Anna Różańska[1], Jadwiga Wójkowska-Mach[1], Małgorzata Bulanda[1], Piotr B. Heczko[1]

ORGANIZATION AND SCOPE OF SURVEILLANCE OF INFECTIONS IN POLISH HOSPITALS. RESULTS OF THE PROJECT PROHIBIT

[1]Jagiellonian University Medical College, Kraków, Poland

ABSTRACT

BACKGROUND. The paper presents results of a survey on organization of surveillance programs in Polish hospitals.

Survey was performed by means of the standardized questionnaire in the year 2012.

MATERIAL AND METHOD. Completed questionnaires were obtained from 9 hospitals of different size and type: 3 small, 2 medium and 4 large, most of them public (6 hospitals).

Questions concerning general organization of the infection control in hospitals were answered by infection control teams.

RESULTS. Infection control team works in every hospital and the head of the team in 8 hospitals is a physician. In most hospitals number of epidemiological nurses per 100 beds range from 0.4 to 0.8.

In every hospital surveillance comprises all the most important from epidemiological point of view forms of infections: surgical site infections, bloodstream infections, pneumonia, urinary tract infections, *Clostridium difficile* and MDRO surveillance - in all wards.

Infection cases in 5 hospitals are documented by epidemiological nurse in collaboration with infection control physician or physician of the ward. In rest of the hospitals cases are documented by infection control physician. Feedback on infection rates to HCWs are given twice a year in most hospitals.

In most of hospitals surveillance has been running for over 10 years.

CONCLUSIONS. The results from this small group may suggest that the surveillance programs are complex and well organized. But, more detailed analysis and comparison with data reported in others countries (especially those concerning hand hygiene or number of microbiological tests) indicate the need of improvements in the field.

Key words: *hospital infections, infections surveillance, patients safety*

INTRODUCTION

PROHIBIT "Prevention of Hospital Infections by Intervention and Training" is a European project that aims to describe and analyze surveillance of nosocomial infections in individual European countries, in particular the identification of barriers hampering the implementation of evidence-based procedures in the field of prevention of nosocomial infections, as well as the possibility to use the surveillance data for comparisons between hospitals in different countries in Europe and between European countries. The project consists of several modules, of which WP3 is dedicated to the description of the current organization of supervision in the individual countries, based on the results of standardized questionnaires in Poland. The project was implemented in Poland under the auspices of the Chief Sanitary Inspector.

The paper presents the results of a survey concerning the functioning of surveillance programs in selected Polish hospitals.

METHODS

The study was conducted with the use of a standardized questionnaire taking into account the organization of surveillance in hospitals in 2011, particularly in three different types of wards: intensive care, surgical and non-surgical. Questionnaires were prepared at the Institute of Hygiene and Environmental Medicine, Charité University in Berlin, and developed in the Polish lan-

Table I.   The size and type of the hospitals participating in the study

Hospital size	Number of hospitals	Number of admissions	The total person-days in hospital
Up to 199 beds	3	14 407	91 103
200- 499 beds	2	15 757	41 700
500 and more beds	4	78 366	416 542
Total	9	108 530	549 345
Hospital type			
I	4	21 194	120 169
II	2	49 019	269 245
III	3	38 317	159 931
Total	9	108 530	549 345

guage in the Department of Microbiology, Jagiellonian University Medical College in Krakow. Questionnaires were filled out by hospital staff: the section on hospital by the infection control team, the other sections by the employees of wards and/or of the infection control team. The whole study included 34 European countries, 24 of which reported data from 294 hospitals, which were then subjected to analysis.

Questions from the general part of the questionnaire, i.e. the organization of surveillance throughout the hospital, concerned:
- the size and form of ownership of hospitals, the annual number of admissions and person-days of hospital stay,
- the number and qualifications of the members of the infection control team,
- forms of infections and hospital wards covered by the registration of infections,
- selected aspects of the infection control team's co-operation with the staff of wards,
- monitoring of selected indicators of the process, in particular those related to hand hygiene.

In Poland, out of 30 questionnaires that were sent out to hospitals, 9 were filled in (the average number of hospitals that participated in the study was 12.25 for individual European countries), including three small ones (up to 199 beds), two medium-sized (200-499 beds) and four large (over 500 beds); these were mainly public institutions (6 hospitals); a detailed characteristics of hospitals participating in the study is presented in Table I.

Statistical analyzes were performed using the Mann Whitney U test and Spearman's Rho test. Mann Whitney U test was used to test the statistical significance of differences in the employment of staff infection control, consumption of disinfectants and the number of blood cultures performed in relation to the size of hospitals. Spearman's Rho test was used to test the correlation between the number of infection control staff and the number of years of surveillance programs with consumption of disinfectants and the number of blood cultures performed in relation to the number of beds.

RESULTS

In each of the hospitals, there was an infection control team. A physician served as a chairperson of the team in eight hospitals and, in one team, it was a person with other qualifications. The number of epidemiological nurses per 100 beds in 7 hospitals was in the range from 0.4 to 0.8 (preferably, the number of nurses is 0.4 per 100 beds); detailed data were given in Table II.

The observed differences in the employment rates of IC nurses and physicians in relation to the number of beds did not indicate any statistical significance.

In four hospitals, surveillance of infections has been in operation for over 15 years, and in three hospitals, for less than 10 years.

In each of the hospitals, according to the answers given in the questionnaire, surveillance and registration in all wards involved blood stream (BSI) infections,

Table II. Epidemiological nurses and physicians of the infection control team in hospitals participating in the study

Hospital code	Number of full-time-equivalent IC nurses (only internal staff)	Number of full-time-equivalent IC physicians	Type of IC physicians employment	Number of IC nurses per 100 beds	Number of IC physicians per 100 beds
H1	1	1	W	0.8	0.8
H2	2	0.4	Z	0.5	0.1
H3	2	0.5	Z	0.4	0.1
H4	3	0	Z	0.4	0.0
H5	1	1	Z	0.5	0.5
H6	1	0.4	W	0.5	0.2
H7	2	0.5	Z	0.6	0.2
H8	2	1	W	0.3	0.1
H9	1	1.5	W	0.1	0.2
Total H1:H9	2	0.8	-	0.5	0.3
Total	1.5	0.5	-	0.4	0.2

* - Z – external consultant, W – employment in the unit
Differences in employment infection control staff per 100 hospital beds in the individual characteristics showed no statistical significance

pneumonia (PNEU), surgical site infections (SSI), urinary tract infections (UTI), *Clostridium difficile* infections (CDI), and the supervision of multi-drug resistant (MDR) strains. In all 284 hospitals participating in the study in Europe, the aforementioned forms of infections and MDRO were monitored in an average of 63.73% (UTI in 181 hospitals) to 93.66% of hospitals (MDRO in 266 hospitals). Seven Polish hospitals had also declared to conduct post-discharge surveillance of SSI – 77.7%, which was a higher percentage than in the group of all European hospitals, which amounted to 59.92%. The forms of SSI recommended for surveillance and monitoring are: cholecystectomy (CHOL), colon surgery (COLO), Cesarean section (CCES), hip arthroplasty and knee arthroplasty (HPRO and KPRO). Among hospitals covered by the study, the supervision of CHOL and COLO was conducted in five hospitals, of CCES – in four and of HPRO and KPRO – in three. In one of the hospitals, other operational procedures were not subject to supervision; in the majority (8), other operational procedures were also monitored. Detailed data concerning monitoring of individual forms of infections are presented in Table III.

Cases of infection were documented in the majority of hospitals (5 units) by an epidemiological nurse, in collaboration with the infection team physician or the attending physician.

Feedback on indicators of morbidity of nosocomial infections in six hospitals (67%) was transmitted to medical staff twice a year, in two (22%) – more frequently than twice a year, and in one (11%) – once a year.

Monitoring was not only limited to epidemiological indicators in the form of incidence of various forms of infections, but also, to the most important indicators of processes, such as the implementation of hand hygiene procedures and the level of consumption of alcohol based handrubs. Seven hospitals declared reporting feedback data concerning the level of consumption of alcohol based handrubs to the personnel of wards. Four of these hospitals made feedback available once a year, one of them – twice a year, another one – more than twice a year and the last one – less than once a year.

The characteristics of selected process indicators regarding hand hygiene were presented in Table IV.

Three hospitals did not disclose the number of blood cultures performed in 2010; in two, 16 and 19 tests were performed per 1,000 person-days, in the remaining four – between 22 and 40. The median value of this measure for all European hospitals participating in the study which reported such information (200 hospitals) is 22 blood cultures per 1,000 person-days.

The diversity of the blood cultures number in hospitals did not have the statistical importance features and did not correlate with the number of infection control staff (nurses and doctors) in relation to the number of beds.

Table III. Monitoring of selected forms of nosocomial infections in hospitals participating in the study (it was possible to select multiple individual variants of answers)

The monitored form of infection	Percentage in Polish hospitals [%]	Percentage in all hospitals participating in the study [%]
BSI – bloodstream infection	100	82
in the whole hospital	100	47
in one ICU ward	-	37
in more than one ICU ward	-	22
in one ward other than ICU	-	6
in more than one ward other than ICU	-	11
PNEU - pneumoniae	100	75
in the whole hospital	100	31
in one ICU ward	-	47
in more than one ICU ward	-	24
in one ward other than ICU	-	2
in more than one ward other than ICU	-	6
UTI – urinary tract infection	100	70
in the whole hospital	100	36
in one ICU ward	-	42
in more than one ICU ward	-	19
in one ward other than ICU	-	5
in more than one ward other than ICU	-	11
CDI – *Clostridium difficile* infection	100	57
in the whole hospital	100	93
in one ICU ward	-	3
in more than one ICU ward	-	2
in one ward other than ICU	-	2
in more than one ward other than ICU	-	3
MDRO – multi-drug resistant organisms	100	90
in the whole hospital	100	87
in one ICU ward	-	12
in more than one ICU ward	-	4
in one ward other than ICU	-	2
in more than one ward other than ICU	-	2
SSI – surgical site infection	100	79
monitored form of SSI: cholecystectomy	56	46
monitored form of SSI: colon surgery	56	44
monitored form of SSI: caesarean section	44	37
monitored form of SSI: hip arthroplasty	33	63
monitored form of SSI: knee arthroplasty	33	47
Postdischarge SSI surveillance	78	46

In each of the hospitals participating in the study, an infection control committee was in operation which always included an epidemiological nurse, an infection control doctor, a head nurse and a microbiologist. The representative of the management in four hospitals was the medical director, in two – administrative director, while in the remaining three hospitals, the infection

Table IV. Some indicators of the process in hospitals participating in the study

Hospital code	Functioning of the program of surveillance of nosocomial infections in years	Alcohol-based handrub consumption monitoring	Alcohol-based handrub consumption [ml/patientdays]	Hand hygiene compliance monitoring	The average hand hygiene compliance ICU/ other wards	Application of sanctions in case of repeated infringements of IC procedures
H1	16	Yes	116	Yes	-[2]/-	No
H2	18	Yes	79	Yes	95%/100%	Yes
H3	7	Yes	21	Yes	-/-	No
H4	12	Yes	40	No	-/-	Yes
H5	6	No	NDA[3]	Yes	-/-	Yes
H6	11	Yes	26	Yes	50%/50%	No
H7	14	Yes	18	Yes	100%/100%	Yes
H8	27	Yes	19	Yes	-/-	No
H9	3	No	NDA[3]	Yes	-/10%	No
Total H1:H9	14	77.8%	26[*]	88.9%	-	Yes – 44.4% No – 55.6%
All hospitals	9	79.6%	21[1]	76.5%	75%/67.5%	Yes – 29.3% No – 70.7%

[1]median

[2]compliance of hand hygiene not performed

[3] data not acquired

control committees included both the medical and the administrative directors. In most hospitals, that is eight, a pharmacist was also a member of the committee and in some there were even people performing other functions besides the ones previously mentioned. Most of the committees (67%) met regularly, in four hospitals infection control committee met more frequently than twice a year, in three – once a year, in the other two – two times a year.

The observed differences did not present statistically significance when analyzing the correlation between the number of cultures or use of disinfectants and the number and qualifications of the members of the infection control team.

DISCUSSION

Surveillance of infections remains one of the priorities of health care in many countries around the world, despite the fact that legislation regarding infection control in hospitals is not uniform on a global scale and for many years there have been discussions on the possibility and effectiveness of actions in this regard (1, 2). We owe the real increase in interest in nosocomial infections to actions based on voluntariness and spontaneity in the framework of national, international or regional schemes. The first infection surveillance program was NHSN (National Healthcare Safety Network, formerly known as National Nosocomial Infections Surveillance System, NNIS) conducted continuously since 1970 by the Centers for Disease Control and Prevention (CDC) in Atlanta, United States.

Another model of surveillance of infections and drug-resistant strains of bacteria was adopted in Europe, where the organization of epidemiological network is governed by provisions imposing an obligation to register specified infectious diseases, infections with drug-resistant strains and nosocomial infections (3, 4, 5). Additionally, the European recommendations advocate the preparation of national guidelines for the prevention of infections, the introduction of targeted surveillance based on an assessment of the risk of infection occurrence in the appropriate fields (specializations), i.e. for selected types of infections in selected patient populations. The aim of this type of solutions is to obtain domestic (national) reference data with the use of epidemiological factors for their validation (6). Also, the Polish Act on the Prevention and Elimination of Infections and Infectious Diseases, introduced, among others, the requirement to evaluate the risk of infection, development, implementation and supervision of the procedures designed to reduce the risk of infection occurring, and the analysis of the local epidemiological situation (7). Unfortunately, neither the Act nor its executive regulations define the risk assessment methods, hence hospitals do not undertake time-consuming actions which demand a lot of experience and professionalism, for the implementation of "risk assessment", which is introduced in accordance with the American or European model, that is, on the basis of epidemiological factors, e.g. the incidence of surgical site infections after surgery as regards selected operations.

Perhaps this is why in Polish hospitals, in accordance with the presented research results, all possible measures to control infections are carried out, while an

overview of the individual components of surveillance in European hospitals indicates a different approach. It turns out that the local (hospital) infection control teams perform supervision according to their own key, i.e. by choosing the scope of the surveillance. The issue concerns not only CDI (8), but also bloodstream infections (Table III), which are supervised in only 11% of hospitals in non-ICU wards, while, in every Polish hospital, each ward carries out such surveillance (9,10). Although, data on the consumption of hand disinfectants in Polish hospitals versus European hospitals indicate no difference (26 ml/person-day vs 21 ml), but on the other hand, in most Polish hospitals it is not known how hand hygiene is performed, i.e., there is a lack of data on compliance of practice in this respect with the existing hospital procedures. In addition, in one of the hospitals where infection control has been performed for the shortest period – for only three years – the tested compliance was only 10%. This example also confirms that the surveillance of infections requires extraordinary patience and a dedicated infection control team, not only in such an important element as, for example, drug resistance surveillance performed at each of the hospitals, but also in the ordinary, tedious everyday activities, e.g. hand hygiene.

Monitoring the consumption of hand hygiene preparations is carried out in different ways in many countries: France, Belgium, Italy, Malta, Great Britain, Spain, Norway, and Germany (11). For instance, in French hospitals, there is a requirement to publish (report) information on the consumption of alcohol based handrubs for hand hygiene (in ml as regards the total length of stay of patients in the hospital) (12). On the other hand, in Austria, recommendations of the Austrian Society for Hygiene and Microbiology were published last year and advocated, among others, the installation of dispensers monitoring (electronically or mechanically) the consumption of hand sanitizer (13).

The observed consumption of alcohol based handrubs in Polish hospitals is confirmed by reports of other, mostly German, authors. For example, Behnke indicates the use in non-ICU wards at the level 6 doses/person-day (median), and 28 in the intensive care unit. According to Graf, in the transplant ward, this figure amounted to 27-32 doses/person-day and according to Scheithauer, it was up to 42 (14, 15, 16).

As far as the second process measure, that is the number of blood cultures per 1,000 patient-days, is concerned, the situation in Polish hospitals also shows the need for improvement. Less than half of all hospitals indicated the number of blood cultures performed at the level of the median in Europe, in two others this number was lower than the median rate. In three remaining hospitals the question concerning this subject was omitted what may suggest the low number of blood cultures or

the poor co-ordination between infection control team and the microbiological laboratory.

CONCLUSIONS

1. Organization of infection control programs seems to be convergent with the local and international recommendations, and the scope of surveillance is even broader than in others European countries.
2. Selected process measures, such as for example the alcohol-based hand rub usage, the number of blood culture per one hundred beds or the results of hand hygiene monitoring indicate the area of improvement of infection control programs in Polish hospitals.
3. Continuous education and improvement of infection control practices is essential for increasing patient safety and quality of healthcare.

Conflict of interests: none

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Address for correspondence:
dr Anna Różańska
Chair of Microbiology
Jagiellonian University Medical College
Czysta str. 18, 31-121 Kraków
Tel. +4812 633 25 67
Fax. +4812 4232439
e-mail: a.rozanska@uj.edu.pl