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ST93-Queensland community-acquired meticillin-resistant *Staphylococcus aureus* clone in France: outbreak in a scout camp and sporadic cases, July to August 2012

T X Nhan (tuxuan.nhan@gmail.com)[1,2,3], M Bes[1,2,3], H Meugnier[1,2,3], L Toko[4], G Julienne[5], J M Thiolet[6], C Tillier[7], S Tessier[7], J Baverel[8], B Conscience[8], J P Lavigne[9], F Laurent[1,3,10], J Etienne[1,2,3], F Vandenesch[1,2,3], A Tristan[1,2,3]

1. Centre National de Référence des Staphylocoques, Centre de biologie et de pathologie Est, Lyon, France
2. Hospices Civils de Lyon, Centre de biologie et de pathologie Est, Laboratoire de Bactériologie, Bron, France
3. Institut National de la Santé et de la Recherche Médicale (INSERM) U851, Lyon, France
4. Centre Hospitalier Belfort-Montbéliard, Service des Maladies Infectieuses, Belfort, France
5. Centre Hospitalier Belfort-Montbéliard, Laboratoire de Microbiologie, Belfort, France
6. French Institute for Public Health Surveillance (Institut de Veille Sanitaire, InVS), Département des maladies infectieuses, Saint-Maurice, France
7. Agence régionale de santé de Bourgogne, Cellule de l' Institut de Veille Sanitaire en Régions Bourgogne et Franche-Comté, Dijon, France
8. Agence régionale de santé de Franche-Comté, Besançon, France
9. Centre Hospitalier Universitaire de Nîmes, Laboratoire de bactériologie, Nîmes, France
10. Hospices Civils de Lyon, Centre de biologie nord, Laboratoire de Bactériologie, Lyon, France

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We describe the occurrence in France of a Panton-Valentine leukocidin (PVL)-positive meticillin-resistant *Staphylococcus aureus* (MRSA) ST93 clone, a predominant community-acquired (CA)-MRSA in Australia. In July to August 2012, an outbreak in a scout camp (n=3) and sporadic cases (n=2) of skin and soft tissue infections were reported. Investigations suggested importation of the clone through travel and onward transmission. This illustrates the epidemic potential of this lineage and the role of travellers in the spread of PVL-positive CA-MRSA.

We describe here the occurrence of sequence type (ST) 93- methicillin-resistant *Staphylococcus aureus* (MRSA) in France, which led to an outbreak and sporadic cases of skin and soft tissue infections, and the investigation led by public health authorities.

Cases were defined as persons with a skin and soft tissue infection (e.g. furuncle or carbuncle) due to an ST93 *S. aureus* strain.

Outbreak cases

The outbreak, comprising three participants of a senior scout camp, occurred in July 2012, in Belfort, in north-eastern France. Case 1 (index case), a 25 year-old man, director of the camp, developed furunculosis on the forehead, neck and leg at the beginning of July after being bitten by mosquitoes. He attended the opening of the camp on 11 July and was hospitalised two days later as the lesions had turned into abscesses. He remained in hospital until 17 July. The carbuncles were treated locally and with systemic clindamycin (600 mg three times a day). He did not return to the camp after his hospital stay.

Case 2, an 18 year-old, developed multiple skin abscesses on his arm three days after his arrival at the camp on 11 July. He was hospitalised from 16 to 19 July and returned to the camp. He was given local treatment for the abscesses, systemic clindamycin (600 mg three times a day).

Case 3, a 16 year-old, who had also arrived at the camp on 11 July, developed two lesions on his arm on 18 July. After consulting his doctor, he was given only local therapy and returned to the camp. A few weeks later, he developed new lesions and he received clindamycin (600 mg three times a day).

All three cases were given information on good hygiene practices.

Sporadic cases

Two additional cases were also identified elsewhere in France in July and August 2012, in the south and east-central parts of the country.

The first, a 20 year-old man had returned to France after a trip to Cambodia (from early June to 18 July). On 8 July, he developed from furunculosis on his legs after a massage. He was treated with amoxicillin-clavulanic

acid on 13 July. The day after his arrival in France, an abscess on his wrist appeared, with no symptoms of arthritis. Despite treatment, he was admitted to hospital in Nîmes in southern France, for incision and drainage of the abscess. Following culture analysis (see below), he received clindamycin plus rifampicin and slowly recovered well, but furunculosis then reappeared three months later.

The second sporadic case, a seven year-old boy, attended the emergency department of a hospital in Lyon on 28 August with a fistulised skin abscess on the elbow and a history of recurrent boils. Three weeks previously, he had received local therapy for a furuncle. No epidemiological data (such as recent travel, information on any other cases among his close contacts) could be collected because the child was lost to follow-up.

Laboratory analysis

Culture from the furuncles or carbuncles from all five patients yielded *S. aureus* isolates, which were sent to the French reference centre for staphylococci in Lyon. Antimicrobial susceptibility testing (penicillin, oxacillin, kanamycin, tobramycin, gentamicin, erythromycin, lincomycin, pristinamycin, levofloxacin, fusidic acid, fosfomycin, tetracycline, rifampicin, trimethoprim-sulfamethoxazole, chloramphenicol and linezolid) was performed by disk diffusion assay and interpreted according to the 2012 guidelines of the Antibiogram Committee of the French Society for Microbiology [1]. All the isolates were only resistant to meticillin.

Molecular characterisation of all the strains was conducted by *agr* typing (by PCR) [2], SCC*mec* typing and toxin profiling (using DNA microarrays) [3,4] and the assignment of isolates to ST (by multilocus sequence typing (MLST)) [5,6]. They harboured the *agr* 3 allele and Panton-Valentine leukocidin (PVL) genes and belonged to the same clone, namely ST93-SCC*mec*IV.

Epidemiological investigations of the outbreak cases

We defined an outbreak as the occurrence of at least three cases with the indistinguishable *S. aureus* strain in a specific population. This took into account the genotypic profile of the strain. The incubation period for *S. aureus* is variable and undefined, thus the time from infection to symptom onset is not a criterion for identification of an outbreak. However, the occurrence of the cases within a month could be a criterion to support the identification of outbreak [7].

Investigations carried out by public health authorities found that Case 1 had travelled to Papua New Guinea from May to late June 2012. He was not aware of having been in contact with anyone with furunculosis or skin abscesses. On his return journey to France, he stopped in Singapore and the first episode of furunculosis appeared a few days later.

It was established that there had been skin-to-skin contact between Cases 1 and 2 during a sports activity at the camp, suggesting direct bacterial transmission.

Cases 2 and 3 shared the same tent, which allows transmission of the causative agent via direct contact or possible sharing of personal items (e.g. clothes, linen and towels).

Control measures at the scout camp

Control measures were implemented, which included disinfection with hydroalcoholic solution of the hands of the three cases at the camp. Those attending the camp were advised orally by the public health authorities not to share personal items and the three cases slept in individual tents. The outbreak was contained within the camp: it closed on 27 July.

Background

In recent years, PVL-positive MRSA has become an important cause of community-acquired skin and soft tissue infections [8]. Some epidemic clones have spread worldwide and have a specific geographical distribution: in France, the European ST80 clone is dominant while in Australia, ST93 (also known as the Queensland clone) is the most common [9,10].

Discussion

This is the first observation of ST93-MRSA grouped infections in France and it highlights the epidemic potential of this lineage. Since its first description in 2003, ST93-MRSA has spread extensively in the community and in hospitals in Australia, where it is the predominant CA-MRSA [10,11], accounting for about 64% of all CA-MRSA infections [12]. International spread of the ST93 clone was reported in United Kingdom in 2010, comprising a small number of epidemiologically linked cases in connection with travel to Australia [13].

Similarly, the French epidemiological investigations suggested that importation of the ST93 strain as a result of foreign travel and clonal dissemination of this lineage has occurred in France. This underlines the potential role of travellers in the intercontinental spread of strains, as observed for other CA-MRSA strains, such as the USA300 strain in France in 2009 [14].

The demography, clinical presentation and transmissibility among the patients at the scout camp were in agreement with data from Australia and CA-MRSA in general [12]. Moreover, factors facilitating the spread of infection were found, including crowding, skin-to-skin contact between individuals and possible sharing of contaminated personal items.

This report also highlights the importance of enhanced hygiene measures and appropriate treatment to control the spread of the infection. The outbreak in the scout camp was contained using good hygiene practices, as recommended by French guidelines for the

management of CA-MRSA infections [7], without screening the exposed population for carriage or systematic decolonisation.

Despite the small number of ST93-infections reported here, their occurrence in a short period of time and their occurrence in various parts of France are of concern. Enhanced surveillance is therefore necessary to determine whether this lineage will spread further in France.

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An unusual transmission event of *Neisseria meningitidis* serogroup W135 type 2a in a healthcare setting, England, 2012

R Puleston (richard.puleston@hpa.org.uk)[1], C Beck[1], M Tahir[2], M Bardhan[2], P Charlemagne[2], C Alves[2], S Ladhani[3], C Watson[3], M Ramsay[3], E Kaczmarksi[4], R Borrow[4], S Gray[4], D Hadlington[5], M Weinbren[6], D Bhattacharjee[6], N Inglis[7]

1. Health Protection Agency, Nottingham, United Kingdom
2. Health Protection Agency, Birmingham, United Kingdom
3. Health Protection Agency, London, United Kingdom
4. Meningococcal Reference Unit, Health Protection Agency, Public Health Laboratory, Manchester, United Kingdom
5. West Midlands Ambulance Service, West Midlands, United Kingdom
6. University Hospitals Coventry and Warwickshire NHS Trust, Coventry, United Kingdom
7. NHS Coventry and Warwickshire, Coventry, United Kingdom

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We report an outbreak of *Neisseria meningitidis* serogroup W135, associated with a transient transmission event between asymptomatic individuals in a healthcare setting. Two elderly persons subsequently developed invasive meningococcal disease. The duration and type of close contact for those directly involved in the probable transmission incident would not have warranted chemoprophylaxis according to current guidelines. Meningococcal infection in older persons usually presents with pneumonia rather than meningitis or septicaemia with purpura.

We report a nosocomial outbreak of *Neisseria meningitidis* serogroup W135, phenotype 2a:P1.5, 2 associated with a transient transmission event between asymptomatic individuals in March 2012. Two elderly individuals admitted to the same hospital group (at different sites) presented within four days of each other with non-specific respiratory tract symptoms of infection. Initial microbiological analysis isolated *N. meningitidis* serogroup W135:2a:P1.5, 2 (*porA* genotype 5, 2, 36-2) from both patients' blood cultures. The identical microbiological phenotype/genotype of these isolates suggested an epidemiological link.

Epidemiological investigation

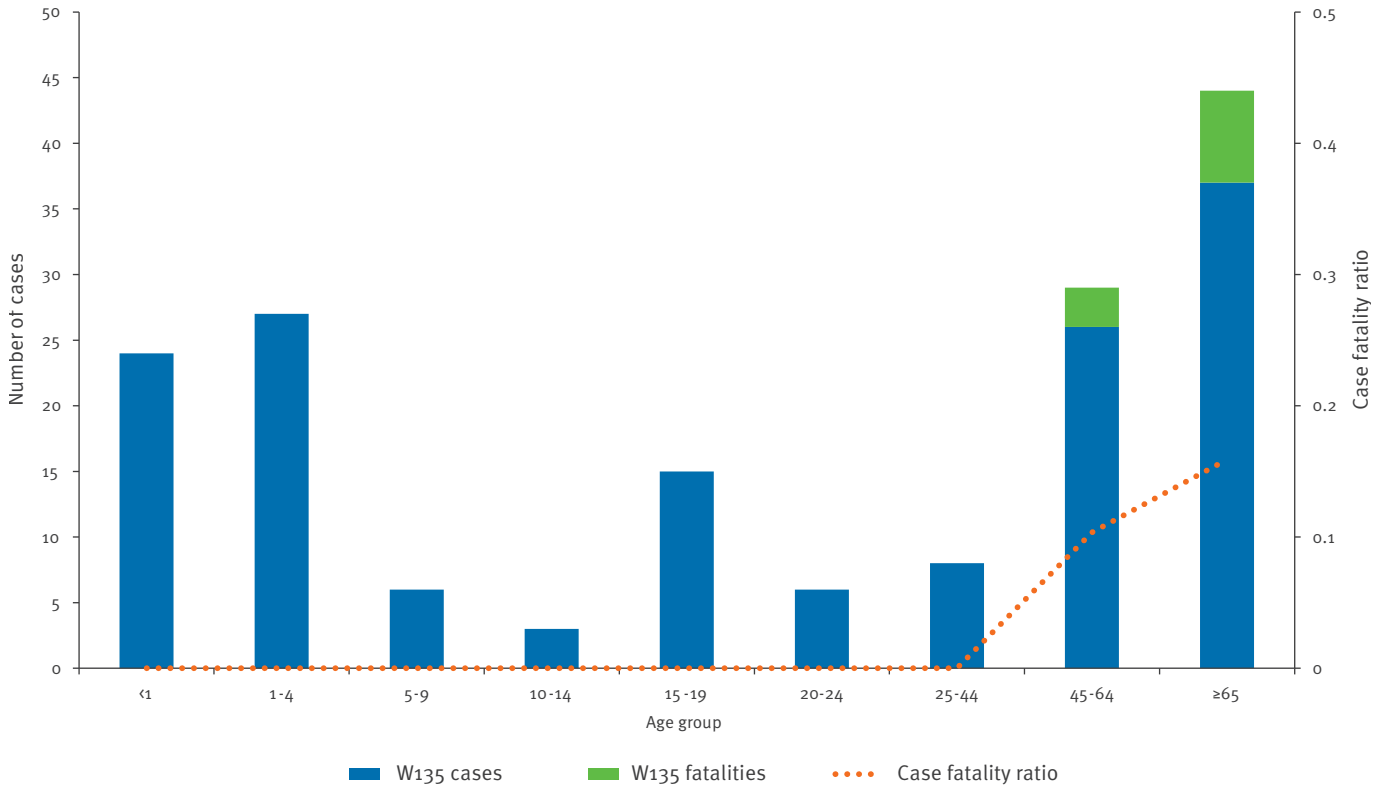
The epidemiological investigation revealed that both patients had in the preceding weeks been admitted to different wards in the same hospital for unrelated illnesses, but had not been in contact with each other during that stay (admitted 19 and 16 days before the positive blood culture result, with stays of 10 and four days, respectively, for the initial admission). However, on the day of discharge, both were transported in the same hospital vehicle at the same time, one to a rehabilitation facility and the other to a care home. Both became ill with non-specific symptoms (however, respiratory infection was thought to be the most likely cause) within six and 10 days after transport, respectively. One patient remained at the rehabilitation unit for management of the disease and the other was readmitted to hospital for treatment. Since the most likely epidemiological link between the two cases was the short transfer journey (duration 67 minutes), nasopharyngeal swabs were obtained from the two staff members involved in the transport and another passenger who was on the vehicle at the same time as the cases, but for less than half an hour.

One of the transport staff (in their 60s) was also found to be carrying serogroup W135:2a:P1.5, 2 (*porA* 5, 2, 36-2) and reported having had upper respiratory tract symptoms in the intervening period (symptom onset 16 days after the patient transport), but had not sought medical attention. The swabs from the second transport team member and the other passenger were negative. None of the affected individuals had travelled abroad during the incubation period. It was not possible to identify the primary case or the sequence of transmission events. For this reason chemoprophylaxis was offered to all staff and patients who had been in close contact with the two infected patients during the incubation period (in the hospital, the transport vehicle and the community) up until 24 hours after commencement of antibiotic treatment of the cases. Chemoprophylaxis and meningococcal ACW135Y quadrivalent conjugate vaccination was also arranged for the swab-positive transport staff member and their close contacts.

Subsequent multilocus sequence typing of the samples obtained from this incident confirmed the epidemiological link between the affected individuals. All were determined to have the same strain designation W135:2a:P1.5,2:F1-1:ST-11 (cc11).

Figure

Laboratory-confirmed W135 *Neisseria meningitidis* cases, deaths, and case fatality ratio by age group, England and Wales, 2006–12 (n=162)



Source: Surveillance data, Health Protection Agency.

Background information

In England and Wales, invasive meningococcal disease most commonly occurs in children under five years of age and teenagers (between the years 2006 and 2011 at incidences of 38.6/100,000 for the under one year-olds, 12.6/100,000 in children aged one to four years, and 3.2/100,000 for teenagers aged from 15 to 19 years) [1,2]. *N. meningitidis* is transmitted through direct contact with infectious respiratory secretions, droplets or aerosols. Typically, for transmission to occur, close, prolonged contact (typically accepted as eight hours or more) is required [1,3-5]. Cases associated with public transport have been noted, but they involved extended contact over a period of hours [6].

Since the meningococcal serogroup C conjugate vaccine was introduced in 1999 to the childhood immunisation schedule in the United Kingdom (UK), around 85–90% of invasive disease cases have been due to *N. meningitidis* serogroup B [2]. Invasive disease by the W135 serogroup is infrequently seen. For example, between 2006 and 2011, serogroup W135 accounted for only 2.3% of cases (annual average: 26 W135 cases) of laboratory-confirmed meningococcal disease in England and Wales, and most occurred in the very young or the very old [2]. Fatalities occurred in 5.5% of these cases, all in adults older than 45 years [2] (Figure)

Discussion and conclusions

In the last 10 years, most W135 organisms isolated in the UK were typed as W135: NT: P1.3.6 cc22 or combinations thereof. In contrast, as reported in this incident, W135:2a:P1.5, 2 cc11 has been only infrequently observed: 32 cases from 2009 to May 2012 (personal communication Dr S Gray, May 2012).

The occurrence described here of invasive meningococcal disease with serogroup W135 may have resulted from a single transient period of close contact. It is notable since symptoms suggestive of meningococcal infection were not apparent at that point. Despite detailed epidemiological and microbiological analysis, it was not possible to determine the sequence of transmission.

Like serogroup Y, most serogroup W135 infections in older adults present as pneumonia (usually in the presence of comorbidities) and are invariably confirmed following a positive blood culture [2,7-9]. Public health notification on clinical suspicion of meningococcal

disease is unusual in elderly persons. Where cases are notified in this age group, they are more likely to be caused by the less prevalent serogroups [2,10].

Epidemiological investigations of clonal complex 11 (cc11) *N. meningitidis* serogroup C have previously demonstrated low levels of carriage and increased case fatality ratios when compared to other clonal complexes [11-14]. It is not known if *N. meningitidis* expressing the serogroup W135 capsular polysaccharide and belonging to cc11 have similar epidemiological features (such as duration of carriage) as serogroup C ST11 organisms. Nonetheless, previous findings from individuals returning from the Hajj demonstrate the capacity of the W135 strain associated with the pilgrimage to cause infection in contacts up to 36 days post return [15].

This cluster of epidemiologically linked serogroup W135 infections raises important implications for the public health and clinical management of the disease, particularly in older age groups. Occupational transmission of meningococcal disease has been previously observed, mostly in laboratory settings. Instances in which emergency workers have been infected have been seen although only from clearly symptomatic patients [16-18].

Antibiotic treatment for cases and prophylaxis for their contacts to eradicate carriage and therefore reduce local transmission is warranted. In addition, for contacts of cases with serogroups ACWY, conjugate vaccines against the specific serogroup may further protect contacts and reduce carriage and local transmission [15,19]. Clinicians need to be aware that while *N. meningitidis* invasive disease is most common in young children and adolescents, it can occur in the elderly, although the presentation will probably differ [2]. Respiratory symptoms predominate in the elderly rather than clinically evident meningitis or septicaemia with purpura. Invasive meningococcal disease caused by all serogroups has a substantially higher case fatality rate in the elderly than in younger age groups. Comorbidities are recognised as an associated risk factor and may explain the poorer outcome [2].

Cases of invasive meningococcal disease occurring in older persons should receive equally robust public health investigation and management as those in younger individuals. Although the duration and type of close contact for the individuals exposed in the ambulance as described here would not have fulfilled the criteria for chemoprophylaxis according to current national public health guidelines, the common epidemiological links allowed appropriate control measures to be implemented. Defining close contacts in incidents where a healthcare source is suspected may be problematic technically and also may provoke anxiety for those involved. A flexible approach utilising expert public health advice to guide intervention is therefore appropriate for this type of occurrence [5].

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Atlas of health and climate: joint publication by WHO and WMO

Eurosurveillance editorial team (eurosurveillance@ecdc.europa.eu)[1]
1. European Centre for Disease Prevention and Control (ECDC), Stockholm, Sweden

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On 29 October 2012 the World Health Organization (WHO) and the World Meteorological Organization (WMO) published jointly an **Atlas of health and climate** that provides scientific information on the connections between weather and climate and major health challenges ranging from diseases of poverty to emergencies arising from extreme weather events and disease outbreaks.

The Atlas gives practical examples of how the use of weather and climate information can protect public health:

- Climate services can help predict the onset, intensity and duration of epidemics.
- Case studies illustrate how collaboration between meteorological, emergency and health services can save lives.
- Cooperation between health and climate services can trigger measures to better protect people during periods of extreme weather events.
- Meteorological and health services can monitor air pollution and its impact on health.
- The relationship between health and climate is shaped by other vulnerabilities, such as those created by poverty, environmental degradation, and poor infrastructure, especially for water and sanitation.

The atlas is available on the WHO website at the following link: http://www.who.int/globalchange/publications/atlas/report/en/index.html