Hospital Infections, Cost and Benefits of Control Program

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Abstract

*The "Hospital - Nosocomial infection" is taken 48 -72 hours after admission of the patient in the hospital and that appears clinically with increasing temperature after the third day of hospitalization. Here are not included diseases that have an incubation period before hospitalization but only those getting another infection in the hospital during the stay. Nosocomial infection is an indicator of quality of service in our hospital facilities. "Nosocomial" - from Greek" Nosos - disease" and "Komein - care". The increasing percentage nosocomial infections is dedicated to more frequent application of catheterization and extended number of instruments usage in invasive techniques. Patients most likely to be affected by nosocomial infections are: **vulnerable** or **frail** patients. Operated patients, burned patients, patients with neoplasia, patients under chemio-therapeutic treatment , patients using steroids and undergoing radiation, patients with diabetes , catheter wearing patients, patients under dialysis, patients with immunodeficience. Control of infections in health care Institutions is a standard of quality and has a crucial role for the welfare and safety of patients, healthcare workers and visitors. 10% of patients hospitalized in acute care can have intra hospital infection. This group of infections belong to the 10-60% of infections, which may occur after discharge the patient from the hospital. Hospital infections constitute a significant factor of morbidity and mortality, so they should be strictly controlled as part of patient care.. Hospital infections have considerable * economic * influence in hospital services and health care costs nationally.*

Keywords: *Nosocomial infection", pathogenic organism, hospital cost.*

I. Introduction

Infection is defined as presence of a pathogenic organism in tissues or liquids of the human body, accompanied by the presence of a clinical effect (local or systemic). Must distinguish from colonization that includes the presence of the organism without clinical signs.

The "Hospital - Nosocomial infection" is taken 48 -72 hours after admission of the patient in the hospital and that appears clinically with increasing temperature after the third day of hospitalization. Here are not included diseases that have an incubation period before hospitalization but only those getting another infection in the hospital during the stay. Nosocomial infection is an indicator of quality of service in our hospital facilities. "Nosocomial" - from Greek" Nosos - disease" and "Komein - care". According to the progression

and development in time of physio-pathologic process of infection , nosocomial infections are divided into:

Early infection development after 48 hours of hospital admission. **Late** infection which is developed after 5-th day of hospitalization. The increasing percentage nosocomial infections is dedicated to more frequent application of catheterization and extended number of instruments usage in invasive techniques. Patients most likely to be affected by nosocomial infections are: **vulnerable** or **frail** patients. Operated patients, burned patients, patients with neoplasia, patients under chemio-therapeutic treatment , patients using steroids and undergoing radiation, patients with diabetes , catheter wearing patients, patients under dialysis, patients with immunodeficience.

2. The purpose of the study

- Knowing the rate of nosocomial infection in the University Hospital Center.
- Specification and analysis of their bacterial origin.
- Determining their structure at the level of clinical units at UHC
- Identification of each bacterial isolate responsible for hospital infection.
- The cost of hospital infections and benefits from infection control program.

Based on the administrative division of the University Hospital Center the study was performed in following clinical:

Urology and Nephrology
General Surgery and Surgery Intensive Unit Care (ICU)
Burning & Plastic Surgery and Endocrinology
Oncology and Cardiosurgery
Neurosurgery
Pediatrics (ICU) and dermatology

3. Study Methodology

The study is **punctual** or **transversal** where the specimens in given clinical unit are gathered within the day following the agenda for the afore mentioned Clinical Services (1 week-1 Service). For collection and storage of clinical specimen for testing, a protocol was compiled. Main source of information was use of clinical patient schedule (Card). Isolation and identification of strains was performed related to Laboratory protocols.

4. Results

Of 177 clinical samples examined 86 of them resulted positive for the presence of various bacterial isolates.Types of microorganisms isolated from tested samples

Escherichia coli	19	10.7%
Pseudomonas aeruginosa	15	8.5%
Enterococcus cloacae	14	7.9%
Staphylococcus aureus	13	7.3%
Klebsiella pneumoniae	7	4%
Acinetobacter baumanii	5	2.8%
Proteus mirabillis	4	2.3%
Enterobacter aerogenes	3	1.7%
Morganella morgani	3	1.7%
Enterococcus faecalis	2	1.1%
Streptococcus viridans	1	0.6%
Total	86	48.6%

Distribution of clinical samples obtained by services

Nr	Clinic Service	Nr of Samples
1	Internal Medicine	37
2	Surgery	57
3	Pediatrics	15
4	Burning & Plastic Surgery	11
5	Surgery ICU	15
6	Cardiosurgery	12
7	Oncology	18
8	Neurosurgery	12
9	TOTAL	177

Categorization of infection

Category 0 (zero)-infection develops within first 48 hours. That category is not classified as Nosocomial Infection (NI)
Category I (a) infection develops between day 2 and 4 of hospitalization
Category 2 (two) infection develops between day 5 and 10 of hospitalization
Category 3 (three) infection developed after day 10 of hospitalization

Nr cases of infection observed in our study by categorization

Category	Nr. Cases	Percentage
0	97	54.8%
I	25	14.1%
2	23	13%
3	31	17.5%
Total	176	99.4%
No Categorisation	I	0.6%
Total	177	100%

Of 177 samples examined, 86 resulted positive for NI causing microorganisms. Among 86 positive samples only 48 belongs to patients with nosocomial infections either early and late, other 37 samples were not included in nosocomial infections.

Relatively high prevalence of 27.1% is explained by the facts that are included in the study only risk services and not all of the hospital.

Of 29 Hemocultures resulted positive 5 or 17.24% of them
Of 42 Urocultures resulted positive 9 or 21:42% of them.
Of 69 Urinary catheters resulted positive 48 or 69.56% of them.
Of 33 Matter cultures resulted positive 23 or 69.7% of them.

So as evidenced, infections associated with urinary catheters constitute the largest share of infections, then those of operator wounds, less urinary infections in patients not catheterized and subsequently sepsis. Service related is evidenced highest rate of infections in Oncology, Neurology ICU, ICU of Burning & Plastics Surgery and Urology.

Control of infections in health care Institutions is a standard of quality and has a crucial role for the welfare and safety of patients, healthcare workers and visitors. 10% of patients hospitalized in acute care can have intra hospital infection. This group of infections belongs to the 10-60% of infections, which may occur after discharge the

patient fromthe hospital. Hospital infections constitute a significant factor of morbidity and mortality, so they should be strictly controlled as part of patient care..

Hospital infections have considerable * economic * influence in hospital services and health care costs nationally. Economic consequences of hospital infections could have the following results:

N.I. by extending the length of stay in hospital lead in setting up costs * hotel *. The patient carries additional costs due to absence at work. Families spend time and money in coming to the hospital to visit the sick.
Emerging infections cause an increase in treatment spending (additional drug therapy, different curative procedures).
N.I. Additional need for research and radiological laboratory for diagnostic purposes.
Addition spending for controlling I.S. including epidemiological and medical research, time spent nurses and managers.
N.I. often are subject to judicial denunciations, whose costs can be high.

Direct Cost

 Includes hospital costs rather than real cost which is difficult to obtain.
 Consists more cost comparison between infected with uninfected patients.
 Severe ill patients have not only a greater risk for IN development but also for more complications, increasing the overall cost.
 Influencing factors are age, sex, pregnancy, major diagnosis.

Indirect Cost

 Includes the cost of personal income, the cost of training employees to deal with the patient.
 Reduced labor productivity in these working places is the main impact of indirect costs.
 Changes in medical practice (when replacing antibiotics commonly used with the most expensive due to nosocomial multi resistant prevalence).

Loss from suffering, pain, disability and premature death.

Hospital Cost

As long as the cost of hospital nosocomial infections passes to a third party (the state or health insurance) is difficult to calculate profit &loss of infection control program. One hospital can evaluate N.I. cost by calculating the index of hospital stay time, additional costs for treatment of nosocomial infections group.

Assessment of the Cost-Effectiveness

Centre for the control of hospital infections has found that 1/3 of N.I. can be prevented by an effective program of infection control. A hospital in the U.S. with a capacity of 250 beds that has primary and secondary service has about 12,000 a year hospitalized patients of which about 5500 undergo surgery. The hospital may have 713 infections per year with no control program and only 487 under effective infection control program. Hospital costs to cover these infections are $ 800,000. Effective program of infection control saves $ 250,000 per year. A hospital with 700 beds with an efficient control of infections could save $ 1,000,000 per year.

Data Q.S.U.T. For the cost of I.N.

 Prevalence project data in 2008 show an infection rate by 47% to PIC (peripheral intravenous catheters), where the surgical service has the following indexes:

Clinic I	2108 hospitalizations	8357 Leke (cost per day)
Clinic II (Urology)	1484	3180
Infantile Surgical Clinic	229	3026
Clinic III	2317	5324
Central ICU.	176	3727
Burns&Plastic	1589	5710
Cardiovascular Surgery	1064	5439

 Counting 8 additional days of stay / for each admission multiplied by the daily cost with the percentage of infection found PIC, additional costs for hospital infections in QSUT are:

Additional Costs For H.I

Clinic I	66,234,239	leke (8 days 47%)	
ALL Clinic II	17,741,8568	leke	days 47%
Kir.inf Clinic	2.604.708.8		
Clinic III	46,378,428		
Central ICU	20,990,583		
Burns&Plastic	35,820,954		
Cardiovascular Surgery	21,677,678		
TOTAL ALL	11.448.446.8		

Q.S.U.T. Budget for 2008 was 882,625,000

With the introduction efficient infection control, reduced by 1/3 of hospital infections cost values, then the above figures are reduced by 70.482.815.6 ALL (savings).

5. Conclusions

 In this calculation (with 47% of IN) value for the coverage of hospital infections in surgical and Intensive Care Unit constitutes 24.19% of the total budget.
 In case of well functioning of the control and prevention of nosocomial infections, it's valued cost savings for N.I. ranges at 8.06 % (About 47% I.N).

References

Archibald l, Philips l, Monnet D, Mcgowan Je Jr , Tenover F, Gaynes R. (1997) Antimicrobial resistence in isolates from patients and outpatients in the united states: The increasing importance of the intensive care unit. Clin infect dis 24:211-5.

Basetti D. Schiton G. (1981) Le infezioni nosocomiali da gram-pozitivi.masson. Milano ;1, 2, 68, 79, 98.

Collins.C.H. and Lyne Patrica, (1976) The Gram-Negative Norsporing Rods; Pseudomonas, Microbiological Methods Boston-London,

Cruickshank R., (1986) Medical microbiology tests employed in bacterial, identification p. 813 Edinburgh and London,

Liendo P., Morlo A., Cisterna R. (2000) Susceptibility of staphylococcu to different antimicrobia lagents in spain. clinikal mikrobiology and infection.suplement 1, 6:10.

Pitzurra M., Pasquerella C., Savino A. (1993): La contaminacione microbica nell'aria atmosferica delle sale operatorie. (rischi , valutazione, normative,prevenzione).ig.mod., 100, 713-67.

WHO (1981) Report of scientific group Geneva, Surveillance: control and prevention of hospital acquaired nozocomial infection.