that utilises microwave heating for antigen retrieval of some markers, showed no detrimental effects with any of the antigens assessed, regardless of the retrieval method. This was to be expected as the buffer that is important for antigen retrieval was not present on the slides during the heating step to achieve adhesion.

There was no evidence in any of the sections of the 'hot spots' that are reported to occur in a microwave oven, as adhesion and staining quality were consistent across individual sections.

Adhesion proved adequate for most specimen types after microwave heating for 30 sec; however, heating for 60 sec produced satisfactory results with all tissue types, including those with a tendency to detach during staining (e.g., heavily keratinised skin, excessively bloody specimens).

There seems to be no limit to the number of slides that can be heated in a batch to achieve adhesion. This is important if a backlog of slides for drying, which would negate the time advantage inherent in microwaving, is to be avoided. Although this technique lends itself to all applications, the greatest advantage will be seen with urgent sections, as almost 20 min can be saved, thus allowing sections to be passed to the histopathologist for reporting at the earliest opportunity.

The use of microwave heating to adhere paraffin sections to microscope slides prior to staining is a viable alternative to traditional use of a 70°C oven. Adhesion is comparable and there is no degradation of, or interference with, the results of subsequent staining techniques.

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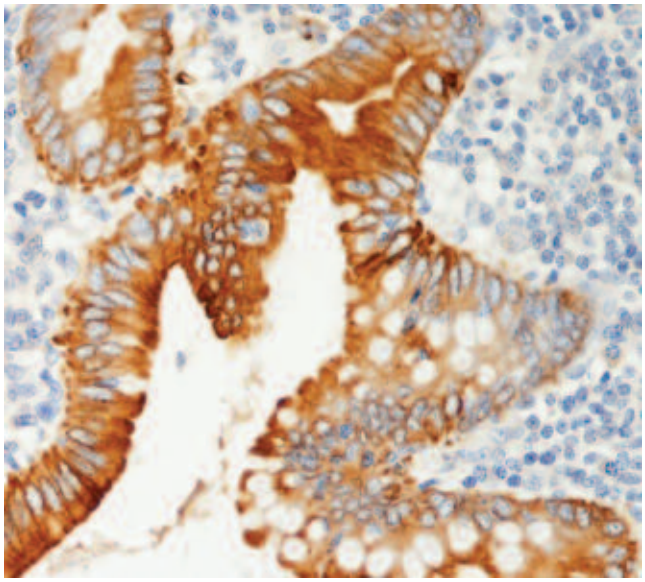

Fig. 2. Cytokeratin (AE1/AE3) immunostaining (dilution: 1:50, enzyme pretreatment: 8 min) of appendix following 60-sec microwave heating (full power) to adhere section (original magnification x400).
See this image in colour at www.bjbs-online.org

Should long-haul flights carry antibiotics on board to treat acute bacterial meningitis and meningococcal septicaemia?

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Acute bacterial meningitis and meningococcal septicaemia represent an import medical emergency in medical microbiology. Several studies suggest that early intervention with intravenous (iv) antibiotics, particularly the β-lactam agents (e.g., benzylpenicillin) in patients with signs and symptoms of the disease, has a positive outcome on morbidity and mortality in infected individuals.[1–3] Consequently, it is now standard UK practice for GPs to carry iv antibiotics in their bag for immediate administration to individuals suspected of presenting with signs and symptoms of these infections, prior to immediate admission to an intensive care unit (ICU) in secondary care or to tertiary paediatric care.

In 2003, a case report[2] was published that described a fatal case of meningococcal meningitis and meningococcaemia in a 20-year-old male student travelling from Tel Aviv, Israel, to Newark, New Jersey, USA, who developed signs and symptoms of infection some 90 minutes prior to landing at Newark, where the patient died two hours after arrival. The airline did not carry antibiotics in its medical kit. The authors of the report[2] recommended that the appropriate authorities should require airlines to add a broad-spectrum antibiotic preparation to the emergency medical kit, as the authors speculated that earlier intervention with an appropriate onboard antibiotic may have saved the life of the young man.

The authors of the current paper have contacted several airlines flying long-haul routes out of the UK to estimate the current level of awareness of this disease among crews of commercial airlines, and what actions would help to raise awareness. It was noted that some airlines carried antibiotics for the treatment of acute bacterial meningitis and meningococcal septicaemia, and some crew members were trained in the recognition of the signs and symptoms of bacterial meningitis and meningococcal septicaemia. One airline welcomed receiving educational resources on meningitis as an information/educational resource for their crews and passengers.

Acute bacterial meningitis and meningococcaemia are serious infections in medical microbiology and should be treated as medical emergencies. This is facilitated on the ground in the UK by the availability of iv benzylpenicillin in

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GP bags, which can be administered to the infected patient prior to admission to hospital.[3] However, a similar response may not be possible once an infected person is airborne. Therefore, airlines and shipping companies should give careful consideration to the management of such events in the interests of the patient's wellbeing and survival.

Recent reports from the Islamic Hajj pilgrimages to Mecca have identified the presentation of Hajj-related meningococcal strains on return of the pilgrims from the festival to their respective countries of origin,[1] which include Sudan,[4] France and England.[5] Thus, such infected individuals who are colonised with meningococci may present with signs and symptoms of infection onboard flights on their return from the Hajj.

Overall, we conclude that there is a need for airlines to re-evaluate their response to the presentation of either condition onboard an aircraft, in terms of awareness, response to and treatment of a mid-air event. As a result, we have designed a proposed care pathway, in order to start discussions and agree a consensus care path among all the airlines. Figure 1 details a suggested care path algorithm to deal with such emergencies, which also emphasises the need for greater awareness among, and training of, aircrews.

The carriage and administration of antibiotics onboard aircraft presents several challenges. These include the choice of antibiotic without microbial identification of a pathogen, the appropriateness of antibiotics in certain patient groups (e.g., pregnant women), cost, shelf life (about 36 months in lyophilised form), administration (who administers the iv antibiotic?/issues of venous access, etc) and anaphylaxsis/response to anaphylaxsis.

The first challenge is what antibiotics should be carried to treat patients if such cases present, bearing in mind that passengers may be travelling from nations that do not have national vaccination programmes against meningococci and pneumococci. The bacterial aetiological agents and antibiotic susceptibility of these meningeal pathogens may vary widely, and this may be compounded by geographical differences. Thus, airline and shipping companies should take account of the local epidemiology of acute bacterial meningitis, based on the ethnicity of the majority of their passengers (e.g., there is a high incidence of penicillin-resistant pneumococci in the Icelandic population).

Overall, it should be remembered that medical emergencies onboard aircraft are relatively rare events. A recent paediatric report indicated that one paediatric emergency occurred for every 20,775 flights.[6] The report also indicated that, although rare, most emergencies (27%) were of an infectious nature and that international flights had a higher incidence than domestic flights.

In conclusion, commercial airlines and shipping companies should give careful consideration about how to deal medically with these albeit uncommon medical emergencies, and should have a medical contingency plan in place to deal with such potential mid-air events.

DR was funded by a Nuffield Summer Vacation Bursary.

Fig. 1. A care pathway algorithm to help deal with emergency presentation in travellers of bacterial meningitis and meningococcaemia while on board an aircraft or cruise ship.

Pre-flight actions

- Confirm patients at check-in as being fit for travel, with particular emphasis on/reference to overt signs of headache, nuchal rigidity (generally not present in children <1 year old or in patients with altered mental status), fever and chills, photophobia, vomiting, prodromal upper respiratory infection (URI) symptoms (viral and bacterial), seizures (30–40% in children, 20–30% in adults), focal neurological symptoms (including focal seizures) and altered sensorium (confusion may be the sole presenting complaint, especially in the elderly).
- Inclusion and promotion of awareness training of acute bacterial meningitis among the crews of commercial airlines and shipping organisations, at staff induction and on a continuous basis, with the aid of resource materials.
- Establishment of telemedicine real-time video link.

Airborne actions on presentation of suspected case

- Seek advice from remote telemedicine physician via video link.
- Seek philanthropic help from onboard healthcare professionals (i.e., doctor and/or nurse).
- Administer intravenous antibiotics (e.g., benzylpenicillin) from emergency medical kit, under instruction from the captain.
- Flight diversion, unscheduled landing and deplane patient with suspected infection at closest airport with appropriate medical facilities.

Follow-up actions

- Inform local public health authorities of suspected case at arrival airport.
- Administer prophylactic antibiotics to contacts, as appropriate.
- Contact tracing of persons on flight.
- Record and audit all suspected cases of acute bacterial meningitis/meningococcaemia.

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