Mongolian Emergency Service
Hospital Hygiene Project
MeshHp.mn

One day prevalence study

Mongolia, January/February 2012

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1

Prevalence study (cross-sectional/transverse)

Infections in all patients hospitalized at a given point in time are identified (point prevalence) in the entire hospital, or on selected units.
Typically, a team of trained investigators visits every patient of the hospital on a single day, reviewing medical and nursing charts, interviewing the clinical staff to identify infected patients, and collecting risk factor data. The outcome measure is a prevalence rate.
Performed ideally on a single day or week.
They can show the magnitude of HAI, identify changing patterns of HAIs, define target areas for intervention.

Incidence study (continuous/longitudinal)

Prospective identification of new infections (incidence surveillance) requires monitoring of all patients within a defined population for a specified time period.
Patients are followed throughout their stay, and sometimes after discharge (e.g. post-discharge surveillance for surgical site infections).
This type of surveillance provides attack rates, infection ratio and incidence rates. It is more effective in detecting differences in infection rates, to follow trends, to link infections to risk factors, and for inter-hospital and inter-unit comparisons.

2

TABLE 5. **Prevalence and incidence rates** *(11,12)*

Prevalence rate	Examples
Number of infected patients* at the time of study / Number of patients observed at the same time X100 (*or number of infections)	*Prevalence (%) of nosocomial infections (NI) for 100 hospitalized patients* *Prevalence (%) of urinary tract infections (UTI) for 100 hospitalized patients*
Number of infected patients at the time of the study / Number of patients exposed at the same time X100	*Prevalence (%) of UTI for 100 patients with* a urinary catheter
Attack rate (cumulative incidence rate)	
Number of new infections acquired in a period / Number of patients observed in the same period X100	*Attack rate (%) of UTI for 100 hospitalized patients*
Number of new infections acquired in a period / Number of patients exposed in the same period X100	*Attack rate (%) of surgical site infections (SSI) for 100 operated patients*
Incidence rate	
Number of new nosocomial infections acquired in a period / Total of patient-days for the same period X1000	*Incidence of bloodstream infection (BSI) for 1000 patient-days*
Number of new device-associated nosocomial infections in a period / Total device-days for the same period X1000	*Incidence of ventilator-associated pneumonia for 1000 ventilation-days*

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Continuous surveillance:
Active, passive, or a combination of both.

Active surveillance:
Daily visits to patient wards/care units to assess patients at-risk of HAI, e.g., surgical site infection (SSI) or central line–associated bloodstream infection (CLABSI).
It requires trained staff.

Passive surveillance:
Reporting by individuals outside the infection control team (laboratory-based surveillance, extraction from medical records postdischarge, infection notification by physicians or nurses) is of low sensitivity.
Positive laboratory reports do not always indicate infection, and negative ones do not always mean infection is absent.

Case finding using active and passive surveillance by an IPC practitioner increases correct detection of HAIs from approximately 25% to >85%.
In continuous surveillance, only incidence cases of HAI should be reported.

4

Post-discharge surveillance

A common question of surveillance programmes is:
Do you need to include post-discharge surveillance in the surveillance plan?

5

Figure 4.2 depicts a short prevalence survey of seven days.
Six patients were surveyed, and two had an active infection:
Patient-3 developed a new infection during the surveillance period and Patient-6 had an existing infection.
Therefore, the number of infections (numerator) would be two for six (denominator) patients.
Patient-5 acquired an infection which is not included because it appeared after the last day of the survey.

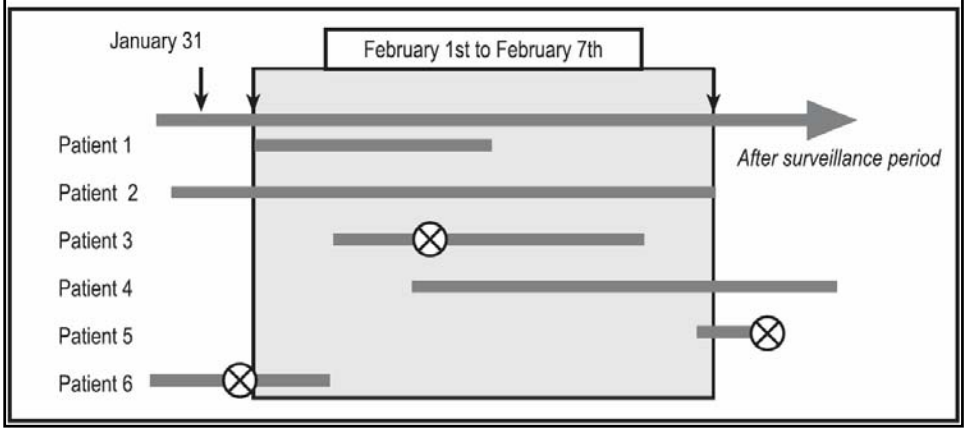

TABLE 2. **Key points in the process of surveillance for nosocomial infection rates**

- Active surveillance (prevalence and incidence studies)
- Targeted surveillance (site-, unit-, priority-oriented)
- Appropriately trained investigators
- Standardized methodology
- Risk-adjusted rates for comparisons

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Definitions for HAI

Definitions should distinguish between HAI and community-acquired infection (CAI).
HAIs can be defined generally as *"An infection occurring in a patient during the process of care in a hospital or other health-care facility which was not present or incubating at the time of admission. This includes infections acquired in the health-care facility but appearing after discharge and also occupational infections among health-care workers of the facility".*

Cutt-off point 48 hours after admission is typically used to distinguish between HAI and CAI.

Well-established criteria for HAIs have been developed by the U.S. Centers for Disease Control and Prevention (CDC).

8

TABLE I. **Simplified criteria for surveillance of nosocomial infections**

Type of nosocomial infection	Simplified criteria
Surgical site infection	Any purulent discharge, abscess, or spreading cellulitis at the surgical site during the month after the operation
Urinary infection	Positive urine culture (1 or 2 species) with at least 10^5 bacteria/ml, with or without clinical symptoms
Respiratory infection	Respiratory symptoms with at least two of the following signs appearing during hospitalization: — cough — purulent sputum — new infiltrate on chest radiograph consistent with infection
Vascular catheter infection	Inflammation, lymphangitis or purulent discharge at the insertion site of the catheter
Septicaemia	Fever or rigours and at least one positive blood culture

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FIGURE 1. **Example of a minimum data collection form for prevalence study**

Date	(dd/mm/yy)	_ _ _ _ _ _
Hospital		_ _
Unit		_ _
Unit specialty		_ _
Patient		
Patient identification		_ _ _ _ _
Age	(years)	_ _ _
Gender	❑ male ❑ female	_
Date of admission in the hospital	(dd/mm/yy)	_ _ _ _ _ _
Patient exposure		
Surgical procedure (during the last month)	❑ Yes ❑ No	_
Urinary catheter	❑ Yes ❑ No	_
Mechanical ventilation	❑ Yes ❑ No	_
Intravascular catheter	❑ Yes ❑ No	_
Antibiotic	❑ Yes ❑ No	_
If yes, prescription for		
❑ Prophylaxis ❑ Therapy	❑ Other/unknown	_
Nosocomial infection		
	❑ Yes ❑ No	_
If yes, fill the following items		
Surgical site infection	❑ Yes ❑ No	_
Urinary tract infection	❑ Yes ❑ No	_
Bloodstream infection	❑ Yes ❑ No	_
Pneumonia	❑ Yes ❑ No	_
Other respiratory infection	❑ Yes ❑ No	_
Line-related infection	❑ Yes ❑ No	_
Other nosocomial infection	❑ Yes ❑ No	_

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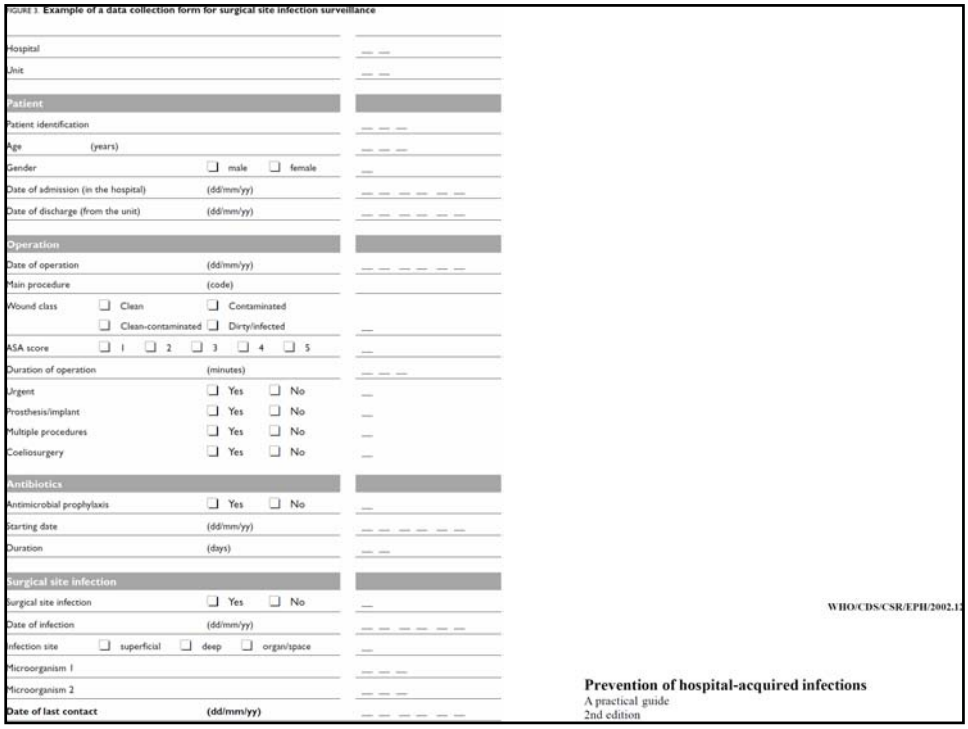

FIGURE 3 **Example of a data collection form for surgical site infection surveillance**

Hospital		__ __
Unit		__ __
Patient		
Patient identification		__ __ __
Age	(years)	__ __ __
Gender	❑ male ❑ female	__
Date of admission (in the hospital)	(dd/mm/yy)	__ __ __ __ __ __
Date of discharge (from the unit)	(dd/mm/yy)	__ __ __ __ __ __
Operation		
Date of operation	(dd/mm/yy)	__ __ __ __ __ __
Main procedure	(code)	
Wound class	❑ Clean ❑ Contaminated ❑ Clean-contaminated ❑ Dirty/infected	__
ASA score	❑ 1 ❑ 2 ❑ 3 ❑ 4 ❑ 5	__
Duration of operation	(minutes)	__ __ __
Urgent	❑ Yes ❑ No	__
Prosthesis/implant	❑ Yes ❑ No	__
Multiple procedures	❑ Yes ❑ No	__
Coeliosurgery	❑ Yes ❑ No	__
Antibiotics		
Antimicrobial prophylaxis	❑ Yes ❑ No	__
Starting date	(dd/mm/yy)	__ __ __ __ __ __
Duration	(days)	__ __
Surgical site infection		
Surgical site infection	❑ Yes ❑ No	__
Date of infection	(dd/mm/yy)	__ __ __ __ __ __
Infection site	❑ superficial ❑ deep ❑ organ/space	__
Microorganism 1		__ __ __
Microorganism 2		__ __ __
Date of last contact	**(dd/mm/yy)**	__ __ __ __ __ __

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Problems

Influence of the persons doing surveillance (standing/reputation in the hospital staff?)

Problem of small numbers in short periods (e.g. 3 months)

Problems of diagnosis:
- Sepsis: the more cases the more blood cultures
- Pneumonia: who makes the x-ray diagnosis?
- Politics of antibiotics: more antibiotics ➔ less infections?
- Microbiologic confirmation of infections?

Numbers of indicator operations big enough?
- e.g. infection rate about 2 % in Germany

12

Journal of Hospital Infection 75 (2010) 214–219

Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevierhealth.com/journals/jhin

Prevalence of hospital-acquired infections and antibiotic use in two tertiary Mongolian hospitals

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13

Definitions

The current infection control guidelines in Mongolia lack standardised definitions for HAI. Therefore the US Centres for Disease Control and Prevention (CDC) definitions of HAI, widely utilised in similar studies, were used in the study for standardisation and comparison purposes.[8,10,11,15–17,20–22,24,25] These categorise 41 diagnostic groups which were classified as: (1) surgical site infection (SSI), (2) bloodstream infection (BSI), (3) urinary tract infection (UTI), (4) respiratory tract infection (RTI) and (5) other infection. All infections with onset >48 h after admission were recorded as HAI. SSI in surgical patients who were readmitted due to infection within one month of surgery or within one year after an implant was placed, were also classified as HAI. Surgical patients with a clean or clean-contaminated wound class and who had symptoms of infection were recorded as having HAI.[26] Patients with a contaminated or dirty-infected wound class were classified as having a community-acquired infection (CAI) together with all other infections. Antibiotic therapy was defined as prophylactic when it was prescribed to patients who had no progressive infections, including infectious comorbidities.

14

Data collection

A one-day prevalence study was conducted during two consecutive weeks: the weeks starting 30 September 2008 in hospital A and 8 October 2008 in hospital B. On the study day, each of the 18 ICPs was designated 20–30 patients in surgical departments, intensive care and emergency units (IC&EU) or 30–40 patients in obstetrics and gynaecology (O&G), and medical departments.

15

SUMMARY

Health statistics of Mongolia indicate that hospital-acquired infections (HAIs) occur in 0.01–0.05% of all hospital admissions. This is considerably lower than internationally reported rates. A one-day survey was conducted in two tertiary hospitals of Ulaanbaatar in September 2008 to estimate HAI prevalence, associated risk factors and patterns of antibiotic usage. Among 933 patients surveyed, 50 (5.4%) were diagnosed with HAI. Prevalence of surgical site infection was 1.1% (3.9% among surgical patients), bloodstream infection 0.3%, respiratory tract infection 1.3%, urinary tract infection 1.3%, and other HAI 1.4%. Microbiological investigations were only documented for 18.9% of all patients. A total of 558 patients (59.8%) were taking 902 courses of antibiotics; 92.1% of patients were prescribed antibiotics without a sensitivity test. Multiple logistic regression analysis revealed that HAI was significantly associated with the admission source, the hospital, length of hospital stay, surgical and other invasive procedures, urinary catheters and other indwelling devices. The study results were comparable with reports from some other developing countries and confirm that official statistics underestimate the true frequency of HAI in Mongolia.

16

Table I
Infection outcomes among patients surveyed in two tertiary hospitals in Ulaanbaatar, Mongolia, 2008

Main variables	Hospital A	Hospital B	Total
Patients with infections[a]	123 (30.4)	220 (41.6)	343 (36.8)
Community-acquired infection (CAI)	108 (26.7)	185 (35.0)	293 (31.4)
Hospital-acquired infection (HAI)	15 (3.7)	35 (6.6)	50 (5.4)
HAIs by department[b]			
Surgical	9 (4.9)	6 (5.3)	15 (5.0)
Medical	4 (1.9)	14 (7.7)	18 (4.5)
Obstetrics and gynaecology	–	6 (3.8)	6 (3.8)
Intensive care and emergency	2 (40.0)	9 (12.7)	11 (14.5)
Types of HAI[a]			
Surgical site infection	3 (0.7)	7 (1.3)	10 (1.1)
Bloodstream infection	–	3 (0.6)	3 (0.3)
Urinary tract infection	8 (2.0)	4 (0.8)	12 (1.3)
Respiratory tract infection	4 (1.0)	8 (1.5)	12 (1.3)
Others	–	13 (2.5)	13 (1.4)
List of HAIs[a]			
Incisional surgical wound infection	2 (0.5)	1 (0.2)	3 (0.3)
Deep surgical wound infection	1 (0.2)	6 (1.1)	7 (0.8)
Laboratory-confirmed bloodstream infection	–	1 (0.2)	1 (0.1)
Clinical sepsis	–	2 (0.4)	2 (0.2)
Symptomatic urinary tract infection	8 (2.0)	4 (0.8)	12 (1.3)
Pneumonia	–	5 (0.9)	5 (0.5)
Bronchitis, tracheobronchitis, bronchiolitis, tracheitis, without evidence of pneumonia	1 (0.2)	–	1 (0.1)
Meningitis or ventriculitis	–	2 (0.4)	2 (0.2)
Gastroenteritis	–	1 (0.2)	1 (0.1)
Intra-abdominal infection	–	1 (0.2)	1 (0.1)
Conjunctivitis	–	3 (0.6)	3 (0.3)
Upper respiratory tract infection (pharyngitis, laryngitis, epiglottitis)	3 (0.7)	3 (0.6)	6 (0.6)
Joint or bursa infection	–	1 (0.2)	1 (0.1)
Skin infection (other than incisional wound infection)	–	1 (0.2)	1 (0.1)
Soft tissue infection	–	1 (0.2)	1 (0.1)
Breast abscess or mastitis	–	1 (0.2)	1 (0.1)
Omphalitis in newborn	–	2 (0.4)	2 (0.2)

Values in parentheses are percentages.
[a] Denominator is the total number of patients.
[b] Denominator is total number of patients in this group of departments.

17

Antibiotic use

A total of 558 (59.8%) patients were taking 902 courses of antibiotics with the average number of antibiotics per patient being 1.62 (SD: 0.88; range: 1–6). In hospital A, 208 (51.4%) patients were taking 308 antibiotic courses with an average of 1.48 (SD: 0.75; range: 1–5) antibiotics per patient, whereas in hospital B, 350 (66.3%) patients were taking 594 courses with an average of 1.70 (SD: 0.94; range: 1–6) antibiotics per patient. At the time of the study, the mean duration of antibiotic therapy was 3.63 days (SD: 2.47; range: 0–14; median: 4.0) in hospital A, 3.71 days (SD: 3.21; range: 0–22; median: 3.0) in hospital B, and 3.68 days (SD: 2.90; range: 0–22; median: 3.0) overall.

Twenty-two types of antibiotic were administered to patients, the most common being ampicillin, gentamicin and cefazolin, together accounting for 72.2% of all antibiotics administered. The

18

Schweiz Med Wochenschr 1999;129:1521–8
Peer reviewed article

Original article

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Nosocomial infections in Swiss university hospitals: a multi-centre survey and review of the published experience

A one-week period-prevalence survey, aimed at assessing the scale of nosocomial infections, was conducted in May 1996 in medical, surgical, and intensive care wards of 4 Swiss university hospitals. Standard definitions by the Centres for Disease Control and Prevention were used except that asymptomatic bacteriuria was not classified as a nosocomial infection. A total of 176 nosocomial infections were found among 156 of the 1349 surveyed patients (prevalence 11.6%; interhospital range 9.8–13.5%). Surgical site infections were most prevalent (30% of all nosocomial infections), followed by urinary tract (22%), lower respiratory tract (15%), and bloodstream infections (13%). The most frequently isolated microorganisms were Enterobacteriaceae (n = 44; 28%), *S. aureus* (n = 20; 13%), *Pseudomonas* spp (n = 17; 11%), and *Candida* spp (n = 16; 10%). One third of all episodes of nosocomial infections were not microbiologically documented. The overall prevalence of nosocomial infections in surgical patients (n = 562) was 16.2% compared to 8.6% for non-surgical patients (prevalence ratio, 1.9; 95% confidence interval [CI_{95}], 1.4–2.5). In one centre, the in-hospital mortality of patients with nosocomial infections was 9.2% (10/109) compared to 3.9% (25/637) for patients without nosocomial infections (odds ratio, 2.47; CI_{95}, 1.15–5.31). Infection rates were similar to those reported by two Swiss pilot studies from the early 1980s. This study offers a reliable measure of the prevalence of nosocomial infections in selected wards at 4 Swiss university hospitals and confirms the importance of nosocomial infections as a heavy burden on health services at the end of this century.

Keywords: prevalence survey; cross transmission; risk factors; comorbidities; case-mix

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Figure 1

Prevalence of patients with nosocomial infections (n = 156) by ward categories and centres – Swiss prevalence study, May 1996. MED = medical wards; SURG = surgical wards; ICU = intensive care units.

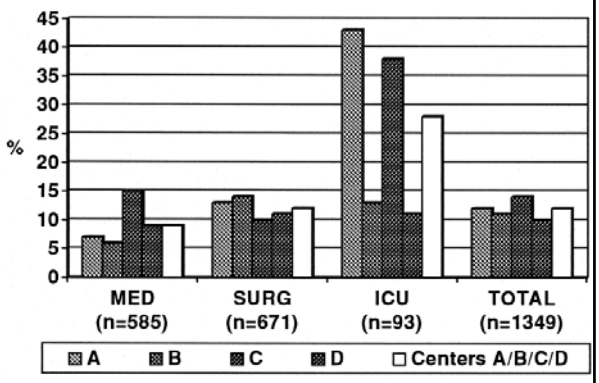

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Table 3

Overall prevalence of nosocomial infections among surgical patients in Swiss University Hospitals.

type of surgery	infected/total patients	prevalence (%)	prevalence ratio (CI_{95})[1]
urologic	4/54	7.4	reference
orthopaedic	18/140	12.9	1.74 (0.62–4.90)
neurosurgical	12/88	13.6	1.84 (0.63–5.42)
cardiovascular	16/103	15.5	2.10 (0.74–5.96)
abdominal	22/96	22.9	3.09 (1.12–8.51)
others and non-specified[2]	19/81	23.4	3.17 (1.14–8.80)
total	91/562	16.2	

[1] Comparing each type of surgery with a reference category of surgery (with a designated ratio of 1).
[2] Others include: gynaecologic, plastic, reconstructive and maxillofacial surgery.

21

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Table 4

Overall prevalence of nosocomial infections in surgical patients (n = 562) by ASA[1] categories.

ASA category[2]	infected/total patients	prevalence (%)	prevalence ratio (CI_{95})
I	5/62	8.1	reference
II	19/183	10.4	1.29 (0.50–3.30)
III	35/184	19.0	2.36 (0.97–5.75)
IV	11/50	22.0	2.73 (1.01–7.34)
V	5/10	50.0	6.20 (2.18–17.62)

[1] American Society of Anesthesiology (ASA) physical status score [37].
[2] Not available information; n = 73, including 16 infected patients.

22

ABSTRACT

OBJECTIVE: To determine the prevalence and risk factors for nosocomial infections (NIs) in four Swiss university hospitals.

DESIGN AND SETTING: A 1-week period-prevalence survey conducted in May 1996 in medical, surgical, and intensive-care wards of four Swiss university hospitals (900-1,500 beds). Centers for Disease Control and Prevention definitions were used, except that asymptomatic bacteriuria was not categorized as NI. Study variables included patient demographics, primary diagnosis, comorbidities, exposure to medical and surgical risk factors, and use of antimicrobials. Risk factors for NIs were determined using logistic regression with adjustment for length of hospital stay, study center, device use, and patients' comorbidities.

RESULTS: 176 NI were recorded in 156 of 1,349 screened patients (11.6%; interhospital range, 9.8%-13.5%). The most frequent NI was surgical-site infection (53; 30%), followed by urinary tract infection (39; 22%), lower respiratory tract infection (27; 15%), and bloodstream infection (23; 13%). Prevalence of NI was higher in critical-care units (25%) than in medical (9%) and surgical wards (12%). Overall, 65% of NIs were culture-proven; the leading pathogens were *Enterobacteriaceae* (44; 28%), *Staphylococcus aureus* (20; 13%), *Pseudomonas aeruginosa* (17; 11%), and *Candida* species (16; 10%). Independent risk factors for NI were central venous catheter (CVC) use (odds ratio [OR], 3.35; 95% confidence interval [CI_{95}], 2.91-3.80), admission to intensive care (OR, 1.75; CI_{95}, 1.30-2.21), emergency admission (OR, 1.57; CI_{95}, 1.15-2.00), impaired functional status (Karnofsky index 1-4: OR, 2.56; CI_{95}, 1.95-3.17), and McCabe classification of ultimately fatal (OR, 2.50; CI_{95}, 2.04-2.96) or rapidly fatal (OR, 2.25; CI_{95}, 1.52-2.98) underlying condition.

CONCLUSIONS: According to the results of this survey, NIs are frequent in Swiss university hospitals. This investigation confirms the importance of CVCs as a major risk factor for NI. Patient comorbidities must be taken into account to adjust for case mix in any study comparing interhospital or intrahospital infection rates (*Infect Control Hosp Epidemiol* 1999;20:37-42).

Vol. 20 No. 1 INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY 37

PREVALENCE AND RISK FACTORS FOR NOSOCOMIAL INFECTIONS IN FOUR UNIVERSITY HOSPITALS IN SWITZERLAND

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TABLE 5
PREVALENCE STUDIES OF NOSOCOMIAL INFECTION IN SEVERAL UNIVERSITY HOSPITALS AND TERTIARY-CARE CENTERS WITH MORE THAN 500 BEDS

Country	Reference	Year of Study	Prevalence ( )
Belgium	Unpublished data*	1984	14.8
Australia	13	1984	8.6
Hong Kong	5	1986	10.5
Spain	4	1990	8.6
France	24	1990	9.0
Norway	14	1991	6.5
United Kingdom	15	1993	11.2
Lithuania	25	1994	9.2
Germany	22	1994	4.4
Switzerland	Present study	1996	11.6

* O. Ronveaux, MD, Institute of Public Health–Louis Pasteur, Brussels, Belgium, oral communication based on unpublished data from reference 16.

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Pilot study of prevalence of infectious diseases in Mongolian hospitals

Questionnaire which should be completed for each ward

Survey date: ☐

Hospital No 1 ☐ Chingeltej District Hospital ☐

Ward specialty:
- ☐ Internal medicine
- ☐ Surgery
- ☐ Gynecology
- ☐ Pediatric
- ☐ Ophthalmology
- ☐ Otorhinolaryngology
- ☐ Urology
- ☐ Infectious diseases
- ☐ Intensive care
- ☐ Traumatology
- ☐ Neurology
- ☐ Other

Total number of patients in ward (admitted to the ward at 8:00 AM and not discharged from the ward at time of the survey):

☐

25

Pilot study of prevalence of infectious diseases in Mongolian hospitals

Questionnaire which should be completed for each patient who gets antibiotics on study day or who has an infection on study day

Hospital No 1 ☐ Chingeltej District Hospital ☐

Ward specialty:
- ☐ Internal medicine
- ☐ Surgery
- ☐ Gynecology
- ☐ Pediatric
- ☐ Ophthalmology
- ☐ Otorhinolaryngology
- ☐ Urology
- ☐ Infectious diseases
- ☐ Intensive care
- ☐ Traumatology
- ☐ Neurology
- ☐ Other: ☐

Gender: male ☐ female ☐

1

Age: ☐ years

☐ months (if < 1 year old)

Date of hospital admission: ☐

Patient receives antimicrobial(s) on the survey date (since 0:00, except for surgical prophylaxis 24 h before time of the survey) (not topical antimicrobials)

Yes ☐ no ☐ unknown ☐

Antimicrobial (generic or brand name)	Route of application (parenteral, oral, rectal, inhalation)	
Cefazolin	☐ parenteral	☐ oral
	☐ rectal	☐ inhalation
Cefatoxim	☐ parenteral	☐ oral
	☐ rectal	☐ inhalation
Gentamycin	☐ parenteral	☐ oral
	☐ rectal	☐ inhalation
Amoxicillin	☐ parenteral	☐ oral
	☐ rectal	☐ inhalation
Ciprofloxacin	☐ parenteral	☐ oral
	☐ rectal	☐ inhalation
Levofloxacin	☐ parenteral	☐ oral
	☐ rectal	☐ inhalation
Ofloxacin	☐ parenteral	☐ oral
	☐ rectal	☐ inhalation

2

Azythromycin	☐ parenteral	☐ oral
	☐ rectal	☐ inhalation
Clarytromycin	☐ parenteral	☐ oral
	☐ rectal	☐ inhalation
Metronidasol (Sulfanilamide)	☐ parenteral	☐ oral
	☐ rectal	☐ inhalation
Vancomycin	☐ parenteral	☐ oral
	☐ rectal	☐ inhalation

Patient has at least one active infection with onset on day 3 of current hospital stay or later or related to previous acute care hospital stay:

Yes ☐ no ☐ unknown ☐

If answer is yes

Kind of infection according to case definitions below**

Please mark here with a cross the kind of infection	Examples	Corresponding HAI Case definitions**
	Infections of the Central Nervous System	**IC, MEN, Spinal abcess**
	Infections oft he eye	**CONJ, EYE**
	Infections of ear, mouth, nose, throat or larynx	**EAR, ORAL, SINU, UR**
	Acute bronchitis or exacerbations of chronic bronchitis	**BRON, LUNG**
	Pneumonia	**PN1, PN2, PN3, PN4, PN5**
	Cardiovascular infections: endocarditis, vascular graft	**VASC, ENDO, CARD, MED**
	GI infections (salmonellosis, antibiotic associated diarrhoea)	**GE, GIT, HEP, CDI**
	Intraabdominal sepsis including hepatobiliary	**IAB**
	Cellulitis, wound infection, deep, soft tissue infection not involving bone	**SSI-S, SSI-D, SSI-O/CRI 1?/SKIN, ST, DECU,**
		BURN, BRST
	Septic arthritis(including prosthetic joint), osteomyelitis	**BONE, JNT, DISC**
	Symptomatic Lower Urinary Tract Infections	**UTI-A, UTI-B, (UTI-C, excluded from PPS)**
	Symptomatic Upper Urinary Tract Infections	**UTI-A, UTI-B, (UTI-C, excluded from PPS)**
	Asymptomatic bacteriuria	**NO CORRESPONDING HAI case definition**
	Obstetric or gynaecological infections, STD in woman	**EMT, EPIS, VCUF OREP**
	Prostatitis, epididymoorchitis, STD in men	**OREP**
	Lab-confirmed bacteraemia	**BSI + source (C-CVC, C-PER, C-ART, S-PUL, S-UTI, etc.,UNKnown origin), CRI3**
	Clinical sepsis (suspected bloodstream infection without lab confirmation=results not yet available, no blood cultures collected or negative blood culture), excluding FN	**NO CORRESPONDING HAI case definition, except for neonates**
	Febrile Neutropaenia or other form of manifestation of infection in immunocompromised host (e.g., HIV, chemotherapy etc) with no clear anatomical site	**NO CORRESPONDING HAI case definition**
	Systemic inflammatory response with no clear anatomic site	**CRI2, SYS**
	Completely undefined, site with no systemic inflammation	**NO CORRESPONDING HAI case definition**

Relevant device in situ before onset of infection:

Intubation in 48 h before onset of infection yes ☐ no ☐

Central venous catheter yes ☐ no ☐

Urinary catheter in 7 days before onset of infection

Yes ☐ no ☐

3

4

Infection present at admission yes ☐ no ☐

If not present at admission, date of onset ☐

Origin of infection current hospital ☐
Other hospital ☐
unknown ☐

diagnostic performed: yes ☐ no ☐ unknown ☐

bacteriological diagnostic yes ☐ no ☐ unknown ☐
virological yes ☐ no ☐ unknown ☐
serologic yes ☐ no ☐ unknown ☐

results: yes ☐ no ☐ unknown ☐

name of microorganism

- ☐ Staphylococcus aureus
- ☐ Other staphylococci than aureus
- ☐ Hämolotic streptococci group A
- ☐ Other hemolytic streptococci
- ☐ Enterococcus ssp.
- ☐ E. coli
- ☐ Klebsiella spp.
- ☐ Enterobacter spp.
- ☐ Pseudomonas aeruginosa
- ☐ Salmonella typhi or paratyphi
- ☐ Other Salmonella spp.
- ☐ Brucella spp.
- ☐ Clostridium perfringens
- ☐ Clostridium spp. other than perfringens
- ☐ Campylobacter
- ☐ Chlamydia trachomatis
- ☐ Shigella spp.
- ☐ Yersinia pestis
- ☐ Yersinia spp. other than pestis
- ☐ Vibrio cholera
- ☐ Lamblia
- ☐ Amoeba
- ☐ Helminthes
- ☐ Hepatitis A
- ☐ Hepatitis B
- ☐ Hepatitis C
- ☐ HIV
- ☐ Other ☐

5

6

SSI - SURGICAL SITE INFECTION

Superficial incisional (SSI-S)

Infection occurs within 30 days after the operation and infection involves only skin and subcutaneous tissue of the incision and at least one of the following:

1. Purulent drainage with or without laboratory confirmation, from the superficial incision
2. Organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision.
3. At least one of the following signs or symptoms of infection: pain or tenderness, localized swelling, redness, or heat and superficial incision is deliberately opened by surgeon, unless incision is culture-negative.
4. Diagnosis of superficial incisional SSI made by a surgeon or attending physician.

Deep incisional (SSI-D)

Infection occurs within 30 days after the operation if no implant is left in place or within one year if implant is in place and the infection appears to be related to the operation and infection involves deep soft tissue (e.g. fascia, muscle) of the incision and at least one of the following:

1. Purulent drainage from the deep incision but not from the organ/space component of the surgical site.
2. A deep incision spontaneously dehisces or is deliberately opened by a surgeon when the patient has at least one of the following signs or symptoms: fever (>38° C), localized pain or tenderness, unless incision is culture-negative.
3. An abscess or other evidence of infection involving the deep incision is found on direct examination, during reoperation, or by histopathologic or radiologic examination.
4. Diagnosis of deep incisional SSI made by a surgeon or attending physician.

Organ/Space (SSI-O)

Infection occurs within 30 days after the operation if no implant is left in place or within one year if implant is in place and the infection appears to be related to the operation and infection involves any part of the anatomy (e.g., organs and spaces) other than the incision which was opened or manipulated during an operation and at least one of the following:

1. Purulent drainage from a drain that is placed through a stab wound into the organ/space .
2. Organisms isolated from an aseptically obtained culture of fluid or tissue in the organ/space.
3. An abscess or other evidence of infection involving the organ/space that is found on direct examination, during reoperation, or by histopathologic or radiologic examination.
4. Diagnosis of organ/space SSI made by a surgeon or attending physician.

29

BSI - BLOODSTREAM INFECTION

- 1 positive blood culture for a recognised pathogen

or

- Patient has at least one of the following signs or symptoms: fever (>38°C.), chills, or hypotension

  and

  2 positive blood cultures for a common skin contaminant (from 2 separate blood samples, usually within 48 hours).

skin contaminants = coagulase-negative staphylococci, *Micrococcus sp., Propionibacterium acnes, Bacillus sp., Corynebacterium sp.*

Note: this definition corresponds to the former HELICS BSI-A definition; BSI-B (single blood culture for skin contaminants in patients with central vascular catheter and adapted treatment) was deleted after the recommendation of an ECDC expert meeting in January 2009 and confirmation during the annual meeting in June 2009. BSI-B were also recently excluded from the CDC definition of laboratory-confirmed bloodstream infections

Source of bloodsteam infection:

- Catheter-related: the same micro-organism was cultured from the catheter or symptoms improve within 48 hours after removal of the catheter (C-PER: peripheral catheter, C-ART: arterial catheter C-CVC: central venous catheter (cave!: report C-CVC BSI as CRI3 if microbiologically confirmed, see CRI3 definition))
- Secondary to another infection: the same micro-organism was isolated from another infection site or strong clinical evidence exists that bloodstream infection was secondary to another infection site, invasive diagnostic procedure or foreign body.
  - Pulmonary (S-PUL)
  - Urinary tract infection (S-UTI)
  - Digestive tract infection (S-DIG)
  - SSI (S-SSI): surgical site infection
  - Skin and soft tissue (S-SST)
  - Other (S-OTH)
- Unknown (UNK): None of the above, bloodstream infection of unknown origin

Note:

- primary bloodstream infections include catheter-related BSI and BSI of unknown origin
- a CVC-associated bloodstream infection according to CDC/NHSN definitions (different from CVC-related BSI) is a primary BSI with central venous catheter use (even intermittent) in the 48 hours preceding the onset of the infection: therefore the presence of "the relevant device" (in this case the central vascular catheter , not peripheral catheters) in the 48 hours before onset of infection is collected even in the absence of microbiological confirmation. (also see AJIC, 1997;25:112-6)

30

CRI - CVC-RELATED INFECTION

CRI1: Local CVC-related infection (no positive blood culture)

- quantitative CVC culture $\geq 10^3$ CFU/ml (3) or semi-quantitative CVC culture > 15 CFU (4)

and

- pus/inflammation at the insertion site or tunnel

CRI2: General CVC-related infection (no positive blood culture)

- quantitative CVC culture $\geq 10^3$ CFU/ml or semi-quantitative CVC culture > 15 CFU

and

- clinical signs improve within 48 hours after catheter removal

CRI3: microbiologically confirmed CVC-related bloodstream infection

- BSI occurring 48 hours before or after catheter removal

and positive culture with the same micro-organism of either:

- quantitative CVC culture $\geq 10^3$ CFU/ml or semi-quantitative CVC culture > 15 CFU
- quantitive blood culture ratio CVC blood sample/peripheral blood sample> 5 (5)
- differential delay of positivity of blood cultures (6): CVC blood sample culture positive 2 hours or more before peripheral blood culture (blood samples drawn at the same time)
- positive culture with the same micro-organism from pus from insertion site

Note:

- central vascular catheter colonisation should not be reported
- A CRI3 is also a bloodstream infection with source C-CVC; however when a CRI3 is reported, the BSI should not be reported in the point prevalence survey; microbiologically confirmed C-CVC BSI should be reported as CRI3

31

Mongolian Emergency Service

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Thank you for your attention!

32