

### Highly fatal outbreak with *Listeria monocytogenes* in Denmark, 2014: review of clinical details

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#### Background and objective

An outbreak with *Listeria monocytogenes* was detected in Denmark June 2014. The source was found to be deli products in particular pork roll sausage from a specific company that directly or by wholesalers supplied over 6000 food establishment recipients including hospitals and care homes. We identified cases and reviewed clinical details and history of exposure to the recalled food substances.

#### Methods

We defined an outbreak-related case as a laboratory-confirmed infection with the outbreak-related subtype of *L. monocytogenes* defined by SNP-analysis on whole-genome sequences isolated during the period from September 1, 2013 through September 30, 2014. From hospitals, we obtained information on clinical details and we interviewed patients or close relatives about symptoms and food exposures one month pre-symptoms onset, using a standardised questionnaire. From the Danish Civil Registry System we retrieved data on mortality to estimate 30-day case-fatality rate (CFR).

#### Results

We identified 40 cases, 22 (55%) were females. Clinical follow-up was available on all; interviews obtained in 25 cases. The CFR was 40% (n=16). Median age of all cases was 71.6 years (range 43-90). We found no difference in age between surviving or dead cases, (p=0.77). Twenty-nine cases presented with blood stream infection only. One case had endocarditis, and 10 presented with CNS infection; eight of which had meningitis and two cerebral abscesses. No maternal-foetal cases occurred. Fever, diarrhoea and headache were reported by 90%, 37% and 36%, respectively. All 40 cases had underlying medical conditions; 21 solid cancers, 15 cardiovascular diseases, 11 type 2 diabetes, 8 rheumatic/autoimmune disorders and 6 haematological cancers. Ten were in treatment with chemotherapy and five radiation therapy. Corticosteroids were taken by 70% and 71% were treated with proton-pump inhibitors. Cases who survived were less likely to suffer from solid cancers than cases who died, 41% versus 80% (p=0.04). Twenty-three had been admitted to hospital prior to onset of listeriosis, three lived permanently in long-term care facilities. In 34 cases, we could estimate the place of exposure; five had been exposed at hospital/care home, 14 in private homes and 15 infected at either hospitals/care homes or private homes. From three cases, mean minimal and maximal incubation time could be estimated at 7 and 11 days, respectively.

#### Conclusion

We found a very high CFR of 40% in this outbreak and high rates of predisposing conditions and medications. Up to 50% could have been infected while staying in hospitals or in care homes. Contaminated food was served to severely ill and immunocompromised individuals possibly explaining the high CFR. Incubation time was difficult to estimate because people repeatedly had eaten the contaminated food. This outbreak highlights the fatal potential of *L. monocytogenes*. Enhanced preventive measures against *L. monocytogenes* in kitchens serving especially vulnerable people are recommendable.