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Epidemiological and Microbiological Profile of Nosocomial Infection in Taif Hospitals, KSA (2010-2011)

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Abstract: The nosocomial infection rate within the study period (January 1 - December 31, 2010) was highest during January and lowest during December, while it was highest during May and August and lowest during January in 2011. The investigated 170 specimens for nosocomial infection showed that 51.7 and 48.3% had community-acquired and nosocomial infection, respectively. Nosocomial infection included respiratory tract infection (RTI) 32.3%, urinary tract infections (UTI) 25.3%, blood infections (BI) 18.2% and surgical site infections (SSI) 12.9%.The predominant Gram-positive isolates (31.7%) were methicillin resistant *Staphylococcal aureus* (*MRSA)* 10.2%, coagulase negative *Staphylococcal* (*CNS)* 8.5% and *Staphylococcal aureus (SA)* 7.4%. The predominant Gram-negative isolates (66.3%) were *Escherichia coli* (*E. coli)* 22.3%, *Pseudomonas areoginosa (PA)* 17.6% and *Klebsiella pneumoniae (KP)* 9.9%. *Candida spp.* represented 2% of total isolates. *E. coli* was the commonest isolate from UTI 47.7%, followed by *KP* 15.1% and *PA* 8.1%. RTI isolates were *PA* 44.4%, *MRSA* 14.8% and *Acinetobacter spp*. 12%. BI isolates were *KP* 23.3%, *CNS* 16.7% and *E. coli* 15%. SSI isolates were *E. coli* 25.6%, *MRSA* 18.6% and *MSSA* 14%. Anti-microbial sensitivity patterns were studied for various micro-organisms, pointed that, *Acinetobacter spp*. and *MRSA* were highly sensitive to Imipenem 88.6% and Vancomycin 98.5% respectively. *E.coli* were highly sensitive to most of the antimicrobial agents except Ampicillin 26.6%.

Abbreviations:
NNIS : National Nosocomial Infections Surveillance.
HAI : Hospital-Acquired Infections.

Key words: NNIS · HAI · ICU · *MSSA* · *Strept* · *Spp.* · NUTI

INTRODUCTION

NNIS defines nosocomial infection as a localized or systemic condition that results from adverse reaction to the presence of an infectious agent(s) or its toxin(s) and that was not present or incubating at the time of admission to the hospital [1]. Nosocomial infections have been recognized for over a century as a critical problem affecting the quality of health care and a principal source of adverse healthcare outcomes [2].

Nosocomial infections, also known as HAI, is an infection whose development is favored by a hospital environment, such as one acquired by a patient during a hospital visit or one developing among hospital staff. Such infections include fungal and bacterial infections and are aggravated by the reduced resistance of individual patients [3]. In the USA where roughly 1.7 million hospital-associated infections, from all types of micro-organisms, including bacteria, combined, cause or contribute to 99,000 deaths each year. In Europe, where hospital surveys have been conducted, the category of Gram-negative infections is estimated to account for two-thirds of the 25,000 deaths each year. Nosocomial infections can cause severe RTI and UTI, BI and diseases of other parts of the body. Many types are difficult to attack with antibiotics and antibiotic resistance is spreading to Gram-negative bacteria that can infect people outside the hospital [4]. The best way for health care workers to overcome this problem is acting right hand hygiene procedures, this is why the WHO launched in 2005 the Global Patient Safety Challenge [5].

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In developed countries, it constitutes from 5-10% of patients admitted to acute care hospitals [6, 7]. The attach rate for developing countries exceeds 25% [8]. Such hospital-acquired, or nosocomial, infections added to the morbidity, mortality and had cost expected from the patient's underlying diseases alone [9, 10].

The development of a nosocomial infection is a chain of events, which is influenced by the microbe, transmission route and patient him/herself [11]. The organisms causing most nosocomial infections usually come from the patient's own body (endogenous flora) [12]. They can also come from contact with staff (cross-contamination), contaminated instruments, needles and the environment (exogenous flora) [12].

Most nosocomial infections are inevitable risks related to treatment. Due to the improvements in the treatments of serious diseases, there are more and more patients whose resistance to infection is severely reduced. Simultaneously, modern treatments necessitate the use of intravenous catheters, urinary catheters, respirators, haemodialysis, complicated operations, cortisone therapy and other factors, which depress the resistance mechanisms and make patients susceptible to infections [13].

Most nosocomial infections are not related to outbreaks, but occur constantly as sporadic cases [14]. Surveillance for nosocomial infections is the corner-stone of prevention and control [15]. The objectives of the current study were to define how many and what kind of nosocomial infections are occurring, what are the causative microbes and what kind of drugs can be used in treatment of infection at general hospitals, Taif, Saudi Arabia during 2010-2011 as a model of hospitals from a developing country.

MATERIALS AND METHODS

A list of all general governmental and private hospitals in Taif was prepared. Using a simple random technique, one governmental hospital and one private hospital were selected for the study. Official approval from directors of the two selected hospitals has been obtained, after clarification of the aim of the study and assuring the confidentiality to them.

Criteria for Diagnosis: Generally, the information used to determine the presence and classification of an infection was a combination of clinical findings and results of laboratory and other tests [(x-ray, ultrasound, computed tomography (CT) scans, biopsies, magnetic resonance imaging (MRI), or endoscopic procedures)].

Nosocomial infection was defined as infection obtained more than 72 hours after being admitted to a hospital, while infection obtained within 48 hours of admission to a hospital was defined as community-acquired infection. The diagnosis of UTI was done according to the two criteria defined by the CDC (Centers for Disease Control and Prevention) in the USA [12]. Blood stream infection was defined as a patient with a clinically important blood cultured positive for bacteria or fungi [8]. The criteria for diagnosis of pneumonia were clinical (fever, cough and development of purulent sputum) in combination with radiological evidence of a new or progressive pulmonary infiltrate with cultured of sputum or tracheal specimens [12]. The SSI used superficial incision infections, infections of the deep incision space and organ space infections were diagnosed according to CDC [16].

Methods

Determination of Overall Annual Rates of Nosocomial Infections: Hospital records, providing the number of patient's days each month and the numbers of nosocomial infections (crude and site specific) each month, were reviewed. The overall annual rates of nosocomial infections during the period from January 2010 to December 2011 were calculated by dividing the total number of nosocomial infections pooled throughout all months by the total number of patients days multiplied by 1000. Critically ill patients (those admitted to medical ICU, surgical ICU, nursery ICU, or burn ICU), were treated as a separate group. Overall rates were calculated for this particular group.

Isolation and Identification of Causative Organisms: Different strains of bacteria were isolated and identified using standard methods [17].

Antibiotic Sensitivity Test: An antibiotic sensitivity test was done according to Kirby-Bauer disc diffusion technique [18]. A series of antibiotics-impregnated paper disks were placed on a plate inoculated to form a bacterial lawn. The plates were incubated to allow growth of the bacteria and time for the antibiotics to diffuse into the agar. The size of zone of growth inhibition depends on the sensitivity of the bacteria to the specific antibiotic and the antibiotic's ability to diffuse through the agar. The Kirby-Bauer test was carefully standardized where a special agar, Muller-Hinton agar was used along with a prescribed inoculums of broth. The antibiotic disks were also standardized to contain a specific amount of antibiotic. After 18-25 hours of incubation at 35°C-37°C,

the clear zones were measured in mm. These were compared with tables giving the interpretation measurement for each antibiotic.

Statistical Design: Data were analyzed by using SPSS, 18 version. Number and percentage were utilized for data description. Nosocomial infection rate was calculated by dividing number of cases by the total number of patients` days.

RESULTS

The 351 patients developing infection following hospital admission were included in this study. Of them, 170 (48.3%) had nosocomial infection and 181 (51.7%) had community-acquired infection. Among those who developed nosocomial infections, RTI were 55 (32.3%), UTI 43 (25.3%) and BI 31 (18.2%) respectively. SSI were 22 cases (12.9%) (Figure 1).

Table 1 indicates the various isolates (n=186) identified from 170 patients. Gram-positive micro-organisms were reported in 31.7%. *MRSA* was the commonest 10.2%, followed by *CNS* 8.5% and *SA* 7.4% while Gram-negative micro-organisms were reported in 66.3%. *E. coli* was the commonest 22.3%, followed by *PA* 17.6% and *KP* 9.9%. *Candida spp.* was reported in only 2% of organisms isolated.

From Table 2, it is obvious that the overall nosocomial infection rate within the study period (January 1 - December 31, 2010) was 1.86 per 1000 patients` days and within the study period (January 1 - December 31, 2011) was 2.09 per 1000 patients` days. It was highest during January (2.6 per 1000 patients` days) and lowest during December (1.0 per 1000 patients` days) in 2010 while it was highest during May and August (2.6 per 1000 patients` days) and lowest during January (1.0 per 1000 patients` days) in 2011.

Table 3 shows that *E. coli* was the most prevalent isolates from UTI 47.7%, followed by *KP*15.1% and *PA* 8.1%. In nosocomial RTI, they were *PA* 44.4%, *MRSA* 14.8% and *Acinetobacter spp*. 12%. Regarding nosocomial BI, the commonest reported organisms were *KP* 23.3%, *CNS* 16.7% and *E. coli* 15%. In SSI, the micro-organisms encountered commonly were *E. coli* 25.6%, *MRSA* 18.6% and *SA* 14%.

Anti-microbial sensitivity patterns were studied for various micro-organisms. Tables 4 and 5 point out some conclusions. *Acinetobacter spp*. and *MRSA* were highly sensitive to Imipenem 88.6% and Vancomycin 98.5% respectively. *E.coli* were highly sensitive to most of the antimicrobial agents except Ampicillin 26.6%.

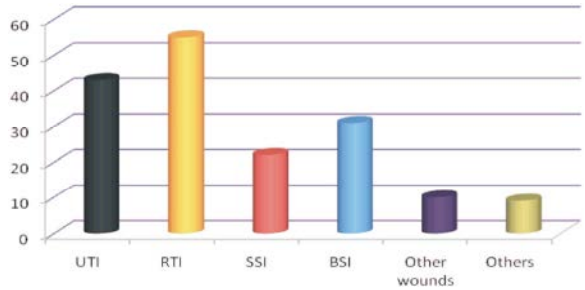

Fig. 1: Distribution of nosocomial infection cases by site of infection

DISCUSSION

Here we presented an overall description of the system affected by infection and causative micro-organisms with further information on antibiotic resistance in a representative sample of Saudi Arabian general hospitals.

Nosocomial infections are widespread. They are important contributors to morbidity and mortality. They will become even more important as a public health problem with increasing economic and human impact because of: 1) increasing number and crowding of people, 2) more frequent impaired immunity (age, illness and treatments), 3) new micro-organisms and 4) increasing bacterial resistance to antibiotics [18].

They are a major cause of preventable disease and death in developing countries. Because patients are highly mobile and hospital stays are becoming shorter, patients often are discharged before the infection becomes apparent (symptomatic). In fact, a large portion of nosocomial infections in hospitalized patients - and all from ambulatory care facilities - becomes apparent only after the patients are discharged. As a consequence, it is often difficult to determine whether the source of the micro-organism causing the infection is endogenous or exogenous.

In the current study, nosocomial pneumonia was the most common infection, while in USA it was reported as the second most common after UTI [19]. Recently, it is documented that NUTI is the most common reported infection. Risk factors had been studied in Taif [20] and recommended reducing the NUTI rate. The findings of the current study could be a reflection of these recommendations (shorter duration of catheter use, more attention to catheter hygiene and increased antibiotic use).

The overall nosocomial infection rate was 2 per 1000 patients` days of patients admitted, which is comparable with those reported in most of the developed countries

Table 1: Identification of the organisms isolated (n=186) from 170 patients

Isolated micro-organism	Percentage %
Gram positive micro-organisms	31.7
• *SA*	7.4
• *Enterococcus fecalis*	2.8
• *CNS.*	8.5
• *Strept. spp.*	2.9
• *MRSA.*	10.2
Gram negative micro-organisms	66.3
• *E.coli*	22.3
• *PA*	17.6
• *Enterobacter spp.*	3.8
• *KP*	9.9
• *Acinetobacter spp.*	6.3
• *Proteus spp.*	2.9
• *Serratia spp.*	1.5
• *Citrobacter*	0.8
• Others	1.1
Fungi 2.0	
• *Candida spp.*	2.0

Table 2: Nosocomial infection rate, Taif hospitals, Saudi Arabia (2010-2011)

	Number of health-care associated infections 2010		Patients` days		Nosocomial infection rate/1000 patients` days	
Month	2010	2011	2010	2011	2010	2011
January	21	9	7912	8454	2.6	1.0
February	10	15	7353	7789	1.3	1.9
March	19	20	7629	8404	2.5	2.3
April	11	18	7393	7789	1.5	2.3
May	14	24	7033	9132	1.9	2.6
June	18	20	7690	8606	2.3	2.3
July	19	18	8026	7569	2.3	2.4
August	13	22	7831	8524	1.6	2.6
September	13	17	7176	8952	1.8	1.9
October	12	16	7944	7452	1.5	2.5
November	12	11	7329	6985	1.6	1.6
December	8	13	8268	7235	1.0	1.8
Total	170	203	91584	96891	1.86	2.09

Table 3: Distribution of commonly reported organisms by site of nosocomial infection, 2010

	Site of infection					
Micro-organisms	UTI (n=43) %	RTI (n=55) %	BSI (n=31) %	SSI (n=22) %	Other wounds (n=10) %	Others (n=9) %
E. coli	47.7	6.5	15.0	25.6	14.3	7.1
KP	15.1	6.5	23.3	7.0	14.3	0.0
PA	8.1	44.4	5.0	11.6	14.3	21.4
Candida spp.	5.8	0.9	1.7	2.3	0.0	0.0
Proteus spp.	5.8	0.9	0.0	0.0	0.0	0.0
Citobacter	4.7	0.0	0.0	2.3	0.0	0.0
MRSA	1.2	14.8	3.3	18.6	33.3	28.6
Acintobacter	1.2	12.0	8.3	7.0	14.3	21.4
MSSA	3.5	3.7	8.3	14.0	4.8	7.1
Enterobacter	3.5	3.7	6.7	2.3	4.8	0.0
Serratia	0.0	2.8	1.7	0.0	0.0	7.1
Enterococcus faecalis	1.2	0.0	3.3	4.7	0.0	7.1
Strept. spp.	0.0	1.9	6.7	0.0	0.0	0.0
CNS	1.2	0.0	16.7	4.7	0.0	0.0
Others	1.2	1.9	0.0	0.0	0.0	0.0

Table 4: The numbers of Gram positive isolates tested and antibiotics sensitivity percentage

Antibiotics	*SA*	*Enterococcus faecalis*	*CNS*	*Strept. spp.*	*MRSA*
Amikacin *	96.0	10.00	122.0	16.0	110.0
%sensitivity	97.9	80.00	72.1	100.0	34.0
Ampicillin *	76.0	22.00	84.0	18.0	90.0
% sensitivity	86.8	72.70	28.6	88.9	2.2
Augmentin *	100.0	16.00	122.0	18.0	134.0
% sensitivity	94.0	75.00	21.3	100.0	1.5
Aztreonam *	94.0	16.00	104.0	20.0	122.0
% sensitivity	95.7	75.00	46.2	90.0	8.2
Carbencillin *	94.0	16.00	106.0	20.0	112.0
% sensitivity	93.6	75.00	37.7	100.0	1.8
Cefozolin *	98.0	16.00	110.0	20.0	128.0
%sensitivity	93.9	75.00	43.6	80.0	6.3
Cefazidime *	90.0	18.00	96.0	18.0	106.0
% sensitivity	91.1	77.80	41.7	88.9	3.8
Ceftriaxone *	90.0	18.00	108.0	18.0	108.0
%sensitivity	91.1	77.80	48.1	100.0	7.4
Cefaroxime *	92.0	18.00	108.0	18.0	112.0
% sensitivity	91.3	77.80	46.3	88.9	8.9
Ciprofloxacin *	96.0	32.00	118.0	16.0	100.0
% sensitivity	95.8	56.30	71.2	87.5	18.0
Cotrimoxasole *	92.0	20.00	108.0	32.0	102.0
% sensitivity	95.7	70.00	46.3	50.0	23.5
Gentamycin *	90.0	30.00	106.0	18.0	104.0
% sensitivity	93.3	80.00	58.5	100.0	17.3
Imipinem *	82.0	14.00	88.0	18.0	94.0
% sensitivity	95.1	71.40	59.1	100.0	8.5
Nalidixic acid *	100.0	4.00	48.0	10.0	46.0
% sensitivity	30.0	00.00	62.5	100.0	8.7
Nitrofurantoin *	30.0	6.00	40.0	10.0	42.0
%sensitivity	93.3	33.30	70.0	100.0	9.5
Piperacillin *	72.0	16.00	62.0	16.0	88.0
% sensitivity	91.7	62.50	67.7	100.0	18.2
Chloramphenicol*	38.0	30.00	48.0	32.0	86.0
% sensitivity	100.0	93.30	83.3	100.0	37.2
Erythromycin *	50.0	24.00	72.0	28.0	94.0
% sensitivity	96.0	25.00	27.8	64.3	19.1
Tetracycline *	52.0	32.00	62.0	30.0	86.0
% sensitivity	92.3	37.50	64.5	60.0	14.0
Oxacellin *	56.0	8.00	72.0	10.0	104.0
% sensitivity	89.3	50.00	19.4	80.0	1.9
Rifampicin *	22.0	30.00	68.0	16.0	88.0
% sensitivity	100.0	33.30	85.3	100.0	77.3
Vancomycin *	2.0	30.00	76.0	24.0	130.0
% sensitivity	100.0	100.00	100.0	100.0	98.5
Penicillin *	72.0	26.00	78.0	30.0	98.0
% sensitivity	2.8	53.80	5.1	33.3	0.0
Clindamycin *	44.0	6.00	56.0	10.0	58.0
% sensitivity	100.0	33.30	60.7	100.0	17.2
Minocyclin *	52.0	8.00	74.0	8.0	96.0
% sensitivity	100.0	25.00	89.2	100.0	77.1

* Number of isolates

Table 5: The numbers of Gram negative isolates tested and antibiotic sensitivity percentage

	E.coli	*PA*	*Enterobacter*	*KP*	*Acinetobacter*	*Proteus*	*Serratia*	*Citrobacter*	Others
Amikacin *	310.0	246.0	52.0	138.0	90.0	38.0	22.0	8.0	14.0
sensitivity	98.7	90.2	92.3	82.6	28.9	100.0	100.0	75.0	100.0
Ampicillin *	316.0	108.0	54.0	136.0	88.0	42.0	22.0	12.0	14.0
% sensitivity	26.6	77.8	7.4	5.9	4.5	57.1	0.0	0.0	28.6
Augmentin *	318.0	166.0	54.0	140.0	90.0	42.0	22.0	12.0	14.0
% sensitivity	64.8	83.1	11.1	60.0	8.9	90.5	18.2	0.0	42.9
Aztreonam *	312.0	240.0	54.0	140.0	88.0	40.0	22.0	8.0	14.0
% sensitivity	89.1	75.0	55.6	72.9	13.6	95.0	100.0	25.0	71.4
Carbencillin *	292.0	152.0	52.0	132.0	86.0	40.0	20.0	12.0	14.0
% sensitivity	74.0	80.3	23.1	60.6	7.0	70.0	10.0	0.0	42.9
Cefozolin *	306.0	150.0	50.0	136.0	84.0	40.0	22.0	10.0	14.0
%sensitivity	81.0	84.0	44.0	70.6	11.9	95.0	81.8	0.0	57.1
Cefazidime *	308.0	202.0	52.0	132.0	84.0	42.0	22.0	10.0	12.0
% sensitivity	80.5	77.2	69.2	69.7	14.3	95.2	100.0	40.0	83.3
Ceftriaxone *	294.0	142.0	52.0	132.0	84.0	38.0	22.0	10.0	10.0
%sensitivity	76.2	83.1	84.6	66.7	16.7	89.5	100.0	40.0	80.0
Cefaroxime *	310.0	144.0	50.0	132.0	84.0	42.0	22.0	8.0	10.0
% sensitivity	81.3	80.6	56.0	66.7	11.9	90.5	27.3	0.0	60.0
Ciprofloxacin *	304.0	220.0	52.0	132.0	88.0	40.0	18.0	10.0	12.0
% sensitivity	75.0	70.0	80.8	81.8	27.3	90.0	88.9	40.0	83.3
Cotrimoxasole *	304.0	134.0	52.0	122.0	88.0	42.0	18.0	10.0	8.0
% sensitivity	58.6	85.1	80.8	62.3	27.3	71.4	100.0	0.0	50.0
Gentamycin *	302.0	192.0	52.0	120.0	84.0	38.0	18.0	10.0	8.0
% sensitivity	82.1	82.3	88.5	73.3	21.4	84.2	100.0	20.0	75.0
Imipinem *	304.0	218.0	50.0	128.0	88.0	38.0	18.0	8.0	8.0
% sensitivity	94.1	73.4	88.0	92.2	88.6	94.7	100.0	100.0	100.0
Nalidixic acid *	178.0	44.0	28.0	68.0	56.0	24.0	10.0	10.0	4.0
% sensitivity	85.4	77.3	85.7	61.8	3.6	83.3	100.0	40.0	100.0
Nitrofurantoin *	194.0	46.0	34.0	70.0	54.0	26.0	12.0	8.0	6.0
% sensitivity	91.8	82.6	58.8	68.8	7.4	61.5	100.0	75.0	10.0
Piperacillin *	290.0	206.0	48.0	118.0	82.0	34.0	18.0	4.0	10.0
% sensitivity	82.1	88.3	79.2	61.0	41.5	100.0	100.0	50.0	60.0
Chloramphenicol*	88.0	34.0	6.0	52.0	28.0	10.0		4.0	4.0
% sensitivity	88.6	94.1	100.0	96.2	14.3	80.0		50.0	100.0
Erythromycin *	56.0	26.0	2.0	22.0	12.0	4.0		5.0	2.0
% sensitivity	85.7	92.3	100.0	90.9	00.0	100.0		0.0	100.0
Tetracycline *	198.0	92.0	26.0	84.0	60.0	22.0	4.0	10.0	10.0
% sensitivity	85.9	89.1	84.6	66.7	10.0	100.0	100.0	0.0	80.0
Oxacellin *	24.0	8.0		16.0	4.0	4.0			
% sensitivity	91.7	75.0		87.5	00.0	100.0			
Rifampicin *	8.0	4.0		14.0	4.0				
% sensitivity	100.0	45.0		100.0	00.0				
Vancomycin *	12.0	2.0		12.0	2.0				
% sensitivity	83.3	100.0		100.0	00.0				
Cefofaxime *	4.0			2.0	2.0		2.0	2.0	
% sensitivity	100.0			100.0	00.0		100.0	100.0	
Penicillin *	14.0	6.0		12.0	4.0	2.0			
% sensitivity	71.4	33.3		85.7	00.0	100.0			
Clindamycin *	38.0	14.0		14.0	6.0	4.0			2.0
% sensitivity	100.0	85.7		85.7	00.0	100.0			100.0
Minocyclin *	30.0	12.0		14.0	6.0	4.0			
% sensitivity	93.3	43.3		85.7	00.0	100.0			

* Number of isolates

[6, 7]. This could be attributed to the fact that KSA general Hospitals area are highly standard hospitals (i.e. in terms of equipment and medical staff) and has strong programs both for surveillance and for prevention and control of infection. Comparatively, a lower figure of 4% has been reported in a maternity hospital in KSA [21].

The Study on the Efficacy of Nosocomial Infection Control (SENIC) project provided the strongest scientific basis to date for the assertion that surveillance is an essential element of an infection control program and improves the outcomes of patients. In this work, Gram-negative bacteria caused 66.3% of the infection. Comparable figure has been reported recently in KSA [4, 21].

Numerous studies had evaluated micro-organisms associated with nosocomial pneumonia. However, variations in patient populations and methods used to obtain and analyze specimens, as well as differences in the definition used for nosocomial pneumonia, had led to variable results. Generally, the micro-organisms associated with bacterial pneumonia are Gram-negative bacilli especially *PA* [5, 22, 23].

Recent studies however, were beginning to show an increase in the prevalence of Gram-positive micro-organisms often *MRSA*, particularly in long-stay, tertiary hospitals, in which most patients were in the ICU and on a ventilator. Our finding supported the results of these studies [22, 23].

In the current study, *E. coli* was the most common infecting micro-organism in patients with UTI. It was responsible for approximately half of cases. The same has been reported by others [24, 25]. The causes of bacteremia were similar to those seen in other large series [26, 27]. The trend for *CNS* may reflect a change from regarding these micro-organisms as skin contaminants to being clinically significant [26, 28]. We found no shift to Gram-positive micro-organisms as reported elsewhere [26-28].

In this study, *SA* was the most common cause of SSI. *MRSA* was documented in 16 (57.1%) of 28 *SA* isolates followed by *E.coli*. The same findings had been mentioned elsewhere [29, 30].

As most SSI become manifested after patient had been discharged from the hospital [31], in this study, we depended on post-discharge reporting by surgeons, a procedure which we found acceptable, since the majority of patients will return for follow-up to the hospital.

Antibiotics resistance is influenced by the antibiotics (mechanism of action and molecular composition) and type of resistance [32]. Resistance can develop by chromosomal mutation, acquisition of plasmids, transposes or antibiotic resistance genes, or interspecies genetic transformation [33]. Antibiotic resistance, regardless of the antibiotic and bacteria will occur with sufficient time and drug use. Widespread of antibiotics use causes selection pressure: resistant strains survive while susceptible ones are eliminated [33, 34]. Increased antibiotic use in hospitals is often associated with increased frequency of resistance [35]. The raise in antibiotic resistance emphasizes the importance of sound hospital infection control, rational prescribing policies and the need for new antimicrobial drugs and vaccines.

The choice of antimicrobial drugs is central to the management of infection. Selection of a suitable antibiotic is fairly straightforward when the microorganism responsible is known. However, when this is not the case, a choice based on current epidemiologic data has to be made and empirical antibiotic treatment is prescribed. This should be followed by conventional culture techniques, whereby the specific antibiotic-sensitivity patterns of the causative organisms are established and the antimicrobial therapy caught subsequently be modified if necessary for those patients who have positive cultures [8].

Because more than 90% of nosocomial infections don't occur in recognized epidemics [36], surveillance principally measures the endemic rates of nosocomial infections. This is important to remember when one attempts to devise prevention or control strategy to reduce the infection. Conclusively, the distribution of nosocomial infections by site was different from that previously reported in KSA hospitals, largely as a result of anticipated low rate of urinary tract infection. RTI, UTI and BI made up the great majorities of nosocomial infections. There is a need for further risk assessment associated with main types of infection.

The most effective technique of controlling nosocomial infection is to strategically implement Quality assurance / Quality control (QA/QC) measures to the health care sectors and evidence-based management can be a feasible approach. For nosocomial infection control, hand hygiene protocol has to be enforced.

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