Overview of The Infection Control Risk Assessment (ICRA) Implementation in Dental Practice at RSGM Unimus

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ABSTRACT

Infections present while undergoing treatment or obtained from health services are called Healthcare-Associated Infections (HAIs). The impact of this incident is the length of treatment and costs provided, increased morbidity, and can result in death. One of the many occupations in the world with the highest risk of infection transmission is health workers working in dentistry since most of human microbial pathogens originate from oral secretions. In contrast, these health workers require their proximity to the patient’s oropharynx. The increase in HAIs occurs due to the lack of application of infection control, so we need to assess this implementation. The Centers for Disease Control and Prevention (CDC), in 2016, issued standardized Infection Control Risk Assessment (ICRA) guidelines to assess the risk of infection in dental and oral health services. This research aims to describe ICRA in the dentist practice at RSGM Unimus. The type of research used was observational, with quantitative analysis methods and a descriptive research design. The results showed that overall, infection control at RSGM Unimus had a percentage of 82%, which was included in the low infection risk category. RSGM Unimus was good at implementing infection control programs.

INTRODUCTION

Healthcare-Associated Infections (HAIs) or commonly referred to as nosocomial infections are a condition of infection that is present while undergoing treatment or obtained from health services (Katyal et al., 2023) (Abraao et al., 2022). This infection affects patients and can occur in health workers and visitors in healthcare facilities (Dekker et al. 2022) (Nakanishi et al. 2021). The time it takes for the infection to grow is the first 48 hours after admission to the hospital or 30 days after treatment is received.
The Centers for Disease Control and Prevention (CDC) found that approximately 1.7 million patients annually are hospitalized with HAIs, and more than 98,000 patients, or 1 in 17 patients, lose their lives due to these HAIs (Haque et al., 2018). Meanwhile, according to an estimation reported by WHO, 15% of all patients receiving treatment in hospitals suffer from HAIs. The highest incidence rates are in the Eastern Mediterranean and Southeast Asia, at 11.8% and 10%, while Europe and the Western Pacific have prevalence rates of 7.7% and 9%. Data from the Indonesian Ministry of Health in 2013 showed that Indonesia, a developing country, had a fairly high prevalence of HAIs, 6-16%.

According to WHO in 2020, two risk factors cause nosocomial infection or HAIs: risk factors related to resources and those unrelated or independent of resources. Risk factors related to resources include; poor environmental hygiene conditions, inadequate waste disposal, poor infrastructure, inadequate equipment, understaffing, overcrowding/a large number of patients, and the absence of local and national guidelines and policies, while for risk factors that are not related to sources power including; prolonged and inappropriate use of invasive devices and antibiotics, high-risk procedures, immunosuppression, and inadequate application of standard precautions and isolation (WHO, 2020) (Scanlon et al. 2022).

One type of work that has the highest risk of HAIs is health workers of dentistry because, according to research conducted by Aldahlawi and Afifi (2020), most human microbial pathogens originate from oral secretions, while health service providers in dentistry require proximity to the patient’s oropharynx and the treatment procedures used can cause blood droplets or aerosols (Watkin et al. 2023).

Given the magnitude of the impact caused by HAIs, infection prevention and control are important. Implementing an Infection Control Risk Assessment (ICRA) is one form of this action. According to Lardo (2016), ICRA is a strategy for controlling infection by considering the possibility and continuity of field application. The outcomes can be accounted for as a prevention program and an improvement in service quality.

Various world organizations have carried out infection prevention and control assessments. One is the CDC, which has four assessment tools for ICRA: Acute Care Hospitals, Hemodialysis Facilities, Long Term Care Facilities, and Outpatient Settings. In 2016, the CDC published the ICRA guidelines in Dental Health Care Settings, which is a development of the ICRA for Outpatient Settings and includes 12 assessment aspects: administrative actions, infection prevention education, and training, health worker safety which includes prevention of the spread of pathogens through blood and its implementation if exposed, hand hygiene, personal protective equipment (PPE), respiratory/cough hygiene ethics, the safety of sharps, safety of injection practices, sterilization and disinfection of tools, environmental infection control, and quality of dental unit water (CDC, 2016).

Based on the background described above, the researchers deem it necessary to assess the application of Infection Control Risk Assessment (ICRA) in Dentist Practice at RSGM Unimus.

This study aims to describe Infection Control Risk Assessment (ICRA) based on 12 parts of the instrument issued by the CDC in a dental practice at RSGM Unimus. This publication provides information to readers on how to describe a good Infection Control Risk Assessment (ICRA) in one hospital as an example for other hospitals.
RESEARCH METHOD

This research was conducted in July-August 2021 and is observational research using a quantitative analysis method and a descriptive research design. This research was conducted at the Dental and Oral Hospital of Universitas Muhammadiyah Semarang, Indonesia. The research subjects were 57 respondents consisting of 14 dentists, 39 dental professional program students, two dental nurses, and 2 PPI teams. The selection of the subjects was determined based on the inclusion criteria and the number of subjects obtained using the proportionate stratified random sampling technique and the Slovin formula.

This study used variable application of infection control. The data used were primary data and secondary data. Primary data was data collected and processed independently by researchers from the answers to questionnaires filled out by respondents. The questionnaire used in this study is adapted from the CDC, namely Infection Control Risk Assessment for Dental Healthcare Setting, to provide detailed information that can enhance the quality of healthcare facilities regarding infection prevention and control. The questionnaire was tested reliably and validly. At the same time, secondary data originated from RSGM Unimus as data on the number of health workers and patient visits at RSGM Unimus. The answers in this study used the Guttman scale-positive responses if the respondent chose the Yes with a value of 1 and a negative answer if the respondent chose the No answer with a value of 0. The evaluation of infection control was then maintained at 1%-100%. Between 51 and 75 percent, the application of infection control is quite good, and the risk of infection is moderate (medium risk). Between 76 and 100 percent, the application of infection control is good, and the risk of infection is low (low risk). Less than 50 percent of respondents report that the implementation of infection control is inadequate and that the risk of infection is high (high risk) (Putri et al., 2017).

This research has received permission from the training and management department of the Dental and Oral Hospital of the Muhammadiyah University of Semarang, Indonesia. Data analysis used univariate analysis presented in the frequency distribution table.

RESULTS AND DISCUSSION

Characteristics of Respondents Based on Gender in Health Workers at RSGM Unimus

Table 1. Distribution of Respondent Characteristics by Gender among Health Workers at RSGM Unimus

<table>
<thead>
<tr>
<th>No</th>
<th>Health Worker Status</th>
<th>Amount</th>
<th>Gender</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Man</td>
<td>Woman</td>
</tr>
<tr>
<td>1</td>
<td>Dentist</td>
<td>14</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>28.6%</td>
<td>71.4%</td>
</tr>
<tr>
<td>2</td>
<td>Dentist Professional Program Student</td>
<td>39</td>
<td>10</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>25.6%</td>
<td>74.4%</td>
</tr>
<tr>
<td>3</td>
<td>Dentist</td>
<td>2</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>4</td>
<td>Infection Control Prevention Team</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>----</td>
<td>-----------------------------------------------</td>
<td>--------</td>
<td>---------</td>
<td>------------</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>57</td>
<td>15</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>26.3%</td>
<td>73.7%</td>
</tr>
</tbody>
</table>

Source: Primary data that has been processed

Based of table 1: demonstrates that 42 respondents, or 73.7 percent, were female, making them the majority in this study.
Characteristics of Respondents based on Age of health workers at RSGM Unimus

Table 2. Distribution of Respondent Characteristics by Gender among Health Workers at RSGM Unimus

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Age Group</th>
<th>Gender</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health workers</td>
<td>20-30</td>
<td>12</td>
<td>38</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>31-40</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>41-50</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>&gt;50</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

*Source: Primary data that has been processed*

Table 2 shows that most respondents are in the 20-30 year age group, with a total of 50 respondents, and the least are respondents in the 41-50 year age group and >50 years, with one respondent in each group.

Frequency Distribution of Research Results on Application of Infection Control at RSGM Unimus Based on Overall ICRA Questionnaire

Table 3. Data Distribution of Research Results on Implementation of Infection Control at RSGM Unimus Based on Overall ICRA Questionnaire

<table>
<thead>
<tr>
<th>No.</th>
<th>Part</th>
<th>Positive Response</th>
<th>Negative Response</th>
<th>Number of Responses</th>
<th>Percentage of Positive Responses</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Administrative Measures</td>
<td>100</td>
<td>14</td>
<td>114</td>
<td>88%</td>
<td>Good and Low Infection</td>
</tr>
<tr>
<td>2</td>
<td>Infection Prevention Education and Training</td>
<td>80</td>
<td>34</td>
<td>114</td>
<td>70%</td>
<td>Fairly Good and Moderate Infection Risk</td>
</tr>
<tr>
<td>3</td>
<td>Dental Health Care Personnel Safety</td>
<td>194</td>
<td>34</td>
<td>228</td>
<td>85%</td>
<td>Good and Low Infection</td>
</tr>
<tr>
<td>4</td>
<td>Program Evaluation</td>
<td>91</td>
<td>23</td>
<td>114</td>
<td>79%</td>
<td>Good and Low Infection</td>
</tr>
<tr>
<td>5</td>
<td>Hand Hygiene</td>
<td>102</td>
<td>12</td>
<td>114</td>
<td>89%</td>
<td>Good and Low Infection</td>
</tr>
<tr>
<td>6</td>
<td>Personnel Protective Equipment (PPE)</td>
<td>106</td>
<td>8</td>
<td>114</td>
<td>93%</td>
<td>Good and Low Infection</td>
</tr>
<tr>
<td>7</td>
<td>Respiratory Hygiene/Cough Etiquette</td>
<td>206</td>
<td>74</td>
<td>280</td>
<td>74%</td>
<td>Fairly Good and Moderate Infection Risk</td>
</tr>
<tr>
<td>8</td>
<td>Sharp Safety</td>
<td>45</td>
<td>12</td>
<td>57</td>
<td>79%</td>
<td>Good and Low Infection</td>
</tr>
<tr>
<td>9</td>
<td>Injection Practices</td>
<td>56</td>
<td>1</td>
<td>57</td>
<td>98%</td>
<td>Good and Low Infection</td>
</tr>
<tr>
<td>10</td>
<td>Sterilization and Disinfection of Patient Care Items and Devices</td>
<td>280</td>
<td>62</td>
<td>342</td>
<td>82%</td>
<td>Good and Low Infection</td>
</tr>
<tr>
<td>11</td>
<td>Environmental Infection Prevention and Control</td>
<td>194</td>
<td>34</td>
<td>228</td>
<td>85%</td>
<td>Good and Low Infection</td>
</tr>
</tbody>
</table>
Table 3. Data Distribution of Research Results on Implementation of Infection Control at RSGM Unimus Based on Overall ICRA Questionnaire (cont’)

<table>
<thead>
<tr>
<th>No.</th>
<th>Part</th>
<th>Positive Response</th>
<th>Negative Response</th>
<th>Number of Responses</th>
<th>Percentage of Positive Responses</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Dental Unit Water Quality</td>
<td>110</td>
<td>28</td>
<td>138</td>
<td>80%</td>
<td>Good and Low Infection Risk (low risk)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1,564</td>
<td>336</td>
<td>1913</td>
<td>Good and Low Infection Risk (low risk)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Percentage</td>
<td>82%</td>
<td>18%</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Primary data that has been processed

Based on Table 3, the highest positive response results are found in the safe injection practice section with 97% and included in the low infection risk category, meaning that infection prevention and control in the injection practice section has been implemented properly. Meanwhile, the lowest positive response results are in the infection prevention education and training section, with 70%. They are included in the moderate infection risk category, meaning there is still a need to increase the implementation of infection prevention education and training in dentistry practice at RSGM Unimus.

Discussion

Part A: Administrative Actions

Based on the results in part A, the assessment of administrative actions, 88% of respondents responded positively by answering “yes.” The administrative actions conducted at RSGM Unimus are included in the low infection risk category, meaning their implementation has been well done.

These results follow the standards issued by the CDC, namely in the implementation of administrative actions, there is at least one individual who has the competence regarding infection prevention and control to be responsible for developing regulations and written infection prevention procedures or standard operating procedures (SPO) regarding the guidelines set out standardized such as the CDC and WHO.

Part B: Infection Prevention Education and Training

According to the 2016 CDC, infection prevention education and training are fundamental for all health workers. It can cover fundamental principles and practices for preventing the spread of infections in dental and oral healthcare facilities (CDC, 2016).

According to part B of the research, which evaluated infection prevention education and training, 70% of respondents gave a positive response—yes—to the question. Infection prevention education and training for health workers at RSGM Unimus falls under moderate infection risk. Hence, the implementation has been fairly successful. However, it still needs to be improved regularly, either every year or when new assignments or procedures that affect exposure are received.

Part C: Safety of Health Workers

According to the findings of part C of the study, which dealt with the evaluation of healthcare workers’ safety, 85% of respondents answered “yes” positively. At RSGM Unimus,
the health worker safety program has been effectively implemented, placing it in the low infection risk category.
These results are also under the standards issued by the CDC in 2016. Infection prevention programs must also meet the needs of health workers, such as vaccination or immunization measures and post-exposure prophylaxis measures for health workers who require exposure management (CDC, 2016).

Section D: Program Evaluation
The evaluation aims to make infection prevention programs and dental practice procedures work better. This evaluation must be accompanied by additional feedback, corrective measures, and necessary training to eliminate issues if infection prevention and control procedures have flaws or issues.

The evaluation of program evaluation, which was the focus of part D’s research findings, revealed that 79% of respondents answered “yes” in most cases. Program evaluation has been successfully implemented at RSGM Unimus, as evidenced by its fall under the low infection risk category.

Section E: Hand Hygiene
The assessment of hand hygiene, which was the research subject in section E, revealed that 89% of respondents answered “yes” in most instances. The execution of hand cleanliness by well-being laborers at RSGM Unimus is remembered for the class of generally safe from contamination, implying that the execution has been all around good.

This result aligns with the CDC’s 2016 guidelines, stating that people must also implement hand hygiene before performing routine dental examinations and surgical procedures and receive education and training on the indications and methods for practicing hand hygiene (CDC, 2016). As a dental and oral service facility, RSGM Unimus must support infection prevention and control measures, provide the equipment necessary to adhere to hand hygiene practices, and ensure that all health workers can easily access them.

Section F: Personal Protection Equipment/PPE
Based on the results in part F, the assessment of self-protection equipment, 93% of respondents answered yes, which was the majority's positive response. Personal protective equipment (PPE) at RSGM Unimus is included in the low infection risk category, meaning it has been well implemented.

These results are under the standards issued by the CDC in 2016, education and training regarding indications for selecting the right PPE to be carried out, as well as the availability of the equipment needed to comply with the practice of using personal protective equipment (PPE), and ensuring that all health workers can easily access it (CDC, 2016).

Section G: Respiratory Hygiene/Cough Etiquette
According to the study's findings in Section G, which evaluated cough etiquette and respiratory hygiene, 74% of respondents responded positively to “Yes.” The moderate infection risk category includes respiratory hygiene/cough etiquette at RSGM Unimus. The
implementation has been quite good, but respiratory hygiene and cough etiquette facilities must be improved to support infection prevention and control programs. According to the 2016 CDC, respiratory hygiene/cough etiquette strategies include (1) putting up a sign at the entrance that contains instructions for patients with symptoms of respiratory infections to cover their mouth/nose when coughing or sneezing, using a tissue, and cleaning hands after touching respiratory secretions, (2) providing facilities for performing hand hygiene in or near the waiting room, (3) offering masks to patients with respiratory symptoms, and (4) providing a separate waiting room, and (5) facilities Health services must also provide education and training regarding the importance of holding respiratory secretions (CDC, 2016).

Section H: Sharps Safety
The care provision in dentistry carries a risk of percutaneous injury (e.g., needles, cuts with sharp objects) among healthcare professionals involving burs, needles, and other sharp instruments. Injuries caused by sharp objects have a risk of transmitting blood-borne pathogens to health workers and patients. When cleaning and disposing of sharp instruments, healthcare workers should be aware of the risk of injury.

According to the findings of the research presented in Section H, which dealt with the evaluation of the safety of sharps, 79% of respondents answered “yes” in a positive manner. The execution of sharps security at RSGM Unimus is remembered for the low contamination risk class, implying that the execution has been very much carried out.

Part I: Safety of Injection Practices
Based on the results in part I, namely an assessment of the safety of injection practices, it was found that most respondents responded positively by answering “Yes,” and the percentage was 98%. Safe injection practices at RSGM Unimus are included in the low infection risk category, meaning the implementation has been well implemented.

These results followed the standards issued by the CDC in 2016. Injection practices must be carried out in a safe and clean place that is free from contamination. Besides, the administration must also be considered (for example, needles and cartridges filled with anesthetic are not used simultaneously or repeatedly) (CDC, 2016).

Section J: Sterilization and Disinfection of Patient Care Items and Equipment
The majority of respondents, 82 percent, responded positively by answering “yes” to the assessment of the sterilization and disinfection of patient care goods and equipment, according to the findings of part J of the research. Sterilization and disinfection of patient care goods and equipment at RSGM Unimus are included in the low infection risk category, meaning the implementation has been well carried out.

These results followed the standards issued by the CDC in 2016. Every healthcare facility must have regulations and standard operating procedures (SPO) for cleaning, disinfecting, and sterilizing dental instruments and equipment. In addition, health workers must receive training on reprocessing steps to ensure that the instruments and equipment used are safe for patient care (CDC, 2016).
**Part K: Environmental Infection Prevention and Control**

According to the research findings presented in Section K—the evaluation of environmental infection prevention and control—, most respondents answered “Yes,” with a percentage of 85%. At RSGM Unimus, environmental infection prevention and control has been successfully implemented, placing it in the low infection risk category.

These results complied with the CDC’s 2016 standards, stipulating that a healthcare facility should have written regulations and standard operating procedures (SPO) for the routine cleaning and disinfection of rooms and surfaces with the greatest risk of contamination. In addition, health professionals must receive instruction in infection control, clinical contact control, and room cleaning (CDC 2016).

**Section L: Dental Health Care Unit Water Quality**

According to the findings of section L of the research, which dealt with evaluating the dental health care unit’s water quality, most respondents answered “yes” with a percentage of 80%. The dental health care unit’s water quality is in the low infection risk category at RSGM Unimus, indicating its successful implementation.

These results meet the CDC’s 2016 standards, which state that a strategy to improve the water quality of dental care units must take into account several factors, such as the availability of regulations and standard operating procedures (SPO) that regulate water quality monitoring based on manufacturer instructions (waterline treatment products). Dental unit manufacturers, sterile saline or water for surgical irrigation, and the dental unit water quality met EPA drinking water regulations (500 CFU/mL heterotrophic bacterial water) for routine dental water (CDC, 2016).

**CONCLUSION**

Respondents with female gender had a higher number and percentage than men, 42 respondents (73.7%) and 15 respondents (26.3%), and the age group of respondents was mostly in the age range 21 to 30 years as many as 50 people (87.72%).

Overall, infection prevention and control at RSGM Unimus had a percentage of 82%. This figure was included in the low infection risk category, meaning RSGM Unimus was good at implementing infection control programs.

Of the 12 assessment sections based on the CDC questionnaire, the results showed that ten sections had good results and were in the low infection risk category. The other two sections had fairly good results and were in the moderate infection risk category, so these two sections still need to be carried out quality improvement. The ten sections that have a low infection risk category are administrative measures, health worker safety, program evaluation, hand hygiene, personal protective equipment (PPE), the safety of sharp objects, the safety of injection practices, sterilization and disinfection of patient care goods and equipment, prevention and control environmental infections, and dental health care of unit water quality. In contrast, infection prevention education, training, and respiratory hygiene/cough etiquette are the two sections with moderate infection risk.
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REFERENCES
