Keywords
CDAD
Neurologic rehabilitation

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CDAD in neurologic rehabilitation – surveillance results from 2003 to 2007

Summary

Background: CDAD is a major problem in Neurologic rehabilitation due to the frequent necessity of antibiotic therapy and the long hospital stay of severely affected patients with stroke or brain injury. We present the data of our CDAD-surveillance from 2003 to 2007.
Method: From 2003 to 2007 all CDAD cases were collected prospectively. A standard regime has been established for the diagnosis, treatment and prevention of CDAD at our hospital. CDAD was diagnosed when both diarrhea and a positive CD-toxin from a stool sample were present.
Results: CDAD incidence rose from 0.6 to 1.1; 1.1 and 1.8 per 1000 patient days during 2003–2006. The relapse freqency was 66 %, 15 %, 7 % and 15 %. The risk profile of our patients concerning CDAD as well as our hygiene-regime did not change during the observation period. Since May 2007 we have enhanced the sensitivity of the diagnostic procedure for CDAD by culturing stool for *C. difficile* in case of a negative toxin test. This resulted in a doubling of positive CDAD test results.
Discussion: The increase of CDAD rates from 2003 to 2006 cannot be explained by internal hospital factors. Rather, it corroborates the widespread subjective impression of generally increasing CDAD rates with objective data. The reduction of relapse-frequency from 2004 on could be the result of a change in the therapeutic regime from metronidazol to vancomycin in this year. Culturing of stool for CD increases the sensitivity of the toxin test, however, there is concern about clinically irrelevant positive results in our patients with prolonged hospital stay, that might be colonized with CD and frequently develop diarrhea from other causes.
Hyg Med 2008; 33 [9]: 357–360.

Introduction

In early neurological rehabilitation patients with serious neurological diseases such as stroke, skull-brain trauma or hypoxic brain damage are treated. These patients are transferred from acute-care hospitals and have generally received intensive medical treatment. The majority of them are immobile, incontinent for stools and urine and suffer from dysphagia. Nosocomial (healthcare-associated) infections – in particular pneumonia and urinary tract infections – are thus very common and necessitate repeated antibiotic treatment in the course of the hospital stay. With an average hospital stay of more than 30 days, these patients spend a very long time in hospital and are generally given proton pump inhibitors as a prophylaxis for stress ulcers.

All these factors are conducive to onset of *Clostridium difficile*-associated disease (CDAD). Hence already at a very early stage, CDAD has been accorded the attention it warrants in the early neurological rehabilitation setting, whereas this has been done in other areas of medicine only in recent years in view of the general rising CDAD incidence [3].

We prospectively recorded CDAD cases in our hospital since 2002 and now report on the surveillance findings for the period from 2003 to 2007.

Material and Methods

Bad Aibling Neurological Hospital is an institution with approximately 250 beds. This hospital is specialised in early rehabilitation of patients suffering from severe neurological diseases.

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Prospective, weekly registration of CDAD cases has been carried out since 2002. Written standard operating procedures are used for diagnosis, treatment and prevention of CDAD throughout the hospital.

Stools are tested for CDAD if diarrhoea persists for more than two days, or this is done sooner if there is strong clinical suspicion of CDAD (e.g. typical smell of stools). CDAD diagnosis is deemed to be confirmed in the presence of the characteristic clinical manifestations (diarrhoea) and concurrent evidence of *Clostridium* toxin (A and B) in stools.

CDAD patients are isolated as a standard procedure (single room or cohorts in a double room). All patients have their own toilet. Staff and visitors may enter the isolation room only after donning a protective gown and disposable gloves. Our infection control policy requires hygienic hand disinfection, followed by handwashing before leaving the room.

The isolation rooms are subjected to daily surface disinfection; initially this was done with Incidur, and since October 2007 the sporocidal product Perform has been used.

Since May 2007 the detection methodology has been expanded by culture of *Clostridium* and, in the event of a positive result, by toxin detection from the culture.

Initially, primary therapy consisted of enteral metronidazole 33500 mg, since 2004 of enteral vancomycin 43125 mg and since July 2007 of enteral vancomycin 43250 mg, with treatment given in all cases for a period of 10 days. As primary prophylaxis all patients are given daily probiotic yoghurt and additional prophylaxis with *Saccharomyces boulardii* after the first recurrence.

No distinction was made between nosocomial and non-nosocomial cases.

Data on the risk profile of our patient population for CDAD were taken from the hospital's nursing databank where the corresponding parameters are recorded daily.

The CDAD incidence density is based on CDAD cases for 1,000 patient days.

Results

Figure 1 shows the number of CDAD cases from 2003 to 2006 as well as the proportion of recurrences. Based on the total number of cases, the recurrence rate was 60 % in 2003, 14 % in 2004, 6 % in 2005 and 13 % in 2006.

With a CDAD incidence density (Figure 2; 90,747 patient days in 2003, 100,279 patient days

in 2004, 99,689 patient days in 2005, 96,736 patient days in 2006), 2004 and 2006 both showed a sharp increase compared, in each case, with the previous year, hence the CDAD incidence in that four-year period had tripled from 0.6 to 1.8 (referred to 1,000 patient days). The proportion of CDAD cases in the intensive care unit (ICU) was 5 % in 2003, 5 % in 2004, 8 % in 2005 and 12 % in 2006. That gives a CDAD incidence density for the ICU of 0.6; 1.1; 1.6 and 3.6 for the years 2003 to 2006 (based on patient days in ICU: 5,071 in 2003; 5,523 in 2004; 5,508 in 2005 and 5,525 in 2006).

Most CDAD cases were of sporadic onset and transmission was suspected in a total of four occasions for the period 2003 to 2007. In all cases this involved the roommates of a patient with diarrhoea before a positive CDAD stool result had been obtained.

The patients' risk profile for development of CDAD (age, hospital stay, frequency of antimicrobial therapy) has not changed in the course of five years.

The improvements in diagnosis seen since May 2007 thanks to culture of *C. difficile* in the event of a negative toxin detection test result and, possibly, toxin detection from the culture led to a rise in the number of positive *Clostridium* test results, from 19 % in 2006 to 31% in the second half of 2007 with an unchanging frequency of requests for testing. Figure 3 shows trends for 2007. In around half of cases it was possible to detect *Clostridium* toxin only after culture of the bacterium.

Since 2007 severe courses of CDAD are systematically recorded in our hospital as per the criteria of the Robert Koch Institute [1]. Two severe courses of disease were seen in 2007 and required ICU treatment. This was triggered in both cases by hypovolaemia and profuse diarrhoea that could not be controlled on a normal ward. No CDAD-associated fatal cases or need for surgical procedures were recorded.

Discussion

To our knowledge, the data presented here are the first of their kind to be published on prospectively recorded CDAD incidence densities in a German hospital for the period from 2003 to 2007. Hence there are no suitable reference values available for evaluation of the absolute increase in the CDAD incidence compared with other hospital departments. In the retrospective survey for 2006, which was conducted prior to the establishment of CDAD-KISS (KISS: German acronym for Hospital Infection Surveillance System), incidence densities between 0.1 and 3.1 cases per 1,000 patient days were recorded for nine German hospital departments [2], with the average being 0.6 cases. The CDAD reference data for 2007 based on the 34 participating hospital departments showed a mean incidence den-

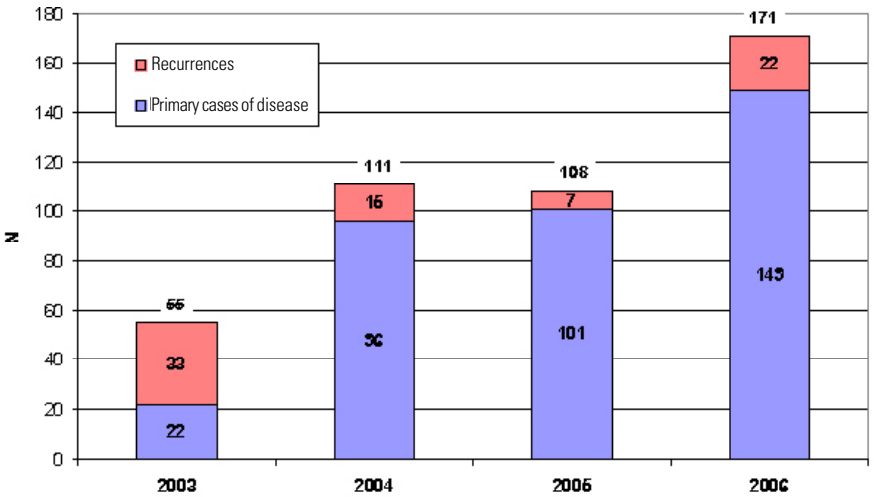

Figure 1: All CDAD cases from 2003 to 2006.

sity of 0.7 [3]. In terms of the incidence distribution, our values would therefore come within the upper third, something that is to be expected in view of our patients' pronounced risk profile.

In our survey we did not distinguish between nosocomial and non-nosocomial CDAD cases. However, virtually all our patients had been transferred from acute-care hospitals. If one uses onset of symptoms after more than 48 hours following hospital admission as the criterion for nosocomial aetiology, then virtually all CDAD cases seen in our hospital were nosocomial infections. It cannot be established whether the causative bacterium was contracted in the previous hospital or in our institution.

Given the essentially unchanged risk profile and unchanged infection control (hygiene) management policy, the sharp rise in the CDAD incidence during the observation period cannot be imputed to identifiable factors within the hospital. We therefore believe that this is more due to increasing enteral colonisation of our specific patient population with C. difficile. That could also explain the drastic rise in the CDAD incidence seen in our ICU in 2006. After all, our patients have all mainly behind them long hospital stays with numerous complications in ICUs of other hospitals.

Based on data from the German Federal Office of Statistics for 2003 to 2006, the frequency of the discharge diagnosis "*C. difficile* enterocolitis" has quadrupled in Germany [4]. Based on objective data, our findings thus corroborate the general impression of a sharply increasing CDAD incidence throughout Germany.

We attribute the drop in the CDAD recurrence rates seen in our patients as from 2003 mainly to the change in the treatment regimen from metronidazole to vancomycin, which was made because of our impression of unsatisfactory metronidazole efficacy. The superiority of vancomycin versus metronidazole for treatment of both primary and recurrent disease has been repeatedly documented in the literature [5,6,7].

Making provision for stool culture in the event of a negative toxin detection result is recommended in general to enhance sensitivity of CDAD diagnosis [8,9]. In that respect, we noted a surprisingly sharp rise in positive results, with a positive toxin-detection test result being obtained in around 50 % of cases only from the *Clostridium* culture.

The diarrhoea prevalence among our patient population is high and there are myriad reasons for this (apart from CDAD, in particular antibiotic-mediated disruption of intestinal flora, feeding-tube nutrition, autonomic neuropathies). Concomitantly, asymptomatic colonisation with a high proportion of toxin-producing *Clostridium* strains is suspected in our patients. In an American study, the rate in a comparable population was 50 % [10]. It must therefore be assumed that expanded diagnostic methods that are also able to detect toxin-producing C. difficile even at a lower concentration result in a higher number of non-relevant CDAD diagnoses, and hence in overtreatment.

In summary a high, and in recent years sharply rising, CDAD incidence has been seen in the early neurological rehabilitation setting. However, the number of severe courses of disease seen was not above average. At least in this setting, the CDAD incidence is very closely related to the method chosen for toxin detection. That should be borne in mind when comparing the incidence rates for different hospitals. This is also especially true in the case of the CDAD-KISS endeavour launched by the German National Reference Centre.

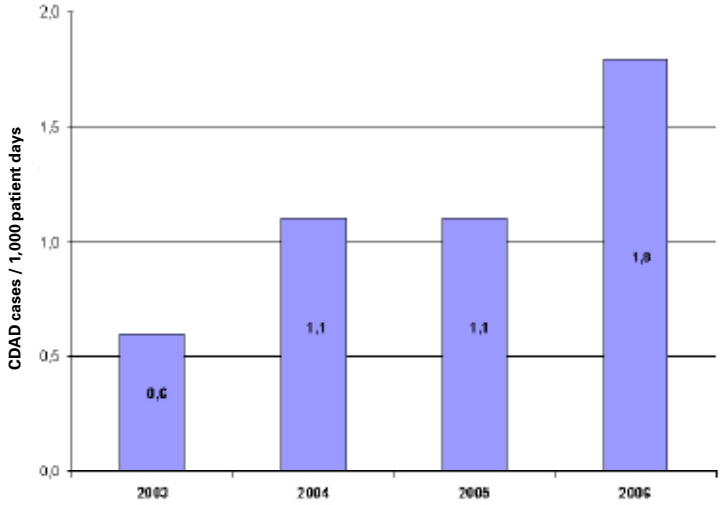

Figure 2: CDAD incidence density from 2003 to 2006.

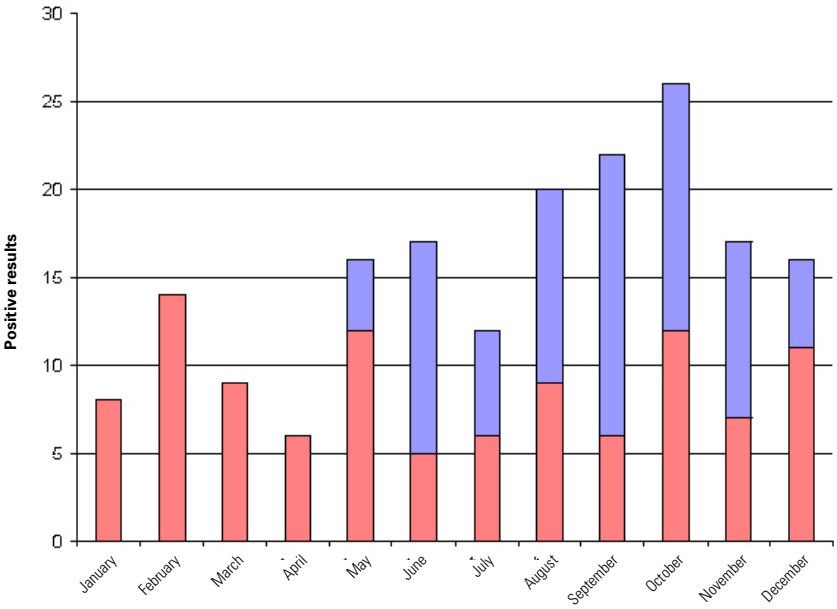

Figure 3: CDAD findings for 2007 after expansion of the diagnostic method. Pink: toxin from stools positive; purple: toxin positive only in Clostridium culture.

Conflict of Interest

The authors declare that there is no conflict of interest as understood by the International Committee of Medical Journal Editors.

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