

Meningococcal disease – probable transmission during an international flight

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Abstract

Two cases of meningococcal disease were identified in passengers who travelled on the same international flight. Both cases were serogroup B with the same allelic profile. The public health action involved chemoprophylaxis for persons seated adjacent to, and in the rows in front and behind, each case. The most likely scenario is that transmission of *N. meningitidis* occurred on board a long distance flight, either from one case to the other or from an asymptomatic carrier to both cases. This scenario and the absence of reports of similar cases in the literature, indicate the risk to other passengers in this setting is low. This investigation reinforces the need for, and the distribution of, good national and international surveillance information to better inform public health decision making. *Commun Dis Intell* 2005;29:312–314.

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Introduction

There have been occasional reports of probable transmission of diseases such as tuberculosis, severe acute respiratory syndrome, influenza, measles and foodborne illness during air travel.^{1–4} Although a number of cases of meningococcal disease have been identified as having flown on aircraft while symptomatic or during their incubation period, no secondary cases have been reported in the literature.⁵

The aircraft cabin has been investigated as a potential setting for infectious disease transmission. Factors such as equal mixing of conditioned and recirculated air, efficient filtering and frequent air exchanges suggest there is little increased risk of disease transmission due to air quality in this setting.⁶ The grouping of persons within a confined space such as the aeroplane setting still poses a risk for transmission of organisms that are easily spread from person-to-person such as measles and influenza.⁷

Specific factors that have been found to affect the risk of transmission of particular infectious diseases such as tuberculosis during air travel include proximity to the case (within two rows), duration of flight (longer than 8 hours) and infectiousness of the index case.^{4,8}

We report on two cases of meningococcal disease who travelled on the same international flight during their incubation period and discuss the likely mode of transmission, the public health response and issues that emerged in response to this cluster.

Case reports

Case A was a 68-year-old female with a history of respiratory illness for three weeks prior to becoming acutely unwell in early May 2003 when she presented to hospital with signs of meningitis. The next day her condition deteriorated, petechial rash had developed and she was admitted to an intensive care unit of a Sydney hospital. The diagnosis of meningococcal disease was confirmed by polymerase chain reaction (PCR) of cerebrospinal fluid (CSF).

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Case B was a 86-year-old female who presented to hospital three days later with fever, diarrhoea and vomiting. Her respiratory status deteriorated and she was intubated and admitted to an intensive care unit of a second Sydney hospital. A petechial rash developed and diagnosis of meningococcal disease was confirmed by PCR of CSF. Both cases were non-smokers and had no medical condition predisposing them to meningococcal disease. Both recovered with antibiotic treatment.

During their incubation period both cases had been on board the same international flight from Los Angeles to Sydney, a 14.5 hour flight arriving into Sydney two days before the onset of illness in case A. The cases were both seated on the left-hand side of the aeroplane in economy class; they were situated 12 rows apart with a galley between their two sections. The investigation at the time could not identify direct contact between the two cases either before, during or after the flight.

Case A was seated in a window seat next to her husband and reported regularly walking laps of the aircraft but denied having any direct contact with other passengers on board. Case B travelled with a family member from Central America to Los Angeles and on to Sydney. On the flight from Los Angeles to Sydney, she was seated in an aisle seat and did not report walking through the aeroplane other than visiting the toilet situated at the back of the aeroplane.

Laboratory results

The CSF and blood of both cases were culture-negative for *Neisseria meningitidis*. The diagnoses of both cases were confirmed as meningococcus serogroup B by PCR of CSF specimens. The genotyping results confirmed that *N. meningitidis* detected in these cases was indistinguishable with the same allelic profile, B:19,7,1:P1.22,14 by *siaD*, *porB* and *porA* sequencing and *abcZ-4*, *adK-10*, *aroE-15*, *fumC-9*, *gdh-8*, *pdhC-11*, *pgm-9* (ST-269 complex) by multi-locus sequence typing (MLST). Both PCR and MLST techniques were performed using standard methodologies.⁹⁻¹³ There were no serogroup B meningococci with the same subtype and serosubtype detected amongst invasive isolates of *N. meningitidis* identified during the same year in Australia.¹⁴

Public health intervention

An expert panel was convened to discuss the cases with reference to the Australian guidelines.¹⁵ The panel recommended that chemoprophylaxis be provided to persons seated adjacent to, and in the rows in front and behind, each case. The provision of chemoprophylaxis was facilitated by the airline providing a passenger manifest and contact was estab-

lished via the public health network of New South Wales. A media release was also issued. Routine surveillance for cases of meningococcal disease in Australia, which includes a thorough travel history, did not reveal any further cases of meningococcal disease in persons from the flight.

Discussion

The two cases of meningococcal disease were linked by probable transmission occurring on board a long distance flight. The probable scenario is that case B was infected by case A during inadvertent contact at some point during their travel. Case A's movements around the aeroplane and case B being seated on an aisle may be important factors in explaining the possible contact within the aircraft. Alternatively, an asymptomatic carrier on board may have transmitted *N. meningitidis* to case A and B during the period of the flight and cases A and B had different incubation periods.

Both Australian and United States of America guidelines currently recommend chemoprophylaxis for those persons seated immediately adjacent to the case for flights longer than eight hours duration.^{5,15,16} The Australian guidelines, at the time these cases were notified, also suggest that persons in the rows in front and behind should be considered for chemoprophylaxis depending on their type of contact.¹⁵ The guidelines from the United Kingdom for sporadic cases do not include chemoprophylaxis for persons travelling in the next seat on the same aeroplane unless that person has had prior prolonged close contact in a household type setting.¹⁷

The risk of transmission of meningococcal disease in this setting appears low. However, given the variations that exist between national guidelines, it is important that high quality surveillance information is collected to inform the public health response. Air travel allows people to cross many regions within an incubation period which emphasises the need for disseminating national and international surveillance data to accurately monitor the risk of communicable disease transmission in this setting. Therefore, Australian states and territories should notify each other of single cases of meningococcal disease in passengers who have travelled on flights longer than eight hours during their incubation period.

Our understanding of the mechanism of transmission within clusters of meningococcal disease is limited and the evidence for chemoprophylaxis in this setting is not strong.¹⁸ This investigation did not identify significant contact between the cases or a common contact but suggests that transmission can occur on long distance flights.

Using PCR methodology to confirm the diagnosis in these cases meant the serogroup information was timely. It is important to note that the serogroup information guided the public health management of these cases, while the genotyping, which can take several weeks, was able to confirm the epidemiological link.

The passenger manifest was easily obtained in this instance. However anecdotal evidence suggests this is not often the case and a standardised procedure for this process would facilitate contact tracing exercises involving airline passengers should they be required.

This report provides evidence of probable transmission of meningococcal disease occurring on board a long distance flight. The limited number of cases in this instance and the absence of reports of similar cases in the literature, indicate the risk to other passengers in this setting is low. Factors that assisted in the public health management of this situation were having timely laboratory confirmation of cases using PCR methodology, an expert public health network available and a cooperative airline company.

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