



Acta Medica Europa

Carbapenem Resistance in Gram-Negative Bacteria

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Dear Editor,

Carbapenem resistance in enteric Gram-negative bacteria (GNB) has emerged as a global public health threat, severely compromising our ability to treat life-threatening infections. These "last-resort" antibiotics were once considered infallible, but their efficacy is now crumbling under the relentless pressure of bacterial evolution and inadequate infection control practices. As the tide of carbapenem resistance rises, this letter aims to sound the alarm and call for concerted action to stem its detrimental impact. Several factors contribute to the rampant spread of carbapenem-resistant GNB (CR-GNB). The potent activity of carbapenems often leads to their overuse and misuse, creating a strong selective pressure for resistant strains. Additionally, the ease of horizontal gene transfer, mediated by plasmids, facilitates the dissemination of carbapenemase-encoding genes across diverse bacterial species. This alarmingly quick transmission of resistance across geographical boundaries further exacerbates the problem (1-4).

The clinical consequences of CR-GNB infections are dire. They are associated with increased morbidity, mortality, and healthcare costs. Patients with infections caused by these "superbugs" face limited treatment options, often relying on older, less effective antibiotics with increased toxicity and narrower spectrums. This predicament underscores the urgent need for novel therapeutic strategies and effective infection control measures. To combat this escalating threat, a multi-pronged approach is necessary. Strengthening antimicrobial stewardship programs through education, guideline implementation, and diagnostic optimization is crucial to limit indiscriminate carbapenem use. Furthermore, robust infection control practices, including hand hygiene, environmental decontamination, and appropriate patient isolation, are vital to restrict CR-GNB transmission within healthcare settings. Investing in research and development of new antibiotics and alternative therapeutics against CR-GNB is critical. Exploring novel antimicrobial strategies, such as phage therapy and monoclonal antibodies, also holds promise in tackling this challenge. Additionally, surveillance systems must be enhanced

to monitor resistance trends and inform targeted interventions (4-7).

Finally, international collaboration is crucial. Sharing knowledge, expertise, and resources across borders is vital to combat the global threat of CR-GNB. This includes harmonization of surveillance methods, standardization of diagnostic tests, and joint research efforts focused on developing new prevention and treatment strategies. Carbapenem resistance in enteric GNB is not a distant threat; it is a pressing reality in hospitals around the world. Failing to act swiftly and decisively will have devastating consequences. By uniting our efforts in antimicrobial stewardship, infection control, research, and global collaboration, we can hope to turn the tide and preserve the effectiveness of life-saving.

REFERENCES

1. Nordmann P, Poirel L. Epidemiology and Diagnostics of Carbapenem Resistance in Gram-negative Bacteria. *Clin Infect Dis*. 2019;69(Suppl 7):S521-S528. doi:10.1093/cid/ciz824
2. Jean SS, Harnod D, Hsueh PR. Global Threat of Carbapenem-Resistant Gram-Negative Bacteria. *Front Cell Infect Microbiol*. 2022;12:823684. Published 2022 Mar 15. doi:10.3389/fcimb.2022.823684
3. Lepe JA, Martínez-Martínez L. Resistance mechanisms in Gram-negative bacteria. *Med Intensiva (Engl Ed)*. 2022;46(7):392-402. doi:10.1016/j.medine.2022.05.004
4. Brink AJ. Epidemiology of carbapenem-resistant Gram-negative infections globally. *Curr Opin Infect Dis*. 2019;32(6):609-616. doi:10.1097/QCO.0000000000000608
5. Fritzenwanker M, Imirzalioglu C, Herold S, Wagenlehner FM, Zimmer KP, Chakraborty T. Treatment Options for Carbapenem-Resistant Gram-Negative Infections. *Dtsch Arztebl Int*. 2018;115(20-21):345-352. doi:10.3238/arztebl.2018.0345
6. Pintado V, Ruiz-Garbajosa P, Aguilera-Alonso D, et al. Executive summary of the consensus document of the Spanish Society of Infectious Diseases and Clinical Microbiology (SEIMC) on the diagnosis and antimicrobial treatment of infections due to carbapenem-resistant Gram-negative bacteria. *Enferm Infecc Microbiol Clin (Engl Ed)*. 2023;41(6):360-370. doi:10.1016/j.eimce.2022.06.014
7. Paul M, Carrara E, Retamar P, et al. European Society of Clinical Microbiology and Infectious Diseases (ESCMID) guidelines for the treatment of infections caused by multidrug-resistant Gram-negative bacilli (endorsed by European society of intensive care medicine). *Clin Microbiol Infect*. 2022;28(4):521-547. doi:10.1016/j.cmi.2021.11.025