

# VU Research Portal

## **Staphylococcus aureus epidemiology and control:**

van Rijen, M.M.L.

2014

### **document version**

Publisher's PDF, also known as Version of record

[Link to publication in VU Research Portal](#)

### **citation for published version (APA)**

van Rijen, M. M. L. (2014). *Staphylococcus aureus epidemiology and control: current challenges and costs analyses*. [PhD-Thesis – Research external, graduation internal, Vrije Universiteit Amsterdam].

### **General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

### **Take down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

### **E-mail address:**

[vuresearchportal.ub@vu.nl](mailto:vuresearchportal.ub@vu.nl)

## Chapter 3.3

# Cluster of MRSA in the community; detection and control

CFH Raven<sup>1</sup>, P van Wijngaarden<sup>2</sup>, G Moen<sup>3</sup> and MML van Rijen<sup>3</sup>

<sup>1</sup>Department of infection disease control, Community Health Service Region West-Brabant, Breda, The Netherlands, <sup>2</sup>Department of Internal Medicine, Amphia hospital, Breda, The Netherlands, <sup>3</sup> Laboratory for Microbiology and Infection Control, Amphia hospital, Breda, The Netherlands.

Adapted from Nederlands Tijdschrift voor Geneeskunde [Netherlands Medical Journal], 2014; 158: A6812

# Abstract

## Introduction

Community-acquired infections with methicillin-resistant *Staphylococcus aureus* (MRSA) mainly affect healthy young people, without health-care related risk factors for MRSA. Patients often present with skin and soft-tissue infections.

## Case description

An 18-year-old woman presented at the emergency department with recurrent purulent skin infections. She turned out to be MRSA-positive. Within six months, two people around her also developed an MRSA infection. Culture showed an archetype CA-MRSA in all subjects (spa type: t008). Additional screening among her contacts identified four additional carriers, two of whom had corresponding skin infections.

## Conclusion

Clusters of CA-MRSA require a coordinated approach from both the treating physician and the public health services. The choice of additional investigation among the circle of contacts was essential in breaking the chain of transmission and reinfection within this cluster.

# Introduction

In the Netherlands, clusters of community-acquired MRSA (CA-MRSA) are rare. A cluster is defined as two or more people who are in some way related to each other, suffering from an infection caused by an identical MRSA strain. A cluster must be reported to the Community Health Service. Sometimes, clusters are not recognised, because patients visit different physicians.

In this case report, we describe an outbreak of CA-MRSA among friends. We describe the way of reporting to the Community Health Service, the contact tracing and the policy following the national guideline about 'Staphylococcus aureus infections, including MRSA'.<sup>1</sup>

## Case report

**Patient A**, a healthy 18-year-old woman presented at the emergency department with an inflammation located at her heel, which had developed spontaneously. Initially, no pus or fluid was found after puncture and the patient received a prescription for oral treatment with amoxicillin-clavulanic acid. Two days later, she had to be admitted for incision and drainage of a rapidly growing abscess next to the heel of Achilles. A wound sample was found to be MRSA-positive. Antibiotic treatment with amoxicillin-clavulanic acid was discontinued and no other antibiotics were prescribed. She had no known healthcare- or livestock-associated risk factors for MRSA carriage.<sup>2</sup> After one month



**Figure 1.** Skin and Soft Tissue Infection (SSTI) of the umbilical region in patient A.

she presented at the emergency department again, this time with a skin and soft tissue infection (SSTI) of the umbilical region (figure 1). Recurrent abscesses needed incision and drainage within a week at distinct anatomical locations.

After successful treatment of the abscesses, patient A was referred to the MRSA outpatient's clinic for MRSA eradication therapy. She told the infectious disease physician that a friend in her street dance group also suffered from SSTI. The members of the street dance group had no physical contact with each other. Personal items, like soap and towels were not shared. However, sometimes they shared clothes, usually washed, but incidentally already worn. The infectious disease physician recommended other members of the dance group suffering from SSTI to contact their general practitioner for MRSA screening.

MRSA eradication therapy for patient A consisted of mupirocin nasal antibiotic ointment, povidone iodine soap body washings combined with oral doxycyclin and rifampicin for one week. Besides this, it was recommended to change the bed linen and nightwear every day during the treatment period to prevent re-colonisation. Control samples of nose, throat and perineum were taken 48 hours after completing treatment. These samples were MRSA negative. Also, control samples after two and three week were found to be MRSA negative.

The household members of patient A were all MRSA negative, therefore initially no treatment for any other household contacts was indicated. Nevertheless, after two months patient A developed two SSTI again. These SSTI reinforced the suspicion that the dance group played a role in the maintenance of the infections.

**Patient B** was a 25-year-old woman from the same street dance group as patient A. Six months after patient A, she asked her general practitioner to be tested for MRSA. The reason for this request was an SSTI of her boyfriend, for which he recently had been treated with oral antibiotics, without any effect. Patient B turns out to be MRSA positive with the identical MRSA type as patient A.

**Patient C** was a 22-year-old woman, who was a friend of patient B. She was not a member of the street dance group and had hardly any contact with patient A. Patient C developed an ankle abscess which was sampled by her general practitioner. Again, the identical MRSA type was found (table 1).<sup>3</sup>

MRSA infection of patient C was reported by the Laboratory for Microbiology to the Community Health Service, after which a contact screening among household members and friends of Patients A, B and C was initiated. All household members and friends suffering from SSTI were tested for MRSA. In total, 10 individuals were screened (table 1). Household members and friends from patients A and C all tested MRSA negative. However, 4 contacts of patient B were found to be MRSA positive. Both her parents were carrying MRSA and her boyfriend and his brother were suffering from SSTI caused by this MRSA strain. All received oral antibiotics, mupirocin ointment and povidone iodine

**Table 1** Patient characteristics and CA-MRSA transmission routes (MLVA-type/cluster † (240/8), Spa-type‡ (t008) and PVL\* positive).

Index patient	symptomatic	Transmission route (contact)	Contact tracing		
			Household members	Friends	MRSA positive
Age, gender					
Patiënt A 18; ♀	Abscess	Friends (B) / street dance	3	1	0
Patiënt B 25; ♀	-	Friends (A,C))/ street dance	2	2	4±
Patiënt C 22; ♀	Abscess	Friends (B)	2	0	0

† MLVA = Multiple-Locus Variable number tandem repeat Analysis

‡ Staphylococcus-protein A

\* Panton Valentine-leukocidine

± identical to index MRSA type

**Table 2** Additional contact tracing after identification of a MRSA cluster in the community<sup>1</sup>

Inclusion of contacts:
- with complaints matching a (MR)SA infection
- with risk factors for <i>S. aureus</i> infection (a.o. immunocompromised, eczema) or presence of risk factors for MRSA carriage (a.o. admission to a foreign hospital)
- working in healthcare

\*Household members and hug contacts without these risk factors will be included after treatment failure. This also applies to pets.

soap at the same time, resulting in permanent MRSA eradication (results after 1 year follow up were still MRSA negative).

Cultures of patient A were MRSA negative until six months after the last gift of treatment. However, at that time she developed an abscess in her armpit, which turned out to be MRSA positive. Again, household members were screened and no MRSA was found. An explanation might be contact of patient A with patient B after the last negative screening sample of patient A, however before starting treatment of patient B. Again, patient A was treated with oral antibiotics, mupirocin ointment and povidon iodine soap. To date, all samples have been MRSA negative and she hasn't suffered from SSTI anymore.

## Consideration

In the Netherlands, outbreaks of CA-MRSA have been described in a sport team and after a visit to a beautician.<sup>4,5</sup> These outbreaks were due to intensive contact between individuals by playing a contact sport, sharing personal items such as towels or soap and professional skin-to-skin contact. This case report describes the same kind of outbreak. An outbreak of CA-MRSA outside the hospital requires a coordinated approach by physicians and Community Health Service.

## Clinical manifestations

A purulent infection of skin and soft tissue (SSTI) is the most common clinical manifestation of CA-MRSA.<sup>6,7</sup> Besides SSTI, necrotising fasciitis and pneumonia have been described, often in young, relatively healthy individuals. PVL is an important virulence factor associated with SSTI. This factor was present in the described CA-MRSA. The treatment of a SSTI caused by MRSA can be treated, next to surgical draining, with oral antibiotics.<sup>8</sup>

## Mandatory reporting

In the Netherlands, since 2008, a cluster of MRSA infections (clinical manifestations in  $\geq 2$  individuals with a probable common MRSA source outside the hospital) must be reported to the Community Health Service.<sup>1</sup> MRSA carriage is excluded from notification. In practice, it can be hard to notice a cluster when individuals belonging to the same cluster visit different caregivers. Therefore, the concerned Community Health Service and the Hospital in this outbreak developed a questionnaire which can be used by the infection control practitioner and the Community Health Service to identify a cluster.

## Contact tracing

It was shown that in 50 percent of all MRSA positive individuals who were living in a household consisting of more than one person, MRSA was acquired by another household member.<sup>9</sup> Therefore, it is important to screen all household members before starting MRSA eradication therapy in the index. For treatment schemes, choice of antibiotics and doses, the SWAB guideline can be consulted.<sup>8</sup>

In this case report, after the MRSA findings in patient B and C, a cluster was reported and additional contact tracing was started following the national guideline.<sup>1</sup> Contacts with complaints matching *S. aureus* infections were included. Thereby, based on the results of Mollema *et al.* it was decided to sample all household members instead of the household members with complaints only.<sup>9</sup> All street dance group members mentioned no infections and were therefore not sampled.

## Conclusion

Although the MRSA incidence in the Netherlands is low, sometimes clusters of CA-MRSA are found.<sup>10,11</sup> In case of a recurrent MRSA infection after a successful eradication therapy, it seems useful to look for transmission in people in the surroundings of the patient. In this outbreak, contract tracing by the Community Health Service and subsequent MRSA eradication treatment coordinated by the MRSA outpatient's clinic resulted in successful control of this cluster.

## Key learnings and best practices

- Purulent skin and soft tissue infections (SSTI) are the most common clinical manifestations of CA-MRSA. It affects mainly healthy young people. Treatment failure of antibiotics of first choice may indicate an underlying MRSA-infection
- A CA-MRSA outbreak is sometimes hard to recognise. Therefore, alertness of physicians and the Community Health Service is required.
- In case of a recurrent MRSA infection after a successful eradication therapy, it is useful to look for transmission in persons in the surroundings of the patient.
- Before starting MRSA eradication therapy, all household members must be tested for MRSA carriage, independently whether they are suffering from infections or are at risk for *S. aureus* infection.



## References

1. National Institute for Public Health and the Environment (RIVM). LCI guideline. *Staphylococcus aureus* infections, including MRSA. 2012; available: [http://www.rivm.nl/Onderwerpen/L/LCI\\_Richtlijnen](http://www.rivm.nl/Onderwerpen/L/LCI_Richtlijnen). Accessed 2014 January 01.
2. Dutch Workingparty on Infection Prevention (WIP). MRSA hospital. 2012; available: <http://www.wip.nl>. Accessed 2014 January 01.
3. Schouls LM, Spalburg EC, van Luit M, *et al.* Multiple-locus variable number tandem repeat analysis of *Staphylococcus aureus*: comparison with pulsed-field gel electrophoresis and spa-typing. *PLoS ONE* 2009; 4:e5082.
4. Lier A. A cluster of PVL positive Community Acquired MRSA *Infectieziekten Bulletin* 2006; 17:109-11.
5. Morroy G, Renders NHM, Timen A. A cluster of PVL positive community associated MRSA among a beautician. *Infectieziekten Bulletin* 2007; 18:232-3.
6. David MZ, Daum RS. Community-Associated Meticillin-Resistant *Staphylococcus aureus*: Epidemiology and Clinical Consequences of an Emerging Epidemic. *Clin Microbiol Rev* 2010; 23:616-87.
7. Patel M. Community-associated meticillin-resistant *Staphylococcus aureus* infections: epidemiology, recognition and management. *Drugs* 2009; 69:693-716.
8. Dutch Workingparty on Antibiotic Policy (SWAB). Optimalisation of the antibiotic policy in The Netherlands XI. Revision SWAB guideline for the treatment of MRSA carriage. 2012; available: <http://www.swab.nl/guidelines>. Accessed 2014 January 01.
9. Mollema FP, Richardus JH, Behrendt M, *et al.* Transmission of meticillin resistant *Staphylococcus aureus* to household contacts. *J Clin Microbiol* 2010; 48:202-7.
10. Donker GA, Deurenberg RH, Driessen C, *et al.* The population structure of *Staphylococcus aureus* among general practice patients from the Netherlands. *Clin Microbiol Infect* 2009; 15:137-43.
11. den Heijer CD, van Bijnen EM, Paget WJ, *et al.* Prevalence and resistance of commensal *Staphylococcus aureus*, including meticillin-resistant *S. aureus*, in nine European countries: a cross-sectional study. *Lancet Infect Dis* 2013; 13:409-15.