Our findings suggest that imported CDI cases should be taken into account when hospital-specific CDI rates are ranked in feedback to participating hospitals to encourage healthcare workers to follow control measures. Controlling CDI in a single hospital may also need collaboration and training in all healthcare facilities in the same region, including long-term care facilities.

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How do we define recurrence in *Clostridium difficile* infection?

Sir,

Clostridium difficile infection (CDI) causes a range of symptoms from mild diarrhoea to life-threatening pseudomembranous colitis [1—4]. The majority of patients experience a single episode of infection; however, despite treatment, some develop further episodes termed 'recurrent CDI' (rCDI) [1]. Enoch *et al.* stated that rCDI is associated with significant morbidity and mortality, with recurrence rates around 25% [5]. Recurrences are a serious, difficult and still unsolved management problem, increasing the length and overall cost of hospitalization [5]. rCDI is an arbitrary term and it is often difficult to define a true recurrence. Public Health England (PHE) define CDI as diarrhoea [at least three consecutive type 5—7 stools on the Bristol Stool Chart (BSC)] and a positive toxin test with clinical suspicion of CDI [6]. rCDI is defined as recurrence of diarrhoea within approximately 30 days of a previous CDI with a positive *C. difficile* toxin test [6]. Enoch *et al.* similarly defined rCDI as the reappearance of clinical CDI (microbiologically confirmed or clinically suspected) on review at day 30 [5]. At Queen Elizabeth Hospital Birmingham (QEHB), we used the PHE guidance to work out our rCDI rate over one year [6]. Using this definition, the recurrence rate was low; however, we suggest that this is misleading and the definition needs careful interpretation by healthcare workers. In addition, we describe some interventions that QEHB have put in place to reduce the rate of rCDI.

At QEHB (a tertiary referral teaching hospital), *C. difficile* testing is undertaken in line with national guidance using a three-stage algorithmic approach [7,8]. In the current study, we carried out an audit, analysing the BSC and clinical symptoms of all the patients who were positive for CDI by glutamate dehydrogenase (GDH) and nucleic acid amplification test (NAAT) in 2015 [7,9]. We used the PHE criteria to identify recurrence which is reappearance of diarrhoea within 30 days of a previous CDI episode (where diarrhoea resolved following treatment) with a positive toxin test [6].

During 2015, 327 stool samples from 249 inpatients tested positive for CDI via GDH and NAAT. There were 41 patients (16%) with more than one positive CDI test, representing either a recurrence or a relapse in infection. Of these 41 patients,

Table I
Daily assessment of infection severity tool

	Level of severity			
Investigation	Mild	Moderate	Severe	Life threatening
General health	Well	Well	Unwell, older adult	
Bristol Stool Chart 6–7 stools per day	<3	>3		
White cell count	Normal	Raised <15	Raised >15	
Temperature	Normal	Normal	>38.5	
Serum creatine	Normal	Normal	>50% above baseline	
Serum lactate	Normal	Normal	2.2–4.9	>4.9
Abdominal x-ray	Normal	Normal	Abnormal	Toxic megacolon
Abdominal examination	Normal	Normal	Painful/distended	Partial or complete ileus
C-reactive protein	Normal	Raised <150	Raised >150	
Serum albumin	Normal	Normal	Falling	
Sepsis screen	Amber flag sepsis	Amber flag sepsis	Red flag sepsis	Red flag sepsis
Abdominal computed tomography				Evidence of severe disease

The daily assessment of infection severity tool measures the following factors: general health of the patient, Bristol Stool Chart monitoring stool type 5–7, white cell count, temperature, serum creatine, serum lactate, abdominal x-ray results, C-reactive protein, serum albumin, sepsis markers and abdominal computed tomography. These markers form the basis of the severity tool and, depending on the score, the patient is treated accordingly. Oral metronidazole is the drug of choice for mild-to-moderate *Clostridium difficile* infection (CDI), with oral vancomycin for severe CDI, and oral vancomycin and intravenous metronidazole for life-threatening CDI.

only 13 patients met the criteria for rCDI based on the PHE definition; a recurrence rate of 5% (13/249 patients) [6]. This value is significantly lower than the nationally reported average of 25% and is unrealistic [5]. Forty-one patients had a second positive CDI test and displayed symptoms of CDI. This equates to 16% of the patients potentially having rCDI, demonstrating the ambiguity of defining genuine rCDI. Sixteen percent would more likely mirror the accepted recurrence rates quoted in the literature [5]. Our observations highlight the difficulty in defining rCDI, especially when looking for resolving diarrhoea after the first episode of CDI.

Taking the ambiguity in defining rCDI aside, the current study found lower rates of rCDI compared with those reported by Enoch *et al.* [5]. Possible reasons for such an observation include some of the novel ways of managing CDI at QEHB. For example, QEHB undertake specialist infection prevention and control (IPC) nurse-led *C. difficile* ward rounds. These comprise a holistic review, including assessment of CDI severity, monitoring of clinical parameters (diarrhoeal symptoms, abdominal examination, blood tests and imaging results) and provision of guidance on antimicrobial management, as well as administering faecal microbiota transplants. These ward rounds are performed thrice weekly, and include a referral process to gastroenterology for complicated cases. A daily assessment of infection severity tool is used at QEHB to help the IPC nurses to identify the patient's response to treatment and determine treatment failure (Table I). The tool is used to guide CDI therapy, and is based on accepted criteria within the National Institute for Health and Care Excellence, Department of Health and PHE guidance documents [6,10,11]. Since the introduction of the severity tool and IPC nurse-led *C. difficile* ward rounds, the average length of stay for patients with *C. difficile* has reduced from 33.8 days to 23.5 days. In addition, the number of patient deaths with CDI reported on the death certificate has decreased by 50%. Further work is warranted to understand the reasons behind the lower rates of rCDI at QEHB compared with nationally reported levels, including more detailed examination of this multi-faceted approach to managing CDI. Here, we describe some novel interventions in our local management of CDI, which may have accounted for a lower rate of rCDI, reduced length of stay and reduced mortality in our inpatient population. Finally, we point out the difficulty in measuring the rate of rCDI accurately. Following the PHE definition, QEHB rCDI would be at 5%; however, with subtle variations in how rCDI is classified, the actual rCDI rate is likely to be around 16% [5]. A better definition of rCDI is needed to enable more robust study of the effect of interventions and treatment on the management of CDI.

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