Journal of Positive Psychology & Wellbeing
2022, Vol. 6, No. 4, 450-454
http://journalppw.com
ISSN 2587-0130

Clostridium Difficile Role Of Family Physicians, Nurses, Dietitian And Clinical Laboratory In The Management

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Abstract

Diagnosing a C. difficile infection (CDI), treating patients, and managing recurrences is a complex process that lacks a complete and thorough understanding of the necessary measures to enhance patient care. This research aims to highlight the lack of diverse viewpoints in considering the issues faced in optimizing care delivery. It specifically focuses on the role of family physicians, nurses, dietitians, and clinical laboratories in managing clinical practice and healthcare system-related challenges. The incidence of Clostridioides difficile infection (CDI) is increasing, leading to higher healthcare expenses for patients as a result of prolonged hospital stays, diagnostic procedures, and medication usage. The reporting of CDI management in primary care worldwide is inadequate. General practitioners offer appropriate outpatient treatment for mild initial cases of Clostridioides difficile infection (CDI) with oral metronidazole. If a person continues to experience diarrhea even after receiving the correct treatment for Clostridiodes, it should be seen as an early indication that a recurrence may occur.

Keywords: *appropriate outpatient treatment for mild initial cases of Clostridioides difficile infection (CDI) with oral metronidazole*

Introduction

The bacteria known as Clostridioides difficile, often known as C. difficile, is one that frequently colonizes the large intestine cavity of humans. Generally speaking, colonization by C. difficile is not dangerous since the growth of this bacterium is inhibited by other bacteria in the digestive tract. On the other hand, C. difficile is capable of growing in its vegetative form under specific circumstances, such as when antibiotics are administered or after operation on the gastrointestinal tract. This allows it to produce toxins that are harmful to the intestinal epithelium. Some of the symptoms that can be caused by a toxic C. difficile infection (CDI) include diarrhea, nausea, and stomach pain. Additionally, other symptoms such as fever and loss of appetite can also be caused by this infection [1,2]. Septic shock, pseudomembranous colitis, and even death are among potential complications that might arise from a more severe case of CDI. According to statistics provided by the European Centre for Disease Prevention and Control, the mortality rate associated with CDI is approximately 4%. This mortality rate is higher among those who are elderly, weak, hospitalized (including in intensive care units), and more. On the other hand, considering the difficulties associated with precisely attributing death to CDI, the fourth percent fatality rate might be an underestimate. According to the statistics collected in England during the 2020/21 fiscal year, for instance, the 30-day all-cause fatality rate of CDI is closer to 13% [3].

Some aspects of the burden of CDI are relatively well understood, such as the costs of healthcare and mortality rates; however, additional research and validation is required on the challenges that clinicians and patients face when attempting to arrive at a diagnosis of CDI, accessing treatment options, and managing infections, including dealing with recurrences [4].

It has been observed that the incidence rates of hospital-acquired C. difficile infection (CDI) have remained rather stable over the past decade [4]. These rates range from eight to two infections per one hundred patient days in both Europe and the United States. On the other hand, due to the overall burden that this infection poses, the Centers for Disease

Control and Prevention have classified it as one of the viruses that constitute a "Urgent Threat" to the public's health [5]. It is estimated that CDI was responsible for 250,000 clinical infections in the United States alone in 2013, and it was linked to as many as 13,000 deaths in that same year. Each year, there are around 40,000 inpatients in European hospitals who are possible candidates for a diagnosis of CDI [6].

Incidence of C. difficile infection is strictly associated with antimicrobial exposure, since an antibiotic-driven shift in the composition of intestinal microbiota results in a loss to colonization resistance and, in the colonized host, antibiotic exposure possibly contributes to the pathogenesis of active infection through impairment of secondary bile acid production. In particular, the production of the primary bile acid taurocholate induces C. difficile by stimulating spore germination. Additionally, antimicrobial-induced depletions of gut bacteria may affect the capacity of the host to convert primary bile acid into secondary bile acid, which subsequently contributes to the development of active infection in a colonized host [7].

Nearly every category of antibiotics has been linked to the infection, with fluoroquinolones, penicillins, cephalosporins, and clindamycin being the ones that pose the greatest threat. The age of the patient, which must be at least 65 years old, is another significant risk factor for the development of chronic obstructive pulmonary disease (CDI), with a relative risk that can be up to ten times higher than that of younger individuals [8]. Other known risk factors for C. difficile infection include hospitalization, surgery on the gastrointestinal tract, a compromised immune system, organ transplantation, chemotherapy, inflammatory bowel disease, chronic kidney disease, environmental contamination, exposure to a

known C. difficile carrier, and having received a previous diagnosis of CDI. However, the role of gastric acid suppression is still a contentious issue [9].

Review:

Since the year 2000, the prevalence of CDI has been steadily climbing across both North America and Europe, with the highest incidence rates being seen in individuals who are elderly. Due to the fact that the prevalence of CDI has been on the rise, nationwide infection prevention strategies have been developed. In 2014, a survey was conducted and published, and the results showed that approximately fifty percent of European countries had released a national guideline for the prevention of CDI [10]. In Germany, severe instances of CDI are required to be reported to government health authorities, whereas in the United Kingdom, individual hospitals are required to report occurrences of CDI to the public. In addition, many CDI surveillance strategies for acute care hospitals have been evaluated and tried in various European territories [11]. In Italy, there is a paucity of solid data on the epidemiology of CDI at the national level, and there has not been a comprehensive program for surveillance of CDI that has been adopted up until this point. When it comes to the burden of CDI in Italy, the information that has been published originates from a single hospital or a small number of institutions. Furthermore, the information is frequently retrospective, and the incidence that has been recorded is highly variable [12]. There is a possibility that this variety is at least partially attributable to the fact that different laboratories employ different diagnostic approaches. Because of this, it is necessary to conduct a prospective survey across the entire country in order to better evaluate the incidence of CDI in Italian hospitals. Additionally, a uniform diagnostic procedure should be utilized, particularly in medical wards, which are responsible for the bulk of the cases that have been recorded [12].

CDI appears to be associated with a worse outcome, with a three-time greater in-hospital overall mortality compared to patients who did not have CDI (16.5% versus 6.7%). Furthermore, in nearly half of the cases (46%) CDI was judged to be related to patient death. This is a significant conclusion from our research. Throughout the course of history, the fatality rate that was attributed to CDI was deemed to be modest (less than 2% of cases). Nevertheless, more recent research has

indicated a significant rise in the mortality and case-fatality rates associated with CD, which is in line with the data that we have previously obtained. In addition, the results of our study showed that CDI was linked to a much longer hospital stay (which was doubled), which further supports the notion that this infection has a large impact on the economy [13].

Concerning the management of CDI, recurrence is one of the most significant obstacles that must be overcome. Our period of observation, which is four weeks after the completion of antibiotic treatment for CDI and actually approximately six weeks after the diagnosis of CDI, is somewhat shorter but quite comparable to the period of observation that is indicated by international guidelines to define the presence of recurrence, which is eight weeks after the beginning of a previous episode of CDI [13]. In the most recent trial, approximately fifteen percent of patients experienced a recurrence, which happened primarily during the first two weeks of follow-up. Although this recurrence rate is slightly lower than some of the earlier data, it is still clinically significant; from this point of view, it will be fascinating to watch in the future the impact, in real-life situations, of novel treatments for CDI that have been associated with a decreased risk of recurrence [14].

The majority of the predisposing factors that we discovered to be strongly connected to CDI are consistent with those that were described in earlier research [14]. These factors include a positive history for the illness, the use of antibiotics, recent hospitalization, and aged individuals. Particularly, antibiotic use has been demonstrated to be a strong predictor of CDI, despite the fact that approximately one-third of our patients who were affected by CD had a history of taking antibiotics without any adverse effects. Our findings indicate that the presence of a current or recent antibiotic course should not be the main factor in determining whether or not a clinical suspicion of diarrhea caused by CDI should be addressed. The significance of this argument

cannot be overstated when it comes to outpatients [15], who may be at a greater risk of incomplete diagnosis. The fact that females looked to be at an elevated risk of CDI was another one of our study's unique findings. This discovery has not been reported before and will require further investigation on the part of researchers. During the course of our research, we found that patients who were currently on proton-pump inhibitors exhibited a tendency toward a higher incidence of CDI. This topic has been the subject of a number of studies, and our findings appear to lend credence to the findings of recent meta-analyses that have demonstrated a fifty to sixty-five percent increase in the occurrence of cognitive dysfunction in patients who are on proton-pump inhibitors [15]. However, there have been issues expressed over the quality of the evidence supporting this correlation. In order to properly investigate the causal relationship between proton-pump inhibitors and CD-associated diarrhea, further studies, especially prospective ones, are required.

In order to maximize the effectiveness of CDI prevention and therapy, it is essential to have a laboratory diagnosis that is both quick and accurate. There are a variety of measures that can be used. On the other hand, the best appropriate method for diagnosis is still a matter of controversy, and fairly recent discoveries have raised concerns about the possibility of overdiagnosis rather than under-recognition of the illness [16]. When attempting to diagnose CDI, it is recommended that a two- or three-stage protocol be utilized. This strategy involves the confirmation of a positive first test with one or two confirmatory tests or a reference method. Additionally, the percentage of false negative for toxins among patients with positive GDH was substantial, and this was largely corrected by a molecular method (the real-time PCR assay Xpert® C. difficile). The two-step EIA method for detecting C. difficile GDH and A and B toxins showed a very high specificity (more than 95%) in many of the experiences that were conducted. A two-step algorithm that includes EIA GDH and toxins when both tests are positive, as well as an extra molecular test (or toxigenic culture) for toxins in the case of GDH+/TOX– samples by EIA, and our findings indicate the value of this algorithm [17].

The vast majority of the strains that were obtained during this research were of the ribotype 018 or 356/607 kind. These ribotypes are phylogenetically related and comprise the majority of the population in Italy. It is particularly important to note that infection with ribotype 018 is linked to complex CDI. Over the course of the past few years, hypervirulent strains 027 and 078 have emerged as more prominent causes of CDI in Italy [18].

Conclusion:

In the acute care context, the presence of Clostridium difficile (C. difficile) infection poses a difficult situation. Staff nurses play a crucial role in promptly identifying, diagnosing, and treating patients with this bacterial infection. The review covers crucial details on C. difficile, such as its pathophysiology, risk factors, patient presentation, diagnosis, and treatment modalities. Given the scarcity of hospital resources, primary care plays a vital role in mitigating the expected influx of numerous patients seeking emergency department services. However, while the overall influence of primary care on clinical results in patients with community CDI has been examined in other European nations, there are little studies available on this topic in France. Recent studies on the United States and Europe indicate that community-acquired infections contribute to approximately 27-41% of all cases of CDI. Toxigenic C. difficile has been found as the third most prevalent bacterial cause of community-associated diarrhea in numerous countries, according to a multicenter point-prevalence investigation. Key priority actions identified by over 50% of survey participants in at least three out of the five countries surveyed include: creating new and inventive products to prevent recurrences; promoting a multidisciplinary approach to patient care (in the UK, Australia, and France); revising diagnosis and treatment guidelines; and providing education and support to primary care professionals and non-experts in CDI management, such as clinical laboratory staff, nurses, and dietitians. The involvement of family physicians is crucial in managing C. difficile, alongside the aforementioned healthcare professionals.

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