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# First Results of National Surgical Site Infection Surveillance in Hungary

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**Introduction**

Healthcare-associated infections (HAI) are an important cause of morbidity and mortality, prolongs hospital stay, increases antibiotic usage, add costs.[1] The surveillance of HAI has been acknowledged as an important component of infection control programmes, and is increasingly recognised as key to improving clinical outcomes.[2]

Hungarian National Nosocomial Surveillance System (HNNSS) was established in 2004. The aim of this system has been to create a national database of HAI, to enable hospitals to perform surveillance of HAI and compare their results with national aggregated data and use the information to improve patient care.[3] HNNSS is a standardized, secure web-based reporting system. It has 2 components: a mandatory and a voluntary part. Software is offered free for hospitals. Mandatory components are reports of nosocomial outbreaks, infections caused by multidrug resistant organisms and nosocomial bloodstream infections. Participation of hospitals in surveilance component is voluntary and confidential. Surveillance compontents are: intensive care unit (ICU) and surgical site infections (SSI). All data are received and analysed by National Center for Epidemiology. Reports of surveillance data are elaborated every six months.

SSI surveillance started in November 2004. Hospitals can choose one or more of 36 defined categories (CDC-NNIS). With SSI surveillance component we joined European Surveillance network HELICS (Hospitals in Europe Link for Infection Controlthrough Surveillance).

**Surveillance methodology**

Definitions of SSI and surveillance methodology are according to the CDC NNIS and HELICS.[4,5,6] Participating hospitals are requisted to collect data for a minimum of six month, on all patients undergoing surgery in a choosen category. Hospitals are able to choose one or more defined surgical categories. Active prospective surveillance on eligible patients is required from the time of surgery until discharge. Postdischarge surveillance is not included by now. Personnel responsability for data collection are provided with training in the surveillance methods and case-definitions. We present a summary of surgical site infection surveillance data submitted to HNNSS between November 2004 and October 2005.

Beginning with November 2004 we announced a Pylot study of five month and from April 2005 started the six month participation periods.

Table 1 shows participation of hospitals, chosen operative procedures and number of operations per period. Number of participating hospitals increased from 19 in the first period to 33 in the seccond period. In both periods participated, university hospitals, teaching and non-teaching hospitals.

Bile duct, liver and pancreas surgery, knee prothesis and mastectomy were excluded because of the low number of operations by now. Hospitals collecting data on less than 50 operations per procedure in a surveillance period need to cumulate data over more then one period to obtain a reasonable precise estimate of their rate of SSI, so their results were not jet been taken into consideration. Hospitals collected data for both periods, but identified no surgical site infection were also excluded, assuming that their case finding in not satisfactory sensitive.

Table 2 shows the number of hospitals and number of operations which were incuded in calculation of SSI rates.

Table 1: Hospital paricipation in surgical site infection surveillance, choosen category of procedures and number of operations

| Surgical Procedure | No. Hospitals Nov 2004-March 2005 | No . Hospitals 2005 April-2005 Sept | Total number of operations |
|---|---|---|---|
| Cholecystectomy CHOL | 8 | 14 | 2302 |
| Cesarean section CSEC | 3 | 12 | 2068 |
| Hip prosthesis HPRO | 6 | 6 | 1077 |
| Large bowel surgery COLO | 4 | 7 | 450 |
| Mastectomy MAST | 3 | 4 | 327 |
| Bile duct, liver, or pancreatic surgery BILI | 2 | 2 | 213 |
| Knee prosthesis KPRO | 2 | 2 | 74 |

Table 2: Number oh Hospitals and operations included in calculation of SSI rates

| Surgical Procedure | No. Hospitals Nov 2004-March 2005 | No . Hospitals 2005 April-2005 Sept | Total number of operations |
|---|---|---|---|
| CHOL | 6 | 8 | 1220 |
| CSEC | 2 | 4 | 1412 |
| HPRO6 | 6 | 6 | 1077 |
| COLO | 4 | 6 | 369 |

**Analysis of data**

Overall incidence of SSI was calculated using aggregated data from all participating hospitals (i.e.number of SSIs per 100 operations in that cathegory). The incidence of SSI was stratified by the American NNIS risk index which ranges from 0 to 3 according to the presence of three major risk factors. The NNIS risk index was computed from the wound contamination class (1 point if >2), contaminated or dirty/infected wounds), the ASA physical status classifications (1 point if >2, severe systemic disease to muribund patient) and the duration of operation (75-th percentile of NNIS distribution).[7]

Due to the relatively small number of procedures in risk group 3, procedures in risk groups 2 and 3 were combined. Infections were classified by type as superficial incisional, deep incisional, and organ/space SSI.

**Results**

Rates of surgical site infections (SSI) vary by category of procedure. Table 3 shows the number of eligible procedures for surveillance in each surgical cathegory for the period 2004 November – 2005 October, the number of surgical site infections and rates of SSI by category of surgical procedure and also HELICS means for the same procedures. Figures show that our SSI rates compared with HELICS means are similar, exept SSI rates of CSEC, that are 46% lower. As backgroud of these low rates we presume lack of postdischarge surveillance in our surveillance system and incomplete case finding.

The comparison of the risk index by surgical procedure (Figure 1) shows the expected differences between the prevalence of risk factors according to the type of operation.

Table 3: Rate of SSI by surgical procedure November 2004 – October 2005 in comparison with HELICS means

| Surgical Procedure | Number of Operations | Number of SSI | Mean Hungary | Mean HELICS |
|---|---|---|---|---|
| CHOL | 1220 | 14 | 1.14 | 1.44 |
| CSEC | 1412 | 19 | 1.48 | 2.75 |
| HPRO | 1077 | 32 | 2.92 | 2.74 |
| COLO | 369 | 31 | 8.40 | 8.41 |

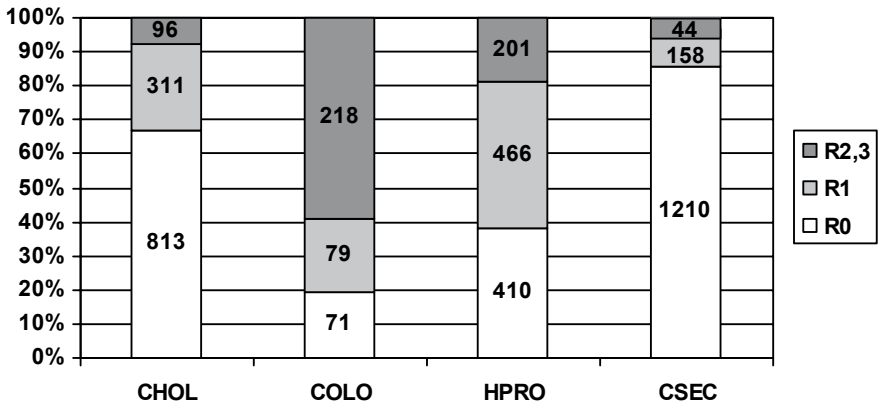


Figure 1: Distribution of NNIS risk index by surgical procedure

Rates of surgical site infections (SSI) vary by category of procedure and NNIS risk index. Table 4 shows the incidence of SSI stratified by three risk index groups (0,1 and 2 and 3 combined). There was, in general, an increase in the incidence of SSI as the risk index group increased. The influence of the number of risk factors on the incidence of SSI was particularly apparent for cholecystectomy, large colon surgery and hip prosthesis, where the incidence increased more then three-fold for procedures in risk index 2 and 3 compared whith those in risk index group 0. In case of cesarian section number of procedures in risk index 1 and 2 and 3 combined was too low by now to be useful for interpretation.

In comparison of our surgical infection rates by operative procedure and by NNIS risk index with the HELICS reports, rates for CHOL, COLO and HPRO are similar, while rates for CSEC are singnificant lower. These low rates could be explained by the underestimation from short postoperative hospital stay and lack of postdischarge surveillance.

Superficial incisional SSI was the most common type of SSI (figure 2), except for colon surgery.

Table 4: Incidence of surgical site infections by surgical procedure and NNIS risk index

| | NNIS risk | Number of operations | Number of SSI | Mean Hungary | Mean HELICS |
|---|---|---|---|---|---|
| CHOL | Összes | 1220 | 14 | 1.14 | 1.44 |
| | 0 | 813 | 5 | 0.61 | 0.76 |
| | 1 | 311 | 5 | 1.60 | 2.18 |
| | 2/3 | 96 | 4 | 4.16 | 5.01 |
| COLO | Összes | 369 | 31 | 8.40 | 8.41 |
| | 0 | 71 | 2 | 2.81 | 5.74 |
| | 1 | 79 | 8 | 10.12 | 7.84 |
| | 2/3 | 218 | 22 | 10.09 | 12.79 |
| HPRO | Összes | 1077 | 32 | 2.92 | 2.74 |
| | 0 | 410 | 88 | 1.95 | 1.99 |
| | 1 | 466 | 11 | 2.34 | 3.62 |
| | 2/3 | 201 | 13 | 5.97 | 5.40 |
| CSEC | Összes | 1412 | 19 | 1.48 | 2.75 |
| | 0 | 1210 | 17 | 1.40 | 2.26 |
| | 1 | 158 | 2 | 1.26 | 2.52 |
| | 2/3 | 44 | 0 | 0 | 0.98 |

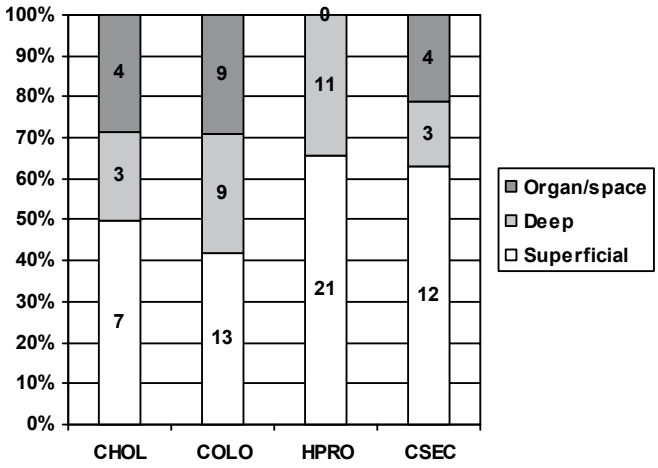


Figure 2: Type of surgical site infection by surgical procedure

## Discussion

The HNNSS provided Hungarian hospitals for the first time with standard case definitions and methods by a secure web-based reporting system for the surveillance of SSI and many hospitals collected data for one or more of 36 defined surgical category.

Standardised methods of surevillance, online reporting, availability of national data, central analysis and quarterly meeting and feed back for participating hospitals are considerd to be key reasons for participating in HNNSS. Local feedback of hospitals for their surgical department is performed monthly by presenting category specific montly incidence rate.

The HNNSS was found to increase awareness of infection control issues within hospitals. For some hospitals with high infection rates of infection, the surveillance stimulated them to review or change local practices.

Increasing participation in the national surgical site infection surveillance system suggests that surveillance of SSI is considered to be of value. Although the standardised surveillance protocol enhances the comparability of the data, the resource intensive nature of surveillance of SSI means that variation in intensity of case finding may also have an impact ont the results. To enhance quality of our surveillance data, we reinforce training in surveillance methods and we plan to develop a protocol for post-discharge surveillance in order to obtain more precice incidence rates. With the increase of number of operations, we will be able to give the distribution in percentiles of SSI rates by operative procedure and by NNIS risk index.

SSI surveillance data can contribute toward effective targeting of infection prevention and control resources in Hungarian hospitals.

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