Prevalence and Impacts of Nosocomial Infection in Thailand 2001

Somwang Danchaivijitr MD*, Chertsak Dhiraputra MD**,
Somporn Santiprasitkul MSc***, Tepnimitr Judaeng MNS***

**Department of Medicine, **Department of Microbiology, ***Center for Nosocomial Infection Control, Faculty of Medicine, Siriraj Hospital, Mahidol University, Bangkok*

Objectives *: To study the prevalence and impacts of nosocomial infection (N.I.) in Thailand.*
Material and Method *: A point prevalence study on N.I. was carried out in 42 hospitals across Thailand in March 2001. The impacts of N.I. were done in the same hospitals by matched control groups in a period prevalence study March 12-25, 2001.*
Results *: The point prevalence rate of N.I. in 42 hospitals involving 18,456 patients across Thailand in March 2001 was 6.4%. The prevalence was higher in male than female patients(7.8% vs 5.0%). The prevalence rates of over 10% were found in 4 hospitals. The infection rate was highest in surgical followed in rank by medical, pediatric and orthopedic departments (9.1%, 7.6%, 6.1% and 5.8%) respectively. The commonest site of the infection was the lower respiratory tract, followed by urinary tract, surgical site and skin and soft tissue (34.1%, 21.5%, 15.0% and 10.5%). Gram-negative bacteria were isolated in 75.7% and gram-postive 18.4%. Penicillins, cephalosporins, aminoglycosides were the most used antimicrobials (31.2%, 25.2%, 12.3%). A period prevalence study on 53,882 patients during a 2 week period in March 2001 showed an infection rate of 2.5%. By matched control group study, an episode of N.I. was associated with 10.1 to 12.5 extra hospital days. The cost of antimicrobials for treatment of an episode of N.I. was 5919.50 baht (148 U.S. dollars). Thirteen point eight per cent of patients with N.I. died, 6.7% directly due to N.I.*
Conclusion: *Nosocomial infection is common in hospitalized patients in Thailand and is associated high mortality rate and economic burden.*

Keywords: *Nosocomial Infection, Prevalence, Impact, Thailand*

J Med Assoc Thai 2005; 88 (Suppl 10): S1-9
Full text. e-Journal: *http://www.medassocthai.org/journal*

Nosocomial infection (NI) is a major health problem in both developed and developing countries. It is associated with a high mortality rate and the cost of treatment is enormous. In Thailand, the prevalence rate of N.I. was 11.4% in 1988[1] and decreased to 7.4% in 1992[2]. The present prevalence survey was designed to assess the overall prevalence of NI in Thailand together with their sites of infection, associated organisms, extra hospital stay, cost of antimicrobial treatment and mortality. Although there has been a significant improvement in the efforts for prevention of nosocomial infection in Thailand, resources allocated to N.I. control and prevention have been very limited. On the other hand, the trend of N.I. is increasing due to the increase in the aging population, invasive investigation and treatment, better management of malignancies and organ transplantation.

The present study is the first study of its kind in Thailand that describes the prevalence rate of N.I. in Thailand and its principal outcome.

Correspondence to : Danchaivijitr S, Department of Medicine, Faculty of Medicine, Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand. E-mail: sisdc@mahidol.ac.th

Material and Method

A prevalence survey was chosen for this multicenter study[3]. A point prevalence survey was done in March 2001 in 42 hospitals across the country. They were randomly enrolled to represent all sizes and location of hospitals. Infection control nurses from the hospitals collected the data using a preset protocol. To

assess the impact of NI a 2 weeks period prevalence study was done in the same hospitals.

The impacts of N.I. on prolonging hospitalization were studied by cohort of patients with N.I., matched one-to-one with patients without N.I. The causes of death in patients with N.I. were determined by attending doctors.

All data were sent to Siriraj Hospital for analysis using Statistical Package for Social Science (SPSS) Software.Categorical variables were presented as number and average respectively.

Results

The point prevalence survey in 42 hospitals involved 18,456 patients. Male and female patients were almost equal. Their average age was 39.7 years. The point prevalence rate of NI was 6.4%, it was higher in male patients and in university hospitals (Table 1).

The prevalence rates of N.I. was highest in the surgical department (9.1%) followed by medical, pediatric and orthopedic departments (7.6%, 6.1%, 5.8%) respectively (Table 2). However, N.I. was highest in the medical departments of medical schools.

Lower respiratory tract was the commonest site of N.I. (34.1%). Urinary tract, surgical site, skin and soft tissue contributed to 21.5%, 15.0% and 10.5% of all N.I. (Table 3).

Micro-organisms were identified in 91.2% of episodes of N.I. (Table 4). Gram-negative and gram-positive bacteria were found in 75.3% and 18.4% respectively. The commonest bacteria was *P.aeruginosa* (19.8%) followed by *Klebsiella*, *Acinetobacter* spp. and *E.coli* (13.5%, 13.0%, 12.6%) respectively. Methicillin-resistant *Staphylococcus aureus* (MRSA) was found in 5.4% and methicillin-sensitive *Staphylococcus aureus* in 2.6%. *Candida* species were identified in 5.3%.

Almost one half of the patients were given antimicrobials at the time of survey (Table 5). The most used drugs were penicillins especially in government

Table 1. Demographic data and the point prevalence rate of N.I.

Data	Categories of hospitals				Average
	U(1)	R(2)	P(3)	O(4)	
No. patients	4,306	6,640	4,090	3,420	18,456
Male(%)	47.0	53.2	47.1	48.1	49.5
Female(%)	53.0	46.8	52.9	51.9	50.5
Age (mean-yr.)	39.6	38.0	40.4	43.2	39.7
Prevalence rate					
Male(%)	8.4	8.3	6.3	7.8	7.8
Female(%)	6.3	4.5	3.7	6.0	5.0
Average(%)	7.3	6.5	4.9	6.9	6.4

U=University, R=Regional, P=Provincial, O=Other
1 = number of hospitals = 4, beds over 1000
2 = number of hospitals = 12, beds 500-1000
3 = number of hospitals = 19, beds 120-500
4 = number of hospitals = 7, beds 120-1000

Table 2. Point prevalence rates of N.I. by departments and categories of hospitals (%)

Departments	Categories of hospitals				Average
	U	R	P	O	
Medicine	10.5	6.8	6.2	7.9	7.6
Surgery	8.7	9.9	6.6	10.5	9.1
Pediatrics	8.2	5.9	3.9	6.2	6.1
Orthopedics	4.4	6.9	4.8	6.1	5.8
Obstetrics	0.6	0.6	1.6	0.6	0.8
Gynecology	1.7	1.9	1.3	3.2	1.9
Rhino-otolaryngology	3.6	0.3	0.5	4.4	1.9

Table 3. Point prevalence rates of N.I. by sites and by categories of hospitals (%)

Sites	Categories of hospitals				Average
	U	R	P	O	
Low respiratory	27.3	38.1	36.9	34.0	34.1
Urinary	24.1	16.1	22.1	27.2	21.5
Surgical	11.2	18.4	20.3	9.4	15.0
Skin and soft tissue	11.5	11.8	6.0	10.6	10.5
Gastrointestinal	3.4	4.7	3.2	4.9	4.1
Primary bacteremia	1.7	3.2	3.2	2.6	2.7
Other	20.8	7.7	8.3	11.3	12.7

Table 4. Micro-organisms identified from N.I. sites in point prevalence survey (%)

Micro-organisms	Categories of hospitals				Average
	U	R	P	O	
Micro-organisms	89.3	90.8	91.9	93.5	91.2
Bacteria					
Gram positive	24.5	15.3	17.5	17.4	18.2
MRSA(1)	8.6	4.1	-	4.4	5.4
MSSA(2)	4.7	4.7	-	2.0	2.6
Coag-neg. Staph.	2.5	2.7	5.5	1.2	2.8
Enteroeocci	3.6	2.2	1.1	3.2	2.6
Other	5.1	1.6	10.9	6.6	5.0
Gram negative	63.9	81.1	80.3	74.9	75.3
P.aeruginosa	18.4	20.0	20.0	21.0	19.8
Klebsiella spp.	8.7	16.1	18.0	11.3	13.8
Acinetobacter spp.	7.9	16.1	14.9	12.1	13.0
E.coli	14.0	11.4	13.7	12.1	12.6
Other	14.9	17.5	13.5	18.4	16.4
Candida spp.	9.8	3.2	2.2	6.1	5.3
Viruses	1.8	0.2	-	1.2	0.8
Other	-	0.2	-	0.4	0.2

(1) MRSA = methicillin resistant S.aureus
(2) MSSA = methicillin sensitive S.aureus

Table 5. Antimicrobials used in the point prevalence survey (%)

Antimicrobials	Categories of hospitals				Average
	U	R	P	O	
Patients on amtimicrobials	42.9	53.0	51.4	46.5	48.5
Antimicrobials :					
Penicillins	22.7	35.8	36.0	23.6	29.5
Cephalosporins	30.0	22.7	22.8	28.5	26.o
Aminoglycosides	8.9	14.7	13.3	9.3	11.6
Quinolones	10.4	7.8	8.9	9.3	9.1
Metronidazole	6.6	5.2	6.8	5.7	6.1
Other	21.4	13.8	12.2	23.7	17.8

hospitals while cephalosporins were the most common antibiotics used in university and other hospitals.

To elucidate the impacts of N.I., a 2 week study was done in the same hospitals of point prevalence study. All patients admitted during this period were enrolled (Table 6). The total number of 53,882 patients were followed, of whom 46.0% and 54.0% were male and female patients respectively. Nosocomial infections in this 2 week period were found in 2.5% of the patients; 2.9% in males and 2.2% in females.

The rates of N.I. were highest in the surgical department (3.6%) followed by medical, orthopedic and pediatric department (3.2%, 2.8%, 2.0%) respectively (Table 7).

The order of frequency of NI in the period prevalence survey was similar to that in the point prevalence study. Lower respiratory tract was the commonest (28.4%) and followed in ranks by urinary tract, surgical site, skin and soft tissue (24.7%, 13.8% and 8.8%) (Table 8).

Table 6. Demographic data and N.I. rates in the period prevalence study

Data	Categories of hospitals				Average
	U	R	P	O	
No. patients	11,035	19,753	13,936	9,158	53,882
Male(%)	43.0	49.2	45.1	44.1	45.4
Female(%)	57.0	50.8	54.9	55.9	54.4
Age (mean-yr.)	36.0	35.5	35.8	38.9	36.6
Rates of N.I(%)					
Male	4.1	2.6	1.9	3.7	3.1
Female	3.1	2.0	1.3	2.7	2.3
Total	3.6	2.3	1.6	3.2	2.7

Table 7. Period prevalence rates of NI by departments and categories of hospitals (%)

Departments	Categories of hospitals				Average
	U	R	P	O	
Medicine	5.8	2.4	2.0	4.6	3.7
Surgery	4.5	3.6	1.8	5.0	3.7
Pediatrics	2.8	2.2	1.4	1.8	2.1
Orthopedics	4.4	2.6	2.1	2.9	3.0
Obstetrics	0.6	0.6	0.6	0.6	0.6
Gynecology	2.8	1.2	1.7	1.4	1.8
Rhino-otolaryngology	1.0	0.2	0.7	2.0	1.0

Table 8. Period prevalence rates by sites of N.I. and categories of hospitals (%)

Sites	Categories of hospitals				Average
	U	R	P	O	
Low respiratory	19.8	32.0	27.4	35.2	28.4
Urinary	28.9	19.6	23.7	27.6	24.7
Surgical	12.1	18.0	16.2	7.9	13.8
Skin and soft tissue	9.3	8.6	8.3	8.8	8.8
Gastro-intestinal	5.9	4.7	8.3	2.4	5.1
Primary bacteremia	2.5	2.5	4.6	3.0	3.0
Other	21.5	14.6	11.5	15.1	16.2

Micro-organisms identified from patients with N.I. in the period prevalence survey are shown in Table 9. The frequently found micro-organisms were similar to those in the point prevalence study (Table 4).

The patterns of antimicrobial use (Table 10) were similar to those in the point prevalence study (Table 5). However, cephalosporins were the most common antibiotics to treat patients with N.I. (Table 11). Aminoglycosides, quinolones and other antimicrobials were used in a higher percentage in patients with N.I. compared to those for all patients.

By matching with patients who did not have N.I., the longer hospital stay in patents with N.I. is shown in Table 12. An episode of N.I. was associated with 10.0-12.5 extra days of admission.

The costs of antimicrobials for the treatment of an episode of N.I. are shown in Table 13. The average cost of antimicrobial was 5,919 baht, and was highest for treating lower respiratory infection (9.892 baht).

As high as 13.8% of patients with N.I. died (Table 14); of these, 6.7% died directly of N.I., and in 3.0%, N.I. was a contributary cause.

Discussion

The prevalence study was done to assess the magnitude of problems of N.I.[3] and to compare the prevalence of N.I. in Thailand[1,2]. By stratified random sampling, 42 hospitals of different categories and in different parts of the country were enrolled. In the point prevalence survey of 18,456 patients, the preva-

Table 9. Micro-organisms identified from sites of N.I. by hospitals in period prevalence survey (%)

Micro-organisms	Categories of hospitals				Average
	U	R	P	O	
Micro-organisms	89.4	90.6	94.7	93.9	90.8
Bacteria					
Gram-positive	20.9	14.6	17.7	18.5	17.7
MRSA	4.5	3.8	3.0	3.8	3.9
MSSA	6.1	3.8	5.5	1.9	4.1
Coag-neg. Staph.	4.2	1.8	3.0	1.3	2.4
Enterococci	3.2	0.8	1.2	2.8	2.0
Other	2.9	4.4	5.0	8.7	5.3
Gram-negative	66.9	82.1	79.9	73.0	75.4
P.aeruginosa	14.5	17.6	17.1	20.4	17.9
E.coli	17.1	18.1	17.7	11.3	14.1
Klebsiella spp.	9.0	17.6	17.1	9.1	13.0
Acinetobacter spp.	10.6	14.1	10.4	14.4	12.7
Other	15.7	14.7	17.7	17.8	17.7
Candida spp.	7.7	3.0	2.4	6.9	5.2
Viruses	4.5	0.3	-	1.4	1.7
Other	-	-	-	0.2	-

Table 10. Antimicrobials used in the period prevalence survey (%)

Antimicrobials	Categories of hospitals				Average
	U	R	P	O	
Patients on antimicrobials	34.9	43.6	42.9	39.5	41.0
Antimicrobials :					
Penicillins	28.6	40.1	41.7	28.0	36.6
Cephalosporins	29.1	20.6	19.3	28.2	23.0
Aminoglycosides	9.0	13.6	12.5	9.2	11.8
Quinolones	9.1	7.2	8.5	7.4	7.9
Metronidazole	6.9	5.4	7.1	5.9	6.2
Other	17.3	13.1	10.9	21.3	14.5

Table 11. Antimicrobials for N.I. in the period prevalence survey (%)

Antimicrobials	Categories of hospitals				Average
	U	R	P	O	
Patients on amtimicrobials	95.4	93.8	96.4	96.9	95.3
Antimicrobials :					
Penicillins	18.5	23.4	27.2	15.7	20.9
Cephalosporins	22.7	21.2	25.2	22.5	22.5
Aminoglycosides	12.0	18.8	18.1	12.1	15.3
Quinolones	13.6	8.9	9.6	15.2	11.7
Metronidazole	6.3	6.9	4.8	3.3	5.6
Other	26.9	20.8	15.1	31.2	24.0

Table 12. Prolongation of hospitalization in patients with N.I. (days)

Sites of NI	Categories of hospitals				Average
	U	R	P	O	
Low respiratory	13.1	12.7	11.7	12.1	12.4
Urinary	10.4	9.5	9.6	10.4	10.0
Surgical	12.2	12.2	13.2	12.9	12.6
Skin and soft tissue	11.1	10.5	7.5	13.9	10.8
Primary bacteremia	15.4	11.8	7.1	12.8	11.8

Table 13. Costs of antimicrobials for one episode of N.I. (baht) (1)

Sites of NI	Categories of hospitals				Average
	U	R	P	O	
Low respiratory	13,000	8,571	6,432	11,750	9,938.25
Urinary	4,629	3,377	3,648	6,737	4,597.75
Surgical site	6,107	3,758	2,453	6,584	4,725.5
Skin and soft tissue	4,987	1,538	2,094	8,964	4,395.75
Primary bacteremia	5,132	3,295	812	16,297	6,384.0
Other	4,014	2,437	1,240	3,471	2,790.5

(1) - 1 US dollar = 40 baht.
Median = 4213.5

Table 14. Mortality in patients with N.I.

	Categories of hospitals				Average
	U	R	P	O	
No. patients with NI	392	449	222	290	1,353
Mortality(%)					
Due to NI	4.1	7.6	10.4	6.2	6.7
Due to NI and other causes	3.1	2.0	1.4	5.5	3.0
Due to other causes	4.3	3.8	5.4	3.1	4.1
Total	11.5	13.4	17.2	14.8	14.3

lence rate (infection proportion) was 6.4% (Table 1). This reflected a steady decline in N.I. prevalence from 11.7% in 1988[1]. The prevalence rates of N.I. vary among countries, reflecting the magnitude of problems, risk factors and efficacy of infection control and to a significant extent, to the selection of patients. In Italy, a large scale study in 2000 showed a prevalence rate of 4.9%[4]. In the United Kingdom, 2 national studies revealed prevalence rates of 9.2% and 9.0% in 1980[5] and 1993-4[6]. In Spain, the prevalence rates of NI during 1990-1997 were 8.1%-9.9%[7] and in Greece in 1999 it was 9.3%[8]. The prevalence rate was highest in teaching hospitals (7.3%) compared to 6.5%, 4.9% and 6.9% in regional, provincial and other hospitals respectively. It is well known that in large medical centers, especially in teaching hospitals, patients have more underlying diseases, malignancies and there are more interventions that predispose patients to N.I. [9] A high prevalence of N.I. was found in patients in medical, surgical pediatric and orthopedic departments (Table 2).

Urinary tract is the commonest site of N.I. in most studies[5-7]. In Thailand, there has been an increase in nosocomial lower respiratory tract infection since 1992[1-2]. The present study showed that lower respiratory tract was the commonest site and accounted for 34.1% of all N.I. (Table 3). This can be explained by the increasing number of elderly patients, more admission into intensive-care units and the surge in the use of respirators. Similar findings were shown in a Greek study in 1999[8]. Other common sites were urinary tract, surgical site and skin and soft tissue. Micro-organisms were identified in more than 90% of episodes of N.I. (Table 4). Gram-negative bacteria were the most common, 75.3% of all pathogens. *Pseudomonas aeruginosa*, *Klebsiella* spp, *Acinetobacter* spp. and *Escherichia coli* were among the most frequently isolated. Gram-positive bacteria were cultured in 18.4% of N.I. Methicillin-resistant *Staphylococcus aureus* (MRSA) were cultured in 5.4% of samples, exceeding methicillin-sensitive *Staphylococcus aureus* (2.6%). *Candida* spp. were isolated in 5.3% of N.I. episodes, being higher in university hospitals (9.8%). They were responsible more in cases of the terminally ill with malignancies receiving immunosuppressive or and chemotherapy. These patients are predisposed to fungal infections, especially to candida.

Antimicrobials were prescribed to one half of the patients at the time of the point prevalence study. Penicillins were the most commonly used antibiotics (31.2%) (Table 5). Cephalosporins ranked second (25.2%) in antimicrobials used in all hospitals but were the first in teaching hospitals (30.0%). Aminoglycosides and quinolones were used less frequently.

To assess the impacts of N.I. regarding extra days in hospital, antimicrobial costs and mortality, all patients admitted into the 42 hospitals during 12-26 March 2001 were studied. Of the 53,882 patients enrolled, 46.0% were males. The patients' mean age was 36 years. Surveillance was done for N.I. which will be followed until the patients were discharged or died. Cohorts of patients with and without N.I. were matched for difference in the length of admission. The average N.I. rate during the 2 week observation was 2.5%, a higher incidence of 2.9% was found in female patients. The N.I. was highest in surgical (3.6%) followed by medical, orthopedic and pediatric departments (3.2%, 2.8% and 2.0%) respectively (Table 7). The ranks of commonly found N.I. (Table 8) were similar to those in the point prevalence study (Table 3) as were identified micro-organisms (Table 9). Penicillins were the most used antimicrobials to all patients during this period prevalence study (Table 10). However, the antimicrobials prescribed to patients with N.I. were different. As shown in Table 11, cephalosporins were the most frequently prescribed antibiotics to patients with N.I. The proportions of aminoglycosides and quionolones given to patienst with N.I. also increased when compared with those given to all patients (Table 10). This finding reflected the greater resistance to antimicrobials among nosocomial pathogens. Prolongation of hospitalization by 10.0-12.5 days was associated with N.I. (Table 12). More extra days in hospitals were found in patients with lower respiratory tract and surgical site infections (12.5 days). Longer hospitalization by NI was previously reported in Thailand[10].

Extra days in hospitals associated with N.I. of 3.1[11] 12[12] and 24 days[13] have been reported from other countries depending on the sites, drug resistant organisms, severity of underlying diseases and of N.I. The average cost of antimicrobials for treatment of one episode of N.I. was 5,919 baht (148 U.S. dollar) (Table 13). Costs for beds, investigation and other treatments are difficult to elucidate but are estimated to be 3 times as high. The number of admissions in Thailand is about 6.2 million. With a prevalence rate of 6.4%, the annual hospital costs for management of N.I. was about 7 billion baht (175 million U.S. dollars). Costs amounting to 5,000 to 40,000 U.S. dollars for management of one episode of N.I. have been estimated in other countries[9,13-14]. These are 11 to 90 times of the authors' estimate.

The mortality rate in patients with N.I. was as high as 13.8% (Table 14). Nosocomial infections was

the direct cause of death in 6.7% of patients and was a contributary cause in 3.0%. In 2001, 37,520 patients died of N.I., an average of 102 patients per day. This confirmed that NI is associated with a high mortality rate and is a significant cause of death in hospitals[15,16].

Conclusion

The study showed that N.I. is a common infection in Thai hospitals. The infection is associated with high morbidity, mortality and economic burden. Concerted efforts by multidisplinary teams, education and data dissemination to clinical staff are needed to reduce the problems[17].

Acknowledgement

The authors wish to thank all participating ICNs. The study was supported by Mahidol University.

References

1. Danchaivijitr S, Chokloikaew S. A national prevalence study on nosocomial infection 1988. J Med Assoc Thai 1989; 72(Suppl 2): 1-6.
2. Danchaivijitr S, Tangtrakool T, Waitayapiches S, Chokloikaew S. Efficacy of hospital infection control in Thailand 1988-1992. J Hosp Infect 1996; 32: 147-53.
3. Mayon White RT, Ducel G, Kereselidze T, Tikhomirov E. An international survey of the prevalence of hospital acquired infection. J Hosp Infect 1985; 11(Suppl A): 43-8.
4. Lizioli A, Privitera G, Alliata E. Prevalence of nosocomial infections in Italy : result from the Lombardy survey 2000. J Hosp Infect 2003; 54: 141-8.
5. Meers PD, Ayliffe GAJ, Emmerson AM, Leigh DA, Mayton-White RT, Mackintosh, et al. Report on the National Survey of Infection in Hospitals 1980. J Hosp Infect 1981; 25(Suppl): 1-51.
6. Emmerson AM, Enstone JE, Griffin M, Kelsey MC and Smyth ETM. The second national prevalence survey of infection in hospitals, overview of the results. J Hosp Infect 1996; 32: 175-90.
7. Vaque J, Rossello J, Arribas L, EPINE Working Group – Prevalence of nosocomial infections in Spain : EPINE study 1990-1997. J Hosp Infect 1999; 43(suppl): 105-11.
8. Gikas A, Pediaditis J, Papadakis JA, Starakis J, Levidiotou S, Nikolaides P, et al. Prevalence study of hospital-acquired infections in 14 Greek hospitals: planning from the local to the national surveillance level. J Hosp Infect 2002; 50: 269-75.
9. Sheng WH, Wang JT, Lu DC, Chie WC, Chen YC, Chang SC. Comparative impact of hospital-acquired infections on medical costs, length of hospital stay and outcome between community hospitals and medical centres. J Hosp Infect 2005; 59: 205-14.
10. Suwanakoon P, Silpapojakul K, Watanasri S, Lumpikanon P, Danchaivijitr S. Symposium: impact of nosocomial infections on Thailand. J Med Assoc Thai 1988; 71(Suppl 3): 52-5.
11. Haley RW, Schaberg DR, Crossley KB, Von Allmen SD, McGowan JE Jr. Extra charges and prolongation of stay attributable to nosocomial infections: a prospective interhospital comparison. Am J Med 1981; 70: 51-8.
12. Kirkland KB, Briggs JP, Trivetle SL, Wilkinson WE, Sexton DJ. The impact of surgical site infections in the 1990s : attributable mortality, excess length of hospitalization and extra costs. Infect Control Hosp Epidemiol 1999; 20: 725-30.
13. Pittet D, Tarara D, Wenzel RP. Nosocomial bloodstream infection in critically ill patients. Excess length of stay, extra costs and attributable mortality. JAMA 1994; 271: 1598-601.
14. Stone PW, Larson E, Kawar LN. A systematic audit of economic evidence linking nosocomial infections and infection control interventions 1990-2000. AJIC 2002; 30: 145-52.
15. Kaoutar B, Joly C, L'Heriteau F, Barbut F, Robert J, Denis M, et al. Nosocomial infections and hospital mortality: a multicentre epidemiology study. J Hosp Infect 2004; 58: 268-75.
16. Le Gall JR, Albert C, Brun Buisson C. Epidemiology of infection and sepsis in intensive care unit patients. Bull Acad Natl Med 2004; 188: 1115-25.
17. Richards C, Emori TG, Peavy G, and Gaynes R. Promoting quality through measurement of performance and response : prevention success stories. Emerg Infect Dis 2001; 7: 299-301.

อัตราชุกและผลกระทบของโรคติดเชื้อในโรงพยาบาลในประเทศไทย พ.ศ. 2544

สมหวัง ด่านชัยวิจิตร, เชิดศักดิ์ ธีระบุตร, สมพร สันติประสิทธิ์กุล, เทพนิมิตร จุแดง

วัตถุประสงค์ *: ศึกษาอัตราชุกและผลกระทบของโรคติดเชื้อในโรงพยาบาลในประเทศไทย*

วัสดุและวิธีการ *: การศึกษาอัตราชุกแบบ point prevalence ในโรงพยาบาล 42 แห่งในประเทศไทยในเดือนมีนาคม พ.ศ. 2544 ศึกษาผลกระทบของโรคติดเชื้อในโรงพยาบาลเดียวกันโดยการศึกษาเปรียบเทียบกับกลุ่มผู้ป่วยไม่ติดเชื้อ*

ผลการศึกษา *: การศึกษาอัตราชุกของโรคติดเชื้อในโรงพยาบาลกระทำในผู้ป่วย 18,456 รายในโรงพยาบาล 42 แห่งในเดือนมีนาคม พ.ศ. 2544 พบว่ามีอัตราชุก 6.4% ผู้ป่วยชายมีการติดเชื้อสูงกว่าผู้ป่วยหญิง (7.8% ต่อ 5.0%). อัตราการติดเชื้อสูงกว่า 10.0% พบในโรงพยาบาล 4 แห่ง. การติดเชื้อพบสูงสุดในแผนกศัลยกรรม รองลงมาคืออายุรกรรม, กุมารเวชกรรมและศัลยศาสตร์ออร์โธปิดิกส์ (9.1%, 7.6%, 6.1% และ 5.8%) ตามลำดับ. ตำแหน่งที่ติดเชื้อพบมากที่สุดคือ ทางเดินหายใจส่วนล่าง ตามด้วย ทางเดินปัสสาวะ แผลผ่าตัด ผิวหนังและเนื้อเยื่อ (34.1%, 21.5%, 15.0% และ 10.5%) ตามลำดับ. พบแบคทีเรียกรัมลบ 75.7% และกรัมบวก 18.4% ยาต้านจุลชีพที่ใช้มากคือ เพนิซิลลิน, เซฟาโลสปอรินส์, อะมิโนกลัยโคไซด์ (31.2%, 25.2% และ 12.3%) การศึกษาแบบ period prevalence ในผู้ป่วยรับใหม่ 53,882 ราย ในช่วง 2 สัปดาห์ของเดือนมีนาคม พ.ศ. 2544 พบอัตราการติดเชื้อในโรงพยาบาล 2.5% การเปรียบเทียบกับกลุ่มที่ไม่มีการติดเชื้อ, พบว่าผู้ป่วยติดเชื้อในโรงพยาบาลนอนโรงพยาบาลนานกว่า 10.1 ถึง 12.5 วัน. ค่ายาต้านจุลชีพสำหรับการติดเชื้อ 1 ครั้งเฉลี่ย 5,919.50 บาท. ผู้ป่วยติดเชื้อในโรงพยาบาลถึงแก่กรรมร้อยละ 13.8 และถึงแก่กรรมโดยตรงจากโรคติดเชื้อในโรงพยาบาลร้อยละ 6.7*

สรุป *: การติดเชื้อในโรงพยาบาลเป็นโรคที่พบบ่อยในประเทศไทย มีอัตราตายสูง และเป็นภาระทางเศรษฐกิจ*