



Short report

Outbreak of *Clostridium difficile* ribotype 027 in a residential home

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SUMMARY

This article reports a significant outbreak of *Clostridium difficile* ribotype 027 infection in a residential care home in the UK. Five of six affected residents died within one month of diagnosis. Investigation of the facility revealed problems with hand hygiene and environmental cleaning. Affected residents had received a mean of 2.7 antibiotic courses in the two months preceding diagnosis. It is important to recognize that *C. difficile* outbreaks can occur in residential homes. There is a need for health- and social-care systems to work closely together to assure the safety of people in their care.

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Introduction

Outbreaks of diarrhoea caused by *Clostridium difficile* are well recognized in hospitals and, to a lesser extent, nursing homes. However, there are few reports of outbreaks in residential care homes, which are not recognized as providing qualified nursing care. With hospitals making significant reductions in rates of *C. difficile* infection (CDI),¹ focus falls increasingly on acquisition of disease in nursing and care homes. This article describes a significant outbreak in a residential care home between February and June 2011.

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Methods

Clinical setting

The studied care home is a converted house with approximately 30 residents, specializing in care of people with dementia. Most bedrooms are single rooms, and more than half have en-suite toilet facilities. There are two sluices, and five shared bath or shower rooms.

Definition

A resident was defined as being affected if they had loose stools on more than one occasion, and a positive microbiological diagnosis of CDI.

Bacteriology

Microbiological diagnosis was performed using enzyme-linked immunosorbent assay of toxins A/B in a stool sample (*C. difficile* ToxA/B II; TechLab, Blacksburg, VA, USA), and confirmed by detection of glutamate dehydrogenase and toxin in a subsequent combined assay (*C. Diff* Quik Chek Complete; TechLab). This testing method predated current UK guidance. Strains were typed using ribotyping and variable number tandem repeat (VNTR) analysis at the regional *C. difficile* reference laboratory.

Results

Description of the outbreak

Six residents were diagnosed with CDI over a five-month period, with the last five cases diagnosed within an 11-week period. The last five of the faecal samples were subsequently available for ribotyping. *C. difficile* ribotype 027 was found in all five samples. VNTR analysis showed that the five isolates were closely related as part of the same cluster, and two isolates were identical.

There were four females and two males amongst the affected residents, with a median age of 87 years (range 78–95 years). Five of the six patients died within one month of diagnosis (median seven days, range three to 26 days). Two death certificates reported causes other than *C. difficile*, two death certificates reported CDI as the direct cause of death, and one death certificate reported CDI as an indirect cause of death (Figure 1).

Outbreak control measures

Following the first two cases, a community infection control practitioner contacted the management of the home. Internal audits of hygiene and cleanliness were reported to show good results, and a favourable report by an external healthcare body was noted. Educational support for staff was offered, but an offer for external audit was declined.

Two months later, another resident was diagnosed with CDI. A community infection control practitioner visited the home and a formal audit was convened for the next week. However, two further cases occurred in the days preceding the audit. A further case was identified retrospectively; this resident had been diagnosed with CDI during a hospital stay. The second of the initial cases was discovered to have had relapsing–remitting diarrhoea over a six-week period. This had been treated with ciprofloxacin by a general practitioner (GP), but no sample was sent until symptoms escalated. It is possible that this delay allowed heavy contamination of the home with *C. difficile* spores.

Affected residents were treated according to severity of infection, consistent with existing UK guidance. One resident was admitted to hospital due to the severity of symptoms, and subsequently died. Two other residents were treated in hospital, having been diagnosed there (Figure 1).

Risk factors

Thorough investigation by a community infection prevention practitioner discovered problems with handwashing, dirty

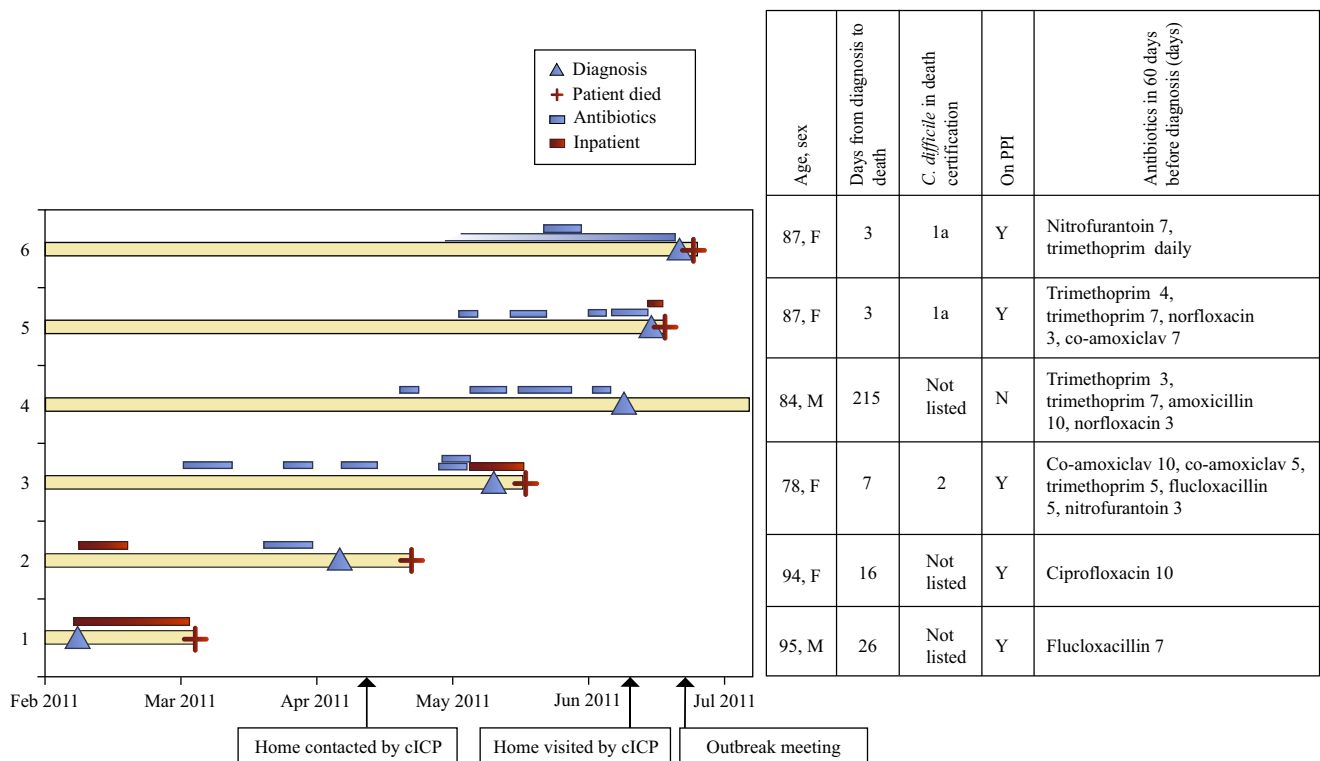


Figure 1. Timeline of outbreak and epidemiological data for affected residents including antibiotic prescriptions. Death certification 1a, direct cause of death; death certification 2, indirect cause of death; PPI, proton pump inhibitor; cICP, community infection control practitioner; *C. difficile*, *Clostridium difficile*; Y, yes; N, no.

utility rooms and environmental cleaning. There was a lack of handwashing facilities in sluice rooms, requiring staff to wash their hands above an outdated sluice hopper. There were no dedicated handwash sinks for staff elsewhere, leading to over-reliance on alcohol-based products. There was generally limited access to liquid soap and disposable towels.

Commode pots were emptied into a sluice hopper, hand-washed and dried on unsealed wooden racks, and the standard was below that achieved with mechanical washers. The home is largely carpeted, and cleaning was performed using non-sporicidal cleaning products. A number of other minor issues were also raised for action.

All affected residents had received antibiotics in the two months preceding diagnosis (Figure 1). Seventeen courses of antibiotics had been prescribed during this time period, representing a mean of 2.7 antibiotic courses per resident. Urinary tract infection was the most common reason for antibiotic treatment. All antibiotic courses were for 10 days or less (median seven days), except for a prescription for daily trimethoprim prophylaxis. Trimethoprim was the most common prescription, three residents received fluoroquinolones and no residents received cephalosporins. Five of the six residents received proton pump inhibitors.

Actions and outcome

Following an outbreak meeting, environmental review and formulation of an action plan, the home rapidly implemented changes in practice, environment and cleaning. Educational sessions for the staff were provided to raise awareness of prevention of infection. Handwashing basins were installed and liquid soap, paper towels and non-touch pedal bins were installed. Dishwashers were fitted in the kitchens. Substandard fittings and fixtures were removed or improved, and a thorough deep clean of the facility was conducted. Internal audit programmes were improved to promptly identify issues in practice (e.g. hand hygiene) and cleanliness. There was communication to all local GPs and the health authority, including an expectation that residents would not be blindly prescribed with antibiotics without appropriate assessment. GPs were supplied with relevant educational information. The community medicines team, whose role is to monitor the use of antibiotics and promote antimicrobial stewardship in the community, were informed of the prescribing issues in order to encourage improved prescribing.

The management of the home acknowledged their ongoing responsibility for infection control, and committed to meet and maintain recognized standards. Six months after the last reported case, there had been no further reported incidents of CDI in residents at this home. The surviving resident remained at the home and was symptom free.

Discussion

This outbreak was associated with a very high mortality rate; a recognized feature with *C. difficile* ribotype 027.² This ribotype is usually resistant to fluoroquinolones,² which had been received by half of the patients.

There were five different GPs for the six residents. Carers reported that antibiotics were prescribed frequently without visits, usually after a telephone call from one of the carers to the GP. Many other homes have dedicated GP cover, allowing

routine visits and examination of unwell residents. Furthermore, early recognition of an outbreak would be more straightforward if there was consistency of medical cover. However, the individual's right to choose his or her own provider of medical care is recognized. It is worrying that antibiotics were prescribed to elderly residents without face-to-face consultation or examination; the actions that were taken aimed to improve personal review of the residents by the GP. Prescription of antibiotics in the community is known to be a significant risk factor for CDI, particularly when multiple antibiotics are administered and to patients who have been hospitalized within the previous six months.³

Four of the residents had been discharged from the local district general hospital within the last three months, but none within six weeks of diagnosis. It is possible that an index case (possibly Resident 2) became colonized with *C. difficile* in the hospital, but it is unlikely that the hospital was a point source for all of these residents, as the residents had been admitted to different wards. Furthermore, this strain was never found in the hospital, and ribotype 027 was uncommon at the hospital during the study period. It is not known if the first resident had the same strain as the other five strains; his sample was discarded before typing could take place. Additionally, his symptoms were mild and his comorbidities meant that he did not return to the home following diagnosis. However, this was the first of an epidemiologically linked series of infections.

Henderson *et al.* identified significant issues regarding infection control practices in residential homes, including absence or delay of isolation, lack of protective equipment and automated sluice facilities, and inappropriate practice when cleaning bedpans and commodes.⁴ Care homes without qualified nursing staff were significantly less likely to send samples spontaneously, but would do so on request from a GP.⁴ In addition, there may be a delay between symptoms and testing. These same factors are likely to have contributed to the outbreak described.

Registered providers of health care have responsibility for infection control,⁵ but owners and managers may have limited experience of the practicalities required. UK-specific guidance for infection control in care homes was published in 2006 and revised in 2013.^{6,7} The most recent guidance builds upon the legal framework provided in the Code of Practice,⁵ and provides practical information for care home staff and managers. This includes comprehensive information on outbreak scenarios (including recognition, communication and action), environment, decontamination and training for staff. There is information on standard infection control principles, including hand hygiene and protective equipment, as well as measures needed for specific infections (including CDI). A large proportion of the carers have vocational qualifications in care, but residential homes may have no fully qualified nursing staff, and training and practice must allow for this. A summary version of the guidance is suitable for training.⁸

The main concern in this episode was that there was delayed recognition of an outbreak, and insufficient communication between external agencies to recognize the problems before further residents were affected. The facilities in the care home were substandard, and the management were unaware of the importance of prompt action to prevent further cases of infection. If a full external audit had been demanded

after the first two cases, it is possible that the issues may have been resolved earlier. However, the authors had not previously seen outbreaks such as this outside of a hospital ward, and the potential for spread and severity in the residential care home setting may have been underestimated.

It is important to remember that residential homes are not hospitals; they are the residents' homes. In this instance, there were insufficient provisions in place to prevent a serious outbreak of a healthcare-acquired infection. The management of care homes should be proactive in highlighting clusters of symptoms or diagnoses at the earliest opportunity, and know how to seek assistance. Additionally, there is a need for staff in care homes to be better informed in infection control practices, and for health- and social-care systems to work more closely to assure the safety of elderly people in their care. Rational prescribing in primary care and consistent surveillance of infections in these homes is important to protect residents from communicable diseases, while prompt identification and escalation to resolve outbreaks are necessary when this fails.

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Conflict of interest statement

None declared.

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