



Surveillance of Novel or rare antimicrobial resistant organisms (NRAO) in Ireland, 2022 - 2024



HE Introduction

- The emergence of Novel or Rare Antimicrobial resistant Organisms (NRAO) is an evolving health threat that challenges the effectiveness of existing treatments. Research and development of new antimicrobial agents (antibiotics) have not kept pace with the rapid evolution of antibiotic resistance, meaning that bacterial infections are becoming harder to treat.
- In 2017, WHO developed the first Bacterial Priority Pathogen's List (BPPL) to guide investment into the R&D of new antibiotics. Since its launch, the BPPL, shown here, has been used to evaluate new antibiotics that are in development, and the results have been published in annual WHO reports.
- The purpose of the BPPL is to guide resource allocation, guide and promote R&D of novel antibacterial agents and support development of effective strategies to prevent, control and treat infections caused by priority pathogens.
- The list has been shown to be a valuable public health tool for guiding AMR surveillance, prevention and control.
- The WHO Bacterial Priority Pathogen's List can be found [here](#)



HE Overview

Year	2022	2023	2024
Total number of NRAO reported	32	67	93
Number of laboratories who submitted NRAOs*	11	12	12

* Not including labs with Nil or Zero return

- The Health Protection Surveillance Centre (HPSC) collects data on Novel or rare antimicrobial resistant organisms on an annual basis using an MS Excel based data collection tool.
- A total of thirty-seven laboratories nationally participate in this surveillance program, in accordance with the case definition shown.
- The number of NRAO identified increased from 32 in 2022 to 93 in 2024 while the number of reporting laboratories (with one or more NRAO to report) remained stable across the period.

Case Definition

Clinical criteria

Not relevant for surveillance purposes.

Laboratory criteria

The identification of an organism from any specimen, whether a diagnostic (invasive, non-invasive infection or colonisation, also known as carriage) or a screening specimen (colonisation, also known as carriage), with a confirmed pattern of antimicrobial resistance of clinical concern and not previously reported (novel) or rarely reported in Ireland.

For this purpose, “clinical concern” means that the pattern of resistance is likely to impact on efficacy of antimicrobial agents that would normally be used to treat the species in question. The “confirmed pattern of antimicrobial resistance” should always be confirmed in a second laboratory (generally a reference laboratory). Guidance on what constitutes a NRAO should be sought from the relevant reference laboratory and the Health Protection Surveillance Centre.

Epidemiological criteria

Not relevant for surveillance purposes.

Case classification

- Possible case: Not applicable
- Probable case: Not applicable
- Confirmed case: Any person meeting the laboratory criteria

Outbreak

An outbreak of a novel or rare antimicrobial resistant organism is defined as two or more confirmed cases of the same antimicrobial resistance pattern (causing any of invasive or non-invasive infection or colonisation) that are linked epidemiologically in time and place.

Note: Given that chains of transmission of organisms are generally silent, assessment of linkage may be challenging. Guidance on what constitutes a NRAO and an outbreak of a NRAO should be sought from the relevant reference laboratory, the Health Protection Surveillance Centre and local Department of Public Health. If deemed indicated, an outbreak control team should be convened.



Carbapenemase-producing *Acinetobacter* spp.

- Carbapenemase-producing *Acinetobacter* spp. (CPA) is a significant healthcare concern due to its high resistance to many antibiotics, including carbapenems.
- Carbapenemase-producing *Acinetobacter baumannii* (CRAb) is the most common cause of nosocomial (healthcare associated) infections caused by CPA accounting for 64% of total cases between 2002 and 2024.
- OXA-23 represented the most common enzyme identified, accounting for half of all cases over the three years, however there was a drop in OXA-23 cases between 2023 and 2024 – from 75% to 33%.
- Conversely, the annual number of NDM cases increased from 3 (19% of CPA) in 2023 to 9 (60%) in 2024.

<i>Acinetobacter</i> spp.		2022	2023	2024
Carbapenemase-producers				
	<i>A. baumannii</i> (CRAb)	3	12	8
	Other <i>acinetobacters</i>	2	4	7
	Total	5	16	15
	NDM	1	3	9
	IMP-1	1	0	1
	GES-56	1	0	0
	OXA-23	1	12	5
	OXA-24	0	1	0
	Other carbapenem-R	1	0	0
	Total	5	16	15





Carbapenemase-producing *Acinetobacter* spp.

Acinetobacter outbreaks

There was one healthcare-associated outbreak Carbapenemase-producing *Acinetobacter baumannii* (CRAb) notified - cases were detected over the last three months of 2023 and were reported as an outbreak at the beginning of 2024.

There was also one healthcare-associated outbreak of *Acinetobacter nosocomialis* notified in 2024.

ECDC genomic-based survey of carbapenem-resistant *Acinetobacter baumannii* (CRAb)

HPSC participated in a genomic survey of carbapenem-resistant *Acinetobacter baumannii* (CRAb) which was launched by ECDC in July 2024 with the aim of collecting data from hospitals from EU/EEA, Western Balkan countries and Türkiye.

The survey also aimed to help countries enhance their capacities for detecting and controlling infections caused by CRAb. This includes strengthening national capabilities for implementing advanced genetic techniques to monitor CRAb and understanding the factors that lead to CRAb infections.

The final survey results will inform national and European CRAb preparedness, prevention and control activities.

The survey, which was conducted through ECDC's European Antimicrobial Resistance Genes Surveillance Network (EURGen-Net), began in October 2024 and ran until June 2025.



Fluconazole-resistant *Candida auris*

- *Candida auris* was first identified in 2009 and has emerged as a cause of healthcare-associated infections in countries worldwide
- Four cases of *C. auris* have been reported in Ireland since it became notifiable in 2017
- There were three cases of fluconazole-resistant *Candida auris* reported in 2022. All three were travel-related and there were no common epidemiological linkages identified. Two of these cases were isolated from wound swabs, while the third was identified from an ear swab
- There was one travel-related case of *C. auris* reported in 2023 – this was noted as fluconazole-resistant (but sensitive to other antifungals) and was isolated from a wound swab
- There were no cases of fluconazole-resistant *Candida auris* reported in 2024
- HPSC has not received any reports of *C. auris* bloodstream infection being detected in Irish hospitals to date

	2022	2023	2024
<i>Candida auris</i>			
Fluconazole-R	3	1	0
Other* <i>Candida spp.</i>			
Fluconazole-R	0	0	4

* 1 *Candida albicans*, 1 *Candida krusei*, 2 *Candida tropicalis*

HE Staphylococci with unusual resistance

- Between 2022 and 2024, there were eight cases of *S. aureus* with unusual resistance or important virulence factor identified – one PVL toxin positive, one hGISA (reduced glycopeptide susceptibility), two teicoplanin-resistant and three daptomycin-resistant.
- There were 49 cases of linezolid-resistant *S. epidermidis*. 50% of *these* cases reported over this three-year period were isolated from blood culture.
- There was one case of teicoplanin-resistant *S. capitis* and three cases linezolid-resistant of *S. haemolyticus*, all identified from blood culture.



Staphylococci	2022	2023	2024
<i>S. aureus</i>			
Reduced glycopeptide susceptibility (includes hGISA)	0	0	1
Daptomycin-R	1	1	1
Teicoplanin-R	0	1	2
PVL	0	1	0
Total	1	3	4
Other staphylococci			
<i>S. epidermidis</i>			
Teicoplanin-R	1	0	0
Linezolid-R	7	20	22
Total	8	20	22
optrA	0	0	0
poxA	0	0	0
G2576T mutation	4	5	20
Unknown	4	15	2
<i>S. capitis</i>			
Teicoplanin-R	0	1	0
<i>S. haemolyticus</i>			
Linezolid-R	0	1	2
G2576T mutation	0	0	2

HE Linezolid-resistant enterococci

- There were seventy-five cases of linezolid-resistant *enterococci* identified between 2022 and 2024.
- The most common species was *E. faecium*, accounting for 65% of isolates.
- G2576T mutation (a specific genetic change that causes resistance to the antibiotic linezolid) was observed in just over half of cases.
- There were two hospital-based outbreaks of linezolid-resistant *enterococci* recognised during this period. In one outbreak, cases were first identified in the second quarter of 2022 and continued into 2023.
- A second outbreak was identified in a different healthcare facility, with cases seen over a six-month period in 2023.

<i>Enterococci</i>		2022	2023	2024
<i>Enterococci</i>				
Linezolid-R		13	22	40
	optrA	2	7	10
	poxA	1	1	3
	G2576T mutation	9	11	18
	Unknown	1	3	9

HE Other organisms

Hypervirulent *Klebsiella* spp.

- There were two cases of hypervirulent *K. pneumoniae* identified in 2022. While both cases occurred within the same hospital over a month-long period, investigations did not identify any epidemiological link

<i>Klebsiella</i>	2022	2023	2024
<i>K. pneumoniae</i>			
Hypervirulent	2	0	0



MDR *Pseudomonas* spp.

- There was one case of multi-drug resistant (MDR) *Pseudomonas* spp. reported in 2023 in a patient who had undergone surgery overseas and had ongoing issues with post-operative infection (MRSA was also identified in this patient)
- There were three cases of carbapenemase-producing pseudomonas reported in 2024, one of which (*P. aeruginosa*) was an invasive case identified from a blood sample

<i>Pseudomonas</i> spp.	2022	2023	2024
Carbapenemase-producers			
<i>P. aeruginosa</i> : NDM	0	0	2
<i>P. japonica</i> : IMP	0	0	1
MDR <i>Pseudomonas</i> spp.	0	1	0

HE Other organisms

Colistin-resistant *Citrobacter* spp.

- There were two cases of colistin-resistant *Citrobacter freundii* identified in screening samples from elderly patients in the same facility in 2023. The *mcr-9* gene was identified in both samples. Infection control undertook preliminary investigations but could not identify any link between both cases.
- Three cases were reported in 2024, all of which were identified via routine rectal screening.
- There were no cases of colistin-resistant *Citrobacter* spp. reported in 2022.

<i>Citrobacter</i>	2022	2023	2024
<i>Citrobacter freundii</i>			
colistin-R; mcr-positive	0	2	3

Acknowledgements

Sincere thanks to colleagues in participating microbiology laboratories and public health departments.

