Nosocomial Surgical Site Infection among Photharam Hospital Patients with Surgery: Incidence, Risk Factors and Development of Risk Screening Form

Pipat Luksamijarulkul MSc*, Nattaya Parikumsil MSc**,
Varaporn Poomsuwan MSc***, Watchara Konkeaw MD**

** Department of Microbiology, Faculty of Public Health, Mahidol University*
*** Photharam Hospital, Photharam District, Ratchaburi Province*
**** Center for Nosocomial Infection Control, Siriraj Hospital, Mahidol University*

Objective: *A cross-sectional analytic study of 268 patients who received surgery at Photharam Hospital was conducted to assess the incidence and risk factors of nosocomial surgical site infection (SSI).*
Material and Method: *The studied patients who voluntarily participated and signed informed consents were interviewed. Pus specimens from SSI patients diagnosed by use of CDC criteria were cultured. After risk factor analysis, the risk screening form was developed and calculated by the Receiving Operating Curve.*
Results: *The results revealed that incidence of nosocomial SSI was 20.52% (55/268 cases). Of 55 SSI patients, 45.46% were positive for bacterial culture. Risk factors for nosocomial SSI from univariate analysis were (a) age of patients > 60 years, OR = 1.91 (p = 0.043), (b) gender as male, OR = 2.20 (p = 0.024), (c) admitted ward as male surgical ward, OR = 2.42 (p = 0.028), (d) current patients' illness as diabetes mellitus (DM), OR = 7.92 (p < 0.001) and tuberculosis, OR = 11.88 (p = 0.001), (e) abnormal ASA score, OR = 3.47 (p < 0.001), (f) smoking, OR = 3.72 (p < 0.001), (g) incorrect prophylactic drug use, OR = 2.98 (p = 0.002), (h) duration of admission > 10 days, OR = 4.87 (p < 0.001), and (i) wound dressing > 1 time/day, OR = 4.16 (p < 0.001). After multiple logistic regression analysis, the significant risk factors were (a) current patient's illness as DM, OR = 14.43 (p = 0.005), (b) smoking, OR = 13.18 (p = 0.001), (c) duration of admission > 10 days, OR = 4.88 (p = 0.032) and (d) wound dressing >1 time/day, OR = 23.32 (p < 0.001). The risk screening form was developed and showed approximately 65% sensitivity and 78% specificity when a cut-off score at risk ≥ 18 was used.*
Conclusion: *This risk screening form should be considered in other hospitals. When a postoperative patients has a score of 18, they should be considered a potential risk for nosocomial SSI and preventive measures should be integrated to reduce the risk for nosocomial SSI.*

Keywords: *Nosocomial surgical site infection, Incidence, Risk factors, Risk screening form*

J Med Assoc Thai 2006; 89 (1): 81-9
Full text. e-Journal: *http://www.medassocthai.org/journal*

Nosocomial infection or hospital acquired infection refers to the infection occurring in patients after admission at the hospital that was neither present nor incubating at the time of admission[1]. It is one of the public health problems throughout the world. The infection causes the patient's physical and mental sickness that makes the patient stay longer in the hospital without necessity[2,3]. Many microorganisms cause diseases in both healthy individuals and in those normal defense mechanisms have been weakened by factors such as chemotherapy or major illness in the hospital. The WHO's survey in 1983 discovered a rate of nosocomial infection of 8.4% in 47 hospitals in 14 countries[4]. However, the infection rate was different from one study to another study, ranging from 1% in the United States to more than 30% in less developed countries where hospital care facilities were poor[5]. A patient who developed nosocomial infections

Correspondence to : Luksamijarulkul P, Department of Microbiology, Faculty of Public Health, Mahidol University, Rajvithi Rd, Ratchathevi, Bangkok 10400, Thailand. E-mail: luksamijarulkul@yahoo.com

especially surgical site infections had an approximately 60% greater risk of being admitted to the intensive care unit and incurred an attributable extra hospital stay of 6.5 days, leading to a direct cost of an additional 3,000 $ per infection[6]. In Thailand, the Eight National Public Health Development Plan (1997-2001) namely emphasized on the quality of hospital services in particular infection control. The national study on nosocomial infection in Thailand in 1992 showed that 21.1% of lower respiratory tract infections, 19.7% of urinary tract infections, and 16.6% of surgical site infections were reported[7,8]. In Photharam Hospital, Ratchaburi Province, the surgical site infection was the third most common nosocomial infection and the trend has increased in recent years. The infection affected to the hospital accreditation and the quality of life of patients admitted in the hospital. The study on the incidence and risk factors of nosocomial surgical site infection are valuable to develop the risk screening form for predicting the infection in surgical patients of Photharam Hospital and other hospitals.

Material and Method

Study design and study subjects

A cross-sectional analytic study of 268 patients who received surgery at Photharam Hospital from October 2001 to September 2002 was conducted to assess the incidence and risk factors of nosocomial surgical site infection (SSI). The studied patients included only surgical patients admitted to 3 surgical wards (male, female and special surgical wards). All studied patients who voluntarily participated and

Table 1. Socio-demographic characteristics of the studied patients admitted in surgical wards, Photharam Hospital (n = 268)

Socio-demographic characteristics			Number	Percentage
Age group (years)	:	≤20	48	17.91
		21-40	93	34.70
		41-60	59	22.02
		>60	68	25.37
		Mean = 41.91 SD = 21.69 Max = 92 Min = 1		
Gender	:	Male	175	65.29
		Female	93	34.71
Marital status	:	Single	86	32.09
		Married	173	64.55
		Widow/Separated	9	3.36
Education	:	Illiterate	33	12.31
		Primary level	151	56.34
		Secondary level	57	21.27
		Vocational level and higher	27	10.08
Occupation	:	Laborer	115	42.91
		Agriculture	60	22.39
		Commerce	44	16.42
		Students/house keeper	49	18.28
Admitted wards	:	Male surgical ward	128	47.76
		Female surgical ward	77	28.73
		Special ward	63	23.51
Income/month (Baht)	:	<5,000	151	56.34
		5,000-10,000	40	14.93
		>10,000	77	28.73
		-X ± SD = 5,598.19 ± 5,791.21 Max = 51,015 Min = 1,000		

signed informed consents were interviewed by using a structured questionnaire including socio-demographic factors, and medical and surgical histories. Pus specimens from SSI patients diagnosed by standard of Centers for Disease Control and Prevention criteria[9] were collected for bacterial culture. After diagnosis of nosocomial SSI, the studied patients were divided into 2 groups; the first group was patients with SSI and the second group was patients without SSI. The information from interviews and medical records between 2 groups were analyzed to search risk factors of nosocomial SSI.

Sample size calculation

Sample size was calculated by using the formula: $n = Z^2_{\alpha/2}P(1 - P)/d^2$. With P = proportion of incidence of nosocomial SSI from the previous study = 0.166[8], $Z^2_{\alpha/2} = 1.96$ at $\alpha = 0.05$, d = 0.05; the calculated sample size was = 213 cases. However, the present study included 268 cases.

Laboratory methods

Pus specimens from patients with nosocomial SSI were collected for preparation of gram stain and bacterial culture. Bacteria were cultured on blood agar, chocolate agar, Maconkey agar and thioglycolate medium. All plates were incubated at 35-37 C for 24-72 hours. Suspected colonies were identified by biochemical test.

Data analysis

Data from interviews and laboratory test were analyzed by using descriptive statistics including percentage, mean and standard deviation. The risk factors of nosocomial SSI were analyzed by using χ^2 test, Odds ratio (OR) and 95% confidence interval of OR. For controlling confounders and for evaluating the effect of risk factors of nosocomial SSI from univariate analysis, multiple logistic regression was applied. The critical level of $\alpha = 0.05$ was used for statistical significance. The risk screening form was developed by using risk scores and the validity of this screening form was calculated by the Receiving Operating Curve (ROC).

Results

General characteristics of the studied patients

Of 268 studied patients, 56.72% were 21-60 years and 25.37% were more than 60 years of age. The mean age was 41.91 years. Approximately 65% were male and 64.55% were married. The majority (56.34%) finished primary level and 10.08% finished higher education in vocational level or higher. Almost 43% had their occupation as a labourer, 16.42% were in private business and 22.39% were farmers. About 48% were admitted to the male surgical ward, 28.73% in the female surgical ward and 23.51% in the special ward were included in the present study. The mean monthly

Table 2. Incidence of nosocomial surgical site infection among the studied patients

Variables		No. of studied	Incidence of nosocomial SSI	
			No.	%
Age (years) :	≤20	48	13	27.08
	21-60	152	22	14.47
	>60	68	20	29.41
Gender :	Male	175	43	24.57
	Female	93	12	12.90
ASA score* :	Code 1	175	23	13.14
	Code 2	76	27	35.53
	Code 3	17	5	29.41
	Total	268	55**	20.52

* American Society of Anesthesiologists (ASA) score: Physical status classification followed by the patient's pre-operative status including 5 levels (code 1-5)[17], but in the present study, the studied patients included only 3 levels (code 1-3).

Code 1: Normally healthy patient

Code 2: Patient with systemic disease

Code 3: Patient with severe systemic disease that is not incapacitating

** 25 cases (45.46 %) were positive for bacterial isolations

income of the family was 5,598.19 baht. Details are shown in Table 1.

Incidence of nosocomial surgical site infection (SSI)

Of the 268 postoperative patients, 55 developed nosocomial SSI (incidence rate, 20.52%). The incidence was relatively higher in patients aged more than 60 years (29.41%) and in males than females (24.57% vs 12.90%). When the incidence was analyzed by ASA score, it showed a higher incidence found in patients with ASA score 2 and 3 (35.53% and 29.41%, respectively). Pus cultures collected from SSI patients showed 45.46% positive for bacterial growth (Table 2). The most frequently isolated bacteria were 26.47% of *Escherichia coli*, 17.65% of Pseudomonas aeruginosa, 11.77% of Acinetobacter spp. and 8.82% of Staphylococcus aureus. Details are shown in Table 3.

Table 3. Results of bacterial isolation from 34 pus specimens of 25 SSI patients with positive bacterial culture*

Results of bacterial isolation	Pus specimens with positive bacterial isolation	
	No.	%
Escherichia coli	9	26.47
Pseudomonas aeruginosa	6	17.65
Acinetobacter spp.	4	11.77
Staphylococcus aureus	3	8.82
Methicillin resistant *S. aureus*	2	5.88
Streptococcus group D	2	5.88
Proteus valgaris	2	5.88
Morganella morganii	2	5.88
Alpha Streptococcus	1	2.95

* Pus specimens from some SSI patients were collected more than 1 time

Table 4. Significant risk factors for nosocomial surgical site infection by univariate analysis

Risk factors		Odds ratio (OR)	95%CI of OR	p-value χ^2 test or Fisher's exact test
Socio-demographic factors				
Age	: >60 years	1.91	1.01, 3.61	0.043
Gender	: Male	2.20	1.10, 4.42	0.024
Admitted ward	: male surgical ward	2.42	1.08, 5.40	0.028
Medical histories and surgical factors				
Current illness	: Diabetes mellitus	7.92	2.14, 25.98	<0.001
	: Tuberculosis	11.88	2.06, 68.61	0.001
ASA score	: Abnormal (code2, 3)	3.47	1.88, 6.40	<0.001
Smoking	: Yes	3.72	1.97, 7.02	<0.001
Prophylactic drug use	: incorrect	2.98	1.44, 6.18	0.002
Duration of admission	: >10 days	4.87	2.17, 10.94	<0.001
General anesthesia	: no use	4.27	2.26, 8.06	<0.001
Wound dressing	: >1 time/day	4.16	2.07, 8.37	<0.001
Shaving before surgery	: No	2.03	1.01, 4.08	0.044

Table 5. Significant risk factors for nosocomial surgical site infection by multivariate analysis (Logistic regression analysis)

Risk factors		Adjusted odds ratio	95%CI	p-value
Wound dressing	: >1 time/day	23.32	4.66, 97.31	<0.001
Patient's current illness	: Diabetes mellitus	14.43	2.69, 61.87	<0.001
Smoking	: Yes	13.18	2.96, 60.85	<0.001
Duration of admission	: >10 days	4.88	1.14, 16.88	0.012

Risk factors of nosocomial surgical site infection (SSI)

From univariate risk analysis, the results revealed that risk factors for nosocomial SSI were (a) age of patients more than 60 years, OR = 1.91 (p = 0.043), (b) gender as male, OR = 2.20 (p = 0.024), (c) admitted ward as the male surgical ward, OR = 2.42 (p = 0.028), (d) current patients' illness was diabetes mellitus, OR = 7.92 (p < 0.001) and tuberculosis, OR = 11.88 (p = 0.001), (e) abnormal ASA score (code 2 and 3), OR = 3.47 (p < 0.001), (f) smoking, OR = 3.72 (p < 0.001), (g) incorrect

Table 6. Validity of risk screening form by risk score model as a predictor of nosocomial surgical site infection

Risk score positive if greater than or equal to	Sensitivity (%)	Specificity (%)	1-specificity
0	100.0	0.0	1.000
13	79.8	61.9	0.381
18	64.9	78.1	0.220
28	38.0	83.4	0.166

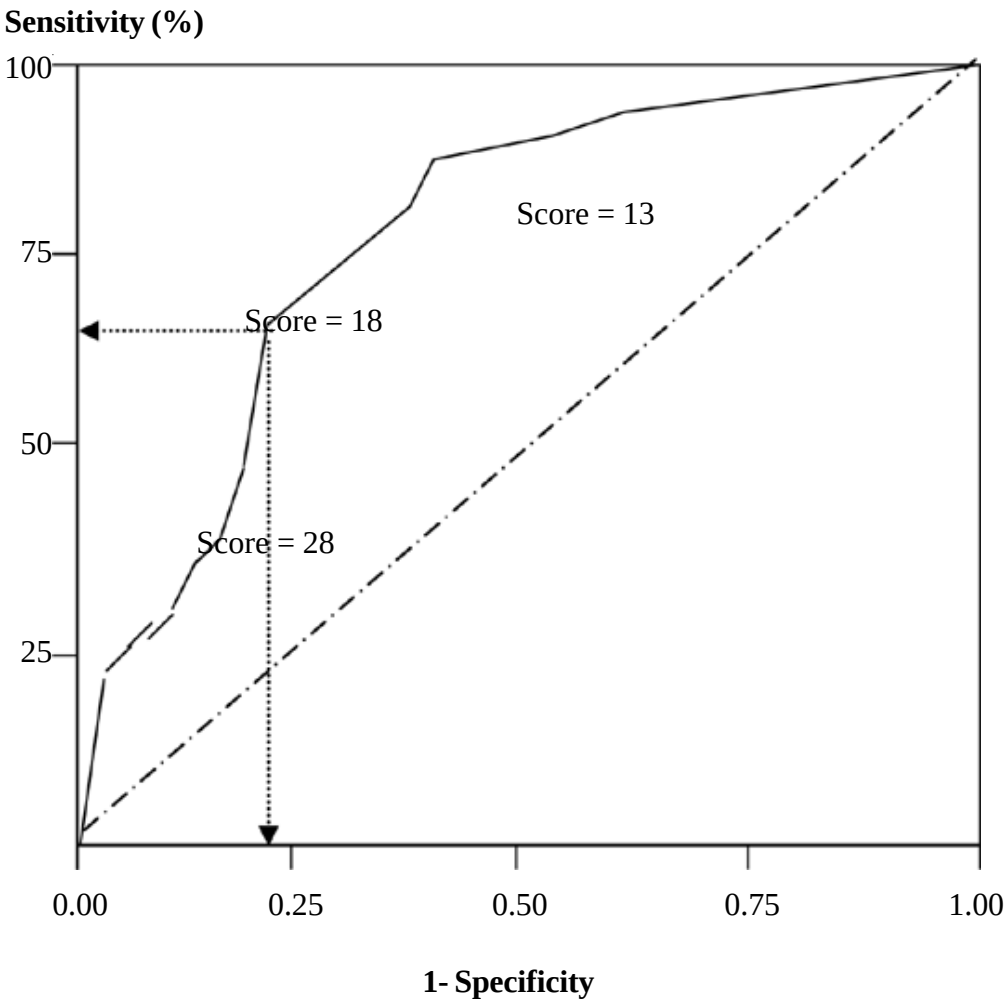

Fig. 1 ROC curve for 4 predictors in the prediction of nosocomial SSI among studied patients (When the cut-off point at risk score of ≥ 18 was used, the sensitivity was approximately 65% and the specificity was 78%)

use of prophylactic drugs, OR = 2.98 (p = 0.002), (h) duration of admission more than 10 days, OR = 4.87 (p < 0.001), and (i) wound dressing more than 1 time per day, OR = 4.16 (p < 0.001). Details are shown in Table 4.

Multiple logistic regression was applied for controlling confounders and for evaluating the effect of risk variables on nosocomial SSI. The order variables which were significant (p < 0.05) in Table 3 were entered into the logistic regression model. The significant risk factors were (a) current patient's illness as DM, OR = 14.43 (p = 0.005), (b) smoking, OR = 13.18 (p = 0.001), (c) duration of admission more than 10 days, OR = 4.88 (p = 0.032) and (d) wound dressing more than 1 time/day, OR = 23.32 (p < 0.001). Details are shown in Table 5.

Development of risk screening form for nosocomial surgical site infection (SSI)

The risk screening form for nosocomial SSI was developed by using risk scores from Table 5 as the following: risk score = scores of current patient's illness + smoking + duration of admission + wound dressing. Score of current patient's illness = 14 for DM, and = 0 for others. Score of smoking = 13 for yes and = 0 for no smoking. Score of duration of admission = 5 when more than 10 days and = 0 when less than or equal to 10 days. Score of wound dressing = 23 when wound dressing was more than 1 time/day and = 0 when no dressing or dressing 1 time/day. The calculation of risk scores was analyzed and the validity of this

Risk screening form for nosocomial surgical site infection

HN. ……AN……..

Patient's name…….... Age…….years……months

Gender ☐ Male ☐ Female Marital status …….

Present residence ……..……..

Telephone……..e-mail……

Risk factors			Full scores	Checklist scores
Wound dressing	:	> 1 time/day	23	
		No dressing or 1 time/day	0	
Patient's current illness	:	Diabetes mellitus	14	
		No	0	
Smoking	:	Yes	13	
		No	0	
Duration of admission	:	> 10 days	5	
		≤ 10 days	0	
Total scores			55	

Interpretation : Total checklist scores ≥ 18 means the patient may be at risk for nosocomial SSI with 65 % sensitivity and 78% specificity.

Fig. 2 Risk screening form for nosocomial SSI developed by using 4 predictors, wound dressing (> 1 time/day), patient's current illness (DM), smoking and duration of admission (> 10 days)

model used for predicting the risk for nosocomial SSI among patients with surgery was calculated by the Receiving Operating Curve (ROC). The sensitivity and the specificity of this model were approximately 65% and 78% when a cut-off score at risk of 18 or more was used (Table 6 and Fig. 1). Risk screening form for nosocomial SSI among these studied patients with surgery is proposed in Fig. 2.

Discussion

The incidence of nosocomial SSI among patients admitted to the surgical wards, Photharam Hospital showed 20.52%. The incidence was similar to previous studies in Thailand ranging from 16.6% to 29.9%[7,10,11]. The peak incidence of nosocomial SSI was in patients aged more than 60 years (29.41%). This evidence supported the findings of the previous studies which reported a greater risk of nosocomial SSI in older patients aged more than 60 years[12-14]. The reason might be due to the patient's immunity which was relatively low among old individuals. A recent study by Keith et al (2005) demonstrated that the increasing age increased the incidence of SSI until age 74 years and at ages $\geq$ 75 years, the increasing age decreased the incidence of SSI[15]. The factors responsible for the findings remain controversial. The incidence in males (24.57%) was higher than females (12.90%), it might be that most male patients had lower health care behaviors than female patients[8]. In addition, a high incidence was found in patients with abnormal ASA score (35.53% in ASA code 2 and 29.41% in ASA code 3). Patients with systemic diseases (ASA code 2 and 3) had a relatively higher incidence of nosocomail SSI than patients without systemic diseases, which supported the studies of Garibaldi, et al (1991)[16] and Haynes and Lawler (1995)[17].

Approximately, 45% of total pus specimens from patients with nosocomial SSI were positive for bacterial growth. The results showed 26.47% positive for *Escherichia coli*, 17.65% positive for *Pseudomonas aeruginosa*, 11.77% positive for *Acinetobacter spp*., 8.82% positive for *Staphylococcus aureus*, and others. The isolated bacteria in the present study were similar to the results from previous studies[3,18,19]. The isolation rate was relatively low due to the limitation of the hospital laboratory. The laboratory of Photharam Hospital could not culture anaerobic bacteria, fungi and viruses which were probably causative microorganisms of nosocomial SSI.

Data from univariate analysis showed that 3 studied socio-demographic variables including age, gender, and admitted patient wards were significantly associated with nosocomial SSI ($p = 0.043$, 0.024, and 0.028, respectively), but these factors were not significant by multivariate analysis. The results supported the findings of previous studies, especially the studied variable as age[20,21]. Another study reported the association between admitted wards and nosocomial SSI[22]. Other studied socio-demographic variables, such as, income, marital status, educational level, and occupation were not associated with nosocomial SSI ($p > 0.05$). After multivariate analysis, it was found that current patients' illness as DM, smoking, duration of admission more than 10 days, and wound dressing more than 1 time/day were significant risk factors for nosocomial SSI (OR = 14.43, $p = 0.005$; OR = 13.18, $p = 0.001$; OR = 4.88, $p = 0.032$, and OR = 23.32, $p < 0.001$, respectively). Previous studies reported that patients with current illnesses, such as, hypertension and DM were at risk for infections as well as nosocomial SSI due to their low immunity[17,23]. This present study found that smoking increased the risk of nosocomial SSI probably due to the effects of nicotine catching vascular wall of arterial vassal and subcutaneous tissues[24,25]. Moreover, smoking delays wound healing. Generally, frequent dressing increases the risk of contamination of wound as well as the finding of the present study which demonstrated one of the risk factors for nosocomial SSI being wound dressing more than 1 time per day.

The risk screening form for nosocomial SSI was developed by using 4 predictors including the current patient's illness as DM, smoking, duration of admission more than 10 days and wound dressing more than 1 time per day. When the cut-off score was $\geq$ 18, the screening form showed approximately 65% sensitivity and 78% specificity analyzed by ROC curve. Therefore, the postoperative patients who had score $\geq$ 18 were considered to be a potential risk for nosocomial SSI, the preventive measures integrated not only the use of antibiotic prophylaxis but also other postoperative care and treatment should be done to reduce the risk for nosocomial SSI[26]. This risk screening form should be considered to apply in other hospitals, especially in hospitals with similar conditions to this studied hospital.

Acknowledgements

The authors wish to thank the staff of the studied wards at Photharam Hospital and we also wish to thank all the studied patients.

References

1. Howard RJ. Surgical infections. In: Schwartz SI,

Shires GT, Spencer FC, Dally GN, Galloway AC, editors. Principles of surgery. New York: McGrew-Hill; 1999: 123-54.
2. Mayon-White RT, Ducel G, Kereselidze T, Tikomirov E. An international survey of the prevalence of hospital-acquired infection. J Hosp Infect 1988;11(Suppl A): 43-8.
3. Nosocomial infection rates for interhospital comparison: limitations and possible solutions. A Report from the National Nosocomial Infections Surveillance (NNIS) System. Infect Control Hosp Epidemiol 1991; 12: 609-21.
4. Emerson AM, Enstone JE, Griffin M, Kelsey MC, Smyth ET. The second national prevalence survey of infection in hospitals--overview of results. J Hosp Infect 1996; 32: 175-90.
5. Pelezar MJ, Chan EC, Krieg NR. Microbiology. New York: McGraw-Hill; 1993.
6. Kirkland KB, Briggs IP, Trivette SL, Wilkinson WE, Sexton DJ. The impact of surgical site infections in 1990s: attributable mortality, excess length of hospitalization, and extra costs. Infect Control Hosp Epidemiol 1999; 20: 725-30.
7. Pinyowiwat W, Watanasri S, Srisukchareon O, Harnsmutr SG, Intralak W, Warapien N, et al. National surveillance on nosocomial infections: a pilot study. J Med Assoc Thai 1988; 71(Suppl 3): 1-4.
8. Danchaivijitr S, Tangtrakool T, Chokloikaew S. The Second Thai National Prevalence Study on Nosocomial Infections 1992.J Med Assoc Thai 1995;78 Suppl 2: S67-72.
9. Horan TC, Gaynes RP, Martone WJ, Jarvis WR, Emori TG. CDC definitions of nosocomial surgical site infection, 1992: a modification of CDC definitions of surgical wound infections. Infect Control Hosp Epidemiol 1992; 13: 606-8.
10. Limsuwan A, Danchaivijitr S. Nosocomial infection control in Thailand. J Med Assoc Thai 1988; 71(Suppl 3): 41-3.
11. Danchaivijitr S. WHO study on nosocomial infections. J Med Assoc Thai 1988; 71(Suppl 3): 44-5.
12. Cruse PJ, Foord R. The epidemiology of wound infection. A 10-year prospective study of 62,939 wounds. Surg Clin North Am 1980; 60: 27-40.
13. de Boer AS, Mintjes-de Groot AJ, Severijnen AJ, van den Berg JM, van Pelt W. Risk assessment for surgical-site infections in orthopedic patients. Infect Control Hosp Epidemiol 1999; 20: 402-7.
14. Scott JD, Forrest A, Feurstein S, Fitzpatrick P, Schentag JJ. Factors associated with postoperative infection. Infect Control Hosp Epidemiol 2001; 22: 347-51.
15. Kaye KS, Schmit K, Pieper C, Stoane R, Caughlan KF, Sexton DJ, et al. The effect of increasing age on the risk of surgical site infection. J Infect Dis 2005; 191: 1056-62.
16. Garibaldi RA, Cushing D, Lerer T. Risk factors for postoperative infection. Am J Med 1991; 91: 158S-63S.
17. Haynes SR, Lawler PG. An assessment of the consistency of ASA physical status classification allocation. Anaesthesia 1995; 50: 195-9.
18. Cardo DM, Falk PS, Mayhall CG. Validation of surgical wound classification in the operating room. Infect Control Hosp Epidemiol 1993; 14: 255-9.
19. Olson MM, Lee JT Jr. Continuous, 10-year would infection surveillance. Results, advantages, and unanswered questions. Arch Surg 1990; 125: 794-803.
20. Malone DL, Genuit T, Tracy JK, Gannon C, Napolitano LM. Surgical site infections: reanalysis of risk factors. J Surg Res 2002; 103: 89-95.
21. Pessaux P, Msika S, Atalla D, Hay JM, Flamant Y. Risk factors for postoperative infectious complications in noncolorectal abdominal surgery: a multivariate analysis based on a prospective multicenter study of 4718 patients. Arch Surg 2003; 138: 314-24.
22. Manson WL, Pernot PC, Fidler V, Sauer EW, Klasen HJ. Colonization of burns and the duration of hospital stay of severely burned patients. J Hosp Infect 1992; 22: 55-63.
23. Delamaire M, Maugendre D, Moreno M, Le Goff MC, Allannic H, Genetet B. Impaired leucocyte functions in diabetic patients. Diabet Med 1997; 14: 29-34.
24. Vinton AL, Traverso LW, Jelly PC. Wound complications after modified radical mastectomy compared with tylectomy with axillary lymph node dissection. Am J Surg 1991; 161: 584-8.
25. Sirensen LT, Jorgensen T, Kirkeby LT, Skovdal J, Vennits B, Wille-Jorgensen P. Smoking and alcohol abuse are major risk factors for anastomotic leakage in colorectal surgery. Br J Surg 1999; 86: 927-31.
26. Gottrup F. Prevention of surgical-wound infections. N Engl J Med 2000; 342: 202-4.

การติดเชื้อในโรงพยาบาลตำแหน่งแผลผ่าตัดของผู้ป่วยที่ได้รับการผ่าตัด โรงพยาบาลโพธาราม: อุบัติการณ์ ปัจจัยเสี่ยง และการพัฒนาแบบคัดกรองความเสี่ยง

พิพัฒน์ ลักษมีจรัลกุล, นาตยา ปริกัมศีล, วราภรณ์ พุ่มสุวรรณ, วัชระ ก้อนแก้ว

การศึกษาภาคตัดขวางชนิดวิเคราะห์ในผู้ป่วยที่ได้รับการผ่าตัดที่โรงพยาบาลโพธาราม จำนวน 268 ราย เพื่อประเมินอุบัติการณ์และปัจจัยเสี่ยงต่อการติดเชื้อในโรงพยาบาลตำแหน่งแผลผ่าตัด ผู้ป่วยที่อยู่ในการศึกษานี้เป็นไปด้วยความสมัครใจและลงลายมือชื่อ เก็บข้อมูลโดยการสัมภาษณ์และเวชระเบียน เก็บหนองจากแผลผ่าตัดในผู้ป่วยที่ได้รับการวินิจฉัย หลังจากวิเคราะห์ปัจจัยเสี่ยงจะพัฒนาแบบคัดกรองความเสี่ยงและวิเคราะห์ความถูกต้องโดยใช้ Receiving Operating Curve ผลการศึกษาพบอุบัติการณ์การติดเชื้อในโรงพยาบาลตำแหน่งแผลผ่าตัด ร้อยละ 20.52 (55/268 ราย) ผลการเพาะเชื้อหนองจากผู้ป่วยที่ติดเชื้อ ทั้ง 55 ราย พบเชื้อแบคทีเรีย ร้อยละ 45.46 ปัจจัยเสี่ยงต่อการติดเชื้อในโรงพยาบาลตำแหน่งแผลผ่าตัด จากการวิเคราะห์ทีละตัวแปร คือ อายุผู้ป่วย > 60 ปี (OR = 1.91, p = 0.043), เพศชาย (OR = 2.20, p = 0.024), หอผู้ป่วยศัลยกรรมชาย (OR = 2.42, p = 0.028), ประวัติการเจ็บป่วยเป็นเบาหวาน (OR = 7.92, p < 0.001) หรือ เป็นวัณโรค (OR = 11.88, p = 0.001), คะแนน ASA ผิดปกติ (OR = 3.47, p < 0.001), การสูบบุหรี่ (OR = 3.72, p < 0.001), การใช้ยาไม่ถูกต้อง (OR = 2.98, p = 0.002), ระยะเวลาการนอนโรงพยาบาล > 10 วัน (OR = 4.87, p < 0.001) และ การล้างแผล > 1 ครั้ง/วัน (OR = 4.16, p < 0.001) เมื่อนำปัจจัยเสี่ยงมาวิเคราะห์ถดถอยเชิงซ้อนเพื่อควบคุมตัวแปรกวน พบว่า ปัจจัยเสี่ยงที่มีนัยสำคัญทางสถิติคือประวัติการเจ็บป่วยเป็นเบาหวาน (OR = 14.43, p = 0.005), การสูบบุหรี่ (OR = 13.18, p = 0.001), ระยะเวลาการนอนโรงพยาบาล > 10 วัน (OR = 4.88, p = 0.032) และ การล้างแผล > 1 ครั้ง/วัน (OR = 23.32, p < 0.001) จากค่าความเสี่ยงที่ได้นำมาพัฒนาแบบคัดกรองความเสี่ยงและวิเคราะห์ค่าความถูกต้องพบว่า แบบคัดกรองให้ค่าความไวร้อยละ 65 ความจำเพาะ ร้อยละ 78 เมื่อตัดที่คะแนน $\geq$ 18