KNOWLEDGE OF HEALTH CARE PROVIDERS OF A TERTIARY HOSPITAL REGARDING POST-OPERATIVE INFECTION

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ABSTRACT

Background: Infection is a very common post-operative complication. Now a day the knowledge about infection among healthcare provider is very essential. The study was aimed to determine the knowledge health care provider regarding the management of infection in postoperative ward.

Methods: The cross-sectional study was conducted among 90 respondents (60 doctors, 50 nurses & 40 supporting staff) from January 2015 to December 2015 in Dhaka Medical College and Hospital. A semi structured questionnaire was used to obtain socio-demographic data and infection management related information from the respondents through face to face interview. In-depth interviews were taken from director of DMCH, head of the department of surgery and nurse in-charge in post-operative ward for qualitative data. After collection data were complied, summarized and analyzed. The study was approved by ethical committee of National institute of Preventive and Social Medicine. Before collection of data, written permission was taken from the director of the selected hospital & take consent from the respondents.

Results: Among 150 respondents, 58% were female with 26-30 years age group. Most doctors were post-graduate & nurses were diploma in nursing. Most of doctors had knowledge about infections- 83.3% told bacterial as a type, 80% told devices as a source and 94% told diabetes as a risk factor. Both doctors and nurses had knowledge about the causes and mode of transmission of infection (90% doctors & 93.2% nurses told unsterile instrument), complication due to infection (100% doctors told sepsis & 86.7% nurses told wound become red & swelling), prevention (100% doctors &92% nurses told proper sterilization of instrument). Doctors (95%) and nurses (74%) known about infection control guideline and. Doctors (47.5%) and nurses (68%) received training about infection management Among 40 staff 80% were known about infection and they knew from their colleague. 82.5% staffs known about sterilization.

Conclusion: This finding had great impact for management of infection and it will be beneficial for all HCW to receive formal and periodic refresher trainings.

ORIGINAL ARTICLE

INTRODUCTION

Infection is the invasion of an organism's body tissues by disease causing agents, their multiplication, and the reaction of host tissues to these organisms and the toxins they produce. The invasion and multiplication of microorganisms such as bacteria, viruses, and parasites that is not normally present within the body. An infection may cause no symptoms and be subclinical, or it may cause symptoms and be clinically apparent. An infection may remain localized, or it may spread through the blood or lymphatic vessels to become systemic. Microorganisms that live naturally in the body are not considered infections. For example, bacteria that normally live within the mouth and intestine are not infections¹

In Bangladesh, a few studies have been conducted in this field. However, in 1990, the rate of hospital acquired infection was found 30% at Dhaka Medical College and Hospital which is quite high. It was found...
that increased frequency was due to overload of the wards by patients, overcrowding by visitors and breach of aseptic measures. In 2003, the rate the rate of infection was found as 11.34% in the DMCH, which reflect a better situation than before. However, the study result revealed that 38.2% patient with HAI had to bear the burden of extra charge because of long hospital stay.

The postoperative phase of the patient’s journey starts when the patient is transferred from the operation theatre to the post-operative ward. Postoperative care may include pain management and wound care. This begins immediately after surgery, for the duration of hospital stay, and may continue after discharge from the hospital. Part of postoperative care is awareness of the potential side effects and complications of procedure. Knowledge is a familiarity, awareness or understanding of someone or something, such as facts, information, descriptions, or skills, which is acquired through experience or education by perceiving, discovering. All health care providers like doctor, nurse & other supporting staff should have knowledge about post-operative infection. Every day they protect themselves, their patient & the public from infectious disease by washing their hands, using sterile techniques, following detail isolation procedures, re-processing patient care equipment, and overseeing the infection control practices of people they supervise.

Postoperative surgical patients are at risk of developing multiple types of hospital acquired infections. These include surgical site infections which can prolong hospital stay, cause morbidity, increase the cost of health care, and even lead to mortality. Other hospital-acquired infections affecting surgical patients include respiratory & urinary tract infections, methicillin-resistant Staphylococcus Aureus bacteraemia, antibiotic-related Clostridium Difficile enteritis & intravascular cannulae-related infections. All surgical wound are likely to become contaminated, usually by resident bacterial flora from skin or viscera. This may not be of clinical significance & contaminated wounds may go unnoticed, progression from wound contamination to clinical infection is largely determined by the adequacy of host defense, the most important immune mechanism of which is neutrophil phagocytosis which occurs during a crucial few hours intraoperative & after operation.

The CDC recommends that sterile techniques & supplies be used for any type of surgical incision. Care of the post-operative incision depending whether incision is closed by primary or secondary intention. Bacteria also are introduced into the wound with poor dressing change technique. Attempts to control infections in the wound bed present challenges to wound healing. Healthcare providers must be cognizant chemicals and techniques used to prevent infection. One of the most effective preventive measures is debridement of devitalized tissue, and necrotic debris must also be removed before topical antibiotics can be used. Another preventive measure is cleaning with nontoxic solutions & adequate force. Normal saline is effective when used with adequate forced to wash away the bacteria. Study has shown that a 35 ml syringe and a 19 gauze needle deliver the solution at 8 psi, adequate to remove bacteria.

Post-operative infection can cause pain; poor wound healing, need for further treatment including antibiotics, longer hospital stay, increase healthcare cost &. Sometime may cause death. It also can result in litigation for the healthcare providers. Ways to try to prevent these types of infection include giving antibiotics before a procedure, when appropriate, using an antiseptic solution to “prep” the area around a surgical incision; maintaining sterility of the surgical area & operating tools; and having operating room staff wear clean clothes, hats, masks.

**METHODS**

This study was a cross sectional study, carried out on a group of health care providers within a time frame of 12 months from 1st January to 31st December 2015 in Dhaka Medical College and Hospital.

The study population comprised of Doctor, Nurse, Word boy, MLSS. Non-probability purposive sampling technique is used for data collection. Due to time constraints, the sample size purposively fixed at 150. The number of doctors, nurses and supporting staff were selected by simple sampling. 60 doctors, 50 nurses and 40 supporting staff such as ward boy, aya, MLSS, Sweeper were selected as study population.

Face to face interview will be performed using a standard questionnaire; in-depth interview & check list fill up by observation, A Semi structured interview questionnaire was developed in both English and Bengali. But the Bengali questionnaire was used. The questionnaire was developed using the selected variables according to the specific objectives. Mixed method approach was applied for collection of data. Three in-depth interviews were taken from the service providers at management level for qualitative data. A checklist was used to verify some of the components related to the thesis. There were 80 questions most close ended that made it easier to analyze the data, responses to each of which were coded. A coding box, where the coding number for each of the responses would be entered, was inserted for each question. Collected data were checked and verified at the end of work. In depth interview was conducted among
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director, head of the department of surgery and nurse in-charge regarding infection management and the duration of the interview ranged from 15-20 minutes. The questionnaire was pre-coded for entry into the software SPSS Statistics software (version 20) and data was analyzed. An analysis plan was developed keeping in view with the objective of the study. Every data were presented by MS word, Excel, table, graph, chart and then interpretation done using SPSS version 20.

The study was approved by ethical committee of National institute of Preventive and Social Medicine. Before collection of data, written permission was taken from the director of the selected hospital. Before initiation of the data collection a brief introduction on the aims of the objectives of the study was given to the respondents. They were informed about their full right to participate or refuse to participate in the study. The researcher also assured the respondents that there was no invasive procedure included in the study and all the findings of the study would be for the research purposes only. Complete assurance was given to them that all information by them would be kept confidential. After completion of these procedures data collection was with their consent.

RESULTS

Among 150 respondents the female respondents were 58% & 22.7% respondents were aged between 26-30 years. Mean = 34.71; (SD = ± 9.448) (Table-1)

| Characteristics | Frequency | Percent |
|-----------------|-----------|---------|
| Sex             |           |         |
| Male            | 63        | 42.0    |
| Female          | 87        | 58.0    |
| Age (years)     |           |         |
| 26-30           | 34        | 22.7    |
| 31-35           | 24        | 16.0    |
| 36-40           | 20        | 13.3    |
| 41-45           | 21        | 14.0    |
| 46-50           | 14        | 9.3     |
| >50 yea         | 10        | 6.7     |
| Total           | 150       | 100.0   |

Mean = 34.71; (SD = ± 9.448).

Among 150 respondents, majority 26% respondents were post-graduation doctors & followed by 20.7% were diploma in nursing, 14% were MBBS, 12.7% were BSc in nursing, 6% can sign only, 5.3% SSC passed, 5.3% were 1-5 class, 5.3% were 6-10 class, 2.7% were HSC passed and 2% only graduate (Table-2). Among those respondents 30% were doing the job in this hospital about 1-2 years (Chart-1) & 52.7% respondents working time were 7-8hrs.

| Position       | Education       | Frequency | Percent |
|----------------|-----------------|-----------|---------|
| Supporting staff| Can sign only   | 9         | 6.0     |
|                | 1-5 class       | 8         | 5.3     |
|                | 6-10 class      | 8         | 5.3     |
|                | SSC passed      | 8         | 5.3     |
|                | HSC passed      | 4         | 2.7     |
|                | Graduate        | 3         | 2.0     |
| Nurses         | Diploma in nursing | 31   | 20.7   |
|                | BSc in nursing  | 19        | 12.7    |
| Doctors        | MBBS            | 21        | 14.0    |
|                | Post graduate doctor | 39  | 26.0    |
| Total          |                 | 150       | 100.0   |
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Among 60 doctors and 50 nurses most 90% known about the post-operative complication. Among 54 doctors 92.6% respondents & among 45 nurses 77.8% respondents told infection as a post-operative complication.

(Table-3).

Table: 3 Distribution of doctors & nurses by knowledge to the post-operative complication

| Post-operative Complication | Doctors (n=54) | Nurses (n=45) |
|-----------------------------|---------------|---------------|
|                            | (f) | %  | (f) | %  |
| Fever                      | 49  | 90.7 | 31  | 68.9 |
| Pain                       | 40  | 74.1 | 31  | 68.9 |
| Infection                  | 50  | 92.6 | 35  | 77.8 |
| Blood clots                | 44  | 81.5 | 22  | 48.9 |
| Fatigue & weakness         | 50  | 92.6 | 26  | 57.8 |
| Delirium                   | 25  | 46.3 | 26  | 57.8 |
| Operational injury         | 31  | 57.4 | 27  | 60.0 |
| UTI                        | 46  | 85.2 | 23  | 51.1 |
| Irregular wound healing    | 42  | 77.8 | 27  | 60.0 |

(Multiple Responses) n = 54+45

The table-4 shows all doctors were know about the type & source of infection. Among them 83.3% told bacterial as a type & 80% told devices as the source of infection. Among 60 doctors 83.3% were known about the risk factors of infection &94.3% told diabetes as a risk factor.

Table: 4 Distribution of Doctors by the knowledge about type & source of infection

| Characteristics   | Yes | No |
|-------------------|-----|----|
|                   | (f) | %  | (f) | %  |
| Type              |     |    |     |    |
| Bacterial         | 50  | 83.3 | 10  | 16.7 |
| Viral             | 45  | 75  | 15  | 25  |
| Fungal            | 29  | 48.3 | 31  | 51.7 |
| Parasitic         | 31  | 51.7 | 29  | 48.3 |
| Source            |     |    |     |    |
| Environmental     | 41  | 68.3 | 19  | 31.7 |
| Devices           | 48  | 80.0 | 12  | 20.0 |
| Personnel         | 37  | 61.7 | 23  | 38.3 |

(Multiple Responses) n=60

The table-5 shows among 60 doctors them all & among 50 nurses majority 86% had knowledge about the causes of infection. Majority 85% (doctor) & 62.8% (nurse) told if instrument is not sterile properly as a cause of infections. Among all doctor 90% told by infectious patient & 88% nurse 93.2% told by unsterile instrument as a mode of transmission of infections.
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Table: 5 Distribution of Doctors and Nurse by the knowledge about Causes & mode of transmission of infection

| Characteristics                      | Doctors (n=60) | Percent | Nurses (n=43) | Percent |
|--------------------------------------|----------------|---------|---------------|---------|
| By cross-infection                   | 51             | 85.0    | 25            | 58.1    |
| If instrument is not sterile properly| 51             | 85.0    | 27            | 62.8    |
| The hospital environment is unclean  | 38             | 63.3    | 21            | 48.8    |
| If waste do not manage properly      | 25             | 41.7    | 15            | 34.9    |
| Any error due to operation           | 23             | 38.3    | 13            | 30.2    |
| Do not take proper care after operation| 36          | 60.0    | 18            | 41.9    |
| More visitors                        | 43             | 71.7    | 18            | 41.9    |

Mode of transmission Doctors (n=60) Nurses (n=44)

| Mode of transmission | Frequency | Percent | Frequency | Percent |
|----------------------|-----------|---------|-----------|---------|
| By infectious patients| 50        | 83.3    | 39        | 88.6    |
| By unsterile instrument | 54    | 90.0    | 41        | 93.2    |
| By air with sneeze & cough | 47    | 78.3    | 17        | 38.6    |
| By needle             | 48        | 80.0    | 16        | 36.4    |
| By waste              | 32        | 53.3    | 26        | 69.1    |
| By blood              | 50        | 83.3    | 27        | 61.4    |

The table 6 shows among 60 doctors 83.3% were known about the risk factors of infection. Among 53 respondents 94.3% told diabetes as risk factors of infections.

Table: 6 Distribution of Respondents according to the risk factor of infection

| Risk factor                        | Doctors (n=53) | Percent | Nurses (n=45) | Percent |
|------------------------------------|----------------|---------|---------------|---------|
| Obesity                            | 33             | 62.3    |               |         |
| Diabetes                           | 50             | 94.3    |               |         |
| Older age                          | 35             | 66.0    |               |         |
| Emergency operations               | 46             | 86.8    |               |         |
| Need more time for complex operation| 41           | 77.4    |               |         |
| Using lifesaving drug before operation | 21        | 39.6    |               |         |

The table 7 shows among 60 doctors & 50 nurses 90% known about the complication of infection. 100% doctors told sepsis & 86.7% nurses told wound become red & swelling.

Table: 7 Distribution of Respondents among Doctors and Nurse by the knowledge about complication due to infection

| Complication of infection | Doctors (n=54) | Percent | Nurses (n=45) | Percent |
|---------------------------|----------------|---------|---------------|---------|
| Rapid heartbeat           | 45             | 83.3    | 24            | 53.3    |
| Sepsis                    | 54             | 100.0   | 37            | 82.2    |
| Hypotension               | 41             | 75.9    | 33            | 73.3    |
| Hypertension              | 41             | 75.9    | 33            | 73.3    |
| Wound become red & swelling | 47            | 87.0    | 39            | 86.7    |
| Delayed wound healing     | 47             | 87.0    | 38            | 84.4    |
| The wound Stitch opening  | 27             | 50.0    | 22            | 48.9    |
| Secondary infection       | 38             | 70.4    | 38            | 84.4    |

The table 8 shows among 60 doctors 95% known about the infection control guideline and among 50 nurse 74% were know about the infection control guideline.
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Table: 8 Distribution of Respondents among Doctors and Nurse by the knowledge about infection control guideline

| Knowledge          | Doctors (n=60) | Nurse (n=50) |
|--------------------|---------------|--------------|
|                    | Frequency | Percent | Frequency | Percent |
| Yes                | 57        | 95.0     | 37        | 74.0    |
| No                 | 3         | 5.0      | 13        | 26.0    |
| Total              | 60        | 100.0    | 50        | 100.0   |

The table 9 shows that among 60 doctors 100% respondents had knowledge about prevention of the infection. Among them all respondents 100% told proper sterilization of instrument & everybody use PPI as a prevention of infection. Among 50 nurses 100% respondents were know about prevention of the infection. Among them most respondents 92% told proper sterilization of instrument as a prevention of infection.

Table: 9 Distribution of Doctors and Nurse by the knowledge about prevention of infection

| Prevention                        | Doctors (n=60) | Nurse (n=50) |
|-----------------------------------|---------------|--------------|
|                                   | Frequency | Percent | Frequency | Percent |
| Proper sterilization of instrument| 60      | 100.0    | 46        | 92.0    |
| Keep infectious patient separately| 55      | 91.7     | 41        | 82.0    |
| Keep hospital clean               | 53      | 88.3     | 36        | 72.0    |
| Everybody use PPI                 | 60      | 100.0    | 39        | 78.0    |
| Proper management of waste        | 25      | 41.7     | 31        | 62.0    |
| Take proper pre-operative & post-operative care | 36 | 60.0 | 34 | 68.0 |

(Multiple Responses)

The table 10 shows 46.7% doctors & 68% nurses got training about infection control. Among 60 respondents 80% & among 50 nurses 66% told there had no training facility in this hospital. Among 28 doctors & 34 nurses who got training 47.1% doctors & 46.4% nurses received <1 week training. Maximum 28.6% doctors & 38.2% nurses received training 1 month ago.

Table: 10 Distribution of doctors & nurses according to got training about infection control & by the knowledge about training facility present in the hospital

| Training                          | Doctors (n=60) | Nurse (n=50) |
|-----------------------------------|---------------|--------------|
|                                   | Frequency | Percent | Frequency | Percent |
| Got training about infection      |            |         |           |         |
| Yes                               | 28        | 46.70   | 34        | 68.0    |
| No                                | 32        | 53.30   | 16        | 32.0    |
| training facility present in the hospital |    |         |           |         |
| Yes                               | 12        | 20.0    | 17        | 34.0    |
| No                                | 48        | 80.0    | 33        | 66.0    |
| Total                             | 60        | 100.0   | 50        | 100.0   |

The table 11 shows among 40 supporting staff 80% had knowledge about infection occurred in post-operative ward. Among 32 respondents who knew about infection 46.9% known by listen from other staff. Among 40 respondents 82.5% knew about the sterilization process.
DISCUSSION

This study revealed that among 150 respondents 40% respondents were doctors, 33.3% were nurse and others were supporting. The female were 58%, more than male. These finding were lower in the contrast of the study conducted by Dr. Garballiyasu. From the present study it is evident that maximum respondents were in the 26–30 years age group and the percentage was 22.7%. Their mean was 34.71; (SD = ± 9.448). The mean age of this study is almost same as the contrast of the study conducted by Dr. Garballiyasu.

In the study it was very much encouraging that among doctors, the majority (26%) completed the post-graduation but the majority (20.7%) of nurses possessed only diplomas. These finding are low in contrast with the findings of a study conducted in Bangladesh by Sickder HK where 93.3% were completed diploma in nursing. Among the supporting staff only 6% can sign only and others are literate. For nursing education in Bangladesh, curriculum in both diploma and bachelor degree in nursing and for supporting staff should educated and trained include general principle of infection control that increase the level of knowledge. Among 150 respondents 30% doing job in the hospital from 1-2 years and 52.7% respondents working time were 7-8hrs. Maximum 67.3% respondents had no personal habit and who have personal habit among them 46.9% are smoker and eating betel leaf.

Among 60 doctors they all were know about the type of infection. Among those respondents 83.3% told bacterial type is the most common type of infection occurred in post-operative ward and few were say others types like viral, fungal & parasitic. Majority respondents 80% told devices as the common source of infection, infection can also have occurred from environmental (68.3%) and personnel (61.7%) source.

In this study 100% doctors known about the causes and mode of transmission of infection but majority (86%) of nurses were known about the causes and 88% are known about the mode of transmission of infection. Majority doctors 85% told by cross-infection & if instrument is not sterile properly as a cause and 90% told by unsterile instrument as a mode of transmission of infections. On other hand maximum nurses 62.8% told if instrument is not sterile properly as a cause and 93.2% told by unsterile instrument as a mode of transmission of infections. According their knowledge nurses has some lacking. So if maintain sterility then we can reduce the chance of infection.

From this study it clearly finds that most 90% doctors and nurses known about the post-operative complication. Among them 92.6% doctors, 77.8% nurses mention infection as the most common post-operative complication and it mainly starts from postoperative ward after operation if not properly manage. Due to infection many complication are arise from those 100% doctors told sepsis and 86.7% told wound become red & swelling as a complication of infection.

For occurring infection some risk factors were responsible and 83.3% doctors had knowledge about those risk factors, the most 94.3% told diabetes as most vulnerable risk factors of infections. So for diabetes patients we should take extra care both preoperative & postoperative. For identify infection some test done, 93.3% doctors done those tests and 100% done blood test primarily for detect infection.

From the present study it is evident that 95% doctors and 74% nurses are known about the infection control guideline. A study was conducted by Zafar et al where two third of the respondents were familiar with the guideline or protocol. On other hand 85% doctors told that there had no written protocol about infection in this hospital.

Prevention is better than treatment and Infection can manage if prevention is taken. The present study shows 100% respondents were known about the prevention of infection. Among them all respondents 100% told infection can prevent by proper sterilization of instrument & if everybody properly uses personal protective equipment like hand gloves, mask, apron, cap etc.

From the present study it is evident that among 60 respondents 46.7% and among 50 respondents 68% got training about infection control. Training course duration is <1 week among 46.4% and 47.1% respondents. Only 28.6% doctors and 38.2% nurses

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Table: 11 Distribution of Supporting staff of knowledge regarding post-operative infection

| Media of knowledge          | Frequency | Percent |
|-----------------------------|-----------|---------|
| By training                 | 11        | 34.4    |
| By watching television      | 4         | 12.5    |
| By listen from others staff | 15        | 46.9    |
| By reading book             | 2         | 6.3     |
| Total                       | 32        | 100.0   |

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do training 1 month ago. 80% doctors and 66% nurses told there had no training facility in this hospital. Finding related to received infection control training of nurses slightly higher than the findings of a study conducted by Sickder HK. From this study we find that the health care providers have lacking’s of training and they must receive more training. The hospital authority should give the training facility by arraigned effective training program in the hospital and establish a training institute.

From this study it was found that among 40 staff most of them are not so educated and well trained but 80% of them had knowledge about infection occurred in post-operative ward and 46.9% of them known by listen from other staff in the hospital.

CONCLUSION

Comparing the findings of the present study at Dhaka Medical College and Hospital with that of the previous studies it is evident that the occurrence of the Infections is lower than that of the previous study. In spite of this attention should be given to operation theater and post-operative wards, because surgical wound infection was still found on the top of the list among all Hospital. Therefore, regular study like this will help to guide hospital for quality control policy. Recent improvements in antibiotic prophylaxis, including the timing of initial administration, appropriate choice of antibiotic agents, and shortening the duration of administration, have established the value of this technique in many clinical surgical settings. Future study designs should strongly consider risk factors for individual patients when new antibiotic agents are tested. The study gave rise to the recommendation on the basis of the study finding to improve the knowledge of infection that is Education and training program should be conducted to improve to improve knowledge and practice of health care providers specially for supporting staff & establish a written protocol about infection control in every hospital.

REFERENCE

1. Medicine Net, (2016). Infection. [online] Available at: http://www.medicinenet.com/script/main/art.asp?articlekey=12923 [Accessed 5 Jan. 2016].
2. Hossain, T. "Nosocomial Infection-A Cross sectional Study In The Surgical Wards Of Dhaka Medical College And Hospital", Journal of Preventive and Social Medicine 10(2) (1991): 69-73
3. Khan, HM, and AK Miah. "Outcome Of Hospital Aquired Infections In A Hospital Of Dhaka City". Journal of Preventive and Social Medicine 22(2) (2003): 45. Print.
4. Atyah, HH, KM Khudhur, and SA Hasan. "Evaluation OfNurses' Practices Toward Postoperative Wound Dressing In Surgical Wards", Iraqi national journal of nursing specialties 1 (2012): 25
5. Gifford, C, N Christelis, and A Cheng."Preventing Postoperative Infection: The Anaesthetist's Role". ContinEducAnaesthCrit Care Pain 11.5 (2011): 151-156
6. Scardillo, J. "Managing Tubes and Drain: Considerations for Infection Control". Prevention and treatment of surgical-site infections Editor: Tomasselli N 2.1 (1980).
7. Iliyasu, Garba et al. "Knowledge and Practices of Infection Control Among Healthcare Workers in A Tertiary Referral Center in North-Western Nigeria". Ann Afr Med 0.0 (2015)
8. Ayliffe, G, and M English. "Hospital Infection: From Miasbas to MRSA". Cambridge university press, Cambridge (2003)
9. Berared, F, and J Gordon. "Postoperative Wound Infections. The Influence of Ultraviolet Infections of the Operating Room and Of Various Other Factors". Ann surg160.1-132 (1964)
10. Best, M. "Ignaz Semmelweis and The Birth of Infection Control". Quality and Safety in Health Care 13.3 (2004): 233-234
11. COHEN, BEVIN et al. "Factors Associated With Hand Hygiene Practices In Two Neonatal Intensive Care Units". The Pediatric Infectious Disease Journal 22.6 (2003): 494-498
12. Exner, Martin, Philippe Hartemann, and Thomas Kistemann. "Hygiene and Health” The Need For A Holistic Approach”. American Journal of Infection Control 29.4 (2001): 228-231
13. Garcia-Zapata, Mary Rocha-Carneiro et al. "Standard Precautions: Knowledge and Practice Among Nursing and Medical Students In A Teaching Hospital In Brazil". International Journal of Infection Control 6.1 (2010)
14. Infection control (2010) Wikipedia, the free encyclopedia. [online] Available from: http://en.wikipedia.org/wiki/Infection control [accessed 10 September 2011].
15. Postoperative infections(2010)Specification Manual for Joint Commission National Quality Core Measure [online] Available from: http://manual.jointcommission.org/releases/archive/TJC2010/DataElem0108.html[accessed 12 June 2012].

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