Acinetobacter baumannii: a known pathogen, a new problem

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Dear Editor,

Acinetobacter baumannii causes a series of infections in healthcare settings and the community, the main ones highlighted in Figure 1. Healthcare-associated infections are commonly observed in patients with severe conditions. Some risk factors, such as immune suppression, burns, severe trauma, long periods of hospitalization, and invasive procedures (such as catheters and mechanical ventilation), contribute to the development of infections caused by *A. baumannii*.[1] Therefore, this article provides a quick review of the literature on infections caused by *A. baumannii* and discusses their relevance during the COVID-19 pandemic.

The World Health Organization (WHO) classified *A. baumannii* as an important threat to human health, and the infections caused by it require the use of specific antibiotics.[2] In this context, carbapenems would currently be the antibiotics of choice against infections caused by multidrug resistant (MDR) *Acinetobacter* spp. It is worth noting, however, that the severity of infections and the mortality rate increase when these infections are caused by carbapenem-resistant strains of *A. baumannii* (CRAB). In healthcare settings, CRAB strains can rapidly contaminate patient care settings and the hands of healthcare professionals. Additionally, these strains can remain viable for extended periods on dry surfaces and can be spread by colonized but asymptomatic people, making CRAB outbreaks challenging to control.[3]

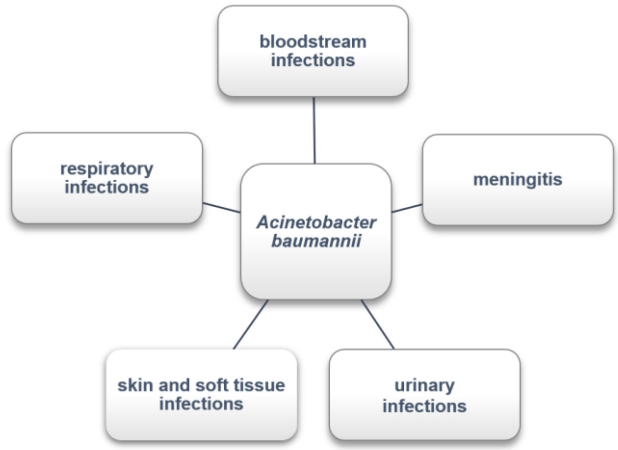

Figure 1. The most common infections associated with *A. baumannii*

The 2019 Antibiotic Resistance (AR) Threat Report from the Centers for Disease Control and Prevention (CDC) classified different bacteria and fungi according to health threats based on data and estimates regarding deaths and infections arising from continued antibiotic resistance. CRAB is in the category of urgent threats. It is worth mentioning that, in 2013, CRAB was already listed as a serious threat in the AR Report. The threat level was escalated to urgent due to the emergence of easily spread resistance in *Acinetobacter* spp. and the lack of current antibiotics and antibiotics in development to treat these infections.[4]

Recently, O'Donnell and colleagues carried out a survey of viable treatment options for patients with severe infections caused by CRAB.

Received: 08 October 2023; revised: 03 December 2023; accepted: 06 December 2023.

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Published December 2023

ISSN 2248 – 2997
ISSN – L = 2248 – 2997

Even though the WHO and the CDC recognize it as an urgent threat pathogen, the optimal treatment for these patients remains poorly defined. Most clinical and preclinical data generally report the use, alone or in combination, of tetracyclines, polymyxins, and a betalactam plus sulbactam, highlighting that some of these treatment regimens present a high risk of nephrotoxicity. Newer agents, such as cefiderocol and eravacycline, have been tested and shown "in vitro" activity, but their clinical efficacy has not yet been fully established.[5] This review work confirms that it is essential for new agents with good in vitro activity, proven clinical efficacy and acceptable tolerability to be developed.

One of the greatest dangers to public health in the current century is antimicrobial resistance and effective control measures using biocides are of great value in protecting health. With the COVID-19 pandemic caused by SARS-CoV-2, a considerable threat to global health was created, and the increasing use of sanitizing solutions and antibiotics was installed to avoid the spread of COVID-19.

It is known that antibiotics do not directly affect the viruses; however, certain cases of bacterial pneumonia superimposed on viral infection have been observed in patients suffering from COVID-19. Furthermore, mechanical ventilation is associated with most hospital-acquired pneumonia cases, requiring antibiotic intervention. This association between mechanical ventilation and cases of pneumonia is worrying, given that many patients with severe COVID-19 are admitted to an intensive care unit, requiring, in some cases, the use of respirators and/or the administration of antibiotics.[6,7]

Many of these patients are treated with empiric broad-spectrum antibiotic therapy, which increases the risk of developing infections caused by multidrug-resistant (MDR) pathogens,[8] such as members of the *Acinetobacter* genus. Infections caused by MDR *A. baumannii* represent a significant problem in patients admitted to intensive care units.

Studies carried out by Russo and collaborators (2021) brought a warning that the development of bloodstream infections caused by MDR *A. baumannii* in patients with COVID-19 further complicates the hospital course and contributes to the high mortality rate of the population in the study.[6] Unfortunately, this is not an isolated case. Since 2021, several scientific articles have been published reporting co-infections with *A. baumannii* in patients with COVID-19 in different countries, including Brazil.[8-12]

In 2022, the CDC published a special report on the impact of COVID-19 on antimicrobial resistance in the United States. Overall, the data showed a frightening increase in resistant infections between 2019 and 2020, with several healthcare facilities reporting CRAB outbreaks in 2020. Cases involving this group of microorganisms increased globally by 35% in 2020 compared to 2019. The report highlights that the possible factors that contributed to this were the exponential increase in the number of more debilitated patients, especially in intensive care units, the more extended period of hospitalization, and even the shortage of personnel and protective equipment.[13] In Brazil, some recent studies have already reported that in the post-pandemic period, there was an increased incidence of CRAB infections in different hospitals compared to pre-pandemic periods.[14]

Another point directly linked to antibiotic resistance deserves to be highlighted. Various sanitizing agents have been widely used to reduce the transmission and survival of SARS-CoV-2 on objects and surfaces. However, several studies have linked antibiotic resistance to using common household disinfectants, such as triclosan and alcohol-based products. Pathogens from the ESKAPE group – which also includes members of the *Acinetobacter* genus – and different species of fungi have already demonstrated resistance to antibiotics and some sanitizers.[15]

With excessive use to contain the spread of COVID-19, the concentration of disinfectants and antibiotics has also been rapidly increasing in various environments such as wastewater, surface water, soils, and sediments, which can result in a wide-ranging health impact for humans and animals. Horizontal gene transfer between bacteria further increases the spread of antibiotic resistance genes. It should also be noted that this dissemination through the food chain places organisms at the highest levels, such as humans, at a higher risk of bioaccumulation and biomagnification.

In summary, it is still uncertain how the COVID-19 pandemic may further affect antimicrobial resistance. An important key point for controlling infections caused by strains of MDR *Acinetobacter* spp. consists of detecting its presence in a hospital or long-term care facility early to control or prevent its aggressive spread. These control measures must be based on the main modes of transmission of this microorganism (Figure 2), being successful when the source is identified and eliminated. These measures, in association with more stringent antimicrobial stewardship protocols, could also prevent the rise of antibiotic resistance.

Figure 2. Primary forms of transmission of *Acinetobacter* spp. in healthcare settings

Author contributions: RCM, RCRM and GLR contributed to writing, analyzing and approval for final submission. GLPAR and JSN contributed to ideas generating, supervision and approval for final submission. All authors read and approved the final version of the manuscript.

Conflicts of interest: All authors – none to declare.

Funding: The authors wish to thank the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) and Fundação de Amparo à Pesquisa do Estado do Rio de Janeiro (FAPERJ) for the research grants to JSN, used for translation services and writing of the article, and Instituto Federal de Educação, Ciência e Tecnologia do Rio de Janeiro (IFRJ) for encouragement for the preparation and decision to submit the article for publication. Apart for this, the funding sources had no role in study design, or in the collection, management, analysis, and interpretation of data.

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Please cite this article as:
Monteiro RC, Malta RCR, Rodrigues GL, Ramos GLPA, Nascimento JS. *Acinetobacter baumannii*: a known pathogen, a new problem. GERMS. 2023;13(4):381-384. doi: 10.18683/germs.2023.1408