administration of drugs/liquids through the vein can lead to infection. The nurse informant explained that phlebitis usually occurs because the insertion is too long or the puncture is wrong, but it can also occur due to factors from the patient himself. Supported by the following interview results:

"Inadequate aseptic technique at the time of insertion, irregular IV cath care, lack of awareness of early signs of phlebitis, patient factors (a lot of movement, clinical condition, therapy given is too concentrated, and due to too long infusion." (MH)

The results of interviews with the Head of the Room and IPCN stated that the risk factors for infection were caused by the patient's condition, such as congenital disease or age, incorrect installation and treatment procedures causing blood clots to clog blood vessels.

Clinical conditions are the main cause of infection, in the case of phlebitis improper infusion. The duration of the installation, the selection of the insertion site, the type of dressing, the insertion technique, the sterility of the intravenous therapy treatment, the lack of sterility during the infusion, factors from the patient (a lot of movement), drug administration are risk factors for phlebitis infection.

The cause of phlebitis in the hospital then raises the risks that occur. Based on the results of interviews conducted, it was found that risks could occur to the patient's health. The risks of phlebitis cases include health risks for patients, namely disruption of blood circulation, redness in the puncture area, pain, swelling, fever in patients, and causing new infections in patients. In addition, the presence of phlebitis cases also causes an indirect impact on hospital services, namely increasing the length of hospitalization, increasing treatment costs, and decreasing the quality of care.

The risk factors for the infection that occur in its application are based on SSI cases

IPCLN and IPCL informants explained that SSI cases are usually caused by a lack of sterilization from medical personnel or from patients, which can cause infection in the operating area. There is an interaction in the body or the person being operated on with germs that cause infection, it can be through the air, skin or surgical instruments conveyed by the informant. Supported by the following interview results:

"Interaction between surgical wounds and germs on the skin, in the air, Interaction with germs that already exist in the body or organs being operated on, Interaction with germs on the hands of doctors and nurses, Interaction with germs found in surgical tools which is not sterile." (MH)

In congenital infection, lack of nutrition also contributes to infection. In the case of SSI, the patient's clinical condition, congenital diseases such as DM, and lack of sterility of medical procedures at the time of surgery, both pre-, intra-, and post-operatively, result in interactions between the surgical wound and germs on the skin, germs that are spread in the air, germs found in the equipment. Unsterile surgical instruments are a risk factor for SSI infection.

In the case of SSI caused by the patient's condition or the resources available in the hospital, it can provide the same risks as phlebitis. SSI infection can cause secondary infection and cause other diseases. Like phlebitis infection, SSI infection also poses a risk to patients, including patients with fever, leukocytes, other infections that spread and can even cause other diseases. This study also showed that SSI caused wound healing in patients to be longer, causing complaints from patients because it caused harm to patients.

Problems and constraints in program implementation and infection control incidents based on phlebitis cases

The interviews showed that in the implementation of the management tried to monitor the services provided by medical personnel and tried to make repairs quickly when signs of phlebitis were found. But in reality, based on interviews with nurses, the implementation of risk management is still not optimal according to the following interview.

"The implementation of phlebitis risk management has not been maximized... just changing the vein line where the

infusion is inserted and overcoming the signs that appear, for example, by compressing the redness or smearing with ointment. There are no standard phlebitis scales and how to overcome them so that the way to overcome them is not the same between nurses" (ARW)

The implementation of phlebitis risk management is because there is no standard phlebitis scale and its treatment, so the way to overcome it is not the same among nurses. The treatment given is also quite simple, namely by changing the venous line and giving the patient ointment. As a nurse, this is a challenge, so it is necessary to minimize the risk of phlebitis by maintaining cleanliness in every action to the patient.

Other obstacles were also found in this study, both in terms of medical personnel and patients in minimizing the risk of phlebitis. The obstacles experienced in minimizing the risk of phlebitis are from the patient factor and the medical staff factor. The problem is due to the patient factor, namely the patient has small veins, difficult IV line and also poor IV line condition, while from the medical staff factor, namely nurses, lack of awareness with phlebitis cases and IV cath treatment and also motivation in controlling these cases.

Problems that most influence the incidence of infection based on SSI cases

Implementing SSI incident risk management is important so that both the planning process and the evaluation of operational actions can run well. Management needs to pay attention to how the implementation of hand hygiene, the pre-, intra- and post-operative processes of patients maintain the cleanliness of the operating area. Problems also often arise because of differences of opinion or perception between doctors and nurses and among nurses in handling infections in hospitals. This is also conveyed in the interview excerpt below.

"The obstacle to minimizing the risk of SSI is the collaboration between nurses, IPCLN and IPCN to monitor the sterility of the operation method and the use of equipment during surgery... because there are still tools that are used for more than one operation." (ARW)

Recommendations related to labor in reducing the incidence of infection based on phlebitis cases

The workforce has given some suggestions regarding efforts to reduce the incidence of infection even though in reality the incidence is still very rare. However, hospitals must still strive to improve health services properly so that the incidence of infections in the past does not happen again. The results of the interview are as follows.

"Take action according to the SOP. Maintain cleanliness, wash hands before and after visiting patients. Always observe the puncture site if an infusion is being inserted, etc." (IR)

The recommendation expressed by the informant is that every worker raises awareness about the incidence of phlebitis by always taking action according to the SOP, maintaining hand, body, and environmental hygiene, and making periodic

observations at the infusion area. This can be an early prevention effort so that if the early signs of phlebitis infection are known, treatment can be taken immediately. In addition to providing recommendations to the workforce, the scope of management also needs to play an important role in handling phlebitis problems, according to the following interview.

"There is monitoring and evaluation related to the incidence of phlebitis." (ARW)

"Improving employee human resources, holding refreshes about phlebitis regularly." (RVB)

Based on the interview results, it is shown that the recommendations proposed are related to regular monitoring and objective evaluation in every reporting of phlebitis events. Policies related to a detailed scale of how to treat phlebitis are also needed so that nurses can provide the same treatment. In addition, regular training to increase knowledge and refresh the knowledge of the workforce is also needed. This is because there are still nurses who have never received training related to HAIs.

Relevant staffing recommendations in reducing the incidence of infection based on SSI cases

Recommendations in reducing the incidence of infection based on SSI cases are also more or less the same as in phlebitis cases. Recommendations are not only given to workers who are directly involved in SSI cases but also to management so that all become part of handling infection cases in hospitals. Following are the results of interviews conducted with several informants.

"Improving employee HRD, Must be compact between the PPI team and employees related to SSI, there is monitoring and evaluation related to pre and post-surgery and officer hand hygiene." (MH)

Based on the results of the interview, it is shown that improving employee competence is the main thing that is recommended. This cannot be separated from increasing awareness of hand hygiene behavior and how to use sterile tools. As operating staff, both nurses and surgeons must also have good cooperation in terms of supervising the implementation of operations, while the cohesiveness of the workforce and the PPI team must also be in sync regarding the handling of SSI cases.

The main suggestion that many informants put forward was related to monitoring and evaluation in the SSI case. The existence of supervision is expected to increase the discipline of health workers related to hygiene so that there is no risk of infection for patients. It is also hoped that the availability of tools that meet sterility standards can help prevent infection. Providing education either directly by conducting evaluations or providing training is also one of the crucial recommendations in preventing and handling SSI cases.

IV. DISCUSSION

Incidence of Infection at PKU Muhammadiyah Hospital Yogyakarta

ICRA itself is a standardized instrument issued by the CDC and used in the United States. Standardized instruments are very important in assessing because non-standardized instruments cannot produce comparable conclusions, and the results cannot be trusted [8].

Zhang et al's study describe the results of a study analyzing a hospital-wide continuous electronic surveillance system based on an existing hospital electronic database that can provide a practical means of measuring hospital-wide HAI incidents. This study shows the incidence has decreased slightly over the past five years, and it provides evidence of the need for infection control in bloodstream infections, ventilator-associated pneumonia, non-ICU, and non-device-associated infections. Summer peaks also indicate that intervention in certain HAIs should be emphasized [9].

Based on the observation data obtained by the researcher, in 2020, the prevalence of phlebitis infection was 3.19%, the prevalence of SSI cases was 0.93%. The highest percentage of phlebitis cases in August 2020 was 0.6%. In SSI cases, there were 4 cases with the highest percentage in January 2020 of 0.9%. Previous research showed that the prevalence of phlebitis was 3.0%, higher than the Indonesian Ministry of Health standard of 1.5% but still below the WHO standard of 5% [10].

Risk factors for infection that occur in its application

Based on the source of infection, infection can come from the community (Community-Acquired Infection) or hospitals (Healthcare-Associated Infections/HAIs). Currently, the term has been changed to Health Service-Related Infections or "HAIs" with a broader meaning, namely that the incidence of infection does not only come from hospitals but also from other health care facilities. Infection is not limited to patients but can also be to health workers and visitors who are infected while in the health care facility environment. The risk factors for HAIs include those found in this study based on PMK no 27 of 2017 which are related to surgical procedures that cause infection of the operating area (SSI) and venous and arterial cannula, namely phlebitis.

Intravenous catheterization or peripheral venous catheterization is one of the most common procedures performed by healthcare providers during a patient's hospitalization. To take samples, fluids, diagnostic procedures for administering drugs, and nutritional supplements. Phlebitis is the most common peripheral catheter-related complication. Phlebitis can be chemical, mechanical, and biological at the puncture site [11].

In the case of phlebitis, the risk factors that occur are the long installation, the selection of the stabbing site, the type of stabbing cover and the stabbing technique. It is supported by previous research studies that longer residence time,

antibiotic infusion, female gender, forearm insertion, infectious disease, and Teflon catheter are important risk factors for the development of phlebitis identified by the included study [9].

One of the risk factors for infection is the patient's factor. Congenital diseases from patients such as high blood pressure or diabetes mellitus can affect health conditions and treat infections if they have phlebitis or SSI infection. Previous studies have shown that the characteristics of patients diagnosed with phlebitis are patients aged more than sixty years, female, malnourished, and suffering from hypertension and diabetes mellitus [12]. This illustrates that the patient's congenital conditions contribute to the incidence of infection, one of which is phlebitis. Phlebitis can cause local edema and inflammation, discomfort, and redness of the skin or subcutaneously [11].

Problems and obstacles in handling the incidence of infection

National data should guide national HAIs prevention initiatives. That Australia does not have national HAIs oversight means that the effects of national initiatives to prevent HAIs are immeasurable. This study has provided the first estimate of the prevalence of HAI at 34 years however, to gain a deeper understanding of the real burden of HAI in Australia, a larger PPS study of HAI across a wider patient population is needed. If Australia successfully addresses HAI and the emerging threat from MDRO, national leadership and coordination are needed to implement a national protocol for regular point-of-general surveillance to inform and drive Australia's healthcare infection prevention initiatives [13].

The problems and obstacles faced in this study were the lack of awareness in handling cases of infection, both phlebitis and SSI. Ying et al in their study, suggested that intravenous therapy is an integral part of professional nursing practice. Nurses have a responsibility to identify risk factors for phlebitis. Nurses working in the medical, orthopedic, and surgical fields have slightly better perceptions than those working in multidisciplinary and oncology [14].

Relevant staffing recommendations in reducing the incidence of infection

PPI training follows SOPs by considering the PPI principles related to the actions taken, including infusion, changing bandages, giving injections and handling post-operative medical waste, washing hands and using PPE, namely gloves [15]. Infection Prevention and Control (IPC) is one of the standards in implementing hospital management. The objectives of implementing the IPC program are to improve the quality of health care facilities, reduce the incidence of HAIs, and to identify and reduce the risk of acquired and transmitted infections among patients, staff, health workers, contract workers, volunteers, students, and visitors [16].

One of the recommendations in this research is holding training for health workers who have never received training

or training that is given regularly to upgrade the knowledge and insight of health workers. This research is supported by research by Adhiwijaya et al., that health workers need to be given basic training and further training is needed. Procurement of advanced PPI training can gradually increase capacity. Training programs are important for hospital health workers and contribute to hospitals because performance will be higher and affect optimal service [17].

Previous research studies have shown that nurses have significant skills for phlebitis prevention and IV peripheral maintenance. Nurses have good knowledge and experience in minimizing phlebitis incidence and reducing risk factors for phlebitis, but malpractice and ignorance reduce service quality [11].

The interview results show that the main recommendation for management is to carry out regular monitoring and evaluation in handling cases of infection, both phlebitis, and SSI. According to Madjid & Wibowo, there needs to be a strong commitment from both the hospital's human resources to attend meetings and from the implementing activities (management and the PPI committee) to evaluate and find ways to learn knowledge still be conveyed to all nurses [15]. Phlebitis is an important ongoing problem in clinical practice today. Avoidance of preventable risk factors, appropriate nursing care, and daily catheter checks are necessary to prevent phlebitis. In detail, the recommendation is that all patients with peripheral venous catheters in situ be screened for complications of peripheral venous catheters at least once daily as recommended by the CDC guidelines on the prevention of intravascular catheter-associated infections. Patients with signs and symptoms of phlebitis should be replaced with a different catheter. An observation chart to document the development of signs of phlebitis can be developed, thereby helping to detect phlebitis early and reducing the patient's discomfort and pain [18].

V. CONCLUSIONS AND RECOMMENDATIONS

Conclusion

1. The incidence of infection in the hospital is phlebitis cases with a prevalence of 3.19% and the prevalence of SSI cases is 0.93%.
2. The risk factors for the infection that occur in its application, the incidence of infection in hospitals consists of 3 themes: service procedure factors, treatment factors, and patient factors. The service procedure factors are related to the length of the procedure, inappropriate action techniques, and the cleanliness of human resources and tools that are not sterile. The treatment factor is care for patients who are less routine, lack of awareness of signs of infection occurring. While the patient factors include the patient moving a lot when given the action, the patient's clinical condition being less supportive, and the comorbidities in the patient.

3. Problems and obstacles faced by the incidence of infection: there are still human resources who have not complied in implementing the PPI, lack of competence in taking action, lack of motivation and awareness in handling incidents, and differences in perceptions between workers. Health workers also experience problems in dealing with index incidents, namely the absence of good standards in handling cases of phlebitis and SSI. There are still nurses who have never received HAIs training.
4. Workforce recommendations include increasing awareness, knowledge, and workforce competence in carrying out service actions, maintaining hand, body, and environmental hygiene and increasing cooperation among health workers in dealing with cases of phlebitis or SSI. For management, the main recommendations are regular monitoring and evaluation, providing adequate tools, providing regular training and implementing standard policies in handling cases of infection, both phlebitis and SSI.

Suggestion

1. Future researchers are expected to be able to test the ICRA for Acute Care Hospital instrument in other hospitals so that can test this instrument for its reliability value.
2. For hospitals in Indonesia, it is expected to carry out an infection risk assessment in the emergency department using the ICRA for Acute Care Hospital instrument, which has been translated.

REFERENCES

1. A. Al-Kadi and S. Salati, “Hand Hygiene Practices among Medical Students,” *Interdiscip. Perspect. Infect. Dis.*, vol. 2012, p. 679129, Sep. 2012, doi: 10.1155/2012/679129.
2. A. P. S. Putri, K. D. Artanti, and D. Mudjianto, “Bundle Prevention Form Filling Completeness of Surgical Site Infection (SSI) on Sectio Caesarea Patients in 2016,” *J. Berk. Epidemiol.*, vol. 5, no. 1, p. 13, Apr. 2017, doi: 10.20473/jbe.v5i1.2017.13-25.
3. A. Zuhrotul and P. Satyabakti, “Surveilans Infeksi Daerah Operasi (IDO) Menurut Komponen Surveilans Di Rumah Sakit X Surabaya Tahun 2012,” *J. Berk. Epidemiol.*, vol. 1, no. 2, p. 12.
4. F. Rivai, T. Koentjoro, and A. Utarini, “Determinan Infeksi Luka Operasi Pascabedah Sesar,” *Kesmas Natl. Public Health J.*, vol. 8, no. 5, p. 235, Dec. 2013, doi: 10.21109/kesmas.v8i5.390.
5. M. N. Prameswari and H. Farida, “Kolonisasi Bakteri Patogen Potensial Penyebab Infeksi Daerah

- Operasi Pada Kulit Pasien Praoperatif,” vol. 4, no. 4, p. 11, 2015.
6. Joint Commission International, “International Patient Safety Goals,” 15AD. <https://www.jointcommissioninternational.org/standards/international-patient-safety-goals/> (accessed Apr. 19, 2021).
 7. S. Lardo, B. Prasetyo, and D. B. Purwaamidjaja, “Infection Control Risk Assessment (ICRA),” *Cermin Dunia Kedokt.*, vol. 43, no. 3, Art. no. 3, Mar. 2016, doi: 10.55175/cdk.v43i3.35.
 8. W. Setyonugroho, K. M. Kennedy, and T. J. B. Kropmans, “Reliability and Validity of OSCE Checklists Used to Assess the Communication Skills of Undergraduate Medical Students: A Systematic Review,” *Patient Educ. Couns.*, vol. 98, no. 12, pp. 1482–1491, Dec. 2015, doi: 10.1016/j.pec.2015.06.004.
 9. L. Lv and J. Zhang, “The incidence and risk of infusion phlebitis with peripheral intravenous catheters: A meta-analysis,” *J. Vasc. Access*, vol. 21, no. 3, pp. 342–349, May 2020, doi: 10.1177/1129729819877323.
 10. I. N. Jannah, S. Suhartono, and M. S. Adi, “Prevalensi Phlebitis Pada Pasien Rawat Inap dengan Infus di RSUD Tugurejo Semarang,” *J. Kesehat. Masy. Undip*, vol. 4, no. 4, Art. no. 4, Nov. 2016.
 11. A. H. Khoso, P. I. Memon, Dr. M. Ali Qureshi, Mrs. S. Bibi, Mr. B. Ahmed Pirzado, and Mr. K. Nadeem, “Associated Risk Factors of Phlebitis among Registered Nurses at PMC Hospital Nawabshah, Experience and Education Based Study,” *Saudi J. Nurs. Health Care*, vol. 4, no. 2, pp. 37–42, Feb. 2021, doi: 10.36348/sjnhc.2021.v04i02.001.
 12. N. M. F. H. Akbar and M. A. Isfandiari, “The Influence of Patients’ Characteristics with Intravena Catheter in Phlebitis Incidence,” *J. Berk. Epidemiol.*, vol. 6, no. 1, p. 1, Aug. 2018, doi: 10.20473/jbe.V6I12018.1-8.
 13. P. L. Russo, A. J. Stewardson, A. C. Cheng, T. Bucknall, and B. G. Mitchell, “The Prevalence of Healthcare Associated Infections Among Adult in Patients at Nineteen Large Australian Acute-care Public Hospitals: A Point Prevalence Survey,” *Antimicrob. Resist. Infect. Control*, vol. 8, no. 1, p. 114, Dec. 2019, doi: 10.1186/s13756-019-0570-y.
 14. C. X. Ying, A. Yusuf, and S. L. Keng, “Perceptions of risk factors for phlebitis among Malaysian nurses,” *Br. J. Nurs.*, vol. 29, no. 2, pp. S18–S23, Jan. 2020, doi: 10.12968/bjon.2020.29.2.S18.
 15. T. Madjid and A. Wibowo, “Analisis Penerapan Program Pencegahan dan Pengendalian Infeksi di Ruang Rawat Inap RSUD Tebet Tahun 2017,” *J. ARSI Adm. Rumah Sakit Indones.*, vol. 4, no. 1, 2017.
 16. S. A. Rahmawati and I. Dhamanti, “Infections Prevention and Control (IPC) Programs in Hospitals,” *J. Health Sci. Prev.*, vol. 5, no. 1, Art. no. 1, Mar. 2021, doi: 10.29080/jhsp.v5i1.396.
 17. A. Adhiwijaya, E. L. Sjattar, and R. Natsir, “Eksplorasi Kendala Tim PPI dalam Pelaksanaan Pencegahan dan Pengendalian Infeksi di RSUD Labuang Baji Makassar,” *J. Ilm. Kesehat. Diagn.*, vol. 11, no. 4, Art. no. 4, Nov. 2017.
 18. A. Mandal and K. Raghu, “Study on incidence of phlebitis following the use of pherpheral intravenous catheter,” *J. Fam. Med. Prim. Care*, vol. 8, no. 9, pp. 2827–2831, Sep. 2019, doi: 10.4103/jfmpe.jfmpe_559_19.