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Historical outbreak of *Salmonella hadar*

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SUMMARY

Background: This article reports a historical outbreak of *Salmonella hadar* in a maternity setting. The outbreak occurred following admission of an infected index case, with transmission to 11 other individuals over a three-month period in a maternity and neonatal unit.

Methods: Despite rigorous assessment of clinical practices, screening of patients and staff, and review of disinfection and sterilization policies, the outbreak was difficult to control. This possibly reflects the capacity of *S. hadar* to survive well in the environment, and cause prolonged and asymptomatic carriage with intermittent shedding.

Findings: It is likely that the index case was a mother who had contracted infection after eating suspect food. Additionally, infection may have been perpetuated by shared use of tubes of yellow soft paraffin for lubrication of digital rectal thermometers.

Conclusion: This outbreak emphasizes the difficulties in controlling outbreaks of *S. hadar* infection in an obstetric/neonatal setting, and also emphasizes the importance of early stool sampling in any patient with diarrhoeal symptoms.

Introduction

Salmonellosis among neonates is uncommon in the developed world, and is usually acquired nosocomially. It is invariably the result of a breakdown in infection control practices in the unit where the babies are being nursed. Identifying the cause of this breakdown can be difficult and time consuming. When cases are admitted to hospital, there is the potential for nosocomial spread to other patients and staff, either directly or by contaminated fomites.[1,2] This article reports an outbreak of *Salmonella hadar* following admission of an infected index case with transmission to 11 other individuals over a three-month period in a maternity and neonatal unit. The maternity unit (now closed) was located in a Victorian building, and had approximately 5000 deliveries each year. To the authors' knowledge, this is the first reported outbreak of *S. hadar* in a maternity and baby unit, and this article aims to describe the investigation, management and control of the outbreak.

Setting

The outbreak occurred in the Glasgow Royal Maternity Hospital, which had a 23-bed special care baby unit (SCBU), a busy 10-bed neonatal intensive care unit (NICU) and three postnatal wards. The labour ward consisted of a receiving room, eight single rooms, two large six-bedded rooms, a bathroom, a sitting room and a therapy room. During the period

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of the outbreak (spanning approximately three months), 600 babies were born in the maternity unit.

Case definitions

A case was defined as any patient found to be colonized or infected with *S. hadar* 48 h after birth, and any staff member with symptoms testing positive for *S. hadar* or with asymptomatic colonization detected on screening.

Description of the outbreak

Baby A grew *S. hadar* from a swab of a rash. The mother of Baby A (Mother A, considered to be the index case) was admitted in labour five days previously and had a history of diarrhoea. Although symptomatic with diarrhoea from admission, there were no initial investigations of stool culture until after Baby A was positive. *S. hadar* was subsequently isolated from the mother's stool. The mother had not been isolated before diagnosis, and was nursed alongside her baby on the postnatal ward. On detection of *S. hadar*, both mother and baby were transferred back to the labour ward as there were no single rooms in the postnatal ward, and they remained there until discharged uneventfully on Day 7. The infection control team were informed, and an outbreak investigation began with a consequent increase in awareness of the risk of salmonella infection among mothers and babies.

Eight days following discharge of the index case, five further cases of *S. hadar* were identified (Babies B—F). The details of these cases were as follows (see also Figure 1).

Baby B was born six days after the index case was discharged. He developed diarrhoea at two days old. His mother, Mother B, was asymptomatic and remained stool culture negative for *S. hadar*.

Baby C was born two days after Baby B and developed diarrhoea at two days old. His mother, Mother C, had diarrhoea and grew *S. hadar* from her third stool specimen. Babies B and C were isolated on the SCBU 16 and 19 days, respectively, after *S. hadar* was isolated from Baby A.

Baby D was born on the same day as Baby B by elective caesarean section. Both Mother D and Baby D were well post partum and discharged home, but both developed diarrhoea when the baby was eight days old and required re-admission; the exact date of re-admission is not known. They were re-admitted and isolated on the labour ward, and both were culture positive for *S. hadar*.

Baby E was born three days after the discharge of Baby D and Mother C, and 10 days after the discharge of Baby C. This baby was asymptomatic and *S. hadar* was identified on rectal swab screening. Likewise, the baby's mother was asymptomatic and did not grow *S. hadar*.

Baby F was asymptomatic and *S. hadar* grew from a rectal screening swab. The mother of Mother F was also asymptomatic, with stools that tested negative for *S. hadar*.

In summary, 41 days after the index case tested positive, a further five babies and two mothers were culture positive for *S. hadar*. In total (including the index case), six babies and three mothers were found to be culture positive for *S. hadar*. Of these, three babies and two mothers were symptomatic with diarrhoea. Three babies and one mother were colonized and asymptomatic. Symptomatic cases were managed conservatively and none of them required antibiotics.

Initial outbreak investigations

Over the course of the outbreak, seven outbreak committee meetings were held with representatives from the Glasgow Royal Infirmary National Health Service Trust Department of Medical Microbiology, the Scottish Salmonella Reference Laboratory, the Department of Public Health, Infection Control Nurses, the Department of Obstetrics, the Department of Paediatrics, the Midwifery Department, the Estates Department, the Department of Occupational Health, Domestic Services and the Press Officer. Liaison was also made with the Chief Medical Officer and the Scottish Office. The investigation was hampered by the outbreak occurring over the festive season, with the consequent reduction in services of many departments.

Initially, no common link could be identified. It was established that Mother A was the index case and most likely brought *S. hadar* into the hospital whilst symptomatic pre-delivery, and cross-infected her baby (Baby A) on or around delivery. Following this, it was noted that babies appeared to develop symptoms first, with subsequent transmission to adults. A putative explanation for this involved the possibility of transmission occurring in the labour ward where several of the babies had been nursed during their hospital stay. Three points were identified at which the organism may have been introduced to the labour ward: by Baby A and Mother A on two occasions (at delivery and on re-admission), and by Baby D and Mother D.

Infection in the community was excluded as all the cases came from geographically distinct regions of the city, and no community cases with the same plasmid profile were detected.

Infection control measures implemented

All babies in the postnatal wards were screened by rectal swabbing at 48 h post partum and then twice weekly. Mothers of affected babies were screened by weekly stool culture.

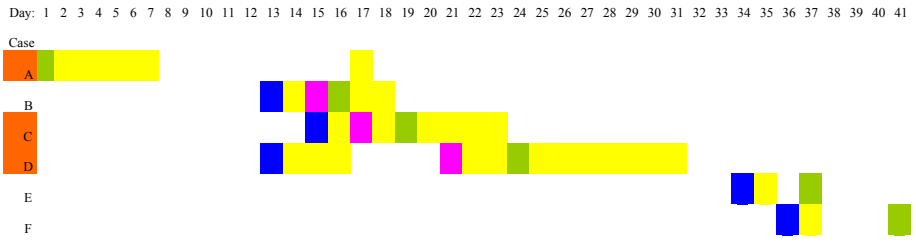

Figure 1. Timeline of the outbreak. Blue indicates day of birth, yellow indicates inpatient stay, pink indicates symptomatic days (if relevant), green indicates day when *Salmonella hadar* was cultured, and orange indicates if mother was symptomatic or culture negative.