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Methicillin-resistant *Staphylococcus aureus* (MRSA) management in palliative care units and hospices in Germany: A nationwide survey on patient isolation policies and quality of life

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Abstract

Background: For palliative care settings, little is known about the benefits of specific methicillin-resistant *Staphylococcus aureus* containment regimens and the burdens patient isolation imposes on affected patients, their families, and professional caregivers.

Aim: To explore the current practice of MRSA management and its impact on inpatients' quality of life as perceived by professional caregivers.

Design: Survey of inpatient palliative care institutions using 23-item questionnaires (infrastructural data: six items, management process: 14, clinical significance: three).

Setting/participants: All palliative care units (179) and hospices (181) listed in Germany's directory of palliative care services. The χ^2 test was used to test for differences; significance level: $p \leq 0.05$.

Results: 229 of 360 questionnaires were returned. More than 90% of the responding institutions employed specific MRSA protocols. Lack of resources was a more important issue for palliative care units than for hospices regarding availability of single rooms ($p = 0.002$) and staffing ($p = 0.004$). Compared to hospices, palliative care units more frequently isolated MRSA patients ($p = 0.000$), actively treated colonization ($p = 0.026$), assessed the efficacy of eradication ($p = 0.000$), provided information on MRSA management to patients ($p = 0.014$) and relatives ($p = 0.001$), more often restricted patients' activities ($p = 0.000$), and reported a negative impact on quality of life ($p = 0.000$).

Conclusions: Rigorously applied MRSA protocols impose significant burdens at the end of life. Research on clinical outcomes including quality of life may identify interventions of questionable benefit. The issue of handling MRSA should be studied as a model for the management of other highly complex conditions and special needs such as patient isolation.

Keywords

Germany, hospices, palliative care, patient isolation, quality of life, questionnaires, methicillin-resistant *Staphylococcus aureus*

Introduction

In patients with far advanced disease, all interventions aim at optimal palliation of symptoms and enhancement of quality of life. For palliative care units (PCU) and hospices,

the emergence of microbial strains highly resistant to anti-infective therapy such as MRSA poses an additional challenge, as regimens that prevent MRSA transmission impose

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barriers and restrictions on patients and their relatives adversely affecting patient related outcomes.^{1,2} Although prevalence numbers in Germany are currently stable,³ MRSA remains a serious health care issue throughout Europe, still being the most commonly identified antibiotic-resistant pathogen in European hospitals.⁴ Thus, rigorous application of such protocols may be essential for infection control but at the same time could jeopardize therapeutic efforts of palliative care.

Given the ethical dilemma of acting according to the principle of patient safety (applying efficient isolation measures) and with respect to one of the main principles of palliative care (social inclusion of the dying), surprisingly only one survey on MRSA management in the palliative care setting has been published so far. This study explored the policies of MRSA containment in 63 southern England PCUs and hospices.⁵ While almost all of the institutions required their staff to take infection control precautions and employed a formal MRSA protocol, a lesser proportion of these enacted some kind of isolation on patients with known or suspected MRSA infection or restricted their activities within the unit, and there was still a lower figure for MRSA screening on admission. Specific procedures varied between the units and according to MRSA status of the patient. Among hospices in particular, there were doubts on the relevance of such protocols and divergent opinions on their impact on patients' quality of life. The authors conclude that there may be systematic underreporting of MRSA prevalence but suggest that 'a more stringent approach... could only increase the number of patients potentially disadvantaged by the burden of eradication treatment'.⁵ Regarding screening, a recent, large prospective case-control study in the US found that universal screening on admission did not reduce the rate of hospital-acquired MRSA infection compared to a targeted approach and was not cost beneficial.⁶

Furthermore, little is known on how prevalent MRSA is in PCUs or hospices. Of three studies, one observed a colonization prevalence of 4–8% in a retrospective chart review of three different hospices in London.⁷ Another group surveyed a single hospice – also in London – using an observational design. They found that 9.2% of patients admitted from settings with unknown MRSA presence had MRSA-positive swabs at some point during their hospice stay, while 7.1% from wards with known MRSA background tested positive.⁸ These figures are lower than the prevalence rates of 17%⁹ to 23%¹⁰ found in UK nursing home residents and similar to the rate of 7.8%¹¹ seen in patients with dementia living in care homes.

We then raised the question whether these findings – perception of rather questionable benefits of specific MRSA protocols coupled with significant side effects – would be observed in German PCUs and hospices as well. Therefore, we conducted a nationwide questionnaire-based survey to assess current practice of MRSA management

and its impact on patients and relatives as perceived by the professional staff. Of particular interest were the differences in perception between the two types of institutions (PCU and hospice) and how these viewpoints translated into institution-specific strategies.*

Methods

To obtain a broad scope of existing MRSA policies in German palliative care units and to avoid selection bias, all PCUs and hospices in Germany were contacted by mail in January 2009. If no response was received by the end of February 2009, an electronic reminder was sent to the institution. To ensure confidentiality and further minimize bias, data processing was planned after de-identification of the respondents.

Ethical issues were discussed within the study group. Formal approval from the institutional review board was not considered necessary, as no data were collected from patients or relatives.

A structured, 23-item questionnaire was developed on the grounds of translation and modification of the original tool used by Dand et al.⁵ consisting principally of closed questions with tick box answers. Six items covered basic infrastructural data, 14 elucidated the MRSA containment policy of each institution, and three looked into attitudes towards use and views of such policies. In the infrastructural section, questions asked for the type of institution – either PCU or hospice (1), total number of beds (2), number of single rooms (3), current number of occupied beds (4), median length of stay (5), and current number of patients with known MRSA positivity (6). In the policy section, information was requested regarding existence of a formal MRSA protocol (7), barriers to admission or discharge of MRSA-positive patients (8), routine MRSA screening on admission (9), isolation of MRSA-positive patients (10), precautions taken by staff caring for MRSA-positive patients (11), MRSA screening of staff (12), information policy for MRSA-positive patients (13) and visitors (14), preventive measures for visitors (15), restrictions of mobility and social activities of MRSA-positive patients (16), treatment policy of MRSA colonization (17), possible contraindications against MRSA eradication therapy (18), laboratory control of MRSA eradication therapy (19), and screening on re-hospitalization of a formerly MRSA-positive patient (20). In the final section on clinical relevance, questions asked whether an existing MRSA protocol was adhered to (21), whether respondents felt such a protocol would influence the patients' quality of life (22), and whether eradication protocols were of importance for inpatient treatment in PCUs or hospices (23).

In the majority of items (8–16, 18, 22–23), the respondents were asked to specify their answers by ticking all appropriate boxes from a checklist. To gain a deeper understanding of relevant factors not explicitly asked for in the

Table 1. Basic infrastructural data of participating palliative care units (PCUs) and inpatient hospices ($n = 229$).

item 1	2	3	4	5	6
type of institution	median available beds (range)	median single rooms (range)	median occupied beds (range)	median length of stay (range)	Mean number of MRSA+ve* pts.** at the time of questionnaire completion
PCU	8 (3–32) $N = 116$	6 (0–13) $N = 115$	7 (2–28) $N = 117$	11 days (1–28) $N = 107$	.28
Hospice	9 (3–16) $N = 112$	9 (1–16) $N = 112$	8 (0–16) $N = 112$	21 days (9–90) $N = 103$	.49

*MRSA+ve = MRSA positive; **pts. = patients

questions, we provided blank space for additional free-listing of detailed comments.

Item 1 allowed for stratification of the data according to type of institution. Thus, we were able to calculate separate figures for PCUs and hospices, respectively, and to compare the results. Data processing and analyses were performed using commercial statistics software (IBM SPSS Statistics 18). Responses were compared using the χ^2 test, significant differences were assumed at p values ≤ 0.05 .

Results

In total, 360 institutions (179 PCUs and 181 hospices) were contacted. About 65% of the PCUs ($n = 117$) and 62% of the hospices ($n = 112$) responded, resulting in 229 evaluable data sets.

Table 1 shows the results of the first six questionnaire items covering basic infrastructural characteristics of the institutions. PCUs and hospices were roughly of the same size and had similar occupancy rates. However, they differed regarding the number of single rooms (6/8 and 9/9, respectively) and median length of stay (11 and 21 days, respectively).

Table 2 provides an overview of the findings in the policy section of the questionnaire.

In both types of institutions – PCU and hospice – the large majority (96% and 92%, respectively) have established MRSA containment guidelines ('protocol', item 7), while PCUs face significantly more barriers to admission or discharge of MRSA-positive patients than hospices (37% vs 22%, $p = 0.012$), partly because of shortage of isolation facilities (15% vs 3%, $p = 0.002$) and personnel (16% vs 5%, $p = 0.004$, item 8). Compared with hospices, a higher percentage of PCUs screen their patients for MRSA colonization (32% vs 4%, $p = 0.000$), but some perform the screening only if specific risk factors, such as wounds or catheters, are present or the referring institution is known to host MRSA carriers (item 9). PCUs more probably isolate MRSA-positive patients (99% vs 76%, $p = 0.000$), in particular those with a prior history of MRSA, a positive swab on referral, specific risk factors, or a risk of MRSA transmission, while ethical reasons not to isolate a patient play a

role more often in hospices (item 10). In both types of institutions, staff were usually obliged to take precautionary measures (item 11). A variety of specific actions were listed, such as disinfection and separation of contaminated waste. MRSA screening of staff (27% vs 9%, $p = 0.001$) was performed to a lesser and variable extent (item 12). More than two thirds of all institutions provided specific information to patients (82% vs 67%, $p = 0.014$, item 13) and visitors (99% vs 89%, $p = 0.001$, item 14), but a higher ratio of PCUs handed out written material. Most institutions recommended precautionary measures for visitors of MRSA-positive patients (item 15), while protective devices like disposable gloves, gowns and face masks were used more commonly in PCUs than in hospices. PCUs more often restricted MRSA-positive patients' activities, such as accessing recreational and dining rooms, contacting other patients, mobility within the hospital, and participation in certain therapies (96% vs 66%, $p = 0.000$, item 16), and they more commonly applied MRSA eradication regimens in patients with MRSA colonization (71% vs 27%, $p = 0.026$, item 17). In both types of institution, there was practical experience to abstain from eradication under certain conditions such as imminent death, confusion, prior eradication failure, inability to give consent, or refusal of eradication therapy (item 18). Both routine laboratory confirmation of successful eradication (97% vs 61%, $p = 0.000$, item 19) and a repeat swab on readmission of a known MRSA carrier patient (83% vs 19%, $p = 0.000$, item 20), were performed more commonly in PCUs than in hospices.

Table 3 shows the results of the section on clinical relevance, as perceived by staff.

Adherence to an existing MRSA protocol was reported to be stricter by the responding PCUs than the hospices (46% vs 27%, $p = 0.010$, item 21). The negative impact of these protocols on the quality of life of the affected patients was estimated higher by PCU staff than by hospice staff (83% vs 55%, $p = 0.000$, item 22); in particular, social deprivation and emotional barriers as an effect of isolation were noted. About half of all institutions reported significant effects of such protocols (item 23) which were related to performance status, mobility, and future treatment

Table 2. Policy of MRSA management in the participating institutions (*n* = 229).

Item		PCU N (%)	Hospice N (%)	Chi square test p=
7	MRSA protocol existing	110 (96)	98 (92)	n.s.*
8	barriers to admission or discharge	43 (37)	24 (22)	.012
8a	lack of single rooms	17 (15)	3 (3)	.002
8b	personnel shortage	19 (16)	5 (5)	.004
9	MRSA screening on admission	37 (32)	4 (4)	.000
9a	all admissions	11 (10)	0 (0)	.001
9b	only patients with risk factors	24 (21)	2 (2)	.000
9c	other reasons	9 (8)	1 (1)	.014
10	isolation of MRSA+ve** pts.***	114 (99)	81 (76)	.000
10a	patients with a history of MRSA	69 (60)	28 (26)	.000
10b	only with a positive swab	108 (94)	50 (47)	.000
10c	with risk factors	22 (19)	4 (4)	.000
10d	high risk of transmission	19 (17)	42 (39)	.000
10e	no isolation for lack of appropriate rooms	0 (0)	1 (1)	n.s.
10f	no isolation for personnel shortage	0 (0)	3 (3)	n.s.*
10g	no isolation for ethical considerations	1 (1)	22 (21)	.000
11	precautions for staff mandatory	114 (99)	110 (100)	n.s.*
11a	protective gloves	112 (97)	107 (97)	n.s.*
11b	disposable gowns	114 (99)	100 (91)	.004
11c	face mask	108 (94)	93 (85)	.023
11d	washing hands	93 (81)	87 (79)	n.s.*
11e	hand disinfection	103 (90)	91 (83)	n.s.*
12	MRSA screening of staff	31 (27)	10 (9)	.001
12a	all new staff members	4 (4)	1 (1)	n.s.*
12b	only staff in contact with MRSA+ve** pts.***	17 (15)	3 (3)	.001
12c	on leaving the team	115 (100)	110 (100)	n.s.*
12d	during epidemic events	17 (15)	0 (0)	.000
13	information for MRSA+ve** pts.***	93 (82)	74 (67)	.014
13a	oral information	76 (67)	61 (56)	n.s.*
13b	written information	47 (41)	25 (23)	.003
14	information for visitors	115 (99)	97 (89)	.001
14a	oral information	109 (94)	93 (85)	.032
14b	leaflet	47 (41)	20 (18)	.000
15	Precautions for visitors recommended	113 (98)	106 (98)	n.s.*
15a	protective gloves	98 (85)	66 (61)	.000
15b	disposable gowns	105 (91)	76 (70)	.000
15c	face mask	97 (84)	67 (62)	.000
15d	washing hands	76 (66)	70 (65)	n.s.*
15e	hand disinfection	104 (90)	93 (86)	n.s.*
16	restricted activities for MRSA+ve** pts.***	107 (96)	72 (66)	.000
16a	restrictions for all MRSA+ve** pts.***	73 (65)	20 (18)	.000
16b	only if higher risk of transmission	34 (30)	52 (48)	.008
16c	access to recreation rooms restricted	103 (92)	64 (60)	.000
16d	other restrictions	24 (21)	8 (8)	.003
17	eradication of MRSA colonization	80 (71)	58 (57)	.026
18	no eradication in certain conditions	96 (87)	78 (83)	n.s.*
18a	in confused pts.***	10 (9)	12 (13)	n.s.*
18b	in dying pts.***	91 (83)	77 (82)	n.s.*
18c	if prior failure of eradication	34 (31)	29 (31)	n.s.*
18d	unable to consent to procedure	14 (13)	14 (15)	n.s.
18e	objection of family or patient	20 (18)	18 (19)	n.s.*
19	laboratory confirmation of eradication	105 (97)	60 (61)	.000
20	repeat swab on readmission	89 (83)	11 (19)	.000

*n.s. = not significant; **MRSA+ve = MRSA positive; ***pts. = patients

Table 3. Attitudes towards use and views of MRSA containment policies.

Item	PCU N (%)	Hospice N (%)	Chi square test p=
21			
MRSA protocol always followed	50 (46)	23 (27)	.010
MRSA protocol mostly followed	57 (52)	49 (58)	n.s.*
MRSA protocol not followed	2 (2)	12 (14)	.001
22			
influence of protocol on pts.** quality of life	93 (83)	56 (55)	.000
23			
clinical relevance of protocol for PCU/HO	67 (60)	46 (44)	.064 (n.s.)*

*n.s.= not significant; **pts.=patients

options of the individual patient. Furthermore, the degree to which the PCU or hospice was embedded in a larger institution facilitating further MRSA transmission played a role in perception of clinical relevance and in decision-making.

The answers given in the free-listing sections of items 8–16, 18, and 22–23 provided additional aspects to each question; the most frequent comments are summarized above in the results of the respective item. In general, a wide variety of comments regarding infrastructure, clinical management, policy, ethics, and personal perceptions were made.

Discussion

In this large questionnaire-based survey of all German PCUs and hospices, we found MRSA protocols present and available in the large majority of both types of institution. Among these, however, the number of ‘active users’ at daily practice level is considerably smaller, which is particularly evident in hospices. Our survey revealed significant differences between PCUs and hospices in terms of structural barriers and MRSA containment policies. In general, the self-reported adherence to protocols was stricter in PCUs, with tighter restrictions on patients, visitors and staff, compared to the more liberal hospice policy. Even though exclusion criteria for eradication therapy did not differ between both types of institution, PCU staff members more commonly perceived a negative impact of MRSA protocols on the patient’s quality of life. These findings reveal perceptions of widespread uncertainty among palliative care staff members regarding MRSA management and marked differences between PCU and hospice policies.

Limitations of the study are of a methodological nature. First, the data are self-reported by the respondents; this methodology is not equivalent to direct observation by the researchers. Second, linkages of phenomena to either causes or effects are not supported by the data. For example, neither the reasons for the inter-institutional differences nor the effects of different policies on the professional teams can be determined. Third, the scope of the survey was limited by the fact that only members of the professional teams were approached (without asking which professions participated in answering the questions) but not family members or patients themselves. Thus, the effects of more or less rigid MRSA regimens on patient-related

outcomes, such as incidence of MRSA colonization, quality of life, and overall satisfaction, could not be measured directly. Moreover, we do not know the non-responders’ characteristics, their MRSA-related policies, and the reasons why they did not participate.

Among the strengths of our survey is, first of all, the large sample size including all German providers of specialized inpatient palliative care (in total, 360 units) and the high response rates of 65% and 62% (for PCUs and hospices, respectively). Second, the UK questionnaire, which served as a template for our translation, had been found useful to obtain insight into MRSA management in the palliative care setting in a smaller study previous to our survey.⁵ Third, we add a trans-cultural view to the previous UK findings by performing the survey in a country with a different language background and by stratification according to the two most common types of palliative care institutions in Germany. This design enabled us to compare the findings of PCUs with those of hospices.

German MRSA guidelines published in 1999 and updated in 2008 include instructions on MRSA detection and eradication, patient isolation measures, staff education, and adherence to sanitation protocols^{13,14} and resemble their counterparts in neighbouring countries. In 2008, the reported MRSA prevalence was decreasing on a European level⁴ and even reached the lowest reported numbers since 1999 in some countries,¹⁵ but differences between national surveillance policies make direct comparisons difficult, and the reported rather than actual levels may not capture the entire picture. Nevertheless, MRSA currently remains a publicly debated¹⁶ major health care issue, particularly in intensive care units³ and large teaching hospitals.¹⁷ A substantial number of palliative care patients are referred from those units accounting for the MRSA prevalence in PCUs and hospices, while community-acquired MRSA contributes as well. However, data on this population are lacking almost entirely, while some groups have explored outcomes and side effects of MRSA management in a general inpatient population. Two Swedish qualitative interview studies and a cross-sectional matched control study from the UK revealed that living with MRSA and its therapeutic implications could be extremely stressful¹ and traumatic² for the affected patients and negatively affect their moods,¹⁸ while others found little detrimental psychological effect of isolation.^{19,20}

A North American cohort study raised the concern of inferior care of isolated patients,²¹ and two observational studies from the US recorded significantly less health care provider/patient contact in isolated than in non-isolated patients.^{22,23} The results of our global assessment of current MRSA containment policies in German palliative care institutions do add evidence from a professional caregivers' and institutional perspective to the cross-border notion of negative effects of such policies on patients both in the palliative care^{5,7,8} and in other settings.^{1,2,18}

Next steps should begin with conducting a multi-centre mixed-method investigation of affected patients' and relatives' opinions on their experience of the MRSA regimen to estimate the magnitude of the problem within the palliative care settings. Second, clinical data obtained from carefully matched cohorts may clarify the significance of MRSA eradication, isolation protocols and treatment. Third, building on these data, a decision-making algorithm may be developed and validated to identify patients who possibly benefit from eradication therapy. As other multi-resistant organisms may emerge in the near future, the case of MRSA should be studied as a model for the management of patients with highly complex conditions and special needs such as isolation.

Our findings highlight the situation of very ill patients who are in need of very complex therapies. MRSA protocols, for example, do not uniquely confer beneficial effects but have to be weighed against possible drawbacks. Therapeutic dilemmas may arise between the concomitant needs for both comprehensive psycho-social care and anti-infective isolation. Guidelines for nursing homes in Germany, for example, recommend an approach ('standard sanitary measures') based on the Centers for Disease Control and Prevention Standard Precautions,²⁴ thus avoiding isolation and restriction of social activities.²⁵ The palliative care specialists' knowledge of how to handle severely ill or dying MRSA-positive patients may reconcile conflicting needs, facilitate a more pragmatic approach to this vulnerable population, and foster timely referrals to PCUs and hospices.

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Notes

*In Germany, PCUs are inpatient units integrated into hospitals; hospital admission criteria are applied. Hospices focus on nursing needs, are freestanding, and generally patients remain there until they die. Funding for services also differs.¹²

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Conflict of interest

The authors declare that there is no conflict of interest.

Publication guidelines

The recommendations of the TREND checklist have been followed where applicable.²⁶ We selected this guideline although our study did not exactly meet the criterion 'nonrandomized evaluations of behavioural and public health interventions', but other publication guidelines are even less suitable. We consider the following items *not applicable* in our case:

- 2 We did not apply a specific theory in designing a behavioural intervention.
- 4 As we collected data retrospectively on established complex interventions as perceived by health care professionals, there is no point in describing interventions being designed within the framework of the study.
- 7 Sample size was not an issue as this was pre-defined by the total number of existing PCUs and hospices in Germany.
- 9 Blinding or masking was not part of our study design.
- 16 We are not able to present data for non-respondents due to the questionnaire design.

References

1. Andersson H, Lindholm C and Fossum B. MRSA – global threat and personal disaster: patients' experiences. *Int Nurs Rev* 2011; 58: 47-53.
2. Skyman E, Sjöström HT and Hellström L. Patients' experiences of being infected with MRSA at a hospital and subsequently source isolated. *Scand J Caring Sci* 2010; 24: 101-107.
3. Geffers C and Gastmeier P. Nosocomial infections and multi-drug-resistant organisms in Germany – epidemiological data from KISS (The Hospital Infection Surveillance System). *Dtsch Arztebl Int* 2011; 108: 87-93.
4. European Antimicrobial Resistance Surveillance System (EARSS). The annual report is published by the National Institute for Public Health and the Environment, P.O. Box 1, 3720 BA Bilthoven, The Netherlands. *EARSS annual report*. 2008: 55-58.
5. Dand P, Fyvie J, Yee A and Sykes N. A survey of methicillin-resistant *Staphylococcus aureus* (MRSA) management in hospices/palliative care units. *Palliat Med* 2005; 19: 185-187.
6. Leonhardt KK, Yakusheva O, Phelan D, et al. Clinical effectiveness and cost benefit of universal versus targeted methicillin-resistant *Staphylococcus aureus* screening upon admission in hospitals. *Infect Control Hosp Epidemiol* 2011; 32: 797-803.
7. Prentice W, Dunlop R, Armes PJ, Cunningham DE, Lucas C and Todd J. Methicillin-resistant *Staphylococcus aureus* infection in palliative care. *Palliat Med* 1998; 12: 443-449.
8. Ali S, Sykes N, Flock P, Hall E and Buchan J. An investigation of MRSA infection in a hospice. *Palliat Med* 2005; 19: 188-196.
9. Fraise AP, Mitchell K, O'Brien SJ, Oldfield K and Wise R. Methicillin-resistant *Staphylococcus aureus* (MRSA) in nursing homes in a major UK city: an anonymized point prevalence survey. *Epidemiol Infect* 1997; 118: 1-5.
10. Baldwin NS, Gilpin DF, Hughes CM, et al. Prevalence of methicillin-resistant *Staphylococcus aureus* colonization in

- residents and staff in nursing homes in Northern Ireland. *J Am Geriatr Soc* 2009; 57: 620-626.
11. Lasseret G, Charlett A, Lewis D, Donald I, Howell-Jones R and McNulty CA. Staphylococcus aureus carriage in care homes: identification of risk factors, including the role of dementia. *Epidemiol Infect* 2010; 138: 686-696.
 12. Ostgathe C, Gaertner J, Kotterba M, et al. Differential palliative care issues in patients with primary and secondary brain tumours. *Support Care Cancer* 2010; 18: 1157-1163.
 13. Robert-Koch-Institut. Empfehlung zur Prävention und Kontrolle von Methicillin-resistenten Staphylococcus aureus-Stämmen (MRSA) in Krankenhäusern und anderen medizinischen Einrichtungen [Recommendations for prevention and control of MRSA strains in hospitals and other health care institutions]. *Bundesgesundheitsbl – Gesundheitsforsch – Gesundheitsschutz* 1999; 42: 954-958.
 14. Robert-Koch-Institut. Kommentar zu den 'Empfehlungen zur Prävention und Kontrolle von MRSA-Stämmen in Krankenhäusern und anderen medizinischen Einrichtungen' [Commentary to 'Recommendations for prevention and control of MRSA strains in hospitals and other health care institutions']. *Epidemiologisches Bulletin* 2008; 42: 363-364.
 15. European centre for disease prevention and control (ECDC). The report mentioned is published by Health Services Executive (HSE) - Health Protection Surveillance Centre (HPSC), 25-27 Middle Gardiner Street, Dublin 1, Ireland (www.hpsc.ie). *Irish EARS-Net report for quarter 3 2010*. 2010: 1-6.
 16. von Hardenberg N. Der Kampf gegen die Superkeime [The battle against the super bugs]. *Süddeutsche Zeitung* accessed online on Oct. 7, 2011 (www.sueddeutsche.de/wissen/gesundheit-der-kampf-gegen-die-superkeime-1.1071090), 2011.
 17. Kappstein I, van der Muhlen K, Meschzan D, Vatou V and Bieg-Habermann S. Prävention von MRSA-Übertragungen: Standardhygiene statt Isolierung: 6 Jahre Überwachung in einem Universitätsklinikum [Prevention of transmission of methicillin-resistant Staphylococcus aureus (MRSA) infection: standard precautions instead of isolation: a 6-year surveillance in a university hospital]. *Chirurg* 2009; 80: 49-61.
 18. Tarzi S, Kennedy P, Stone S and Evans M. Methicillin-resistant Staphylococcus aureus: psychological impact of hospitalization and isolation in an older adult population. *J Hosp Infect* 2001; 49: 250-254.
 19. Newton JT, Constable D and Senior V. Patients' perceptions of methicillin-resistant Staphylococcus aureus and source isolation: a qualitative analysis of source-isolated patients. *J Hosp Infect* 2001; 48: 275-280.
 20. Kennedy P and Hamilton LR. Psychological impact of the management of methicillin-resistant Staphylococcus aureus (MRSA) in patients with spinal cord injury. *Spinal Cord* 1997; 35: 617-619.
 21. Stelfox HT, Bates DW and Redelmeier DA. Safety of patients isolated for infection control. *JAMA* 2003; 290: 1899-1905.
 22. Evans HL, Shaffer MM, Hughes MG, et al. Contact isolation in surgical patients: a barrier to care? *Surgery* 2003; 134: 180-188.
 23. Kirkland KB and Weinstein JM. Adverse effects of contact isolation. *Lancet* 1999; 354: 1177-1178.
 24. Siegel JD, Rhinehart E, Jackson M and Chiarello L. 2007 Guideline for isolation precautions: preventing transmission of infectious agents in health care settings. *Am J Infect Control* 2007; 35: S65-164.
 25. Robert-Koch-Institut. Infektionsprävention in Heimen [Prevention of infections in nursing homes]. *Bundesgesundheitsbl – Gesundheitsforsch – Gesundheitsschutz* 2005; 48: 1061-1080.
 26. Des Jarlais DC, Lyles C and Crepaz N. Improving the reporting quality of nonrandomized evaluations of behavioral and public health interventions: the TREND statement. *Am J Public Health* 2004; 94: 361-366.