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Research Article

Questionnaire-based survey on structural quality of hospitals and nursing homes for the elderly, their staffing with infection control personal, and implementation of infection control measures in Germany

Fragebogenerhebung zur Ausstattung von Krankenhäusern sowie Einrichtungen der stationären und ambulanten Kranken- und Altenpflege mit Hygienefachpersonal und zur Umsetzung ausgewählter Hygienemaßnahmen in Deutschland

A. Kramer[1]
O. Assadian[2]
J. Helfrich[3]
C. Krüger[4]
I. Pfenning[5]
S. Ryll[1]
A. Perner[1]
B. Loczenski[6]

1 Institute of Hygiene and Environmental Medicine, University Medicine Greifswald, Germany

2 Clinical Institute for Hospital Hygiene, Medical University of Vienna, Vienna General Hospital, Vienna, Austria

3 DAK-Gesundheit, Hamburg, Germany

4 Clinic for Surgery – Visceral- and Vascular Surgery, Vivantes Humboldt Klinikum, Berlin, Germany

5 Techniker Krankenkasse, Hamburg, Germany

6 Wannsee-Akademie, Berlin, Germany

Abstract

From January to May 2012, 1,860 hospitals throughout Germany received a questionnaire encompassing 77 items. Additionally, 300 outpatient care services and 310 nursing homes for elderly in Berlin also received a 10-item questionnaire asking on their implemented infection control practices. All questionnaires were anonymous. A total of 229 completed questionnaires from hospitals, 14 questionnaires from outpatient care services, and 16 questionnaires from nursing homes were eligible for further analysis.

The lack of Infection Control physicians was identified as the largest issue. In hospitals sized 400–999 beds a gap of 71%, and in hospitals sized ≥1,000 beds a gap of 17% was reported. Depending on the number of hospital beds, 13–29% of hospitals sized ≥100 beds reported not havening one infection control nurse. Since based on the number of beds in larger institutions or in facilities caring for high-risk patients several infection control nurses may be required, the deficiency in infection control nurses may even be higher, particularly in secondary and tertiary care facilities. Furthermore, the analysis revealed that the legal requirements for surveillance and reporting of notifiable infectious diseases have not yet been implemented in 11% of the facilities. The implementation of antibiotic strategies did show significant gaps. However, deficiencies in the implemented measures for the prevention of surgical site infections were less frequent. Yet 12% of the participants did not have a dedicated infection control concept for their surgical services. Eight percent of hospitals were not prepared for an outbreak management and 10% did not have established regulations for wearing surgical scrubs. Deficiencies in waste disposal and the control of air-conditioning systems were also noted. Based on the results of this survey, conclusions on the optimal resource allocation for further improvement of patient safety may be drawn.

While all participating nursing homes had some sort of infection control consultation, this only applied to 12 out of 16 outpatient nursing services. However, all 16 nursing services worked on the basis of an implemented infection control plan. Though legally binding hygiene recommendations have not yet been implemented for nursing homes, the necessity of infection control to assure patient safety has obviously been recognised throughout these services.

Keywords: hygiene management, infection control personnel, surveillance, antibiotic stewardship, hospitals, outpatient care services, nursing homes, survey, questionnaire

Zusammenfassung

Im Zeitraum Januar bis Mai 2012 wurden deutschlandweit 77 Fragen zum Hygienemanagement an 1.860 Krankenhäuser sowie je 10 Fragen an 300 ambulante Pflegedienste und 310 Pflege- und Altenheime in Berlin versandt. Die Erhebung war anonym. Von den Zusendungen der Krankenhäuser konnten 229 vollständige Datensätze ausgewertet werden. Aus dem Bereich der Pflege- und Altenheime bzw. der ambulanten Pflegedienste beteiligten sich 14 bzw. 16 Einrichtungen.

In den Krankenhäusern ergab sich als größtes Problem der Mangel an Krankenhaushygienikern. Bei Krankenhäusern von 400–999 Betten klafft eine Lücke von 71%, ab 1000 Betten von 17%. Krankenhäuser ab 100 Betten verfügen je nach Bettenzahl in 13–29% über keine Hygienefachkraft. Da in Abhängigkeit vom Infektionsrisiko insbesondere in Häusern der Maximalversorgung mehrere Hygienefachkräfte pro Haus benötigt werden, ist das Defizit noch größer anzusetzen. Die Analyse ergab darüber hinaus, dass die gesetzliche Vorgabe zur Infektionserfassung in 11% der Krankenhäuser derzeit nicht umgesetzt wird. Auch bei der Realisierung einer Antibiotikastrategie sind deutliche Mängel offenkundig. Weniger häufig sind Defizite bei der Prävention postoperativer Wundinfektionen, in 12% der Einrichtungen existiert kein spezieller Hygieneplan für den OP-Bereich. 8% der Krankenhäuser haben keine Vorkehrungen für ein Ausbruchsmanagement vorgesehen und 10% haben keine Regelung für Bereichskleidung etabliert. Auch bezüglich Abfallentsorgung und der Überprüfung von raumlufttechnischen Anlagen werden Defizite deutlich. Auf Grundlage der Analyseergebnisse werden Schlussfolgerungen zur Verbesserung der Patientensicherheit abgeleitet.

Während alle an der Umfrage teilnehmenden Pflege- und Altenheime hygienisch betreut werden, trifft das bei den ambulanten Pflegediensten nur auf 12 von 16 zu. Allerdings arbeiten alle 16 Pflegedienste auf der Grundlage eines Hygieneplans. Obwohl es für die ambulante Pflege bisher keine rechtlich bindenden Hygieneempfehlungen gibt, wurde die Notwendigkeit der Qualitätssicherung der Hygiene offensichtlich erkannt.

Schlüsselwörter: Hygienemanagement, Hygienefachpersonal, Infektionserfassung, Antibiotikastrategie, Krankenhäuser, ambulante Pflegedienste, Pflege- und Altenheime, Fragebogen

1 Introduction

Preventing Healthcare Associated Infections (HAI) is one of the important pillars of societies' life expectancy and quality of life. Recently, the German Federal Infection Protection Act (IfSG) stipulated on August 4th, 2011 [1] has been amended by defining parameters which will allow a future "practice of good hospital hygiene" throughout Germany. This amendment is also understood as an important element to foster a positive culture of safety in German health acre. The individual Federal State Hygiene Regulations [Landeshygieneverordnungen State Ordinance on Hygiene] regulate in detail the implementation of the IfSG in the respective German federal states. Further technical information on the prevention of HAI is continuously stipulated in a number of directives of the Commission for Hospital Hygiene and Infection (KRINKO) as well as the Commission of Anti-Infectives, Resistance and Therapy (ART) at the Robert Koch-Institute in Berlin. Finally, quality indicators to be monitored are in preparation through the German Federal Joint Committee (Gemeinsamer Bundesausschuss).

The new Federal Infection Protection Act [1] regulates that the respective directors of healthcare institutions have to ensure that dedicated infection control measures based on the state-of-the-art medical science are implemented in their facilities in order to prevent HAIs and to control and prevent the transmission of pathogens, especially antibiotic resistant organisms. The affected healthcare facilities include hospitals, centres for outpatient surgery, preventive health care and rehabilitation centres which provide medical care comparable to that of hospitals, as well as dialysis centres, medical day units, birth centres, and other treatment and care centres similar to the centres mentioned, as well as doctor's and dentist's surgeries and surgeries of other medical professions. The directors of hospitals and facilities for outpatient surgery have to ensure that HAI and the occurrence of pathogens with specific resistance and multi-resistance are continuously recorded and evaluated in order to take

appropriate action against their spread, if required. For this, data analysis on type and extent of antibiotic consumption is further required. For all healthcare services, presence and implementation of infection control plans are required, however, dentist's surgeries, doctor's surgeries, and surgeries of other medical professions are excluded from this obligation. It remains in the responsibility of the individual federal state governments if the implementation of infection control plans will also be required of these healthcare settings [1]. Already now, some German federal states did not implement this option in their respective Federal State Hygiene Regulation.

The key requirement to implement strategies for preventing HAI is the adequate equipment of the facilities with infection control personnel. The recommendation of KRINKO on staffing forms the basis for staffing and organisational requirements to prevent HAI [2]. Accordingly, one hospital hygienist (infection control physician) is required for facilities with ≥400 beds. For a rough orientation, the following staffing needs are recommended for infection control nurses (ICN): High risk for infection = 1ICN per 100 beds, medium risk of infection = 1ICN per 200 beds, and low risk for infection 1 ICN per 500 beds. In addition, the number of day-patient/outpatient cases has to be taken into account.

The work of the infection control team is significantly fostered by infection control practitioners (ICP) and infection control link nurses (ICLN). The KRINKO recommends that every ward and each functional area within a healthcare facility should have at least one ICP and one ICLN who have a key role as liaison staff for communication with the core infection control team on site.

Since the implementation of staffing with adequate numbers of infection control personnel has to be realized throughout Germany by 2016, the aim of the present survey was to explore the current situation staffing and resource at the beginning of 2012. The obtained data may assist to identify future needs for action. In addition, participants were asked to state the current major deficits for successful implementation of infection control in their facilities. Even though the amendments of the IfSG did not regulate the infection control staffing of nursing homes for elderly and outpatient continuing health care services, these facilities were also included into the survey, randomly selected from Berlin and the surrounding areas.

2 Methods

From January 2012 to April 2012 (eleven weeks), the Initiative of Infection Prevention conducted an online survey entitled "Study on the Infection Protection Act in German Hospitals: Strategies and Standards". The survey consisted of a 77-item questionnaire. In addition to the online access, a link to the questionnaire was sent to 1,860 hospital directors in Germany by E-Mail, supported by additional media attention, including a press conference on January 31, 2012. The participants had the possibility to tick the most appropriate answer and, if feasible, also could add plain text responses. The survey was anonymous.

This questionnaire was followed by a survey on the hygiene conditions in outpatient and inpatient nursing institutions in Berlin from April 30 to May 16, 2012. With the support of the health navigator of local health care funds (AOK-Gesundheitsnavigator, http://www.aok-gesundheitsnavi.de/), E-mail addresses of 300 outpatient care services and 310 nursing homes were obtained and the questionnaire were sent via E-mail to the respective directors of the facilities.

For data analysis, a descriptive statistic was used, highlighting proportions of responses.

3 Results

3.1 Hospitals

From participating hospitals, 229 questionnaires contained complete data records and were eligible for further analysis. All German federal states were covered, yet the number of participants per federal state was obviously influenced by the size of population and the number of hospitals in the respective German federal state (Figure 1).

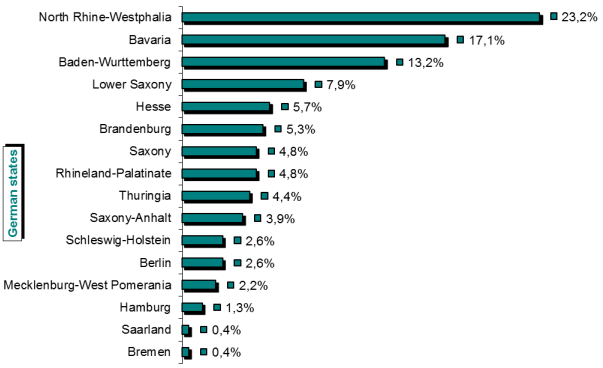

Figure 1: Proportion of hospitals per German federal state participating in the survey

Almost one third (32%) of the questionnaire were completed by 3 ICNs, 18% by the chief physicians, 13% by ICPs, 8% by the leading medical specialists, 7% each by the respective nursing home managers and the medical directors, 5% by hospital hygienists, 4% each by quality managers and cost controllers, respectively, 3% by other physicians, 2% by managing directors, and 1% by other staff.

The size of the participating hospitals varied from <100 to >1,000 beds. The majority (64.5%) of responding medical facilities had a size ranging from 200–399 and 400–999 beds, respectively. (Figure 2).

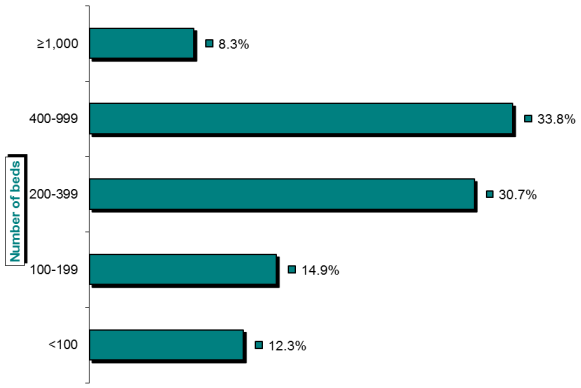

Figure 2: Distribution of number of beds of participating hospitals

The staffing situation required for implementation of adequate infection control policies was assessed in average with "3 – satisfactory" (corresponding to the school grading system 1 to 6 with 1 "very good" and 6 "deficient"). Seven percent of the participants assessed the staffing situation as very good, 33% as good, 36% as satisfactory, 24% as poor or worse, and one hospital even with grading mark 6 "deficient". As reason for their respective response and grading the participants stated too much stress, staff shortage, and failure to use the time budget required to fulfil the function of ICP.

The staffing with hospital hygienists shows significant deficiencies. 71% of the hospitals with 400 to 999 beds did not employ a full-time hospital hygienist. Hospitals with less than 1,000 beds had only 1 hospital hygienist in average. 17% of hospitals with ≥1,000 beds have not employed a full-time in-house hospital hygienist. The average number of successfully placed IC positions in this group was 1.6 (Table 1).

The situation of employment of ICPs is just as unsatisfactory (Table 1).

The recruitment of ICNs was considerably better than that of hospital hygienists, even though the target numbers were not achieved (Table 2).

The appointment of ICLNs had developed surprisingly well, presumably because this function can almost be filled cost neutral (Table 2).

The co-operation of the infection control team with the other management of the hospital in the hygiene committee as co-ordinating, advisory, and supporting body to implement hygiene management was established in 92% of the participating hospitals. The consultations were held once (7%), twice (49%), or more (34%) in a year.

Pertaining to the communication and feed-back for preventive strategies, 59% of the hospitals indicated that they were evaluating and communicating their quality results in-house, e.g., as continuing education, meetings in the wards, or meetings with the hygiene committee. Eight percent of the quality results were externally evaluated and communicated, mainly through participating in the German Hospital-Infection-Surveillance-System (KISS). One third (33%) of the participants did not answer to this question.

Three quarter (75%) of the hospitals indicated to have provided the patient with information on dealing with multi-resistant pathogens. Information is often communicated in writing, for instance by means of information leaflets, but also verbally by hospital staff. In addition, patients can get information on the web pages of the hospital. Two hospitals already offered patient training courses and information seminars, respectively.

The evaluation of the hygiene management through patients was identified as another possibility for improving staff compliance. In 55% of the hospitals, patients can assess the quality of hygiene via a feedback questionnaire. In 62% of the hospitals, patients have the possibility of evaluate the quality of hygiene by writing statements and dropping these into a letter box. Other possibilities, apart from the Internet and personal communication, are opinion cards or feedback via the complaints management systems.

Different topics were chosen when asked on the significance of implementation of guidelines and standards, respectively.) Almost all hospitals did use the test and learning toolkit Hospital Hand Hygiene (Campaign Clean Hands) as well as the videos published by the German Society of Hospital Hygiene, as 99% of the hospitals stated to use this material (Table 3).

Screening strategies for MRSA were also well established. Half (49%) of the facilities screen according to the recommendations of the KRINKO, 39% before certain medical procedures/surgery, or when patients were admitted to risk areas, and 21% even carry out a general screening strategy on admission. 43% carry out staff screening, for instance in the case of disease outbreaks. However, 51% did not carry out staff screenings at all (Table 3).

The implementation of either the KRINKO recommendations or the guidelines of the Association of the Scientific Medical Societies in Germany (AWMF) into in-house guidelines was realised only in 74% of the hospitals (Table 3). This is where considerable unused reserves may exist.

Only 21% of the facilities had implemented a strategy to use antibiotics prudently (Antibiotic Stewardship Programs. In 64%, the implementation still was pending. 45% monitored the use of antibiotics, and 43% of the participants had not yet implemented any corresponding procedure.

There was also a significant deficiency in the surveillance of HAI since it was not executed in 11% of the hospitals, although required by law (Table 3). If surveillance was conducted, the German KISS system was applied by 63%, 10% recorded according to KISS but did not report to KISS, 14% used other surveillance systems such as ORBIS, Hybase, or IQIP, and 13% had developed their own surveillance system.

Off note, 12% of the hospitals did not have a specific hygiene plan for surgical departments, and 8% of the hospitals had not prepared any arrangements for outbreak management (Table 3). Deficiencies in the regulation of surgical scrub clothing as well as waste disposal and im-

Table 1: Percentage of hospitals employing full-time in-house hospital hygienists and infection control practitioners (ICP)

Number of beds	No in-house hospital hygienist (%)	Average number of filled positions	No in-house ICP (%)	Average number of filled positions
<100	71.4	1.1	42.9	1.9
100–199	88.6	1.2	23.5	1.5
200–399	85.3	1.3	25.7	2.0
400–999	71.4	1.0	22.1	4.0
≥1000	16.7	1.6	16.7	11.5

Table 2: Percentage of hospitals employing full-time in-house infection control nurses (ICNs) and infection control link nurses (ICLNs)

Number of beds	No in-house ICNs (%)	Average number of filled positions	No in-house ICLNs (%)	Average number of filled positions
<100	60.7	1.5	28.6	2.5
100-199	29.4	1.1	35.3	6.0
200-399	25.7	1.3	32.9	9.0
400-999	13.0	2.1	32.5	11.8
≥1000	22.2	5.2	33.3	30.6

Table 3: Implementation of selected infection control strategies in German hospitals

Item	Guideline or SOP		
	yes	no	unknown
Implementation of the KRINKO recommendations and AWMF guidelines in in-house guidelines	74%	9%	17%
Hand Hygiene	99%	1%	0%
MRSA screening	94%	6%	0%
Prevention of nosocomial infections associated with vascular catheters	86%	6%	8%
Prudent use of antibiotics	62%	27%	10%
Hygiene plan for surgical departments	85%	12%	3%
Surveillance of HAI	87%	11%	2%
Outbreak management	85%	8%	7%
Surgical scrub clothing regulations	89%	10%	1%
Control of air-conditioning installations	85%	4%	11%
Waste disposal	84%	6%	10%

plementation of hygiene safety of air-conditioning installations were also reported.

3.2 Outpatient and inpatient nursing institutions in Berlin

14 nursing homes as well as 16 outpatient care services participated in the survey.

While those 14 inpatient facilities were without exception under infection control supervision, 12 out of the 16 outpatient facilities were under different hygienic supervision (Table 4). A specialist for industrial medicine, a skilled hygienist, and a disinfector advised one of the inpatient institutions on a part-time base.

While all outpatient institutions worked on the basis of a written infection control plan, this was not the case in one of the inpatient facilities.

In-house inspections for quality counselling were carried out in all facilities, in two inpatient institutions once a year, in seven twice per year, and in another two every month. Three institutions did not provide information on their time schedule for inspection. The following intervals

Table 4: Infection control supervision in outpatient and inpatient nursing institutions

Hygiene professionals	Inpatient			Outpatient		
	yes	third-party care	no	yes	third-party care	no
Infection control nurse[1] (ICN)	6	6	2	2	3	11
Hospital hygienists	0	3[2]	11	0	0	16
Infection control link nurse (ICLN)	13[3]	0	1	7[4]	0	7

[1] Training pursuant to the guidelines of the DGKH [2] in addition to ICN.
[3] Eleven and [4] five, respectively, have completed continuing training pursuant to the recommendations of the DGKH [9, 10].

of inspection were indicated for outpatient facilities: monthly, every two months, and once a year.

4 Discussion

The number of hospitals participating in this survey represented approx. 10% of all hospitals in Germany. Since it can be assumed that centres with a comparatively bigger interest in infection control may have participated, better results may hardly be expected for Germany. This hypothesis is supported by the results of an analysis carried out in 2011 with a similar sample size (n=272) which showed that in 50% of the facilities with 300–599 beds no professional hospital hygienist was employed. Facilities with ≥600 beds employed 1.6 hospital hygienists per hospital on average [2].

Without sufficient infection control staff it will be impossible to effectively supply infection prevention services. Accordingly, a hospital cannot provide surgical services, if it does not provide surgeons. Prior to the amendment of the IfSG, the German Society of Hospital Hygiene, above all, claimed repeatedly that the analogous situation is given in case of a lack of hospital hygiene specialists. In this regard, especially the number of full-time hospital hygienist cannot be considered to be even roughly sufficient. According to the German Hospital Federation (DKG), 379 hospitals with ≥400 beds exist in Germany (published 24th November 2011). Smaller hospitals add to this which need external advice on hospital hygiene. The DKG estimates the demand of hospital hygienists up to a total of 850 [3]. Until 2016, this gap cannot be bridged by means of the regular five years graduate medical training for specialist in hygiene and environmental medicine. Therefore, in 2013 a temporary solution was implemented in form of a structured curricular medical training "hospital hygiene", including distance-based in-service training, introduced by the German Medical Association. The participants of this training are expected to have completed a specialist medical training in a clinical field or the subject of public health. Medical training is to be linked to a training centre of personal choice and the "trainee" will be supported by a mentor. This two year professional training includes five special modules involving 40 hours each [4], [5], [6]. Irrespective of this, the medical field of hygiene and environmental medicine which is currently only available at twelve independent university chairs has to be re-established at the other 15 university locations, where it has been abandoned previously [7].

Appointing trained ICPs, although also challenging, is a minor issue as compared to the lack of hospital hygienists, since this qualification can be achieved in a 40 hours curriculum pursuant to the recommendations of the DGKH [8].

To compensate the deficiency of infection control nurses in Germany, the period until 2016 could be sufficient, since the training consists of 12 to 24 months, provided there is an interest in this medical training to the required extent and enough training capacity.

The appointment of infection control link nurses in comparison to the assignment of ICPs has been realised faster, though the KRINKO did not recommend this key interface to care until 2009 and the DGKH did not propose the curriculum until 2010 [9], [10].

Deficiencies in the communication of infection control programs have also been noted, but facilities found innovative solutions, including web-based feedback or including patients into feedback mechanisms. Communication is a key element for successful hygiene management. After identifying the problem and developing strategic solutions and measures, these have to be communicated to the employees while the implementation by the employees has, in turn, to be evaluated. Furthermore, measures for infection prevention have to be comprehensible for patients, among others by leaflets or personal discussion with the health and hygiene specialists. Communication is essential for an efficient interaction between employees as well as between employees and the patient. Patients can only act properly with regard to infection prevention, if they are informed about the occurrence of multi-resistant pathogens. However, the evaluation of the patient's hygiene behaviour [11] can contribute to improving compliance.

Overall, the screening for MRSA is well established. Nevertheless, screening should be extended to patients with planned peri-operative antibiotic prophylaxis because the current peri-operative antibiotic prophylaxis regiments will be ineffective in case of an unrecognised MRSA colonization and subsequent infection [12].

Unused reserves exist with the implementation of the recommendations of the KRINKO and the guidelines of the AWMF, respectively, into in-house guidelines. The wording of Section 23 (3) in the new IfSG on the assumption of adherence to the state-of-the-art medical science in case the recommendations published by both the KRINKO and the ART have been observed results in a high level of commitment which will lead to liability problems of the institutions in case of non-compliance.
The rather slow implementation of antibiotic stewardship programs indicate that published recommendations of the ART are urgently needed.
Since infection surveillance pursuant to Section 23 (4) IfSG is legally binding, the centres which have not yet established surveillance have to implement this while it is reasonable for benchmarking to implement the recommendations of KISS [13], [14].
The relevant recommendation of the KRINKO [15] forms the basis of infection prevention in nursing homes. The survey shows that all nursing homes participating in the survey are provided with hygiene maintenance and carry out an internal quality control. Obviously, the recommendations of the KRINKO bear fruit.
Even though the infection risks in private households are considerably lower than in medical institutions, as the individually affected live in their own microbiological environment, the principles to avoid the transmission of infectious diseases have to be adhered to in outpatient care as well [16]. The hygiene framework for outpatient services of the working group of German Federal States is an appropriate basis for organising hygiene management in outpatient care [17]. Though there does not exist yet any legally binding recommendations for outpatient care, the analysis shows that quality assurance in hygiene has the significance it deserves in this area.

5 Conclusion

The subject of Infection Control has apparently moved to the focus of hospitals. However, despite the necessity and legal obligations, successful infection control still cannot be implemented sufficiently in Germany, chiefly because of a shortage in well trained medical staff, and above all, hospital hygiene specialists. This deficiency can only be compensated with political support and through the wish to re-implement institutes for Hygiene and Environmental Medicine at universities with a Faculty of Medicine. An obvious financial incentive for hospitals is to map the entire costs of hygiene in the Diagnosis Related Groups so as to thus refinance the quality management of hygiene. Finally, published recommendations of the ART are urgently required for the implementation of antibiotic stewardship.

Notes

Competing interests

The authors declare that they have no competing interests.

Authorship

The authors S. Ryll in cooperation with A. Perner and B. Loczenski are representing the Initiative of Infection Prevention (Initiative Infektionsschutz).

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Corresponding author:
Prof. Dr. med. O. Assadian
Clinical Institute for Hospital Hygiene, Medical University of Vienna, Vienna General Hospital, Waehringer Guertel 18-20, 1090 Vienna, Austria, Phone: +43-1-40400-1904, Fax: +43-1-40400-1907
ojan.assadian@meduniwien.ac.at

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