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Management of patients with suspected infectious diarrhoea in hospitals in England

Running title (40 characters max): Managing infectious diarrhoea in England

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SUMMARY

Background: Advances in molecular and genomic testing for patients with suspected infectious diarrhoea are on the horizon. It is important to understand how infection control and microbiology departments currently operate with respect to the management of these patients in order to assess the implications of more widespread diagnostic testing. However, there are few data available on current practice in this context.

Aim: Describe current infection control and microbiologist practice across England with respect to the management of patients with suspected infectious diarrhoea.

Methods: Hospitals in England completed three questionnaires on current testing practice in this context. Questionnaire design was informed by current practice within the Oxford University Hospitals group.

Findings: 41% of hospitals completed at least one questionnaire. A notable proportion of staff time is devoted to the management of patients with suspected infectious diarrhoea. Staff training is generally good, but compliance with policy documents is only 80%. Cleaning and isolation policies vary across hospitals, suggesting that either these are not evidence-based, or that this evidence base is weak. There is more agreement on outbreak definitions, management and cohorting policies. Stool testing decisions are mainly driven by patient characteristics, while strain typing is infrequently used (except to investigate *C. difficile* infections). Multiple practical difficulties associated with patient management were identified, along with a clear appetite for more widespread genomic diagnostic testing.

Conclusion: Managing patients with suspected infectious diarrhoea is a major burden in England. Advances in testing practice in this context could have significant clinical and economic impacts.

Keywords: infection control, diarrhoea, microbiology, questionnaire, patient management

INTRODUCTION

Cases of infectious diarrhoea represent a significant health burden. In 2012, there were 65,032 laboratory reports of *Campylobacter* spp. infections alone in England and Wales[1], with the annual cost of infectious intestinal disease in the UK National Health Service (NHS) estimated to be £743 million[2]. Infectious diarrhoea can trigger high levels of healthcare use and work absenteeism[2], and requires careful management in hospitals, particularly when a cause has not been identified. Current diagnostic tests can provide some information to guide clinical decision-making but tend to focus on identifying a single specific organism. As many different pathogens can cause infectious diarrhoea, this can lead to costly delays in patient isolation and treatment decisions, and to restricted isolation capacity being taken by those who do not have infectious diarrhoea.

Advances in testing technologies are on the horizon, and new tests that can detect multiple pathogens in a single reaction may allow clinical teams to make more accurate and timely patient management decisions. These advances include multiplex polymerase chain reaction (PCR) assays and whole genome sequencing[3,4]. Prior to implementing these new tests, it is important to establish how patients with infectious diarrhoea are currently managed in hospitals in order to assess the implications of more widespread molecular testing. However, it is not clear what the base case is in England: evidence on current practice is limited to a single survey of *C. difficile* testing, conducted in 2006, which highlighted issues surrounding inconsistent management of outbreaks, poor adherence to internal policies and a lack of routine isolation[5]. However, current practice has evolved since 2006, and these results are not necessarily applicable outside of *C. difficile* testing.

This study describes the results of surveys of infection control and microbiologist practice in England in 2013 with respect to the management of patients with suspected infectious diarrhoea. Its scope is wider than previous studies, considering multiple infectious causes across a range of hospitals.

METHODS

Current practice in this context was mapped between November 2010 and January 2011 in the Oxford University Hospitals (OUH) NHS Trust, which comprises four hospitals, providing acute care to a population of 650,000 people. Infection control staff, and laboratory and ward staff with infection control responsibilities, were interviewed. Standard operating procedures (SOPs) for infection control and microbiology laboratory testing were also examined.

Information from the interviews and SOPs was used to design three survey questionnaires. Questionnaire One ('Infection Control') was designed for completion by infection control managers, collecting information on the infection control team, patient monitoring, infection control training and practice, and outbreak management. Participants were also asked to consider how two potential future scenarios might impact on the management of patients with suspected infectious diarrhoea. Scenario One concerned the impact of consolidating microbiology laboratory services. Scenario Two concerned the implementation of a hypothetical multiplex assay for 10-20 gastrointestinal pathogens.

Questionnaire Two ('Laboratory') was designed for completion by laboratory staff, collecting information on which factors and patient characteristics drive testing decisions, and the cost of current testing practice. Questionnaire Three ('Microbiologist') was designed for completion by microbiologists, collecting information on commonly requested tests (including turnaround times) and standard treatment practice. Participants were also asked to consider Scenario One and Two.

In all three questionnaires, respondents were asked to only consider current practice in relation to adult patients. Questionnaires are provided in **Appendices 1-3**.

The questionnaires were piloted in three hospitals in February 2012, with final versions sent to 51 acute NHS hospitals (one-third of all acute NHS hospitals) in England in May 2012. Due to time and resource constraints, a weighted random sample was used, with hospitals categorised by size. Ten small, 18 medium and 23 large/teaching hospitals were chosen to reflect the number of hospitals of each type in England.

The Director of Infection Prevention and Control in each hospital was sent an introductory letter and examples of the questionnaires by email, and offered a £20 Amazon voucher per questionnaire as an incentive for completion. If approval was given (or no response received), the senior infection control nurse, lead microbiologist, and microbiology laboratory manager in each hospital were contacted by email and phone up to four times between May 2012 and January 2013 to request completion.

RESULTS

Twenty six responses were received from 21 hospitals (17 Infection Control, 6 Microbiologist and 3 Laboratory questionnaires). 41% of hospitals responded to at least one questionnaire. The response rate across all questionnaires was 17%.

Infection control questionnaire results

Six small, 6 medium, and 5 large/teaching hospitals completed this questionnaire, with responses received from all regions, except London. The mean number of infection control staff per hospital is 7.0. **Table 1** summarises the burden of suspected infectious diarrhoea and patient monitoring. One-fifth of the time of each infection control team is spent on the management of diarrhoea. The mean number of patients with suspected infectious diarrhoea admitted to each hospital per month is 96. Infection control teams spend 1 hour 40 minutes per day tracking patients with suspected or confirmed infectious diarrhoea (17 minutes per team member), with most teams tracking bed and ward moves using both manual paper-based and computer systems. Only two hospitals stated that their computer system could provide automatic notifications of patients with potentially infectious diarrhoea. Most patients with suspected infectious diarrhoea enter monitoring systems on the same day that symptoms are initiated.

Table 2 describes staff training. Almost all hospitals have several relevant policies, predominantly made available via local intranet and targeted training sessions. Further information on the distribution of policies to staff is provided in **Appendix 4**. Median compliance with 'Standard Precautions' policies by ward staff is reported to be 80%. Most (but not all) hospitals undertake terminal cleans and change curtains when side rooms, beds in bays (areas within wards containing a small number of beds) or even whole wards are vacated by patients with suspected or confirmed infectious diarrhoea. In almost all hospitals, cleaning policies extend to cover other locations that an affected patient may visit. Glove use increases in most hospitals in cases of infectious diarrhoea, but only a third of hospitals vary their cleaning policy depending on whether this diagnosis is suspected or confirmed. Almost all patients (99%) with suspected infectious diarrhoea are isolated in a side room. When insufficient side rooms are available to manage multiple patients with suspected infectious diarrhoea, most hospitals prioritise patients by isolating those with particular pathogens, or the most severely ill.

Table 3 provides information on outbreak management. Most hospitals use a threshold level of cases to determine when an outbreak is underway and when to close a ward. The mean number of wards closed annually due to infectious diarrhoea was approximately 12 per hospital, with norovirus being the most common cause. Data on average length of closure was not collected within this survey. Previous studies report an average duration of closure of 7-8 days[6]. Almost two-thirds of hospitals had a policy of cohorting multiple patients with shared causative agents in the same ward.

Microbiologist questionnaire results

Six NHS hospitals completed this questionnaire (2 medium, 4 large/teaching). Only a partial geographic spread was achieved. **Table 4** provides information on stool sample testing. Pathogens are specified on a minority of stool sample test requests, usually either norovirus or *C. difficile*. The patient characteristics that influence testing decisions vary by pathogen (e.g. patient age influences *C. difficile* testing. while length of stay influences *Shigella* spp. testing; further details provided in **Appendix 4**). The median length of time between taking a sample and receiving test results varied between one day for *C. difficile* and norovirus, and 2.5 days for *Shigella* spp., *E coli* and *Salmonella* spp.. Most hospitals were unable to state the sensitivity of the tests they used. One *C. difficile* case in every 20 was estimated to fall into a potential outbreak situation, with strain typing information requested in almost all of these (falling to two-thirds outside of outbreak situations). Strain typing information is used to identify linked cases, map outbreaks, detect evidence of cross-transmission over longer periods, and demonstrate absence of outbreak.

Table 5 summarises treatment practice. Two-thirds of hospitals routinely empirically treat patients with metronidazole or vancomycin following a positive *C. difficile* test. No hospitals routinely empirically treat patients with positive *Campylobacter* spp. or *Salmonella* spp. tests. Half of all patients complete antibiotic therapy in hospital. Of those discharged before treatment has been completed, 10% will be readmitted within 14 days. In a quarter of cases, causative pathogens are identified after discharge. In these circumstances, all hospitals inform the clinical team. However, only 40% of hospitals follow up patients with diagnoses of infectious diarrhoea in primary care.

Laboratory questionnaire results

Only three hospitals responded to this questionnaire, providing only partial information, hence it was impossible to summarise data meaningfully.

Future scenarios

Full responses to questions on potential future scenarios are given in **Appendix 4**. Respondents had several concerns regarding the impact of a consolidation of microbiology laboratory services, including:

- Increased length of time to receive test results;
- Greater transmission and more frequent outbreaks;
- Slower decision-making;
- Loss of local epidemiology data and responsiveness to local needs.

Successful implementation was said to require well-defined processes and good communication systems, and could lead to increased consistency in infection control advice offered.

Benefits identified from a hypothetical multiplex assay for gastrointestinal pathogens included:

- More informed and faster decisions regarding isolation and de-isolation;
- More effective use of side-room space and reduced bed-blocking;
- Improved patient outcomes;
- Earlier identification of outbreaks and implementation of cohorting.

However, concerns were raised about the need for such tests to be accurate and the requirement for samples to be taken as simply as possible.

DISCUSSION

It is important to understand how infection control and microbiology departments currently operate with respect to the management of patients with suspected infectious diarrhoea in order to assess the implications of more advanced molecular/genomic diagnostic testing, which is increasingly being used in research settings and likely to be translated into clinical practice within the next 5 years. This paper describes current infection control practice across England, building on previously published papers which have a more limited scope, considering a narrower range of infectious causes in fewer hospitals[5].

The management of these patients takes up a noteworthy proportion of infection control team time. Many hospitals still track patient moves using paper-based systems; there is clearly some scope to reduce this burden through more widespread implementation of electronic management systems. Infection control staff receive comprehensive training in patient management, although compliance with 'standard precautions' policies by ward staff is only reported to be 80%. Reasons may be cultural or structural (e.g. high proportions of agency staff), or reflect a near-continuous emergency situation in hospitals facing acute pressures. Cleaning and isolation policies vary, suggesting that either the evidence base is weak in this area or there are infrastructural obstacles preventing staff from following protocols, but there is more agreement on outbreak definitions, management and cohorting policies. However, in the absence of evidence describing organism transmission routes, it is not clear that each hospital should necessarily follow the same infection control protocols.

Pathogens are rarely specified on stool tests, with testing decisions driven by patient characteristics. Strain typing information is requested if a *C. difficile* outbreak is suspected (possibly reflecting easy access to ribotyping via the *C. difficile* Ribotyping Network[7]), but is used infrequently otherwise. Antibiotic therapy is commonly completed outside of hospital, with a significant minority of patients subsequently readmitted for additional treatment. It is notable that, in a quarter of cases, causative pathogens are identified after discharge.

Respondents identified multiple practical difficulties associated with managing these patients, including bed blocking and a lack of side room capacity. Respondents also revealed a clear appetite for more widespread molecular/genomic diagnostic testing, commenting that this would lead to improved decision-making and patient outcomes. However, it was noted that if the implementation of new technologies (requiring significant capital infrastructure) leads to a more centralised molecular testing service, decision-making may ultimately be slower, with systems less responsive to local needs. Given that centralised laboratory systems provide services in countries such as Germany, Switzerland and the USA, and the current trend for increased centralisation of microbiology services in the UK[8], the degree of importance to attach to this finding is unclear. Respondents also noted that a potential disadvantage of such assays is that they may increase detection of asymptomatic *C. difficile* carriers not requiring treatment. Whether such information would still help to reduce disease transmission in hospitals is unclear, since, without diarrhoea, transmission risks are plausibly reduced[9].

Questionnaire response rates were low, particularly for the microbiologist and laboratory questionnaires, which meant that we did not receive responses from all areas in England. This may be because the questionnaires were long and asked detailed questions in order to accurately reflect current practice. Some questions also requested information which could be viewed as sensitive, e.g. self-reported adherence to hospital policies (although all respondents were assured that responses were anonymous). This could limit the generalisability of findings to all hospitals in England. However, given that responses were internally consistent, and were also consistent with requests for advice regarding management made to the authors, the results are likely to be broadly generalisable. Future studies should consider alternative methods to incentivise the completion of questionnaires which request potentially sensitive information. A second limitation of this study is that respondents were asked to provide estimates in response to several survey questions, instead of directly measuring these values, deriving them from a dataset or reporting values captured by a monitoring system. Use of self-reported estimates was necessary because much of the relevant data is not routinely collected by infection control and microbiology departments. Alternative approaches (e.g. completing data collection forms in real-time for consecutive patients) might theoretically have improved the quality of the final dataset. However, we consider this unlikely, given the low response rate associated with the simpler chosen approach, and the administrative difficulties associated with coordinating such real-time data collection across multiple departments. Thirdly, we were not able to verify much of the data reported; for example, in the absence of environmental monitoring, it is not possible to assure that the high reported adherence to cleaning policies was having the desired effect. Finally, our study is conducted in England. Given the considerable differences in hospital organisation and management in healthcare systems worldwide, we are wary about generalising our results to other countries. However, this study provides a useful guide to the type of information that would be required in other settings in order to determine the clinical and cost-effectiveness of new molecular/genomic tests in other settings, where they will no doubt be used.

This survey was originally conducted to inform an investigation into the use of rapid integrated PCR-based diagnostics for gastrointestinal pathogens[10], prototype tests that were not ultimately translated into clinical practice. As these tests were only briefly outlined in the questionnaires as theoretical future scenarios, there is no reason that this should limit the generalisability of the results.

To place the responses to the future scenario questions into context and quantify the potential benefit of improved diagnostics in infection control, it is informative to consider the costs associated with microbiological testing and isolation measures. However, little information on such costs in England is available. One review reported that the incremental cost of *C. difficile* infection ranged from £4577 in Ireland to £8843 in Germany[11]. US estimates fall within a similar range[12]. A UK study estimated that each 5% reduction in in MRSA or *C. difficile* cases reduced national costs by £4.9 million annually[13], but other UK estimates are now out of date[14]. A Canadian study provided limited evidence that the cost of readmissions for further treatment following *C. difficile* infections can be high[15]. No studies were identified that provided data that could be used to estimate the monetary benefits of improved diagnostics for multiple infectious causes in England.

In summary, a notable proportion of time in English hospitals is devoted to the management of patients with suspected infectious diarrhoea. Improvements in the quantity and quality of molecular and genomic information relating to the diagnosis of gastrointestinal pathogens could have significant clinical and economic impacts in this context. Studies which combine the data on current practice reported in this paper with cost estimates that are applicable in England would allow the full economic impact of such improvements in testing to be more accurately quantified.

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TABLES

Table 1: Burden of suspected infectious diarrhoea and patient monitoring

Variable	Category	Value [a]
Mean percentage of infection control team time spent on the routine management of diarrhoea (SD)		20.7 (12.4)
Method by which infection control staff are informed about patients with suspected diarrhoea: % of cases (SD)	Member of infection control team visits ward Ward staff contact infection control team Lab result received by infection control team Other	22.4 (18.6) 35.1 (26.0) 31.3 (27.9) 11.1 (26.0) [b]
Mean number of patients with suspected infectious diarrhoea admitted per month (SD)	Small hospitals Medium hospitals Large/teaching hospital All hospitals	149.6 (173.6) [c] 75.0 (27.8) 43.78 (37.7) 95.7 (117.9) [d]
Mean number of hours per day spent by the infection control team tracking patients (SD)		1.7 (0.8) [e]
Mean number of hours per day spent by each infection control team member tracking patients (SD)		0.3 (0.2) [e]
Median percentage of patients with suspected infectious diarrhoea who enter monitoring systems on the same day as initiation of symptoms (interquartile range)		80.0 (50.0) [f]
Mean number of hours taken for patients to enter monitoring systems, for those patients who enter this system on the same day as initiation of symptoms (SD)		3.5 (2.4) [f]
Percentage of hospitals in which access to the monitoring system is limited to the infection control team		53.3 [f, g]
Method used to track the movements of patients with suspected or confirmed diarrhoea of infectious origin (Number of hospitals)	Only bed moves are tracked Only ward moves are tracked Both bed and ward moves are tracked	1 2 14
Systems used to monitor patients with suspected or confirmed infectious diarrhoea (Number of hospitals)	Manual paper based system Computer based system Both manual and computer based systems	3 2 12
Type of computer system used to monitor patients (Number of hospitals) [f, h]	CRS/PAS (standard Case Record/Patient Administration Systems) IC net (commercial system) Other	8 5 8 [i]
Information provided by computer system (Number of hospitals) [h, j]	Automatic alerts to notify infection control staff of patients with potentially infectious diarrhoea	2

Variable	Category	Value [a]
	Automatic alerts to notify infection control staff of patients with confirmed infectious diarrhoea	11
	Identifies patients who have previously been admitted with infectious diarrhoea	7
	Tracks patients with suspected or confirmed infectious diarrhoea through hospital system	7
	Collects regular data on incidence of infectious diarrhoea	5
	Provides automated electronic transfer of test results from local microbiology lab	7
	Other	1 [k]

[a] N=17 unless otherwise indicated; [b] Includes "Electronic system and infection control telephone calls to wards" (N=1), "Computerised Bristol Stool Chart collated and sent to infection control team daily" (N=1), and "Real time" (N=1); [c] One small hospital reported that 450 patients were admitted each month. Disregarding this hospital, the average for small hospitals was 74.50 (SD: 50.74); [d] N=12 (5 small hospitals, 3 medium hospitals, 4 large/teaching hospitals); [e] N=16; [f] N=15; [g] In cases where access is not limited to the infection control team, those who have access include "Microbiologists" (N=2), "Site/bed managers" (N=1), "Ward staff" (N=2), "All hospital staff" (N=1), and "Ward staff, managers and bed managers" (N=1); [h] Multiple answers possible; [i] Includes "Extramed" (N=2), "Meditech" (N=1), "Modified <local hospital name> system" (1), "Winpath" (N=1), "e-track and ICE <local hospital name>" (N=1), "In-house system" (N=1), and "Real time/ICE" (another commercial package) (N=1); [j] N=13; [k] Includes "Document events" (N=1)

Table 2: Infection control staff training

Variable	Category	Value [a]
Percentage of hospitals with a 'Standard Precautions policy'		94.1
Median compliance with standard precautions: percentage (interquartile range)		80.0 (15.0)[c]
Percentage of hospitals in which a terminal clean is undertaken when a patient with suspected or confirmed infectious diarrhoea vacates a space within a ward, by type of space	Side room Bed space in bay Whole bay	100.0 100.0 68.8[b]
Percentage of hospitals in which curtains are changed as part of this terminal clean, by type of space	Side room Bed space in bay Whole bay	100.0[b] 88.2 62.5[b]
Percentage of hospitals in which glove use increases in cases of suspected or confirmed infectious diarrhoea		88.2
Percentage of hospitals in which the cleaning policy varies depending on whether a diagnosis of infectious diarrhoea is suspected or confirmed		29.4
Percentage of hospitals in which the cleaning policy is extended to cover other locations in the hospital which the affected patient may visit		94.1
Percentage of hospitals who carry out routine environmental testing		5.9
Percentage of hospitals with a policy for the 'Management of patients with diarrhoea and vomiting'		94.1
Percentage of hospitals with an 'Isolation policy'		94.1
Median percentage of patients with suspected infectious diarrhoea isolated in a side room (interquartile range) [b]		99.0 (10.0)
Percentage of hospitals in which all patients [with suspected infectious diarrhoea] are isolated in a side room [b]		43.8
When insufficient side rooms are available to manage multiple patients with suspected infectious diarrhoea, how are patients prioritised? (Mean ranking [e])	The most severely ill patients are prioritised Older patients are prioritised Particular pathogens or strains are prioritised Patients who have been sick for longer are prioritised Other	2.3 3.5 1.0 4.0 1.6
Median length of time (hours) for symptomatic patients to be isolated in a side room or cohorted in a closed bay (interquartile range)		2.0 (2.6)
Mean number of bed moves a typical patient with suspected or confirmed infectious diarrhoea will make across the entire duration of their inpatient stay (SD)		2.1 (0.9)
Percentage of hospitals with a '*Clostridium difficile* policy'		100.0
Percentage of hospitals in which staff receive training on the management of patients with potentially infectious diarrhoea, over and above that which is provided in standard operating procedures and policies		94.1

[a] N=17 unless otherwise indicated; [b] N=16; [c] N=13; [d] Multiple answers possible; [e] Relevant reasons for prioritisation were ranked from 1 (top priority) to 5 (lowest priority)

Table 3: Outbreak management

Variable	Category	Value [a]
Conditions under which a hospital would class multiple cases of infectious diarrhoea as an outbreak: number of hospitals [b]	For particular strains of pathogen	6
	Once a threshold level of cases has been reached	14
	Once an attributable death has been recorded	2
	Other	4[c]
Median number of outbreaks of infectious diarrhoea recorded across a hospital between 1st April 2010 and 31st March 2011 (interquartile range) [d]	Viral gastroenteritis	1.5 (4.8)
	Clostridium difficile	0.0 (2.2)
	Norovirus	6.0 (11.8)
	Other causes	0.0 (0.0)
Conditions under which a hospital would consider closing a ward due to an outbreak of infectious diarrhoea: number of hospitals [b]	Once a single case has been positively identified	1
	For particular strains of pathogen	6
	Once a threshold level of cases has been reached	12
	Once an attributable death has been recorded	0
	Other	7[e]
Mean number of wards closed as a consequence of outbreaks of infectious diarrhoea across a hospital between 1st April 2010 and 31st March 2011 (SD)	Small hospitals	8.0 (5.6)
	Medium hospitals	10.2 (5.4)
	Large/teaching hospitals	16.2 (11.2)
	All hospitals	11.7 (7.9) [d f]
Percentage of hospitals with a policy of cohorting multiple patients with infectious diarrhoea in the same ward if tests indicate that these patients share the same causative agent		64.7

[a] N=17 unless otherwise indicated; [b] Multiple answers possible; [c] Other conditions include "Infection Control Nurse (ICN) experience" (N=1), "An outbreak with a high level of suspicion" (N=1), "More than one case connected by time and space of a similar pathogen or symptoms whilst awaiting lab confirmation" (N=1), "Norovirus when staff are affected / off sick" (N=1); [d] N=12; [e] Conditions include "ICN clinical judgment/experience" (N=1), "Risk assessment" (N=1), "If cases in cubicles the ward will remain open, if one case in a bay the bay will close, if two bays affected the ward will close" (N=1), "We don't close wards, just affected bays" (N=1), "Once more than 2 bays are affected" (N=1), "Consensus" (N=1) ; [f] 3 small hospitals, 5 medium hospitals, 4 large/teaching hospitals

Table 4: Stool sample testing and microbiologist strategies for dealing with *C.difficile* infections

Variable	Category	Value
Percentage of cases in which pathogens are specified on stool test requests (SD)		20.2 (17.0)
Pathogens commonly specified: number of hospitals	*Salmonella* spp. *Campylobacter* spp. *Shigella* spp. *Cryptosporidium* spp. Norovirus *C. difficile* *E. coli* O157 Other	0 0 0 0 4 5 2 1
Median length of time (hours) between taking a stool sample and receiving test results, by pathogen (interquartile range)	*C. difficile* *Shigella* spp. *E. coli* O157 *Campylobacter* spp. Norovirus *Salmonella* spp. *Cryptosporidium* spp.	21.0 (6.0) 56.0 (22.0) 60.0 (20.0) 48.0 (12.0) 24.0 (16.5) 56.0 (22.0) 42.0 (30.0)
Median percentage of cases of *C. difficile* infection that are considered to fall into a potential outbreak situation (interquartile range)		5.3 (10.5)
Median percentage of cases of *C. difficile* infection in which strain typing information is requested in potential outbreaks (interquartile range)		95.5 (0.0)
Median percentage of cases of *C. difficile* infection in which strain typing information is requested outside of potential outbreaks (interquartile range)		95.5 (67.5)
Median percentage of cases of *C. difficile* associated infection in which further tests are required to confirm a diagnosis (interquartile range)		10.3 (18.0)

Table 5: Treatment of suspected or confirmed infectious diarrhoea

Variable	Category (if applicable)	Value [a]
Percentage of hospitals who routinely empirically treat patients with positive *C. difficile* tests [b]		66.7
First-line antibiotic treatment for patients with diarrhoea caused by a *C. difficile* infection: percentage of hospitals who use each treatment option [c]	Metronidazole (400mg, 10-14 days, oral) Fidaxomicin (200mg, 10 days, oral)	80.0 20.0
Second-line antibiotic treatment for patients with diarrhoea caused by a *C. difficile* infection: percentage of hospitals who use each treatment option [c]	Vancomycin (125mg, 10-14 days, oral)	100.0
When is antibiotic treatment initiated in patients with diarrhoea caused by a *C. difficile* infection: percentage of hospitals	When a sample is sent for testing When a causative pathogen is identified	50.0[d] 50.0
Percentage of hospitals who routinely empirically treat patients with positive *Campylobacter* spp. tests		0.0
Percentage of hospitals who routinely empirically treat patients with positive *Salmonella* spp. tests		0.0
Mean percentage of patients who complete antibiotic therapy in hospital (SD)		47.2 (40.8)
Of those patients discharged on antibiotics for infectious diarrhoea before a full treatment course has been completed, the mean percentage that are readmitted within 14 days of discharge (SD)		10.0 (0.0)
Percentage of hospitals reporting that there are regular circumstances in which antibiotic treatment given to treat suspected infectious diarrhoea impacts on other antibiotics that patients may be receiving [e]		16.7
Mean percentage of cases in which causative pathogens are identified after discharge (SD)		26.8 (26.8)
Actions taken if causative pathogens are identified after discharge: percentage of hospitals	Clinical team informed and advised to inform patients' GP or patient	100.0
Percentage of hospitals who ever follow up patients with diagnoses of infectious diarrhoea in primary care		40.0[f]
Percentage of hospitals with procedures in place to identify patients who have been readmitted within 14 days of discharge, again with infectious diarrhoea		60.0

[a] N=6 unless otherwise indicated; [b] i.e. who routinely empirically treat patients who subsequently turn out to have positive *C. difficile* tests; [c] N=5; [d] Although no respondents selected this option, 3 respondents selected 'Other' and gave responses that suggested empiric treatment, including "If there is clinical evidence of infection" (N=1), "Our guideline states that treatment should be started before the test result is available if *C. difficile* is suspected clinically" (N=1), and "On suspicion empirically or on detection of pathogen whichever is earlier" (N=1). These respondents were therefore classified in the category 'when a sample is sent for testing'; [e] for example, meaning that other concomitant antibiotics have to be stopped or changed; [f] N=5