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Brief Report

Impact of COVID-19 prevention measures on risk of health care-associated *Clostridium difficile* infection

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A B S T R A C T

Clostridium difficile is the most common pathogen between health care-associated infections and its incidence has increased during the last years. Lack of enough evidence about effective hygiene interventions to prevent this disease. Due to the coronavirus disease 2019 (COVID-19) pandemic, several strategies to reduce microorganism spread were adopted in hospital setting. The objective of this study was to establish whether such strategies can reduce health care associated *C difficile* infection (HA-CDI) incidence. We found that, during the pandemic (2020) HA-CDI incidence was significantly lower with respect to the previous years. This work demonstrates that maintaining this level of attention regarding control activities related to prevention of microorganism transmission significantly reduce HA-CDI and related expenses in terms of health costs and human lives.

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BACKGROUND

Clostridium difficile (CD) is the most common pathogen among health care-associated (HA) infections.^{1,2} An important obstacle in prevention of *C difficile* infection (CDI) is the lack of enough evidence about effective hygiene interventions to prevent this disease. Although preventive contact precautions are recommended, there are no sufficient data on their effectiveness for its prevention.^{3,4} Due to the coronavirus disease 2019 (COVID-19) pandemic, several strategies to reduce microorganism spread were adopted in hospital

setting.⁵ The objective of this study was to establish whether such strategies can reduce HA-CDI incidence. The primary task was to identify differences on HA-CDI incidence in medical wards before and during the COVID-19 pandemic. The secondary task was to evaluate if severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection could influence the incidence of CDI.

METHODS

We conducted a retrospective analysis on medical wards' discharges (n. 1617) in S. Andrea Hospital (Rome) from March 1 to June 30, 2020 comparing data before (2017, 2018, and 2019) and during (2020) the COVID-19 pandemic. Intensive care units and paediatric wards were excluded. CDI diagnosis was confirmed by clinical suspicious (presence of diarrhea defined as ≥ 3 unformed stools in 24 hours) plus stool tests positive for CD. HA-CDI incidence was depicted as CDI diagnosed ≥ 72 hours after admission per 100 total discharges. Data was collected using Excel Office, and χ^2 test was performed to detect differences in HA-CDI incidence between different groups. Value of $P < .05$ was considered as significant.

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Table 1.

Data from medical departments between March, 1 and June, 30

	Discharges	Number of HD-CDI	HA-CDI incidence
2017	422	39	0.092
2018	348	25	0.072
2019	364	24	0.066
2020 (Covid-19 free)	333	11	0.033*
2020 (Covid-19)	150	7	0.047

During 2020 Covid-19-free departments shown lower incidence of HA-CDI compared to the previously years (* $P < .05$). Covid-19 departments shown higher HA-CDI incidence than Covid-19-free departments of the same year (not significant).

RESULTS

The number of discharges and HA-CDI diagnosis for each medical ward is reported in Table 1. No statistically significant difference of HA-CDI incidence between years 2017, 2018, and 2019 was observed. Conversely, during the pandemic (2020) HA-CDI incidence was significantly lower with respect to 2017 (odds ratio [OR] = 2.98; $P = .002$), 2018 (OR = 2.27; $P = .023$) and 2019 (OR = 2.07; $P = .047$) (see Table 1 and Fig. 1). Interestingly, during 2020, COVID-19 departments showed higher HA-CDI incidence respect to Covid-19 free wards (not significant). This data suggests SARS-Cov2 infection as a possible risk factor for CDI in agreement with recent evidences that report altered gut microbiota in COVID-19 patients.⁶ Further studies are needed to confirm this hypothesis.

DISCUSSION

CDI incidence has increased from 4.5/1000 adult discharge in 2001 to 8.2/1000 discharge in 2010⁷ with annual health care costs

that exceed \$1.5 billion in the United States.⁸ Several studies have been carried out to identify CDI prevention strategies in hospital setting. Although contact precautions, personal protective equipment (PPE) employments and healthcare workers hygiene education are strongly recommended, as of today, evidence for their effectiveness in CDI prevention is still weak.^{3,4} Although within a limited period of observation, this work provides evidences for such strategies' effectiveness in reducing HA-CDI incidence. From the beginning of the pandemic, PPE (surgical masks, latex gloves, and disposable medical coats) were employed by health care workers and a greater attention has been paid to frequent handwashing and surfaces disinfection. Relatives' visits to patients were limited to only one family member at a time and were reduced from 2 to 1 time per day. Each visitor had to wear PPE described above and adopt the social distancing measures recommended by the World Health Organization (WHO). We report a significant reduction of HA-CDI incidence while using these precautions. Our study does not tell which one of the prevention measures adopted during emergency played a major role in this modification. Previous studies demonstrated that intensified hand-hygiene practices alone were not effective in preventing CDI.⁴ We can therefore speculate that all practices described above adopted in their complex along with greater attention paid by health personnel have led to lower CD spread. HA infections frequency is an indicator of the health care quality. Previous studies demonstrated how health workers' hygiene errors are at the base of microorganism spread in hospital setting: in particular, protocol deviations during PPE donning and doffing are common and cause self-contamination.⁹ The COVID-19 emergency has led to extraordinary levels of attention by all health care personnel regarding control activities related to prevention of microorganism transmission. This study demonstrates that maintaining this level of preventive measure over time would significantly reduce HA-CDI and related expenses in terms of health costs and human lives.

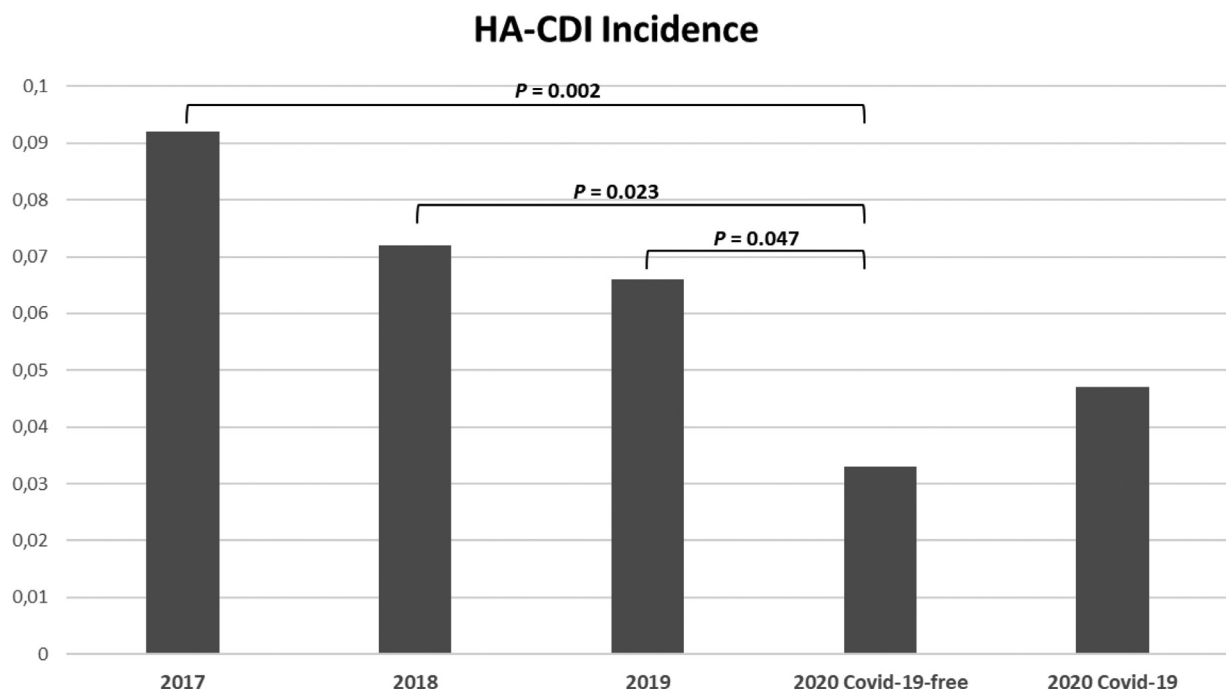


Fig 1. Data from medical departments between March, 1 and June, 30, 2020. During 2020 Covid-19-free departments shown lower incidence of HA-CDI compared to the previously years (* $P < .05$). Covid-19 departments shown higher HA-CDI incidence than Covid-19-free departments of the same year (not significant).

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