and could not be imitated. We tried to avoid biases by blinding the observer who determined whether each patient developed VAP.

The fact that the incidence of VAP in the intervention group was not statistically significantly different from that in the control group was most likely the result of an inadequate sample size. Therefore, we conducted a meta-analysis and found that 2% chlorhexidine was effective for the prevention of VAP. Moreover, we observed that the rate of VAP (mean number of cases per 1,000 ventilation-days) in the intervention group was significantly less than that in the control group. We focused attention on the clinical importance of the study results (the 50% reduction in the rate of VAP), rather than on the *P* values (the incidence of VAP was 4.9% in the chlorhexidine and 11.4% in the normal saline group; $P = .08$). The causative agents of VAP in all study patients were mainly *Pseudomonas aeruginosa, Acinetobacter baumannii,* and *Klebsiella pneumoniae.*

We were concerned about the adverse effects of chlorhexidine, such as irritation of oral mucosa, as was indicated in our article.[2] We mentioned the factors that might increase the risk of irritation of oral mucosa and warned the healthcare workers who wanted to implement this intervention for their patients. However, we considered that the benefit of VAP prevention outweighed the risk of adverse effects.

We believe that the results of the meta-analysis were valid, because we included only the studies that used 2% chlorhexidine for patients who received mechanical ventilation. The meta-analyses mentioned by Silvestri et al.[1] included studies that used less-concentrated chlorhexidine and included a different population. Although 2% chlorhexidine solution did not significantly decrease mortality among patients who received mechanical ventilation, our intervention was very cost-effective.

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Should We Screen Patients for Extended-Spectrum β-Lactamase–Producing Enterobacteriaceae in Intensive Care Units?

To the Editor—There have been an increasing number of reports worldwide demonstrating that Enterobacteriaceae, especially *Escherichia coli* and *Klebsiella pneumoniae,* have frequently become producers of extended-spectrum β-lactamases (ESBLs).[1-3] Such ESBL-producing organisms are resistant to broad-spectrum penicillins and many cephalosporins. In addition, these organisms frequently are resistant to other agents (eg, fluoroquinolones) and can transmit their resistance genes by way of plasmids.[4] Unlike for other pathogens (eg, methicillin-resistant *Staphylococcus aureus* [MRSA]) that are difficult to treat, the optimal strategy to combat the spread of ESBL-positive organisms is unknown. Screening patients who are at risk could be beneficial, but an optimal screening method has not been found, and screening for such ESBL-producing organisms has been limited. In 2006, the University Medical Center Freiburg faced a dramatic increase in the number of patients with infections due to ESBL-positive Enterobacteriaceae. Therefore, we introduced admission screening in 4 intensive care units (ICUs) to determine the prevalence of ESBL-positive patients in these high-risk areas.

The University Medical Center Freiburg is a 1,600-bed university hospital with all of the clinical specialities. Approximately 60,000 patients are admitted each year, accounting for a total of 440,000 patient-days.

In addition to standard precautions, contact precautions are generally recommended only for patients infected with ESBL-positive bacteria at the University Medical Center Freiburg. These contact precautions include housing the patient in a single room or cohorting the patient with other infected or colonized patients, the wearing of gloves and gowns by healthcare workers, and the performance of rectal screening of roommates for ESBL producers. During the study period (August through December 2007), 4 surgical ICUs (referred to as ICUs A, B, C, and D) were instructed to screen patients for infection due to ESBL-positive Enterobacteriaceae by means of culture of rectal samples. Mainly patients who have undergone a solid-organ transplant are admitted to ICU A, those who have undergone cardiovascular surgery are admitted to ICU B, those who have undergone visceral or orthopaedic surgery are admitted to ICU C, and trauma patients are admitted to ICU D.

Cultures were performed on a chromogenic medium for

the screening of ESBL-positive Enterobacteriaceae (chromID ESBL; bioMérieux) for all submitted rectal swab samples. This chromogenic agar contains a mixture of antibiotics, including cefpodoxim, and allows for the discrimination of different species or genera of Enterobacteriaceae on the basis of colony coloration. Additionally, cultures used as growth controls were performed on Columbia blood agar plates (Becton-Dickinson). Colonies that we thought were producers of ESBL were confirmed by the use of a commercial combination-disk method (ESBL Set; MAST Diagnostics) that contained cefotaxim, ceftazidim, and cefpodoxim with or without clavulanate and by the use of a double-disk synergy test that contained ceftriaxone and amoxicillin-clavulanate.[5]

Clinical samples other than rectal swab samples were cultured, and antibiotic resistance testing was performed according to standard laboratory procedures. According to the criteria of the Clinical and Laboratory Standards Institute, if reduced susceptibility to cephalosporins was detected in Enterobacteriaceae, the isolates were checked for production of ESBL, as described above.

Admission screening was performed for 755 (45%) of the 1,674 newly admitted patients to the 4 ICUs during the study period (Table). The majority of the patients who were not screened were expected to stay in the ICU for only a few hours. The rate of carriage of ESBL carriers detected by admission screening ranged from 3.0% to 9.0% of patients per ICU (Table). Overall, 35 (5%) of the 755 patients screened had rectal colonization, but only 6 (17%) of the 35 patients were already known to carry ESBL-producing organisms. If the isolation of ESBL-producing organisms from clinical cultures is included in the analysis, then 2.4%–6.1% of patients per ICU were found to be positive for ESBL-producing pathogens; 52 (7%) of the 755 patients screened were infected or colonized with ESBL-producing pathogens, and 9 (25.7%) of the 35 patients with rectal colonization developed a subsequent infection (ie, 5 developed a urinary tract infection, 2 developed a surgical site infection, 1 developed pneumonia, and 1 developed pleural empyema).

Guidelines for the care of patients infected with ESBL-producing bacteria vary and do not necessarily include screening for ESBL-producing organisms. However, there is broad evidence to suggest that, with respect to MRSA, the screening and identification of patients at risk are crucial for infection control.[6]

We analyzed the situation in 4 ICUs in a German tertiary care hospital and were surprised to find a mean ESBL carriage rate of 5% during admission screening, a rate similar to what has been reported recently from the United States.[1] In that latter, larger study from the United States by Reddy et al.[1] involving approximately 17,000 patients from 4 ICUs, a progressive increase in the incidence of ESBL-producing Enterobacteriaceae colonization was reported during the 6-year period of the study. The mean rate reached 3% in 2005, ranging from 7% in the medical ICU to 4% in the surgical ICU. Data from Israel and Saudi Arabia indicate colonization rates in excess of 10% and even 26%.[2,3]

Rectal colonization is a known risk factor for infection due to ESBL-producing Enterobacteriaceae.[2] Reddy et al.[1] reported that 35 (8.5%) of 413 patients colonized with ESBL-producing Enterobacteriaceae developed a subsequent bloodstream infection.[1] In our study, every fourth colonized patient suffered from an infection caused by an ESBL-producing organism during the course of their hospital stay. In 2007 at our hospital, the hospital-wide burden (ie, the number of cases per 1,000 patient-days) of infections due to ESBL-positive bacteria was twice as high as that of MRSA infections (0.3 vs 0.15 cases per 1,000 patient-days; data not shown).

In consideration of the fact that the burden of infections due to ESBL-producing bacteria is high and continues to rise and that the risk of developing a subsequent infection due to an ESBL-producing organism is considerable, we advocate introducing admission screening for high-risk patients with severe underlying disease (eg, for patients who have had severe trauma, who have undergone major surgery or a transplant, and/or who have been admitted to a hematology unit), because these are the types of patients who frequently develop nosocomial infection and in whom early and adequate empirical antibiotic treatment is vital. This is in contrast to MRSA screening; as long as the exact reservoir and prevalent modes of transmission remain unclear, it might not be helpful to restrict admission screening to only high-risk patients who, for example, have invasive devices in place, are on dialysis, or have chronic wounds. With such a program, it should be possible to provide data relevant for cost-benefit analyses.

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Infectious Complications After Reimplantation of Bone Flaps in Patients Who Underwent Decompressive Craniectomy

To the Editor—As a neurosurgical procedure, decompressive craniectomy has been described as a therapeutic approach to intractable intracranial pressure—resulting from a traumatic brain injury or brain edema of other etiology—and malignant middle cerebral artery infarction, as outlined in a number of algorithms for therapy.[1] Some of the technical details of the procedure, including the storage of removed bone flaps, are mostly based on institutional experience, and the infectious complications associated with delayed cranioplastic repair have not been routinely monitored.

A survey consisting of the following 5 questions was e-mailed to a representative convenience sample of 100 large and small neurosurgical departments at university, teaching, and community hospitals in Germany: (1) How many decompressive craniectomies were performed between 2004 and 2006? (2) How many bone flaps were reimplanted between 2004 and 2006? (3) How many infections (ie, clinical diagnosis in a patient's record) associated with bone-flap reimplantation were observed between 2004 and 2006? (4) How are bone flaps stored at your institution? (5) Is there a maximal storage duration at your institution?

The medical insititutions from which the quality assurance data were collected and recorded remained anonymous; any identifiers of the institutions were destroyed after being entered into a spread sheet (Excel 2003; Microsoft Deutschland GmbH), in compliance with German federal data protection laws. Specific institutional review board authorization is not required by German law for this kind of research.

Only the data sets of 12 medical centers could be fully analyzed, because many institutions were not able to match decompressive craniectomies with their respective reimplantation procedures or to provide infection rates; these insitutions had to be excluded. Therefore, the planned multiple regression analysis using JMP, version 5.1 (SAS), had to be abandoned because of the small number of medical centers included in our study.

In the 12 medical centers included in the study, 682 decompressive craniectomies (range, 4–335 procedures per medical center) and 301 bone-flap reimplantation procedures (range, 2–137 procedures per medical center) had been performed. This represents a mean reimplantation rate of 44% (range, 37%–75%). Of the 301 bone-flap reimplantation procedures, 22 were reported to have infectious complications (mean infection rate, 7.3%; range, 0%–11.7%). There was a large variation in maximal storage times among the 12 medical centers: no restrictions, 1 month, 6 months, 12 months, 24 months, and up to 5 years. The 12 medical centers' practice patterns for storage were also highly variable, including frozen storage at −80°C ($n = 3$), −70°C ($n = 3$), −24°C ($n = 1$), and an unknown temperature ($n = 3$) and bone-flap implantation in the abdominal wall ($n = 2$). Bone flaps were pretreated with either Lavasept (BBraun AG) for 5 minutes ($n = 1$) or Jodobac (Bode Chemie) for 30 minutes ($n = 1$), or they were boiled in sterile normal saline for 20 minutes before freezing ($n = 1$). The infection rate in the medical center with a storage temperature of −24°C was the highest at 11.7%; however, no valid statistical analysis could be performed because of the small number of medical centers in our study.

Decompressive craniectomy is reported to be a lifesaving rescue procedure for selected patients, although its definite place in algorithms for therapy for intractable intracranial pressure still needs to be determined.[1] With the increased utilization of this neurosurgical procedure, the questions of how to handle, store, and reimplant bone flaps harvested at initial decompression and the infectious complications associated with delayed cranioplasty become an important issue for the long-term care of those often severely ill patients.

Our study was limited by the small number of complete data sets for analysis, which is one of the major drawbacks of surveys, and highlights the demand for prospective surveillance efforts. The infection rate that we calculated in our study is in accordance with the rates found in the literature (ie, 2.1%–7.8% in larger case series).[2,3] However, no common definitions for infectious complications after delayed cranioplasty are in place, which limits comparison. The storage procedures described in the literature also differ from one medical center to the next. For example, freezing techniques include freezing at −35°C or −84°C without pretreatment,[3] at −80°C after rinsing with neomycin,[4] at −16°C after immersion in amikacin sulphate,[5] and at −20°C in 100% ethanol solution and autoclaving before reimplantation.[6] Jho et al.[2] described a technique that uses gas sterilization with ethylene oxide for storing explanted skull bone at room temperature, and interest is growing in the intracorporeal storage of bone in the abdominal wall[7] or in a subgaleal pocket,[8] especially in regions of the world where extracorporeal storage is limited