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ORIGINAL ARTICLE

Assessment of Infection Prevention and Control Implementation in Primary and Secondary Health Care Facilities in Rivers State

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Keywords

Infection Prevention and Control; Hospital-acquired infections; Health facility self-assessment

ABSTRACT

Background: Controlling infections in healthcare facilities is necessary for reducing infection transmission. There is limited data on the status of Infection Prevention and Control (IPC) programme in healthcare facilities in Rivers State. An assessment of IPC implementation in health facilities in Rivers State was therefore conducted.

Methods: In this cross-sectional study, stratified sampling technique was applied to select 99 healthcare facilities. Health personnel in-charge of selected facilities were interviewed using the validated Infection Prevention and Control Assessment Framework (IPCAF) tool. It was modified to focus on four out of eight core components areas and graded using the World Health Organization IPCAF guidelines.

Results: Twenty (20.2%) facilities had IPC programmes with clearly defined objectives and activity plans. A copy of the IPC guidelines was available in 56 (56.6%) facilities, however, only 13 (13.1%) monitored implementation of the guidelines. Forty (40.4%) facilities had healthcare workers that were trained based on updated IPC guidelines. Supply of personal protective equipment was adequate in 29 (29.3%) facilities and a mixed method of healthcare waste disposal was practiced in 46 (46.4%) facilities. Overall, 56 (56.6%) of the facilities had scores within the basic IPC level of practice while 43 (43.4%) had scores within the intermediate level of IPC practice.

Conclusion: Findings from this study indicate that IPC committees should be set up in all healthcare facilities with the obligation of updating IPC guidelines, training healthcare personnel, and implementing IPC activities in respective healthcare facilities.

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INTRODUCTION

Hospital-acquired infections raise significant public health concerns as it contributes to increasing the burden of health problems among patients with other illnesses seeking for healthcare services in health facilities. The occurrence of hospital-acquired infections also increases the burden of work on health

workers and contributes to increased morbidity, mortality, and hospital expenses for the patients.[1] Long hospital stay is known to be a predisposing factor to the occurrence of hospital-acquired infections in patients.[2] Individual factors including patient's age, presence of comorbidities, injuries, and low immunity can contribute to patients' susceptibility to hospital-acquired infections. External factors such as poor hygienic practices of the health personnel, use of unsterilized or poorly sterilized medical equipment on patients when conducting medical procedures, and a polluted hospital environment also contribute significantly to the occurrence of nosocomial infections.[3]

There is limited data on the worldwide estimations of infections acquired from health facilities, however, it has been reported that in advanced countries, the prevalence of hospital-acquired infections ranges between 3.5%-12% among hospitalized patients and this is reported to be higher in developing nations.[4] A study in South Africa[5] reported an overall prevalence of approximately 8% while a similar study in Ghana[6] recorded a range of 3.5% to 14.4% prevalence of hospital-acquired infections. Studies conducted in other African countries have reported an overall prevalence of hospital-acquired infections within the range of 2.5% - 45.8%.[7] In Nigeria, researchers have also reported the occurrence of hospital-acquired infections, including urinary tract infections, surgical site infections and blood stream infections amongst others, with a prevalence ranging between 14% - 49%.[1,8–11] A major reason for this high burden of hospital-acquired infections in developing countries is the lack of infection prevention and control (IPC) auditing.[8] There is also a deficiency in enforcing and implementing infection prevention and control policies and guidelines in the healthcare setting.[12] This can increase the transmission of hospital-acquired infections, prolong hospital stay and increase hospital expenditures. Consequently, the practice of infection prevention and control is a basic necessity and is vital for the safety and wellbeing of patients and health workers in the hospital setting.

Infection prevention and control is a scientific approach to limiting the spread of hospital-acquired infections to patients and clients who seek for health services in the health facilities.[13] The World Health Organization provided guidelines and a

health facility assessment tool for assessing infection prevention and control (IPC) practices.[14,15] The guidelines can be adopted or modified for use by health facilities at different levels in order to reduce the occurrence of hospital-acquired infections. The tool used for assessment of health facilities is called the Infection Prevention and Control Assessment Framework (IPCAF) and contains eight core components that addresses major aspects of infection prevention and control practices. The tool serves to give a broad summary of the position of IPC practices of each health facility following IPC recommendations made by the World Health Organization. It does not focus on specific IPC practices or risk factors for individual patients.[15]

This research aimed to assess the IPC programmes in selected healthcare facilities in Rivers State with the purpose of knowing the status of IPC practices and making recommendations for improvement in order to reduce the burden associated with poor infection prevention and control practices in healthcare facilities.

METHODOLOGY

This study was conducted in 2019 in Rivers State which is located in the south-south of Nigeria. The State has twenty-three Local Government Areas (4 urban and 19 rural), with a projected population of 7,809,035 million based on the official population growth rate of 3.4% in 2018 and is considered as the 6th most populous State in the country.[16] A number of economic activities go on in the State including fishing, farming, and petty trading. Others engage in occupations in the oil and gas industries, and other professional and commercial activities. There are 343 primary healthcare facilities in Rivers State (59 in the urban LGAs and 284 in the rural LGAs). The secondary healthcare facilities in the State are 36 in number and includes either a general or cottage hospital located in each of the 23 LGAs in Rivers State.[17] The study population consisted of primary and secondary healthcare facilities in the State, however, doctors in charge of the facilities or designated health personnel were interviewed for the IPC facility assessment.

A descriptive cross-sectional study design was employed and the sample size calculation for health facility surveys[18] was adapted for this study using the single population proportion formula; $n = Z^2p(1-p)/d^2$. The proportion (p) of primary healthcare centers was obtained by

dividing the total number of primary healthcare centres (343) by the number of public health facilities (including health posts) providing primary healthcare services in the state (360), and expressed in decimal. This gave p = 0.95, as the relative proportion for healthcare facilities among public healthcare facilities in the state. The level of precision was set at 0.05 and a 95% confidence interval, also considering a non-response of 20%, the minimum sample size was 88.

However, 115 primary healthcare facilities were selected using a stratified sampling approach. First, primary healthcare facilities were stratified according to locations in rural and urban Local Government Areas (LGA). Thereafter, healthcare facilities were selected by simple random sampling from the list of health facilities in each LGA. The number of selected healthcare facilities was done using proportionate to size, according to the number of primary healthcare facilities in the LGA. From the 59 urban and 284 rural primary healthcare facilities in the state, a total of 19 urban and 96 rural primary healthcare facilities respectively were selected. Simple random sampling was used to select 12 secondary health facilities from the list of 36 secondary healthcare facilities in the state. In total, 127 healthcare facilities were selected for this study.

The IPCAF tool was used to evaluate health facilities on their level of practice in infection prevention and control as recommended by the World Health Organization.[15] The framework was developed for the purpose of assessing infection prevention and control practices in health facilities. It also serves the purpose of identifying strengths and lapses in IPC implementation at the facility level. The tool is a guide to enable healthcare facilities plan for ways to improve their IPC practices to meet the standard requirements and reduce the burdens associated with hospital-acquired infections. The tool has also been validated by researchers for this purpose.[19] The IPCAF framework consists of 8 core components including: IPC programme; IPC guidelines; IPC education; HAI surveillance; Multimodal strategies; Monitoring/audit of IPC practices and feedback; Workload, staffing and bed occupancy; and Environments, materials and equipment for IPC.[15]

Each core component has indicators which in turn have scores attached to them. The highest score for each component is 100,

making a final total score for all eight components to be 800. The final score for each health facility is the addition of all scores obtained from each core component. Thereafter, the IPC level for each health facility was graded based on the score obtained. A score range between 0-200 is an inadequate level of IPC practice and indicates that IPC core component implementation is deficient, requiring significant improvement. Scores ranging between 201-400 shows a basic IPC level of practice, indicating that some aspects of IPC are in place but not sufficiently implemented. Further improvement is required. Scores ranging between 401-600 is an intermediate level of IPC practice, and indicates that most aspects of the core IPC components are appropriately implemented. The facility should continue to improve on their IPC program. Scores ranging between 601-800 is an advanced level of IPC practice and indicates that IPC core components are fully implemented and are appropriate to the needs of the facility.[15]

This tool was adapted and modified to accommodate the environmental setting of the health facilities which are located in both rural and urban areas in the state and to allow for uniformity in assessment of the healthcare facilities. Therefore, for this study, four core components of the IPCAF tool were used to assess and grade the healthcare facilities. These included IPC programme, IPC guidelines, IPC education and training, and built environment, materials and equipment for IPC at the facility level. The IPCAF scoring was scaled up to follow the WHO IPCAF grades, therefore the overall score of 400 for this study was multiplied by two to get the score of 800.

A total of twelve nurses with Bachelor of Science in Nursing qualification were trained as research assistants for this project. Data was collected by scheduled face to face interviews with heads of facilities and where the head of facility was not available, appointed health workers were interviewed. Ethical approval was obtained from the Rivers State Primary Health Care Board with the reference number RSPHCMB/MSB/Vol.1/082.

Data collected was cleaned and analysed using IBM SPSS version 25. Descriptive statistics for the health facilities were presented as frequencies and percentages in tables. Assessment and grading of four IPC core activities in the health facilities were also presented as frequencies and percentages in tabular forms.

Table 1. Characteristics of health facilities

Variable	Frequency (n=99)	Percent
Type of facilities		
Primary	90	90.9
Secondary	9	9.1
Respondents		
Doctor	87	87.9
Nurse	12	12.1
Staff Strength		
≤ 5	5	5.1
6-10	26	26.5
Over 10	67	68.4
Number of beds		
≤ 5	26	26.3
6-10	51	51.5
Over 10	22	22.2

RESULTS

Only 99 facilities gave their consent to participate out of the 127 health facilities selected for this study, giving a response rate of 78%. Table 1 indicates that there were 90 (90.9%) primary healthcare facilities and 9 (9.1%) secondary health facilities. The cadre of respondents included 87 (87.9%) doctors and 12 (12.1%) nurses.

Twenty (20.2%) of the facilities indicated that they had clearly defined objectives and annual activity plan, 45 (45.5%) facilities have an IPC committee or team while 16 (16.2%) reported that the IPC team holds IPC meetings and activities (Table 2). Fifty-six (56.6%) healthcare facilities had a copy of the IPC guidelines and 13 (13.1%) monitor the implementation of at least some of the IPC guidelines in the facilities (Table 3). Concerning IPC training, 40 (40.4%) of the facilities stated that their healthcare workers were trained based on the updated IPC guidelines, and 38 (38.4%) reported that IPC training was offered annually for healthcare workers but not mandatory. Twenty-six (26.3%) facilities reported that IPC training was offered annually for healthcare workers and is mandatory while 35 (35.4%) reported not knowing the frequency of IPC training offered to healthcare workers in the facility (Table 4).

Majority 80 (80.8%) of the healthcare facilities had running water and soap in sufficient quantity and 94 (94.9%) of the healthcare facilities had hand washing stations at strategic places, while 85 (85.9%) reported that healthcare providers wash hands between procedures. Fifty (50.5%) of the facilities had alcohol-based hand rubs readily available and 42 (42.4%) used a new pair of gloves before any procedures, while 29 (29.3%) of the healthcare fare facilities indicated that they had adequate supply of gloves and other personal protective equipment (PPEs).

Table 2: Availability of IPC programme in the health facilities

Variable	Frequency (n=99)	Percent
There is an IPC programme		
Yes, without clearly defined objectives	62	62.6
Yes, with clearly defined objectives and annual activity plan	20	20.2
No	17	17.2
There is an IPC committee/team		
Yes	45	45.5
No	52	52.5
Don't know	2	2.0
The IPC Team meets for IPC meetings and activities		
Yes	16	16.2
No	80	80.8
Don't know	3	3.0

Table 3: Availability of IPC guidelines in the health facilities

Variable	Frequency (n=99)	Percent
Availability of copy of IPC guidelines		
Yes	56	56.6
No	39	39.4
Don't know	4	4.0
Regular monitoring of IPC guidelines implementation		
Yes	13	13.1
No	86	86.9

Table 4: IPC training of health personnel in the facilities

Variable	Frequency (n=99)	Percent (%)
Training of health personnel on new or updated IPC guidelines		
Yes	40	40.4
No	7	7.1
Don't know	52	52.5
Frequency of IPC training		
IPC training offered annually for healthcare workers but not mandatory	38	38.3
IPC training offered annually for healthcare workers and is mandatory	26	26.3
Don't know	35	35.4

Table 5: Assessment of health facilities' built environment, materials and equipment for IPC

Variable	Frequency (n=99)	Percent
WATER		
Running water and soap in sufficient quantity		
Yes	80	80.8
No	19	19.2
Hand washing stations at strategic places		
Yes	94	94.9
No	5	5.1
HAND HYGIENE		
Providers wash hands between procedures		
Yes	85	85.9
No	10	10.1
Don't know	4	4.0
Alcohol based hand rub available		
Yes	50	50.5
No	49	49.5
PERSONAL PROTECTIVE EQUIPMENT (PPE)		
New pair of gloves used before any procedures		
Yes	42	42.4
No	57	57.6
Adequate supply of gloves and other PPEs		
Yes	29	29.3
No	69	69.7
Don't Know	1	1.0
SHARPS AND MEDICAL WASTE MANAGEMENT		
Sharps disposed in sharp boxes		
Yes	95	96.0
No	4	4.0
Sharp boxes are placed in all injection areas		
Yes	39	39.4
No	52	52.5
Don't know	8	8.1
Medical wastes are segregated		
Yes	68	68.7
No	31	31.3
Type of waste disposal system		
General dump site	7	7.1
Incineration	8	8.1
Burying	17	17.2
Open burning	21	21.2
Mixed methods (combination of 2 or more methods)	46	46.4

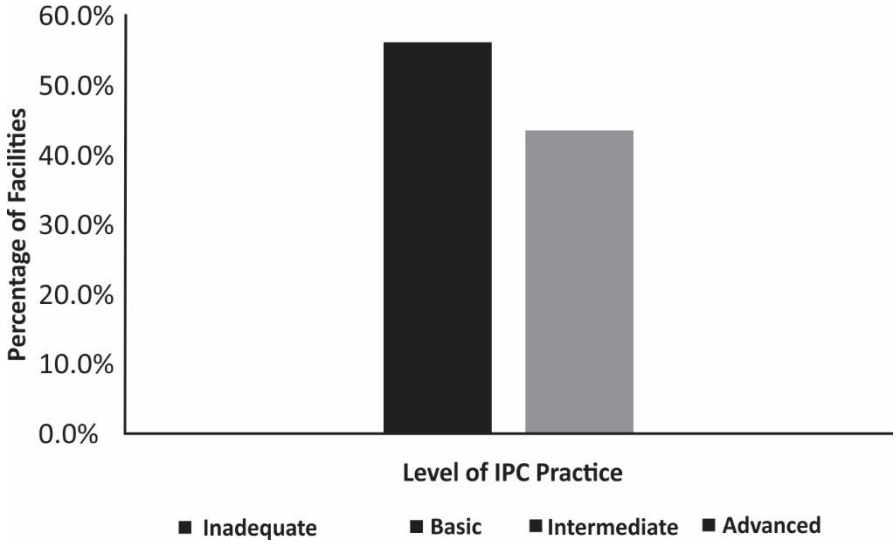

Figure 1: Level of IPC practice of health facilities

Furthermore, 95 (96%) of healthcare facilities stated that sharps were disposed into sharp boxes and only 39 (39.4%) reported that the sharp boxes were placed in all injection areas. Additionally, 68 (68.7%) of the facilities reported that wastes generated from the healthcare facilities were segregated. Seven (7.1%) of the health facilities dispose their waste at the general dump site, 8 (8.1%) by incineration, 17 (17.2%) by burying, 21 (21.2%) by open burning and 46 (46.4%) by mixed methods of healthcare waste disposal (Table 5).

Following the IPCAF scoring, 56 (56.6%) healthcare facilities had a score ranging between 200-400 and this indicates the basic IPC level of practice in these facilities, while 43 (43.4%) healthcare facilities had a score ranging between 401 – 500, indicating an intermediate level of practice. No healthcare facility had inadequate level of IPC practice, or an advanced level of IPC practice. (Figure 1)

Additionally, only 2 facilities had an IPAC score within the range of 251-300, 18 facilities had a score ranging between 301-500, and 36 healthcare facilities had an IPAC score between 351-400, while 41 healthcare facilities had a score ranging between 401-450 and only 2 facilities had a score between 451 -500. No healthcare facility had a score above 500 and the maximum possible score is 800.

DISCUSSION

IPC plays an important role in reducing the transmission of hospital-acquired infections, and ensures that both patients and healthcare workers are safe. In this

study, an assessment of IPC implementation and practice was assessed in primary and secondary healthcare facilities in Rivers State using four core components of the WHO infection prevention and control assessment tool.

In this study, more than half the number of facilities assessed had IPC programme without clearly stated objectives and plan of activities. Similar result was observed in a study conducted in Ghana[20] were more than fifty percent of the health facilities had IPC program but without clearly defined objectives. The World Health Organization reiterates that establishing IPC programmes are vital for limiting the spread of infectious diseases in the hospital setting.[21] When there are no clearly stated goals for programme implementation activities, achieving the programme goals becomes difficult. The finding indicates that further improvement is expedient to ultimately achieve an advanced level of IPC practice.

We observed that most of the healthcare facilities had a copy of the IPC guidelines but only a few monitored the adherence to implementation of IPC activities. A local adaptation and application of the IPC guidelines can guarantee and sustain good IPC practices in healthcare facilities.[22] This observation clearly indicates the need for awareness creation, information, education and periodic training of health care workers on infection prevention and control. There are suggestions that evidence-based guidelines on IPC practices and procedures can effectively reduce hospital-acquired and antimicrobial resistance especially when combined with healthcare workers' education and training.[22] This is reflected in the responses to IPC education and training in this study, where less than fifty percent of the facilities reported that the health workers had received training on the updated IPC guidelines annually. Similar studies in Ethiopia and Nigeria have observed that health personnel have good knowledge about infection prevention and control because they have received training on IPC, but the level of IPC practice was low.[23,24]

Research shows that there is a wide disparity in IPC training and education among health workers on infection prevention and control and researchers recommend integrative nationwide trainings and similar learning strategies among health workers to allow for uniformity in IPC knowledge and practice.[25] The WHO and other researchers

have also shown that IPC knowledge and skills may not be very effective enough and recommends a participatory approach to education and training in infection prevention and control.[14,26] Core component eight assesses the basic necessities to achieve standard precautions for preventing transmission of infectious diseases at the health facility level and is a minimum requirement to maintaining infection prevention and control practices in health facilities. This component includes; assessment of the built environment, materials and equipment for infection prevention and control.[27]

In this study, most health facilities had appropriate material and equipment necessary to control infection transmission, especially for maintaining hand hygiene. This is commendable considering the fact that some of the health facilities were located in the rural areas with inadequate infrastructural facilities. There is however, a dire need to improve on the provision of personal protective equipment such as hand gloves and face masks. The availability of appropriate PPEs will improve hygienic practices especially for procedures that involve the change of PPE for each new patient seen. However, the rational use of PPEs should be weighed against infection transmission and sustainable affordability of the PPEs in resource poor settings.[28]

The mixed method of healthcare waste disposal (i.e., applying more than one waste disposal method within a facility) was practiced in most health facilities, including a combination of incineration, open burning, disposal at a general dump site and burying. This is an indication for improvement of IPC practices for disposing healthcare waste, as some of the methods of disposal are unsafe for both the health workers, patients and members of the community e.g., open burning and healthcare waste disposal at the general dump sites. The World Health Organization has recommended a variety of healthcare waste disposal methods that can be used in health facilities and resource poor settings, such as thermal, chemical and containment processes.[29]

Following the WHO scoring, less than half of the assessed facilities fell into the intermediate IPC category indicating that the facilities demonstrate satisfactory level of IPC measures but can upgrade on the existing IPC practices. Additionally, over fifty percent of the health facilities fell into the basic category, indicating that they demonstrate some practice of IPC

activities but these are inadequate and are required to make significant progress in their IPC practices. None of the facilities assessed had scores within the inadequate or advanced level of IPC practice. It is apparent that there should be more focus on improving the IPC practices at the health facility level to prevent the occurrence of hospital-acquired infections, avoid prolonged hospital stay of patients and reduce the healthcare expenditures.

Limitations: A major limitation of this study is that only four WHO IPC core components were assessed and this was to allow for uniformity in data collections across the health care facilities located in both rural and urban areas and to reduce constraints on the limited funds for the study. However, it provides a platform for complete IPC assessment to be conducted in the future using all the eight core components. In addition, information was only based on report by the heads of the facilities and not combined with direct observation. This study also assessed only public healthcare facilities and the findings may not be applicable to what may be obtained in the private healthcare settings. Further studies to ascertain IPC practices in private health facilities is recommended.

Study strengths: Findings from this study has provided information about IPC level of practice in health facilities in the State and will encourage the development of plans for improvement of IPC practices to reduce and prevent the occurrence of hospital-acquired infections. This study also raises awareness for facilities to conduct future periodic IPC self-assessment using the WHO infection prevention and control tool which is the main purpose of developing the tool.

Conclusion: A general finding from this study is that all the healthcare facilities surveyed carried out some level of infection prevention and control practices. Following the WHO IPCAF scoring, most health facilities had scores within the basic IPC level category and deliberate upgrade in the core components is important to reduce and prevent hospital acquired infections. Other healthcare facilities had scores within the intermediate IPC level category and can improve on their IPC practices following the core components. Specific recommendations to management of these health facilities based on findings from this study include the following; healthcare facilities should have an IPC programme with a yearly plan of action that will be piloted by the IPC committee

consisting of health personnel who have received IPC training. The IPC committee should have regular meetings to review and update IPC guidelines, schedule training and retraining sessions that will build the IPC capacity and skills of all healthcare workers within the facility. The IPC committee should ensure adequate supply and proper use of PPEs following the IPC guidelines. Health facilities can also improve on the disposal of medical waste using the incinerator as other methods can expose health workers, patients and the general population to infectious medical waste and sharps, which can increase the probability of the occurrence of hospital-acquired infections. Overall, there is the need for health facilities in Rivers State to improve on their IPC practices following the core components of the IPCAF tool as recommended by the WHO. The tool should also be used for periodic self-assessment of health facilities to ensure compliance to IPC standards.

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