RAPID RISK ASSESSMENT

Outbreak of invasive meningococcal disease in the EU associated with a mass gathering event, the 23rd World Scout Jamboree, in Japan

21 August 2015

Main conclusions and options for response

On 13 August 2015, the UK reported through the European Early Warning and Response System (EWRS), two confirmed cases of invasive meningococcal disease (IMD) among Scottish scouts who had recently returned from the 23rd World Scout Jamboree held in Yamaguchi City in Japan. The Jamboree, which was held from 28 July to 8 August, was attended by over 33 000 scouts from 162 countries.

As of 19 August 2015, two EU countries, the UK and Sweden, have reported eight cases (five confirmed and three suspected cases) of IMD in scouts and their contacts associated with this event. The meningococcal serogroup W (MenW) strain has been identified as the causative agent in two of the cases in the UK. Preliminary typing suggests that the strain is indistinguishable from the strain that has been increasingly seen in England since 2009. The index case has not been identified. It is not uncommon for young people to be asymptomatic carriers of meningococci, and because the majority of IMD cases result from recent transmission following close contact with an asymptomatic carrier, it is likely that one or several scouts attending the Jamboree were indeed carriers. It has not yet been established if the Swedish and Scottish cases interacted and possibly shared a close contact. However, the number and frequency of close contacts between participants at a Jamboree is expected to be high. It is known that units from Finland, France, Sweden, Switzerland, and the USA stayed in tents close to the UK units at campsites. In addition, a disco was arranged every third day, where all groups at the Jamboree mixed.

Further microbiological and molecular studies are needed to provide laboratory evidence of direct or indirect transmission between the cases.

Options for response include:

- Early recognition, isolation and management of suspected meningitis cases
- Identification of close contacts of cases and provision of chemoprophylaxis
- Monitoring of close contacts for clinical symptoms for at least ten days from the latest possible exposure
- Ensuring that all scouts who attended the Jamboree receive information about the symptoms of IMD and instructions on when to consult healthcare services, and to inform healthcare providers about the possibility of meningococcal infection
- Ensuring that identified contacts of cases receive information to allay anxiety and provide advice on the action to take should they develop symptoms consistent with IMD:
  - stiff neck
  - high fever
  - sensitivity to light
  - confusion, change in mental status

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  - headache
  - vomiting
  - rash, bruising
  - joint, muscle pain
- Vaccination of contacts with Meningococcal ACYW vaccine should be considered.

Source and date of request

A request from Member States on 19 August 2015.

Public health issue

Risks to the EU related to cases of meningococcal meningitis following a mass gathering event in Japan.

Consulted experts

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Disease background information

Invasive meningococcal disease (IMD) is an acute bacterial disease that is uncommon, but often severe and potentially life-threatening. The infectious agent is *Neisseria meningitidis,* a Gram-negative aerobic diplococcus. Invasive disease includes meningitis, bacteraemia, sepsis, or, less commonly, pneumonia, arthritis, and pericarditis. Case-fatality rates are high, at approximately 8–15%. Ten to 20% of survivors suffer long-term sequelae, including mental retardation, hearing loss, and loss of limb use. Infants younger than one year of age are at the highest risk of infection, followed by 15–24 year olds. Close and prolonged contact – such as kissing, sneezing or coughing on someone, or living in close quarters (such as a dormitory, sharing eating or drinking utensils) with an infected person (including a carrier) – facilitates spread of the disease. The average incubation period is four days, but can range between two and ten days [1].

Transmission

Humans are the only reservoir of *N. meningitidis*. People become infected as a result of exposure to infective droplets. The bacteria normally colonise the mucosa of the upper respiratory tract without causing disease, and only a small proportion (< 1%) of people who are infected with *N. meningitides* progress and develop invasive disease. The mean duration of carriage, in settings where prevalence is stable, has been estimated at approximately 21 months [2]. Carriage rate varies from around 3%–25% of the population, depending primarily on age [3]. In studies conducted in Europe and North America, carriage rates have been shown to be very low in the first years of life and then to sharply increase in teenagers, reaching a maximum in those aged between 20–24 years.

The contacts most at risk of meningococcal disease are other members of the household of a case of IMD. Studies carried out in Europe and North America before routine use of clearance antibiotics, showed that household contacts of a case of IMD had a 500 to 800-fold greater risk of contracting meningococcal disease than the general population. The risk was highest in the first week after onset of illness in the case and fell rapidly thereafter [4]. Higher frequency of intimate kissing, involving close contact with respiratory droplets from the nasopharynx, is associated with increased risk of both carriage and disease [5-8]. However, contact with saliva *per se*, such as through sharing drinks or superficial mouth kissing, is not thought to significantly increase risk of carriage or disease [9].

The infectious period lasts until the organisms are no longer present in discharges from the nose and throat. With effective antibiotic therapy meningococci usually disappear from the nasopharynx within 24 hours [10,11].

Symptoms, diagnosis and management

The most common symptoms of meningococcal disease are a stiff neck, high fever, sensitivity to light, confusion, headaches and vomiting. Initial diagnosis of meningococcal meningitis can be made by clinical examination followed by a lumbar puncture showing a purulent spinal fluid. The bacteria can sometimes be seen in microscopic examinations of the spinal fluid. The diagnosis is supported or confirmed by growing the bacteria from specimens of spinal fluid or blood, by agglutination tests or by polymerase chain reaction (PCR). Identification of serogroup and susceptibility testing to antibiotics are both important to define control measures.

Typing methods for *N. meningitidis* in Europe have been agreed and standardised across all national reference laboratories by the European Meningococcal Disease Society, and implemented through the ECDC-funded Invasive Bacterial Disease Laboratory Network (IBD-LabNet) [12]. The fine typing of *N. meningitidis* includes determination of serogroup, multilocus sequence typing (MLST) at least at clonal complex level, and sequence-based analysis of porA variable regions (VRs), VR1 and VR2, and FetA [13].

Meningococcal disease is potentially fatal and should always be viewed as a medical emergency. Appropriate antibiotic treatment must be started as soon as possible following arrival to a hospital. A range of antibiotics can be used to treat meningococcal infections, including penicillin, ampicillin, chloramphenicol and ceftriaxone [14].

Vaccines

There are twelve identified meningococcal capsular groups A, B, C, E, H, I K, L, W, X, Y and Z. Vaccines have been developed to protect against the more common capsular groups A, B, C, W, and Y [14].

Polysaccharide vaccines available to prevent meningococcal disease for over 30 years provide short-term protection to older children and adults but not infants unable to respond to the polysaccharides in these vaccines. Therefore meningococcal conjugate vaccines have mainly replaced the older polysaccharide vaccines and are today available against groups A, C, Y and W in different combinations to control the disease.

Meningococcal conjugate vaccines against group C have been available in the EU/EEA since 1999. Currently seventeen countries offer the vaccine in their childhood vaccination programmes [15]. Tetravalent meningococcal conjugate vaccines against groups A, C, Y and W were authorised in the EU/EEA in 2010 and 2012 [16-17].

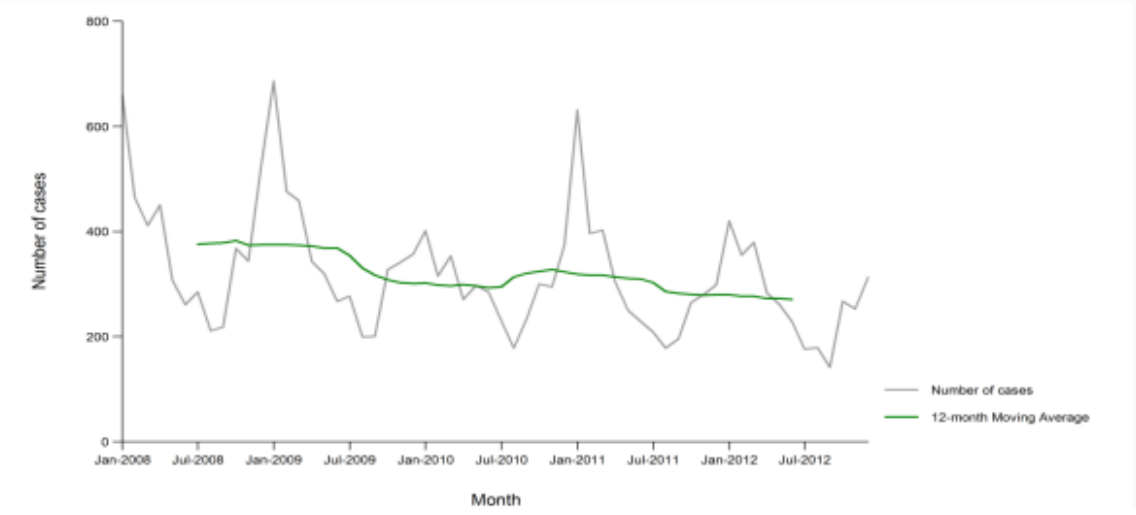
A four-component meningococcal group B protein vaccine was authorised in the EU/EEA in 2012. So far one Member State, the United Kingdom, has decided to include the vaccine in the routine national immunisation programme, starting in the autumn of 2015 [18].

Meningococcal disease epidemiology in the EU

The incidence of meningococcal disease can vary substantially by geographic location and time. The disease can occur as sporadic cases, outbreaks, and large epidemics.

Invasive meningococcal disease (IMD) is rare in Europe: 0.68 cases per 100 000 population in 2012 and country-specific rates of confirmed IMD ranging from 0.11 to 1.77 cases per 100 000 population. Most cases of invasive meningococcal disease are caused by serogroups B and C, with serogroup B being dominant. Disease caused by serogroup Y has been increasing although it is still less frequent than B and C. An overall decreasing trend has been observed over the last ten years, partly attributable to the introduction of serogroup C conjugate vaccine to national immunisation schedules in some countries. It is important to strengthen surveillance of meningococcal disease to evaluate the impact of the ongoing vaccination programmes and support decision-makers, particularly in view of the recent availability of new vaccines [1].

Figure 1. Distribution of confirmed invasive meningococcal disease reported cases, EU/EEA, 2008–12

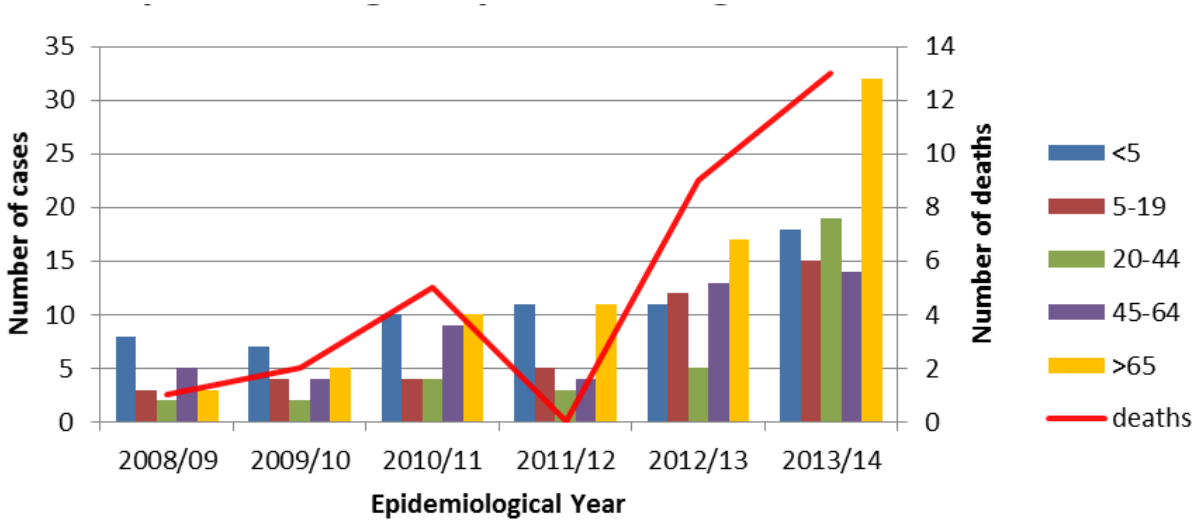


Source: Country reports from Austria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

Historically, meningococcal group W (MenW) has caused only a small proportion of meningococcal infections globally [19]. MenW tends to be more prevalent outside of Europe with outbreaks being recorded in Africa and South America. Large epidemics of MenW disease were associated with the Hajj pilgrimage in 2000–2002, and the UK saw a corresponding spike in cases when pilgrims returned home and disease spread amongst close contacts [20]. For this reason, the ACWY vaccine is a compulsory entry requirement into Saudi Arabia for pilgrims on Hajj and Umrah, and for other travellers in Hajj season.

Since 2009, England and Wales have reported an increase in the incidence of invasive meningococcal disease due to group W (MenW). According to a recent publication, this increase in invasive MenW disease is due to the rapid endemic expansion of a single clone belonging to cc11 and is associated with severe disease with unusual clinical presentations. Detailed clinical information obtained for all laboratory-confirmed MenW cases diagnosed during three epidemiologic years (2010–2011 to 2012–2013), alongside whole-genome sequencing analysis of the clinical isolates, showed a year-on-year increase in invasive MenW disease across all age groups. In 2013–2014, MenW was responsible for 15% of all invasive meningococcal disease. All but one of the recent MenW:cc11 isolates were very closely related, consistent with recent clonal expansion [21].

Figure 2. Number of laboratory-confirmed cases of MenW disease and associated deaths by age group and year of diagnosis over six epidemiological years in England and Wales



Source: Meningitis Research Foundation. The graph was produced with data from: Shamez N. Ladhani, et al. Increase in endemic Neisseria meningitidis capsular group W ST-11 complex associated with severe invasive disease in England and Wales. Clinical Infectious Diseases 2014 [cited Advance access November 10];

In the 2014/15 epidemiological year, as of July 2015, there have been 170 confirmed MenW cases in England. The UK has opted to rapidly implement a national MenACWY programme for adolescents as a result of the increase in MenW disease. All 14-18 year olds will be immunised with ACWY vaccine as soon as is practical to prevent further increases in disease amongst the wider population [22].

On 3 July, Finland posted an urgent inquiry on the Epidemic Intelligence Information System for vaccine preventable diseases (EPIS VPD) reporting an unusual increase in the number of serogroup W meningococcal disease. Since February 2015, four cases of serogroup W have been reported in Finland, compared with 0–1 case annually during the past ten years. Other countries have also reported an increase: France (25), Belgium (7) and Ireland (4) for the 2014/2015 epidemiological year.

Event background information

On 13 August 2015, the UK reported through the European Early Warning Response System (EWRS) two confirmed cases of invasive meningococcal disease among Scottish scouts who had recently returned from the 23rd World Scout Jamboree in Japan [23]. The Jamboree, which was held from 28 July to 8 August in Yamaguchi City, Japan, was attended by over 33 000 scouts from 162 countries. The map of the campsite of the northern hub of the 23rd World Scout Jamboree is available at http://www.23wsj.jp/assets/site_map-northernhub.pdf

The onset of illness of the first case was 8 August during the return journey to the UK, and the onset date for the second case was 11 August 2015. On 14 August, a third confirmed case of meningococcal disease was reported in a returning scout. All three cases are in the same scout group and they all returned to Scotland on 8 August. All three confirmed cases had less severe initial symptoms and were admitted to hospital in Scotland with meningococcal meningitis. They were treated with antibiotics and are recovering well. Two of the cases have been confirmed as having capsular group W meningococcal disease. Preliminary typing suggests that the strain is indistinguishable from the strain that has been increasing in England since 2009.

A fourth meningococcal case, reported on 18 August, is a secondary case, a household contact (parent) of a scout from the north of Scotland unit. The scout, who is not a case, had a sore throat with onset 8 August and was prescribed amoxicillin on 10 August with a microbiological diagnosis from throat swab of Group G streptococcus. On 13 August, he received antibiotic prophylaxis with ciprofloxacin, along with all other scouts who returned to the north of Scotland from the Jamboree. The parent had sore throat, cough and coryza seven days prior to a sudden onset of nausea, vomiting, myalgia, headache and photophobia on 16 August leading to hospital admission as a suspected meningitis case.

Health Protection Scotland (HPS) have offered chemoprophylaxis and MenACWY conjugate vaccine to all known close contacts and members of this scout unit. HPS sent an advisory letter to the UK scouts who attended the Jamboree. There have not been any cases reported in England, Wales and Northern Ireland to date.

On 17 August 2015, the Swedish Public Health authorities reported through EWRS the detection of one probable and two suspected cases of meningococcal infection in Swedish participants who had returned after attending the same event in Japan. On 18 August 2015, the probable case in Sweden was confirmed by a positive PCR and culture in blood and CSF to be infected by *N. meningitidis*. Serogrouping results are pending as of 18 August. The patient is a 15 years old female, who returned from Japan on 9 August, had symptom onset on 14 August and sought health care on 16 August. She is currently in critical condition, with signs of meningitis and septicaemia. One of the two other suspected cases in Sweden is a 24 years old male scout leader who is being treated for suspected meningococcal septicaemia, and is currently recovering. Laboratory results are negative both in culture and PCR for meningococcal disease. The second suspected case is also a 15 years old female, who sought health care on 15 August for fever, headache, muscle pain and a sore throat, and was treated for suspected meningococcal septicaemia. All samples of this case have so far been negative indicating a probable viral infection. On 18 August, the Public Health Agency of Sweden received information regarding an additional suspected case who attended the Jamboree in Japan. The suspected case is a 16 year old boy, who returned from Japan on the 9 of August, had symptom onset with fever and joint pain on 12 of August, and contacted the hospital on 16 August. He received oral penicillin. He recovered from the fever quickly and was sent home the following day, still with light joint pain. Results showed a positive culture in throat swab.

According to information available to Swedish authorities, all scouts from different parts of the world lived in tents in groups of around 38 during the Jamboree, sharing the same kitchen facilities. So far Sweden has no information if the Swedish cases had any contact with the Scottish scouts. However, a disco was arranged every third day, where all groups mixed. It is also known that units from Finland, France, Sweden, Switzerland, and the USA stayed at nearby campsites.

The public health actions taken in Sweden involve letters sent out to all 1 900 participants and their parents, advising them to seek medical care if the participants show any signs of meningitis infection. In addition, Sweden has recommended all 1 900 participants to obtain chemoprophylaxis from their local healthcare provider and, if possible, have nasopharyngeal and throat swabs collected.

As of 19 August 2015, 11 EU/EEA countries, Denmark, Norway, Portugal, the Czech Republic, Slovakia, Malta, Romania, Estonia, Spain, Austria and Slovenia reported through EWRS that they have had participants to the Jamboree but have not received alerts of suspected or confirmed cases. All ten countries have informed their participants but have not initiated antibiotic prophylaxis or vaccination.

On 14 August, the Japanese Ministry of Health, Labour and Welfare (MHLW) requested the Scout Association of Japan to alert the Jamboree participants to visit hospitals as soon as possible if they developed any symptoms of meningococcal disease. MHLW shared this information with the Ministry of Education, Culture, Sports, Science and Technology (MEXT), local authorities and the Japanese Medical Association. Invasive meningococcal meningitis is a notifiable disease in Japan, and there has been no report of cases associated with the event during and after the World Scout Jamboree.

Outbreaks of IMD associated with mass gathering events

Since 1987 several outbreaks of meningococcal disease have been reported in association with the annual Hajj pilgrimage. In 2000, an outbreak of IMD in Europe caused by *N. meningitidis* W135 2a: P1,2.5 was linked to transmission among pilgrims attending the Hajj that year. Close to 90 cases were reported from nine countries with the highest number of cases in the UK and France; 14 cases were fatal. Most of the early cases were among returning pilgrims but the outbreak later spread to their contacts and then to those with no known pilgrim contact [24].

ECDC threat assessment for the EU

Multi-country outbreaks of IMD have been linked to transmission during international mass-gathering events in the past. A majority of the approximately 33 000 scouts who participated in the Jamboree were aged 14 to 17 years, an age group known to be at increased risk of invasive meningococcal infections. The Jamboree was attended by scouts from all over the world, some of them from countries with high endemicity of meningococcal infections. Transmission of *N. meningitidis* is primarily to close contacts of an infected person, typically family members, people who share crowded sleeping quarters and through kissing or other exposures to the saliva from a colonised person. Transmission from a symptomatic case is uncommon but there is a small increased risk of disease in people who have very close contact with a symptomatic case prior to completion of 24 hours of antibiotic therapy.

The risk of developing IMD is highest immediately after a person has acquired an infection and declines over a 10-day period after infection. The Jamboree ended on 8 August, and the critical 10 day period (the upper incubation period range) for a newly infected person to develop IMD has elapsed for those scouts that may have become infected at the Jamboree. So far, eight cases of IMD (five confirmed and three suspected) with epidemiological links to the Jamboree have been reported by two EU Member States (Sweden (4) and the UK (4)), while 11 countries (Denmark, Norway, Portugal, the Czech Republic, Slovakia, Malta, Romania, Estonia, Spain, Austria and Slovenia) have reported that they have not received any notifications about cases. However, it is possible that additional cases will be reported due to delays in seeking healthcare, diagnosis and reporting to health officials. It is also possible that cases among contacts of infected participants may occur despite the lapse of time since the Jamboree.

Conclusions and options for response

As of 19 August 2015, two EU countries, the UK and Sweden, have reported eight cases (five confirmed and three suspected cases) of IMD in scouts and their contacts associated with a mass gathering event in Japan. The MenW strain has been identified as the causative agent in two of the cases in the UK. Preliminary typing suggests that the strain is indistinguishable from the strain that has been increasing in England since 2009. The index case has not been identified. It is not uncommon for young people to be asymptomatic carriers of meningococci, and because the majority of IMD cases result from recent transmission following close contact with an asymptomatic carrier, it is likely that one or several scouts attending the Jamboree were indeed carriers. It has not yet been established if the Swedish and Scottish cases have interacted and possibly shared a close contact. However, the number and frequency of close contacts between participants at a Jamboree is expected to be high. It is known that units from Finland, France, Sweden, Switzerland, and the USA stayed in tents close to UK units at the campsite. In addition, a disco was arranged every third day, where all groups at the Jamboree mixed.

Further microbiological and molecular studies are needed to provide laboratory evidence of direct or indirect transmission between the cases.

Options for response include:

- Early recognition, isolation and management of suspected meningitis cases
- Identification of close contacts of cases and provision of chemoprophylaxis
- Monitoring of close contacts for clinical symptoms for at least ten days from latest possible exposure
- Ensuring that all scouts who attended the Jamboree receive information about the symptoms of IMD and instructions when to consult healthcare services, and to inform healthcare providers about the possibility of meningococcal infection.
- Ensure that identified contacts of cases receive information to allay anxiety and provide advice on the action to take should they develop symptoms consistent with IMD:
  - stiff neck
  - high fever
  - sensitivity to light
  - confusion, change in mental status
  - headache
  - vomiting
  - rash, bruising
  - joint, muscle pain
- Vaccination of contacts with MenACYW vaccine should be considered.
- Countries that report confirmed cases should upload the fine typing results to European Meningococcal Epidemiology in Real Time (EMERT) database as quickly as possible.

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