ORIGINAL ARTICLE

Knowledge, attitude, and infection control practices of two tertiary hospitals in Port-Harcourt, Nigeria

SFA Brisibe, B Ordinioha[1], PK Gbeneolol[2]

Department of Family Medicine, Niger Delta University Teaching Hospital, Okolobiri, Bayelsa State, [1]Department of Community Medicine, University of Port Harcourt Teaching Hospital, [2]Department of Medical Services, University of Education, Port Harcourt, Port Harcourt, Rivers State, Nigeria

Abstract

Background: Surgical site infections (SSIs) are a significant cause of morbidity, emotional stress and financial cost to the affected patients and health care institutions, and infection control policy has been shown to reduce the burden of SSI in several health care institutions. This study assessed the effects of the implementation of the policy in a tertiary hospital in Port Harcourt, Nigeria.

Materials and Methods: A cross-sectional, comparative study design was used for the study, with data collected using a structured questionnaire and guided observation of doctors and nurses involved in the management of patients that had caesarean sections in two comparable tertiary hospitals in Port Harcourt-the University of Port Harcourt Teaching Hospital (UPTH) and the Braithwaite Memorial Specialist Hospital (BMSH).

Results: There were no statistically significant differences in the designations and length of practice of the respondents in both hospitals ($P = 0.77$). However, 63.64% of the respondents in UPTH were aware of the infection control committee, compared with none in BMSH. The appropriate timing for the administration of prophylactic antibiotics, and for the removal of the hair at the incision site were observed by 57.58% and 69.69% respectively of the respondents in UPTH, compared with 22.86% ($P = 0.00$) and 0.00% ($P = 0.02$) in BMSH. The reasons given by the respondents in UPTH for nonadherence to the infection control policy include poor supervision (39.39%) and lack of in-service training (21.21%), while the respondents in BMSH gave reasons that include inadequate supply of consumables (34.29%) and absence of a hospital's policy on infection control (22.88%).

Conclusion: The implementation of the infection control policy resulted in some improvements in certain infection control practices.

Key words: Adherence, hospital infection control committee, hospital infection control policy, Nigeria, Port Harcourt, practice, surgical site infection

Date of Acceptance: 02-Apr-2014

Introduction

Surgical site infection (SSI) is a common complication of surgical operation, affecting up to 5% of all the surgical operations carried out in developed countries,[1] and significantly higher in developing countries.[2] It is a significant cause of morbidity, emotional stress and financial cost to affected patients and health care institutions.[3-6] It is estimated that SSI can add ten extra days to the patient's stay in hospital,[3] requires a daily $94.31 antibiotics for treatment,[4] it is capable of increasing the hospital bill by £1780;[5] and able to increase the mortality of patients by more than 170%.[6] SSI is also a growing source of a malpractice suit in developing countries, not only for the extra financial burden it places on the patient, but also for the emotional stress caused by the ugly scar that comes with it.

Address for correspondence:
Dr. Seiyefa Fun-Akpa Brisibe,
P. O. Box 162, Omoku, Onelga, Rivers State, Nigeria.
E-mail: sfbrisibe@gmail.com

Access this article online	
Quick Response Code:	**Website**: www.njcponline.com
	DOI: ***
	PMID: *******

Surgical site infection is usually acquired in the course of the surgical operation, either from the exogenous microbes in the air, medical equipment, surgeons and theater staff; or from the flora on the skin or in the operative site of the patient, and rarely from the blood used in surgery. The infecting microorganisms are variable, and depend on the type and location of the surgery, and the type of antimicrobials received by the patient. The main risk factor of the infection is the extent of contamination of the surgical site during the surgery, which is to a large part dependent on the length of the operation, the general condition of the patient, quality of surgical technique, the presence of foreign bodies including drains, the virulence of the microorganisms, concomitant infection at other sites, the use of preoperative shaving, and the experience of the surgical team.[7,8]

Infection control policy has however been shown to reduce the burden of hospital-acquired infections in several health care institutions, and has since become a constant feature in most health facilities in developed countries.[9] Hospital infection control policy can be defined as the systematic measures taken by the management of a hospital to reduce the incidence, and improve the adverse effects of hospital-acquired infections on patients and health workers. The policy sets guidelines on adequate sanitary conditions of operation rooms, use of sterile instruments, active treatment of patients infections, removal of hair immediately before surgeries, adequate preparation of surgical site with antiseptics, preoperative showering, effective patient-caregiver barriers, good operation technique and prophylactic antimicrobial treatment among others.[8]

The implementation of the policy in a health facility includes a commitment for the regular supply of medical consumables, and the setting up of a committee to carry out surveillance and educational activities that are important in the observance of the recommended hygiene practices.[10] These put a lot of pressure on the poorly resourced hospitals in developing countries, which often are unable to mobilize the required resources. This study assessed the effects of the implementation of the policy on the knowledge, attitude, and practice of the health workers in the University of Port Harcourt Teaching Hospital, Port Harcourt (UPTH), by comparing them with those of the comparable Braithwaite Memorial Specialist Hospital (BMSH).

Materials and Methods

Study design

A cross-sectional, comparative study design was used, in which the practice and adherence to the WHO infection control guidelines among the health workers of the UPTH, Port Harcourt were compared with those of the BMSH, the other multi-specialist tertiary health care institution in Port Harcourt, South-South Nigeria.

Study site

The UPTH was a 657 bed multi-specialist teaching hospital, funded by the Federal Government of Nigeria. It constantly draws patients from all the neighboring States of the oil-rich Niger delta region; a catchment population that can be conservatively put at 10 million people. It carried out an average of 600 surgeries a month, more than 30% of which were cesarean sections.

An infection control committee was established by the management of the UPTH in September, 2005 following a spate of litigations arising from postoperative wound infections. A further incentive was provided by a government directive that directed the immediate adoption and implementation of the WHO guidelines on the prevention of hospital associated infections. The committee was made up of nurses, pharmacists and medical specialists in microbiology, epidemiology, medicine and surgery, and had the responsibilities of carrying out educational programs on the infection control policy, and ensuring that all the dictates of the policy are carried out. The educational program was mainly theoretical, consisting of presentations delivered during a grand round.

The policy came into effect in January 2006, after the educational program, and the commitment of the management of the hospital to ensure the regular supply of antiseptics and sterile consumables that are vital to the success of the policy. This was accomplished by contracting the supply of sterile linens and dressing packs to a private company, with adequate checks, and mandating the clinical departments to ensure the steady supply of antiseptics and similar consumables, through a revolving fund scheme. The policy was implemented with vigor by the infection control committee, in the initial few months, as it represented a viable option for the hospital to reduce the rising number of malpractice litigations against it. It however fizzled out, as members of the committee had other responsibilities in hospitals, and therefore could not fully dedicate their time in the discharge of their infection control responsibilities.

The BMSH, in contrast did not have an infection control committee, nor did it have a policy; infection control measures in the hospital were practiced implicitly. BMSH is a 300 bed hospital, funded by the Rivers State government, to provide specialist care to patients referred from secondary health facilities in the State. It carried out an average of a hundred caesarean sections a month and most of its health workers were trained in UPTH.

Data collection

All the nurses and doctors involved in the management of patients that had a cesarean section in both study hospitals were recruited into this study. Cesarean section was selected as a case study, because it is the most common surgical operation carried out in both hospitals, involves patients

who are similar, and is carried out using operative procedures that are similar in both hospitals.

The data for the study were collected using a semi-structured questionnaire, and complemented with guided structured observations. The questionnaire was derived from the guidelines established by the WHO,[8] the Centers for Disease Control and Prevention[11] and similar published studies,[10] and used to collect information on the knowledge, attitude and compliance of the health workers to the policy. The guided structured observation was carried out using a checklist and was also influenced by the WHO policy. The respondents were specifically asked or observed on the use of sterile instruments, active treatment of patients' infections, removal of hair immediately before surgeries, adequate preparation of surgical site with antiseptics, preoperative showering, effective patient-caregiver barriers, good operation technique and the prophylactic use of antimicrobials.

Data analysis

Data handling and analysis were carried out using Stata 10 data analysis and statistical software (Stata Corp) and Microsoft Excel. Summary measures were calculated for each outcome of interest, and the differences between the study hospitals were tested using the Student's *t*-distribution for mean, and Chi-square test with appropriate continuity corrections for proportions. For all statistical tests, $P \leq 0.05$ was considered as statistically significant.

Ethical clearance

The approval to undertake the study was sought and obtained from the Ethical Review Committee of the UPTH, Port Harcourt, and from the management of both study hospitals. Informed consent was also sought and received from all the study participants.

Results

A total of 33 questionnaires administered on respondents that took part in the management of the patients in UPTH were sufficiently completed for analysis, while a total of 35 questionnaires were administered and retrieved from the respondents in BMSH. The characteristics of the respondents in both hospitals are presented in Table 1. There are no statistically significant differences in the designations ($P = 0.77$) and length of stay of the respondents in both hospitals. More than 60% of the respondents in UPTH are medical doctors and there is a comparable proportion in the BMSH; the mean length of practice of the respondents in UPTH was 1.37 years, compared with 1.86 years for respondents in the BMSH.

There are statistically significant differences in awareness of the existence of the hospital's infection control committee ($P = 0.00$) and in the presence of posters in the hospital ($P = 0.00$), as 21 (63.64%) of the respondents in UPTH were aware of the existence of the committee and 15 (42.86%) could see the posters; compared to none in BMSH. However, none of the hospitals had an infection control manual, or an infection control nurse; and there was no significant difference in the proportion of respondents with formal training in infection control measures ($P = 0.34$), as 42.42% of the respondents in UPTH received the training, compared to 28.57% in BMSH.

There are however statistically significant differences in the timing of prophylactic antibiotics ($P = 0.00$), removal of hair at the incision site ($P = 0.00$) and in hand hygiene practices ($P = 0.04$). The appropriate timing of the administration of prophylactic antibiotics (intra-operative administration) was observed by 57.58% of the respondents in UPTH, compared to 22.86% in BMSH ($P = 0.00$). The appropriate timing for removing the hair at the incision site was observed by 69.69% of the respondents in UPTH, compared to none in BMSH ($P = 0.02$); while 51.52% of the respondents in UPTH always washed their hands before a procedure, compared to 22.86% in BMSH ($P = 0.02$).

Table 1: The characteristics of the respondents in both hospitals

Characteristic	*N*=35 (%)		*P* value
	UPTH	BMSH	
Designation of respondent			
Consultant	7 (21.21)	8 (22.86)	0.77
Resident doctor	16 (48.48)	14 (40.00)	
Nurse	10 (30.30)	13 (37.14)	
Knowledge of infection control practices			
Awareness of the existence of hospital's infection control committee	21 (63.64)	0 (0.00)	0.00
Formal training on infection control measures	14 (42.42)	10 (28.57)	0.34
Presence of manual	0 (0.00)	0 (0.00)	
Presence of posters	15 (42.86)	0 (0.00)	0.00
Presence of departmental infection control nurse	0 (0.00)	0 (0.00)	
Timing of preoperative removal of hair (before operation)			
>1 h	23 (69.69)	0 (0.00)	0.00
1-11 h	10 (30.30)	13 (37.14)	0.76
12-24 h	0 (0.00)	22 (62.86)	0.00
Peri-operative administration of antibiotic			
Preoperative	9 (27.27)	3 (8.57)	0.04
Intra-operative	19 (57.58)	8 (22.86)	0.02
Postoperative	5 (15.15)	24 (68.57)	0.00
Hand washing in between the examination of patients			
Always	17 (51.52)	8 (22.86)	0.02
Only if obviously contaminated	11 (33.33)	21 (0.00)	0.04
When necessary	5 (15.15)	6 (17.14)	0.8

UPTH=University of Port Harcourt Teaching Hospital; BMSH=Braithwaite Memorial Specialist Hospital

The reasons given by the respondents for their noncompliance with the infection control guidelines are presented in Table 2. The respondents in UPTH attributed their noncompliance, mostly to the poor supervision of the infection control committee (39.39%) and the lack of training on infection control measures (21.21%); while the respondents in BMSH gave reasons that include inadequate supply of consumables (34.29%), lack of training on infection control measures (25.71%) and absence of a hospital policy on infection control (22.88%).

Discussion

The implementation of the infection control policy resulted in some improvements in the appropriate hand washing practices, the prophylactic use of antibiotics and the removal of hairs at the incision site.

The appropriate timing of the administration of prophylactic antibiotics was observed by 57.58% of the respondents in UPTH, compared to 22.86% in BMSH. Appropriate prophylactic antibiotic administration has been shown to reduce SSI;[12] and in obstetrics, intra-operative administration, just after the clamping of the umbilical cord is considered the best time for the prophylactic antibiotics, because of the likely adverse effect of antibiotics on the newborn.[13] More than two-third (68.57%) of the antibiotic prophylaxis given in the comparable hospital was given in the postoperative period, probably out of fear of adverse effects affecting the baby. This practice has however been shown not to be too effective in the prevention of SSI.[14]

The appropriate timing for removing the hair at the incision site was observed by 69.69% of the respondents in UPTH. This is largely consistent with the WHO guidelines, and very important in the prevention of SSI. Studies have indicated that preoperative hair removal more than 12 h prior to surgery is associated with higher risk of SSI,[11,15] hence the recommendation that the hair should be removed immediately before surgery.[11] The adoption of this practice can largely be attributed to the implementation of the policy in UPTH, especially as it was not practiced in the comparable hospital (BMSH), even though most of the health workers in the hospital were trained in UPTH.

Table 2: Reasons for non-compliance with the infection control guidelines

Characteristic	*N*=35 (%)	
	UPTH	BMHS
Lack of in-service training on infection control measures	7 (21.21)	9 (25.71)
Inadequate supply of consumables	3 (9.09)	12 (34.29)
Poor supervision and monitoring by hospital infection control committee	13 (39.39)	0 (0.00)
No hospital guideline on infection control	3 (9.09)	8 (22.86)
No obvious clinical benefit	2 (6.06)	2 (5.71)
Directives of senior colleague	3 (9.09)	1 (2.86)
Lack of clinical evidence	2 (6.06)	3 (8.57)

UPTH=University of Port Harcourt Teaching Hospital; BMSH=Braithwaite Memorial Specialist Hospital

The WHO infection control guideline recommends that hand washing should be carried out between contacts with patients.[8] This was observed by 51.52% of the respondents in UPTH, compared to 22.86% in BMSH, but significantly lower than the 88% recorded in a Dutch hospital, after an education program to improve hand hygiene.[16] This is not good enough, considering the fact that the role of proper hand hygiene in the prevention of SSI has been established in several studies, not only in the pre-operative period, but also after the surgery.[17]

On the whole, the practice improvements recorded after the implementation of the infection control policy in the study hospital are significantly lower than what were achieved in several other hospitals, especially the well-resourced hospitals in developed countries.[18] This can be attributed to the inactivity of the hospital's infection control committee, the suboptimal educational program of the committee, and the absence of stimulating and re-strategizing benefits that could have been provided by the surveillance activities of the infection control committee.[10]

The inactivity of the hospital's infection control committee is buttressed by the fact that 9.09% of the respondents in UPTH were not aware of the hospital's infection control policy, 63.64% of them did not know of the existence of the infection control committee, while 39.39% of the respondents actually blamed the committee for their inability to adhere to the infection control policy. The infection control committee could have been more effective, if they had dedicated staff to carry out their activities. An Expert Panel of the Society of Healthcare Epidemiology of America recommends that hospitals should have a dedicated infection control team, consisting of specialists in infection control, epidemiology and infectious disease; and including infection control physician and nurses.[10]

The educational program of the infection control committee is likely to have been suboptimal, because the hospital did not have an infection control manual; only 42.42% of the respondents in the hospital received in-service training on infection control, and just 42.86% of the respondents could acknowledge the presence of appropriate posters. These are probably responsible for the 21.21% of the respondents that attributed their noncompliance to the policy, to the fact that they were not trained. They are also responsible for the doubts expressed by the respondents over the effectiveness of the policy, as reflected in the 6.06% of the respondents that saw no clinical benefit of the policy, the 6.06% that believed the

policy is not evidence-based, and the 9.09% that chose to follow the directives of their senior colleagues. The educational program of the hospital's infection control committee ended few months after the implementation of the policy, and is obviously not too effective. It could have been more effective if adult training techniques had been used, and if the educational program had been simple, clear, and relevant to the hospital's infection control policy.[10] The US expert panel further recommends the use of multiple educational formats, including face-to-fact discussions, practical demonstrations and the use of video and computer technology to adequately meet the needs of health workers with varying educational backgrounds and work responsibilities.[10] The educational program should therefore include providing individual surgeons with the reports of the SSI rates of their patients, and offering effective strategies on how to reduce the SSI.

The hospital's infection control committee did not have a surveillance program, and this has a significant effect. Surveillance has been identified as the single most important factor in the prevention of nosocomial infection., with the Study on the efficacy of nosocomial infection control showing that surveillance is able to reduce the incidence of nosocomial infections involving the four major sites (bloodstream, surgical wound, urinary tract, and respiratory tract) by 32%.[9] The prescribed SSI surveillance activities, like other surveillance programs consist of the continuing systematic collection, analysis, interpretation and dissemination of data related to SSIs-activities that mirror the plan-do-check-act that is applied in quality improvement that would be beneficial in improving practice, and reducing the prevalence of SSI in the hospital.

Conclusion

The implementations of the infection control policy resulted in some improvements in appropriate hand washing practices, the prophylactic use of antibiotics and the removal of hairs at the incision site. The improvements achieved are however significantly lower than what were achieved in several other hospitals, especially the well-resourced hospitals in developed countries. The appointment of dedicated infection control staff, improvements in the educational activities of the hospital's infection control committee and the incorporation of surveillance activities in the work of the committee are hereby recommended.

References

1. de Lissovoy G, Fraeman K, Hutchins V, Murphy D, Song D, Vaughn BB. Surgical site infection: Incidence and impact on hospital utilization and treatment costs. Am J Infect Control 2009;37:387-97.
2. Allegranzi B, Bagheri Nejad S, Combescure C, Graafmans W, Attar H, Donaldson L, *et al*. Burden of endemic health-care-associated infection in developing countries: Systematic review and meta-analysis. Lancet 2011;377:228-41.
3. Sanou J, Traore SS, Lankoande J, Ouedraogo RM, Sanou A. Survey of nosocomial infection prevalence in the surgery department of the Central National Hospital of Ouagadougou. Dakar Med 1999;44:105-8.
4. Inan D, Saba R, Gunseren F, Ongut G, Turhan O, Yalcin AN, *et al*. Daily antibiotic cost of nosocomial infections in a Turkish university hospital. BMC Infect Dis 2005;5:5.
5. Coello R, Glenister H, Fereres J, Bartlett C, Leigh D, Sedgwick J, *et al*. The cost of infection in surgical patients: A case-control study. J Hosp Infect 1993;25:239-50.
6. Taye M. Wound infection in Tikur Anbessa hospital, surgical department. Ethiop Med J 2005;43:167-74.
7. Nosocomial infection rates for interhospital comparison: Limitations and possible solutions. A Report from the National Nosocomial Infections Surveillance System. Infect Control Hosp Epidemiol 1991;12:609-21
8. WHO. Prevention of Hospital-Acquired Infections: A Practical Guide. Geneva: WHO; 2002.
9. Haley RW, Culver DH, White JW, Morgan WM, Emori TG, Munn VP, *et al*. The efficacy of infection surveillance and control programs in preventing nosocomial infections in US hospitals. Am J Epidemiol 1985;121:182-205.
10. Scheckler WE, Brimhall D, Buck AS, Farr BM, Friedman C, Garibaldi RA, *et al*. Requirements for infrastructure and essential activities of infection control and epidemiology in hospitals: A consensus panel report. Society for Healthcare Epidemiology of America. Infect Control Hosp Epidemiol 1998;19:114-24.
11. Mangram AJ, Horan TC, Pearson ML, Silver LC, Jarvis WR. Guideline for prevention of surgical site infection, 1999. Hospital Infection Control Practices Advisory Committee. Infect Control Hosp Epidemiol 1999;20:250-78.
12. Ichikawa S, Ishihara M, Okazaki T, Warabi K, Kato Y, Hori S, *et al*. Prospective study of antibiotic protocols for managing surgical site infections in children. J Pediatr Surg 2007;42:1002-7.
13. Soper DE. Infections following cesarean section. Curr Opin Obstet Gynecol 1993;5:517-20.
14. Tran TS, Jamulitrat S, Chongsuvivatwong V, Geater A. Risk factors for postcesarean surgical site infection. Obstet Gynecol 2000;95:367-71.
15. Mishriki SF, Law DJ, Jeffery PJ. Factors affecting the incidence of postoperative wound infection. J Hosp Infect 1990;16:223-30.
16. Helder OK, Brug J, Looman CW, van Goudoever JB, Kornelisse RF. The impact of an education program on hand hygiene compliance and nosocomial infection incidence in an urban neonatal intensive care unit: An intervention study with before and after comparison. Int J Nurs Stud 2010;47:1245-52.
17. Boyce JM, Pittet D, Healthcare Infection Control Practices Advisory Committee. Society for Healthcare Epidemiology of America. Association for Professionals in Infection Control. Infectious Diseases Society of America. Hand Hygiene Task Force. Guideline for Hand Hygiene in Health-Care Settings: Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. Infect Control Hosp Epidemiol 2002;23 12 Suppl: S3-40.
18. Lynch P, Pittet D, Borg MA, Mehtar S. Infection control in countries with limited resources. J Hosp Infect 2007;65 Suppl 2:148-50.

How to cite this article: ???

Source of Support: Nil, **Conflict of Interest:** None declared.