



OPEN ACCESS

EDITED AND REVIEWED BY
Maria Teresa Mascellino,
Sapienza University of Rome, Italy

*CORRESPONDENCE

Marta Colaneri
✉ marta.colaneri@gmail.com
Andrea Gori
✉ andrea.gori@unimi.it

†These authors have contributed equally to this work and share first authorship

‡These authors have contributed equally to this work and share last authorship

RECEIVED 27 February 2025

ACCEPTED 04 March 2025

PUBLISHED 18 March 2025

CITATION

Scaglione G, Perego M, Colaneri M, Genovese C, Brivio F, Covizzi A, Viaggi B, Bandera A, Gori A, Finazzi S and Palomba E (2025) Corrigendum: Understanding the burden of antibiotic resistance: a decade of carbapenem-resistant Gram-negative bacterial infections in Italian intensive care units. *Front. Microbiol.* 16:1584655. doi: 10.3389/fmicb.2025.1584655

COPYRIGHT

© 2025 Scaglione, Perego, Colaneri, Genovese, Brivio, Covizzi, Viaggi, Bandera, Gori, Finazzi and Palomba. This is an open-access article distributed under the terms of the [Creative Commons Attribution License \(CC BY\)](https://creativecommons.org/licenses/by/4.0/). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Corrigendum: Understanding the burden of antibiotic resistance: a decade of carbapenem-resistant Gram-negative bacterial infections in Italian intensive care units

Giovanni Scaglione^{1,2†}, Matilde Perego^{3†}, Marta Colaneri^{1,4*}, Camilla Genovese^{1,2}, Fabio Brivio^{1,2}, Alice Covizzi¹, Bruno Viaggi⁵, Alessandra Bandera^{6,7}, Andrea Gori^{1,2,4*}, Stefano Finazzi^{3‡} and Emanuele Palomba^{1‡}

¹Department of Infectious Diseases, Luigi Sacco Hospital, Milan, Italy, ²Department of Biomedical and Clinical Sciences "L. Sacco", University of Milan, Milan, Italy, ³Laboratory of Clinical Data Science, Department of Public Health, Mario Negri Institute for Pharmacological Research IRCCS, Ranica, Italy, ⁴Centre for Multidisciplinary Research in Health Science (MACH), University of Milan, Milan, Italy, ⁵Department of Anaesthesiology, Neuro-Intensive Care Unit, Careggi University Hospital, Florence, Italy, ⁶Department of Pathophysiology and Transplantation, University of Milano, Milan, Italy, ⁷Infectious Diseases Unit, IRCCS Ca' Granda Ospedale Maggiore Policlinico Foundation, Milan, Italy

KEYWORDS

epidemiology, multidrug-resistant, intensive care unit, gram-negative, carbapenem-resistant, hospital-acquired infections

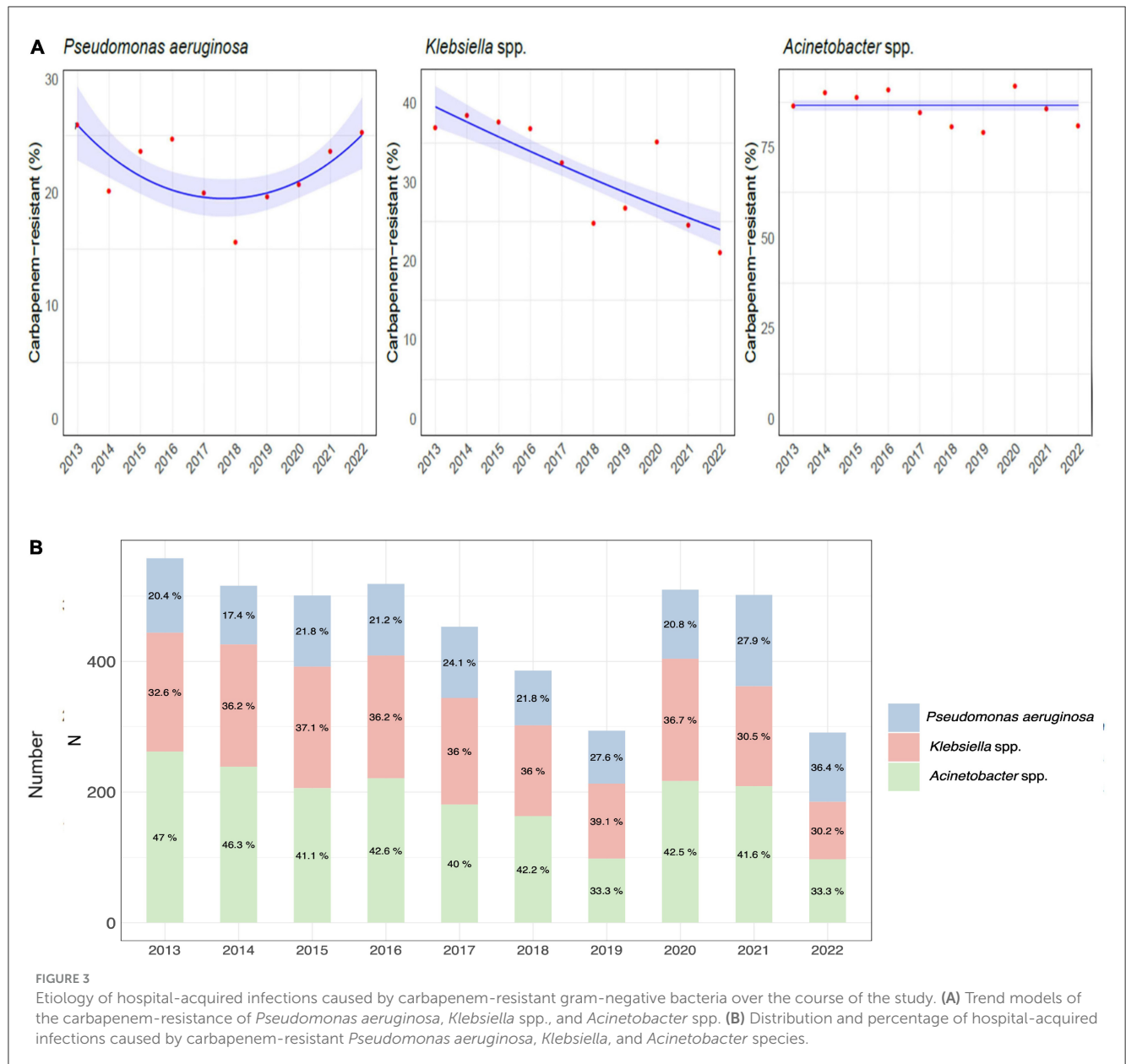
A Corrigendum on

Understanding the burden of antibiotic resistance: a decade of carbapenem-resistant Gram-negative bacterial infections in Italian intensive care units

by Scaglione, G., Perego, M., Colaneri, M., Genovese, C., Brivio, F., Covizzi, A., Viaggi, B., Bandera, A., Gori, A., Finazzi, S., and Palomba, E. (2024). *Front. Microbiol.* 15:1405390. doi: 10.3389/fmicb.2024.1405390

In the published article, there was an error in [Figure 3](#), page 6 as published.

In Panel B of [Figure 3](#) the percentage of carbapenem-resistant strains was not correct. The corrected [Figure 3](#) and its caption appear below.



In the published article, there was an error in Figure 6, page 8 as published.

In Figure 6 the percentage of carbapenem-resistant strains was not correct.

The corrected Figure 6 and its caption appear below.

In the published article, there was an error in Supplementary Table 2. The percentages of carbapenem-resistant *Acinetobacter* spp. strains were not correct. The corrected supplementary table has been published in the original article.

In the published article, there was an error in Supplementary Table 5. The percentages of carbapenem-resistant *Acinetobacter* spp. strains were not correct. The corrected supplementary table has been published in the original article.

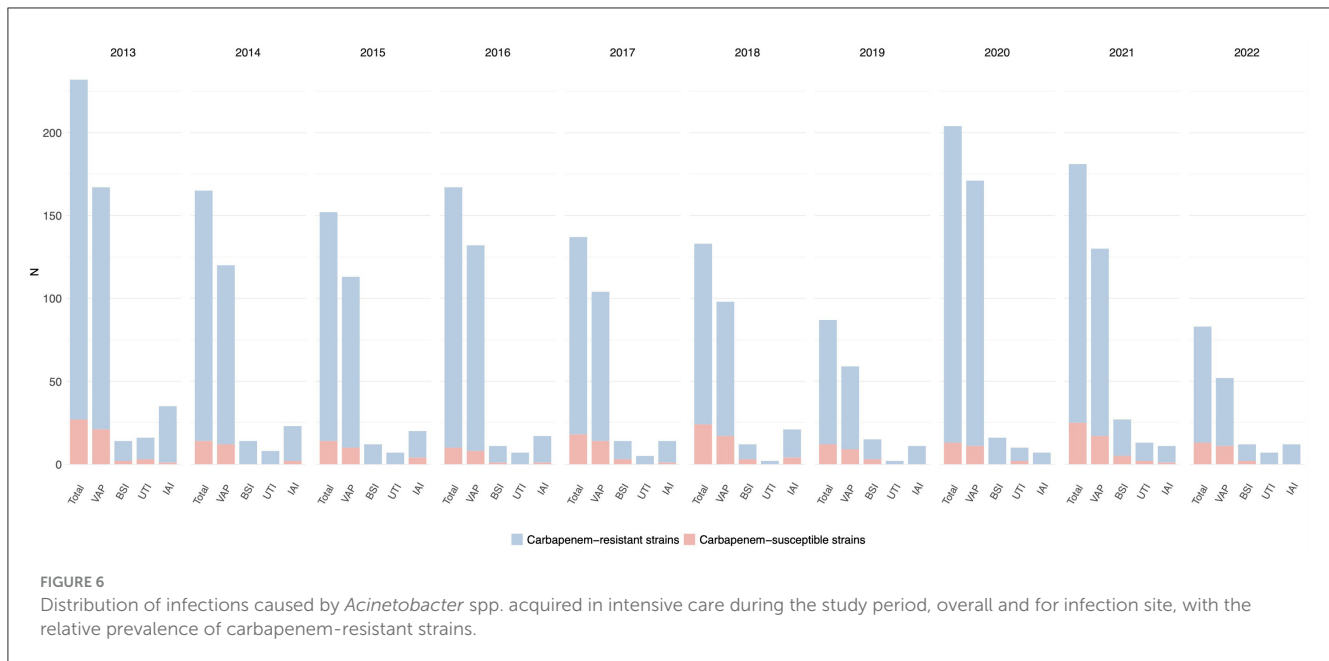
In the published article, there was an error. The percentages of carbapenem-resistant *Acinetobacter* spp. strains were not correct.

A correction has been made to Results, 3.2.3 *Acinetobacter* spp. Infections, page 7.

This sentence previously stated:

“*Acinetobacter* spp. was the least frequently isolated GNB of the three in study (2183/25966, 8.4%) and displayed the overall lowest rates of resistance to carbapenems (290/2183, 13.3%). This pathogen was mainly responsible for VAP (1146/9260, 12.4%) and to a lesser extent for IAI (171/1921, 9.0%), BSI (147/2940, 5.0%), and UTI (77/1959, 3.9%). The carbapenem resistance proportion was the highest in BSI (19/147, 13.0%), followed by VAP (130/1146, 11.3%), UTI (7/77, 9.1%) and IAI (14/171, 8.2%). Carbapenem-resistant *Acinetobacter* spp. rates varied greatly from one year to the other and this pathogen was most prevalent in the years 2019 (21%) and 2022 (19.2%)”

The corrected sentence appears below:



“*Acinetobacter* spp. was the least frequently isolated GNB of the three in study (2,183/25,966, 8.4%) and displayed the overall highest rates of resistance to carbapenems (1,893/2,183, 86.7%). This pathogen was mainly responsible for VAP (1146/9260, 12.4%) and to a lesser extent for IAI (171/1,921, 9.0%), BSI (147/2,940, 5.0%), and UTI (77/1959, 3.9%). The carbapenem resistance proportion was the highest in IAI (157/171, 91.8%), followed by UTI (70/77, 90.1%), VAP (1,016/1146, 88.7%), and BSI (130/147, 88.4%). Carbapenem-resistant *Acinetobacter* spp. rates varied greatly from one year to the other, with a peak of 91.9% in 2020.”

A correction has been made to **Discussion**, page 7.

This sentence previously stated:

“The findings of our study shed light on the epidemiology of HAIs in Italian ICUs over a ten-year period. Our analysis reveals a substantial burden of HAIs, with an average of 1.5 infections per patient over the study period, with high prevalence of CR-GNB, particularly *Pseudomonas aeruginosa*, *Klebsiella* and *Acinetobacter* species. This trend was mainly driven by *Klebsiella* spp. and *Pseudomonas aeruginosa*, with 31.4% and 21.8% of isolate showing this susceptibility profile, respectively. In particular, CR-GNB accounted for a third of IAI and a quarter of each VAP, BSI and UTI caused by these pathogens. Finally, during the SARS-CoV-2 pandemic, ICU-HAIs showed a peak in both incidence and CR-GNB rates, in contrast to a previously declining trend.”

The corrected sentence appears below:

“The findings of our study shed light on the epidemiology of HAIs in Italian ICUs over a ten-year period. Our analysis reveals a substantial burden of HAIs, with an average of 1.5 infections per patient over the study period, with high prevalence of CR-GNB, particularly *Pseudomonas aeruginosa*, *Klebsiella* and *Acinetobacter* species. This trend was mainly driven by *Klebsiella* spp. and *Pseudomonas aeruginosa*, with 31.4% and 21.8% of isolate showing this susceptibility profile, respectively. In particular, CR-GNB accounted for a third of IAI and a quarter of each VAP, BSI

and UTI caused by these pathogens. Notably, over the course of the decade, up to 90% of *Acinetobacter* spp. isolates retrieved showed carbapenem-resistant. Finally, during the SARS-CoV-2 pandemic, ICU-HAIs showed a peak in both incidence and CR-GNB rates, in contrast to a previously declining trend.”

A correction has been made to **Discussion**, page 8.

This sentence previously stated:

“In our cohort, *Acinetobacter* spp. caused less than one tenth of all ICU-acquired infections and showed the overall lowest rates of resistance to carbapenems (13.3%). This data is in contrast with European and national reports, where carbapenem-resistant strains account for up to one third of all isolates globally, with even higher percentages in Italy, where carbapenem-resistance in *Acinetobacter baumannii* reaches peaks of 88% (European Centre for Disease Prevention and Control, 2022). These differences may be explained by the higher prevalence of carbapenem-resistant strains in settings different than ICU, as other European studies have already observed (Said et al., 2021; Kinross et al., 2022). Furthermore, our analysis only included infections diagnosed by a physician and did not consider respiratory, intestinal and device colonisations, which are often characteristic of *Acinetobacter* species. Finally, we considered all *Acinetobacter* spp. strains, not focusing only on *Acinetobacter baumannii*, which may have partially lowered the overall prevalence of carbapenem-resistance. As confirmed by our findings, infections caused by *Acinetobacter* spp. typically exhibit a varied distribution, marked by sporadic outbreaks, thereby serving as an indicator for evaluating infection control and prevention strategies. The emergence of the SARS-CoV-2 pandemic has accentuated these distinctive patterns, highlighting avenues for enhancing management approaches (Mangioni et al., 2023b).”

The corrected sentence appears below:

“In our cohort, *Acinetobacter* spp. caused less than one tenth of all ICU-acquired infections and showed the overall highest rates of resistance to carbapenems (86.7%). This data is in line with European and national reports, where carbapenem-resistant

strains account for up to one third of all isolates globally, with even higher percentages in Italy, where carbapenem-resistance in *Acinetobacter baumannii* reaches peaks of 88% (European Centre for Disease Prevention and Control, 2022). These findings confirm an alarmingly high prevalence of carbapenem-resistant strains in infections among critically ill patients, a trend previously observed in other European studies outside the ICU (Said et al., 2021; Kinross et al., 2022). As showed by our data, infections caused by *Acinetobacter* spp. typically exhibit a varied distribution, marked by sporadic outbreaks, thereby serving as an indicator for evaluating infection control and prevention strategies. The emergence of the SARS-CoV-2 pandemic has accentuated these distinctive patterns, highlighting avenues for enhancing management approaches (Mangioni et al., 2023b).”

The authors apologize for these errors and state that this does not change the scientific conclusions of the article in any way. The original article has been updated.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.