

Factors associated with death in patients with *Clostridium difficile* infection in a French university hospital

Nagham Khanafer^{1, 2}, Frédéric Barbut³, Catherine Eckert³, Clarisse Demont⁴, Christine Luxemburger⁴, Michel Perraud², Philippe Vanhems^{1, 2}

¹University of Lyon, Lyon, France; ²Epidemiology and Infection Control Unit, Edouard Herriot Hospital, Hospices Civils of Lyon, Lyon, France; ³Natioanal Reference Laboratory for

Clostridium difficile Saint Antoine Hospital and UPMC, Paris, France; ⁴Sanofi Pasteur, Lyon, France

Background and objective 1

Clostridium difficile has emerged as an important health-care associated pathogen. *C. difficile* infections (CDI) contribute significantly to increase patient morbidity, mortality, and hospital costs. During the last decade, many studies reported that CDI severity, complications, and related deaths had substantially increased. Our objective was to describe the prognosis of patients suffering from diarrhea related to *C. difficile* and to identify factors associated with death by day 60 (D60) in patients with confirmed CDI.

Material and methods 2

A three years prospective cohort study was conducted at Edouard Herriot Hospital, a University Hospital in Lyon, France. All hospitalized patients (≥ 18 years), suffering from diarrhea related to *C. difficile* and who signed an informed consent were included and followed up to D60 after diagnosis. A CDI case was defined by a positive result of Enzyme-immunoassay of toxins or by a positive toxigenic culture result. Collected data were: age, gender, co-morbidities, hospitalization information, exposure to potential risk factors of CDI, clinical symptoms, microbiological and biological tests, and outcome. Severe CDI was defined as pseudomembranous colitis or complications related to CDI e.g. megacolon, colectomy, intestinal perforation, septic shock requiring intensive care unit admission. The origin of acquisition of CDI: health care-associated, community-acquired, or unknown, was defined as recommended by National and European guidelines. A multivariate Cox regression model was used to identify factors associated with death by D60. Risk was expressed as adjusted Hazard Ratio (aHR) with 95% confidence interval (95% CI). Statistical analyses were performed with SPSS (version 17.0 for Windows, SPSS, Inc., Chicago, IL, USA) and 2-tailed $P < 0.05$ was regarded as the threshold of statistical significance.

Results 3

Between February 2011 and February 2014, 233 patients with confirmed CDI were included. The mean of age was 65.3 years and there were more men than women (52.5% vs 47.5%). Most of CDI episodes were hospital-acquired (75.5%). The remaining cases were community-acquired (19.6%) and for indeterminate origin (4.9%). The crude mortality rate within 60 days after diagnosis was 15.9%. Death was related to CDI in 15 of the 37 deceased patients (40.5% of deceased cases). Factors associated with death within 60 days in patients with CDI are presented in table 1.

Table 1. Multivariate Cox regression analysis: factors associated with death at day 60 in patients with CDI

	aHR	95%CI	P
Severe CDI	12.08	5.53-26.38	$<10^{-3}$
Age >68 years	3.53	1.45-6.55	0.003
Cancer	3.53	1.72-7.26	0.001
Diabetes mellitus	1.85	0.94-3.64	0.08
Neurological diseases	2.18	1.08-4.40	0.03

Conclusion 4

Our study showed an overall mortality of 15.9% among patients suffering from CDI. Multivariate analysis showed that age >68 years, severe CDI, malignancy and neurological diseases were independently associated with mortality in CDI patients. Some of these factors, which are readily available at the time of diagnosis, can be used for outcome prediction and to identify high risk patients who could benefit from closer monitoring or more aggressive therapy.

Contacts: Nagham Khanafer (naghamkhanafer@hotmail.com) & Philippe Vanhems (philippe.vanhems@chu-lyon.fr)