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Management of a large healthcare-associated outbreak of Panton–Valentine leucocidin-positive meticillin-resistant *Staphylococcus aureus* in Germany

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Summary We report the largest documented healthcare-associated outbreak of Panton–Valentine leucocidin-positive meticillin-resistant *Staphylococcus aureus* (PVL$^+$ MRSA) in Europe. Six index patients from three long-term care facilities (LTCFs) were screened positive for PVL$^+$ MRSA in 2004 on admission to a community hospital in Germany. The purpose of this prospective study was to describe the prevalence of PVL$^+$ MRSA in the LTCFs before and after infection control interventions. Screening for MRSA with or without PVL was performed in all three LTCFs in 2004 [453 residents, 240 healthcare workers (HCWs)] and 2005 (440 residents, 192 HCWs). Swabs from anterior nares and wounds, if applicable, were collected. Colonised residents and staff were treated with mupirocin nasal ointment and topical antiseptics, and staff were provided with hygiene education. Total MRSA carrier rate of residents and HCWs in 2004 was 11.3% (PVL$^+$ MRSA 9.1%, PVL$^-$ MRSA

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2.2%). There were comparable carrier rates between residents and HCWs in each LTCF. All PVL^+ MRSA isolates were of clonal origin (MLST 22) representing a novel *spa* sequence type t310. A decrease in total MRSA prevalence (from 11.3 to 5.5%) and PVL^+ MRSA (from 9.1 to 3.3%) was observed in 2005. The rate of PVL^- MRSA remained unaffected. No symptomatic skin infections were noted among residents or HCWs. In this outbreak incomplete control of PVL^+ MRSA presumably resulted from difficult and delayed detection and decolonisation of carriers, incomplete compliance with control measures and lack of enforcement by public health authorities.

Introduction

The worldwide spread of meticillin-resistant *Staphylococcus aureus* (MRSA) is a challenging public health problem.[1–3] Recently, new variants of MRSA appeared that are distinct from healthcare-associated MRSA (HA-MRSA) by the following characteristics: they are observed primarily in the community in patients without risk factors and are therefore termed community-associated MRSA (CA-MRSA); they cause deep skin and soft-tissue infections; they are resistant to oxacillin but susceptible to most other classes of antibiotics; and they frequently carry the genes for the Panton–Valentine leucocidin (PVL).[4–7]

PVL-positive (PVL^+) MRSA is now increasingly recognised in the healthcare system.[8–13] MRSA outbreaks in long-term care facilities (LTCFs) have previously been reported; however, little is known about the best control strategy for outbreaks with PVL^+ MRSA.[11,14–17] From January through June 2004, PVL^+ MRSA was first noted among six residents of three LTCFs (two from each LTCF) in Straubing, Germany, screened on admission to the local primary care hospital. The purpose of this prospective study was to determine the prevalence of PVL^+ MRSA in these three LTCFs and to describe the effect of infection control measures.

Methods

Setting and study populations

Straubing in Germany has 44 100 inhabitants and eight LTCFs with approximately 800 residents and 400 healthcare workers (HCWs). The St Elisabeth Hospital is a 485-bed, tertiary care hospital, serving the majority of the town's population and also that of the surrounding county. Patients at risk for MRSA are routinely screened on hospital admission, taking swabs from anterior nares and skin lesions, if present. In 2004, PVL^+ MRSA at hospital admission was detected in residents of three of the eight LTCFs (LTCF A, B and C).

A case was defined as a patient, resident, HCW or relative of a HCW living or working in either one of the three LTCFs between 15 January 2004 and 7 September 2005, who had MRSA identified in a clinical or screening specimen from any site. MRSA isolates were distinguished according to their PVL status (with or without PVL: PVL^+ or PVL^-).

Prevalent cases were defined as the proportion of individuals who harboured PVL^+ MRSA during 2004 and 2005. Incident cases were defined as the number of new cases who harboured PVL^+ MRSA either in 2004 or 2005.

Epidemiological investigation

Prevalence of MRSA carriage was determined among residents and staff in all three LTCFs in period I in 2004 and in order to investigate success of control measures again in period II in 2005 (LTCF A: 28 January 2004 to 15 July 2004 and 9 May 2005 to 24 August 2005; LTCF B: 23 June 2004 to 27 September 2004 and 25 April 2005 to 7 September 2005; LTCF C: 2 November 2004 to 13 December 2004 and 3 June 2005 to 27 June 2005). Time periods were different in the LTCFs due to differences in managing the epidemiological workload in the three LTCFs. One representative from each LTCF was fully involved in the screening and infection control process. Participation in the study was voluntary and not enforced by the local health authorities. The German infection control law covered legal authorisation. Relatives of HCWs were screened only if a family history of skin or soft-tissue infection was reported. Screening was performed using a cotton swab, moistened with sterile 0.9%