

COMMUNITY-ACQUIRED METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS* IN SWITZERLAND: FIRST SURVEILLANCE REPORT

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Methicillin-resistant *Staphylococcus aureus* (MRSA) is an emerging community pathogen. Community-acquired MRSA (CA-MRSA) has been associated with virulent strains producing Panton-Valentine leukocidin (PVL) and a variety of other exotoxins. In Geneva, PVL-producing CA-MRSA was first reported in 2002 and a surveillance system based on voluntary reporting was set up.

Each MRSA-positive culture result with an antibiotic resistance profile different from the endemic strain prevailing in the Geneva healthcare setting diagnosed in a patient without a history of hospital admission in the previous 12 months was notified to the local health department. A questionnaire was completed by the attending physician with demographic, clinical and exposure information.

From January 2002 until December 2004, data on 58 cases were reported, including 26 cases grouped in 13 distinct transmission clusters. Most were family related and for two of them, colonisation persisted over a 12 month period despite treatment. Thirty three patients (57%) were male. Median age was 32 years, 22% being younger than 10 years. Forty one cases (71%) were infected and 17 (29%) colonised. Symptomatic skin lesions such as furunculosis, impetigo or abscess were present in 40 (97%) of the 41 infected cases. Most cases had no underlying disease. Thirty eight cases (65%) had travelled abroad. Forty (69%) of 58 isolates carried the PVL toxin.

CA-MRSA infections in Geneva appear to be an emerging problem in the canton. Surveillance should continue and should possibly be extended to other parts of the country to better describe transmission patterns and the spread of this pathogen. Prevention and control of CA-MRSA infections represent a challenge for the future, requiring contact tracing, education and treatment of infected and colonised contacts.

Euro Surveill 2006;11(1): 42-3

Published online January 2006

Key words: community, methicillin resistance, Leukocidin, Panton-Valentine, Staphylococcal infection, Switzerland

Introduction

Methicillin-resistant *Staphylococcus aureus* (MRSA) is an emerging community pathogen. It was first reported in the early 1990s among closed communities of Aborigines in Western Australia [1]. Outbreaks of community-acquired MRSA (CA-MRSA) infections in healthy children and adults have been described worldwide [2]. CA-MRSA infections tend to occur in younger persons than do hospital-acquired MRSA (HA-MRSA) infections. They often cause sporadic cases of skin and soft tissue infections but cases of necrotising pneumonia have also been reported [3]. CA-MRSA has been associated with virulent strains producing Panton-Valentine leukocidin (PVL) and a variety of other exotoxins [4]. It shows resistance to methicillin, which is encoded by the *mecA* gene, mostly found on the type IV staphylococcal cassette

chromosome (SCC) [2]. The spread of these strains does not seem to be limited to the community and may also concern the hospital setting [5], although in Geneva, low prevalence of CA-MRSA on admission to the main hospital has been reported [6].

Voluntary laboratory-based CA-MRSA surveillance was set up in Geneva in 2003, to ensure adequate case investigation and contact tracing, estimate incidence and transmission patterns, and develop prevention strategies. We report the first results of this surveillance system.

Methods

Four laboratories (the Geneva University Hospital (Hôpitaux Universitaires de Genève, HUG), clinical microbiology laboratory and three private ones) participated on a voluntary basis in the surveillance system. Physicians from public hospitals and private clinics also provided information on cases. The population of the Canton of Geneva is estimated to be around 427 400 persons (2004).

For surveillance purposes, a laboratory reportable CA-MRSA was defined as any MRSA isolate with an antibiotic resistance profile different from the endemic strain prevailing in the Geneva healthcare setting, diagnosed in a patient without history of hospitalisation in the previous 12 months.

All CA-MRSA cases reported by the laboratories since 2002 and fitting this case definition were included in our database.

Presence of PVL or other exotoxins was determined with PCR-based assays [2,8].

For each laboratory reported case, a questionnaire was sent to the clinician in charge requesting demographic, clinical and epidemiological data information. Data on the type of infection and other specific clinical features were collected (questionnaire in French available on request).

For each infected CA-MRSA case, active contact tracing was done within one week of identification of the index case. The case's family members or close contacts were offered screening and treatment (or decolonisation) if required. This active search increased the number of infected or colonised cases included in the surveillance database and allowed the identification of several clusters.

Results

From January 2002 to December 2004, 58 CA-MRSA cases were reported; 41 cases (71%) had a clinical infection and 17 (29%) were colonised. Thirty three patients (57%) were male. Median age was 32 years (inter-quartile range: 11-49) and 22% of cases were younger than 10 years. Symptomatic skin lesions such as furunculosis, impetigo or abscess were present in 40 (97%) of the 41 infected cases. Abscesses and furunculosis were the most common clinical presentation. Sixteen cases (28%) had a close contact person with similar skin lesions.

Thirty one cases (75%) were in patients who presented with their first episode and 10 (25%) with a relapsing infection. The majority of infected cases (34/41, 83%) had no comorbidity. No deaths or severe infection were reported. Seven cases were in temporary residents who lived abroad and 38 had travelled abroad in the preceding 12 months (Africa, 6; Europe, 11; Asia, 4 and North America, 2; not known, 15). The epidemic curve is shown in the figure.

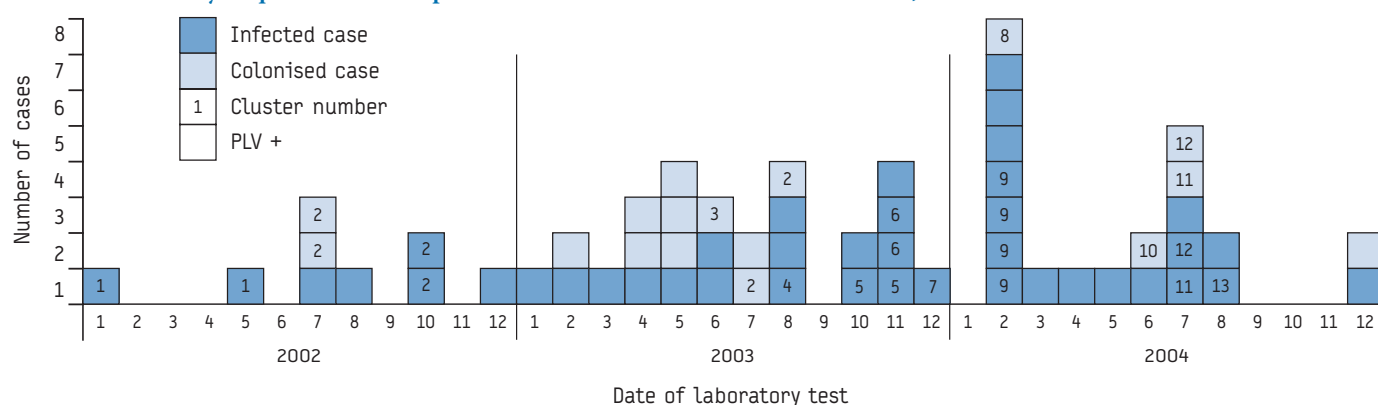
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Cases of community-acquired MRSA reported to the Geneva surveillance database, 2002-2004



Forty of 58 isolates carried the PVL toxin. Twenty seven (66%) of these isolates were recovered from infected cases and 13 (76%) from colonised cases.

A total of 26 cases could be grouped in 13 distinct transmission clusters. Of them, 9 clusters were family-related (size: 2-7 persons); 3 were heterosexual couples and 1 occurred within an ambulatory health setting (private practice) (size: 3). In two of the familial clusters, colonisation persisted over a 12-month period despite several treatment attempts administered simultaneously to all family members.

Discussion

It is essential to differentiate healthcare-associated MRSA infections occurring in the community among patients at risk of HA-MRSA (such as a previous history of hospital admission) from true CA-MRSA infections due to strains which are present in the community only [3,6]. The possibility that strains first identified in the community will disseminate further within the hospital population is of great concern [7]. It should be noted that, to our knowledge, Geneva is currently the only canton in Switzerland where such specific surveillance (a systematic, patient-based surveillance of CA-MRSA infections detected in both outpatients and inpatients) exists.

In Geneva, PVL-producing CA-MRSA was first reported in 2002 [4]. Within weeks of the alert, the Direction Générale de la Santé (DGS), with the assistance of a CA-MRSA epidemiology working group (see appendix), set up a voluntary CA-MRSA surveillance system. The medical community and microbiology laboratories were informed and as a result, participate actively and voluntarily in the surveillance system.

The case definition of our surveillance system was based on microbiological criteria (antibiotic resistance profile) together with epidemiological criteria (no hospital contact within the previous 12 months). However, more specific microbiological characteristics such as the SCC *mec* type or the presence of PVL were also investigated in all cases. Because case definitions may vary between surveillance systems, caution should be applied when comparing CA-MRSA prevalence in different settings.

Skin and soft tissue infections caused by CA-MRSA may be an emerging problem in Geneva and, probably, other parts of Switzerland. Continued and expansion of surveillance is critical to assess the spread of this new pathogen.

The majority of isolates (69%) carried the PVL toxin. Further studies should be conducted to determine the role of PVL as a marker of community acquisition and its importance to distinguish from healthcare-associated acquisition.

The existence of more than a dozen clusters demonstrates the importance of local transmission. More data are needed to clarify the risk profile for infection and the relative contribution of imported cases versus local transmission. Our population-based surveillance network will help to better understand the extent of the spread of CA-MRSA not only in the community but also to the healthcare setting. Specific epidemiological studies are planned to better understand these potential risk factors and transmission patterns.

Prevention and control of CA-MRSA infections represents a challenge for the future, requiring better surveillance, contact tracing, education and treatment of infected cases and colonised contacts.

Acknowledgements

Thanks to Geneva physicians and laboratories for their contribution, and to Pr. Jerome Etienne, Centre National de Référence des Staphylocoques, Faculté de Médecine, Lyon, France for encouragement, support and contribution to laboratory testing.

Appendix

The Geneva CA-MRSA epidemiology working group is composed of Dr P Sudre, M Girard, Dr C Aramburu (EPIET)/ DGS Geneva; Dr S Harbarth, Dr S Hugonnet, Pr Didier Pittet/ SPCI, HUG Geneva; Pr J Schrenzel, G Renzi/ DMI, HUG Geneva; Dr A Gervaix, Paediatric department/ HUG Geneva, Dr Na Liassine, Bioanalytique-Riotton UNILABS, Geneva; Dr L Gauthey, Dr M Pechère, Association of Physicians in Geneva; Dr CA Wyler/ Youth Health Service, Geneva

References

- Riley TV, Pearman JW and Rouse IL. Changing epidemiology of methicillin-resistant *Staphylococcus aureus* in Western Australia. *Med J Aust.* 1995 Oct 16;163(8):412-4.
- Vandenesch F, Naimi T, Enright MC, Lina G, Nimmo G, Heffernan H et al. Community-acquired methicillin-resistant *Staphylococcus aureus* carrying the Pantone-Valentine leukocidin genes: worldwide emergence. *Emerg Infect Dis.* 2003 Aug;9(8):978-84.
- Grundmann H, Tami A, Hori S, Halwani M, Slack R. Nottingham *Staphylococcus aureus* population study: prevalence of MRSA among elderly people in the community. *BMJ.* 2002 Jun 8;324(7350):1365-6.
- Liassine N, Auckenthaler R, Descombes M-C, Bes M, Vandenesch F, and Etienne J. Community- Acquired Methicillin *Staphylococcus aureus* Isolated in Switzerland Contains the Pantone-Valentine Leukocidin or Exfoliative Toxin Genes. *J Clin Microbiol.* 2004 Feb;42(2):825-8.
- Wannet WJB, Heck MEC, Pluister GN, Spalburg E, van Santen MG, Huijsdens XW et al. Pantone-Valentine leukocidin positive MRSA in 2003: the Dutch situation. *Euro Surveill.* 2004 Nov;9(11):28-9.
- Harbarth S, François P, Schrenzel J, Fankhauser-Rodríguez C, Hugonnet S, Koessler T et al. Community- Associated methicillin-resistant *Staphylococcus aureus*, Switzerland. *Emerging Infectious Diseases.* June 2005, 11(6):962-5.
- Vandenesch F and Etienne J. How to prevent transmission of MRSA in the open community? *Euro Surveill.* 2004 Nov;9(11):5.
- François P, Huyghe A, Charbonnier Y, Bento M, Herzog S, Topolski I et al. Use of an automated multiple-locus, variable-number tandem repeat-based method for rapid and high-throughput genotyping of *Staphylococcus aureus* isolates. *J Clin Microbiol.* 2005 Jul;43(7):3346-55.