# Enhanced Surveillance of Carbapenemase-Producing Enterobacterales (CPE) 2024

For more information on CPE, including Factsheets, Case Definitions and previous years surveillance reports (pre-pandemic), please go to *Carbapenem Resistant Enterobacteriaceae (CRE) - Health Protection Surveillance Centre (hpsc.ie)*

# 2024 Surveillance Report - Introduction

- Carbapenemase-producing Enterobacterales (CPE), sometimes referred to as carbapenem-resistant Enterobacterales (CRE), are a growing threat to public health due to very limited options for treatment of infection
- Like most bacteria, CPE can cause a wide range of infections ranging from urinary tract infections (UTIs) and skin and soft tissue infections (SSTIs) to more severe invasive infections, such as bloodstream infections (BSIs)
- CPE, like all bacteria belonging to the Enterobacterales order, are known to colonise patients. Asymptomatic and often unrecognised colonisation contribute to the successful dissemination of CPE, particularly in healthcare settings
- Enhanced CPE surveillance was stopped in 2020 due to staff in participating laboratories and the Health Protection Surveillance Centre being re-deployed to other duties as a result of the COVID-19 pandemic. A revised version of CPE surveillance resumed in 2022
- The case definition for the purposes of this enhanced surveillance of CPE was amended to reflect the disease progression and to more accurately reflect the burden in different scenarios (e.g., screening, non-invasive infection, invasive infection)

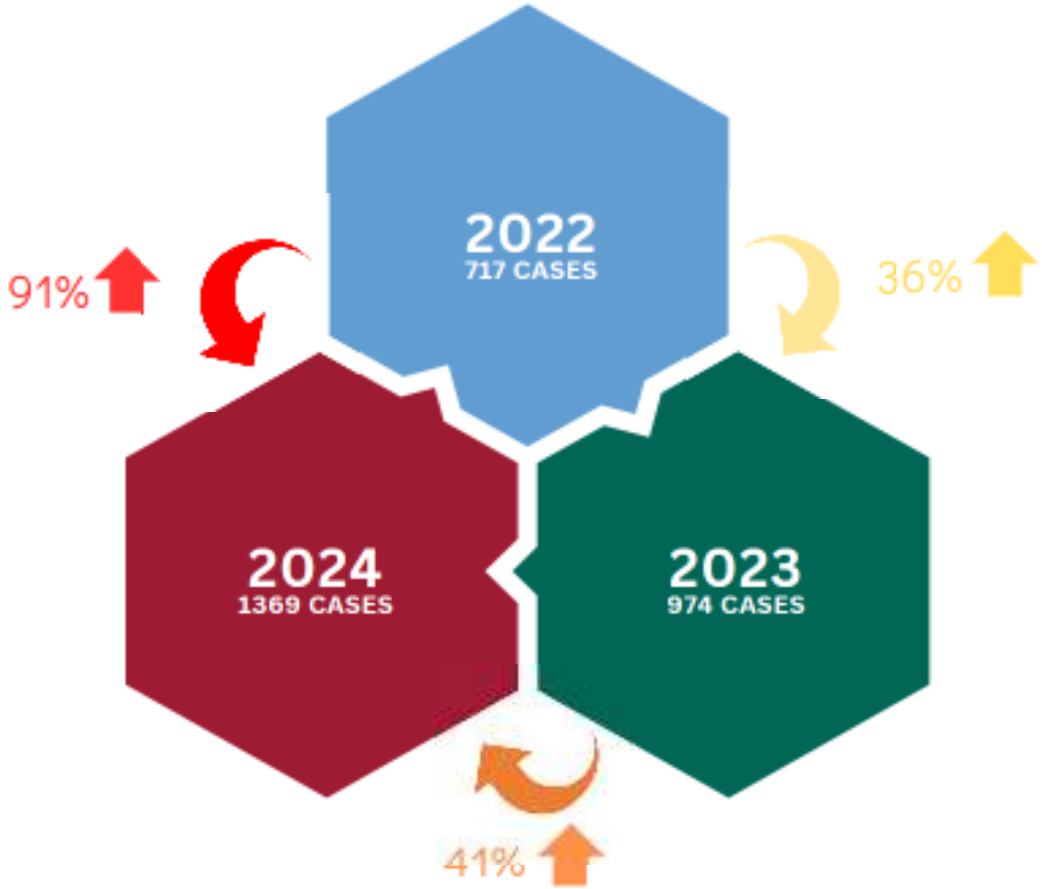
# 2024 Surveillance Report – Key Points

- In 2024, **1557** confirmed CPE isolates were reported to this surveillance system compared to **1096** in 2023 and **861** in 2022
- Data was received from 30 out of 37 laboratories (both public and private hospitals) in 2024 compared to 32 laboratories in 2023 and 31 in 2022. These laboratories range in size from small local hospital laboratories to large tertiary hospitals
- The adjacent table shows the number of isolates reported by all laboratories (n = 1557) in addition to the number of isolates reported by the twenty-four laboratories who submitted data in **all three years** (n = 1369)
- Comparing **just** these 24 laboratories, there was a **91%** increase in reported cases between 2022 and 2024

| | 2022 | 2023 | 2024 | % increase 2022 v 2024 |
|---|---|---|---|---|
| N CPE (all labs) | 861 | 1096 | **1557** | **81%** |
| N CPE (24 labs*) | 717 | 974 | **1369** | **91%** |
| * labs who reported data for all three years | | | | |
| Invasive | 2% | <2% | 2% | |
| Non-invasive | 10% | 9% | 9% | |
| Colonisation | 88% | 90% | 89% | |
| OXA-48** | 73% | 72% | 74% | ↑ |
| NDM | 9% | 11% | 9% | ↓ |
| KPC | 8% | 10% | 14% | ↑ |
| VIM | 7% | 3% | 2% | ↓ |
| Others | 3% | 4% | 1% | |

**includes OXA-181 and OXA-244; and in combination with KPC, NDM and VIM

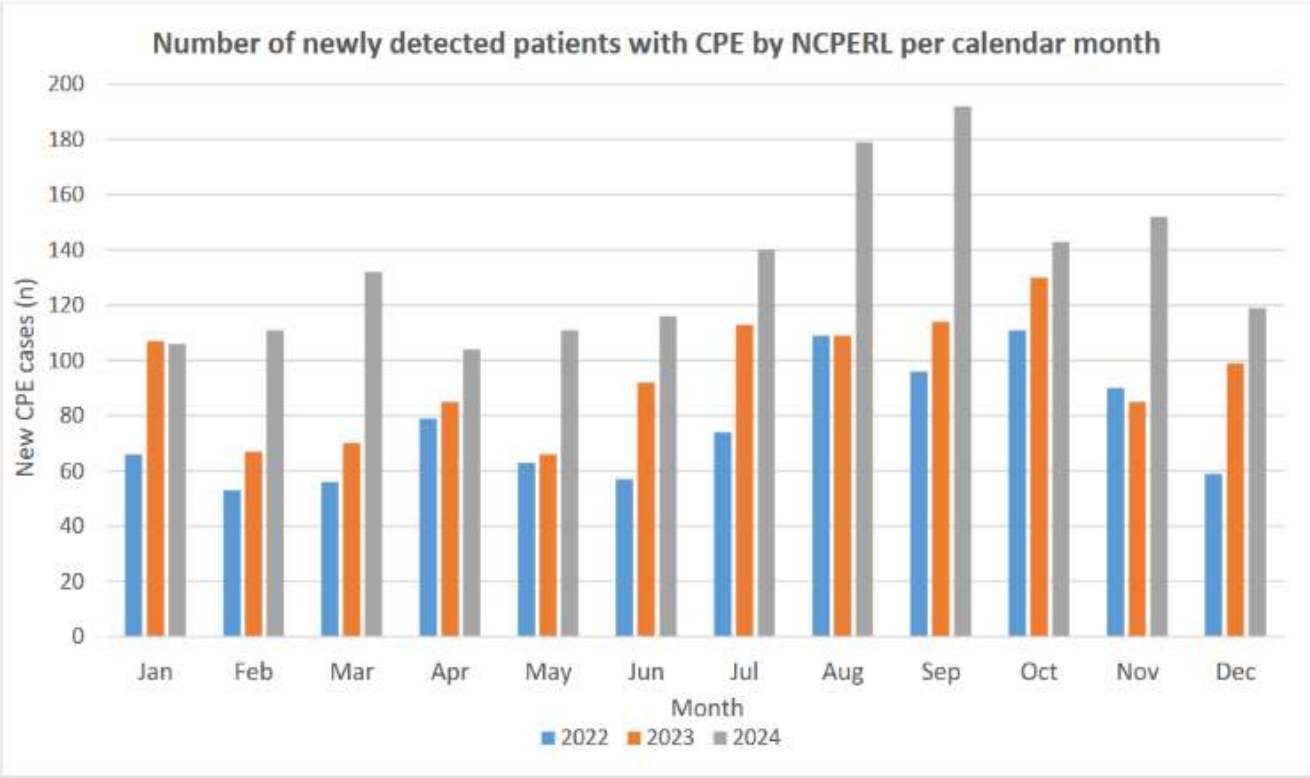
# 2024 Surveillance Report – Key Points




Year-on-year % increase based on the twenty-four laboratories who submitted CPE data in 2022, 2023 and 2024

# 2024 Surveillance Report – Key Points

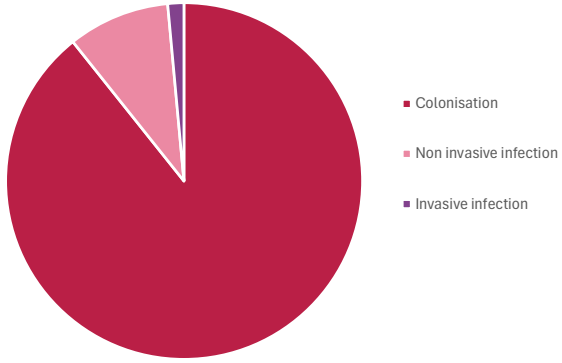
- This increase in CPE reflects the increase reported by AMRIC (Antimicrobial Resistance and Infection Control program) in their monthly summary reports
- The adjacent graph shows the number of patients newly detected with CPE in each month of 2024 and is based on data from the National CPE Reference Laboratory Service (NCPERL)
- These monthly reports are based largely on data related to HSE acute hospital operations but also include data related to isolates from other acute hospitals and the community
- AMRIC monthly Summary Reports on Carbapenemase Producing Enterobacterales (CPE) can be found here




*Source: AMRIC Summary Report on Carbapenemase Producing Enterobacterales (CPE) December 2024*

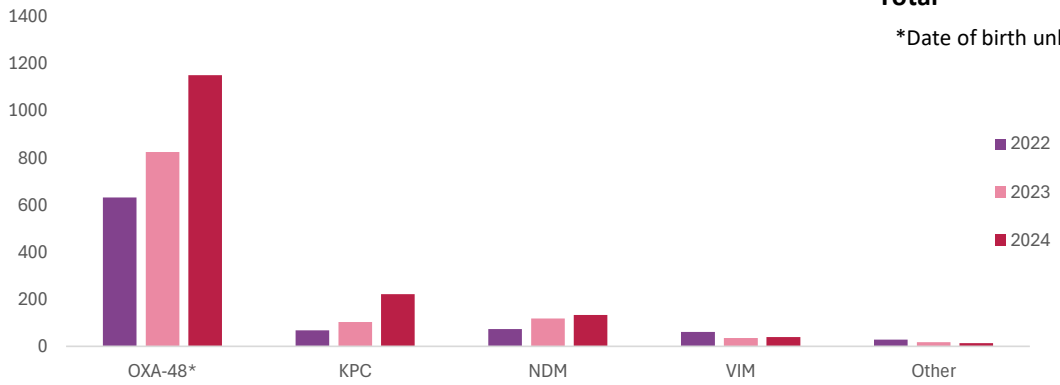
# 2024 Surveillance Report – Key Points

- Approximately **89%** of all CPE in 2024 were associated with colonisation, **9%** with non-invasive infection and **2%** with invasive infection. This is in line with previous years
- **OXA-48** represented the most common enzyme reported in in all three years
- The number of NDM and KPC isolates both increased slightly in 2024, while the number of VIM isolates reported remained similar to 2023
- Over half of all CPEs in 2024 were reported in older adults (aged **65 years** and older)




| Age Group | Number of cases |
|---|---|
| 0-4 | 15 |
| 5-9 | 2 |
| 10-14 | 1 |
| 15-19 | 4 |
| 20-24 | 10 |
| 25-34 | 47 |
| 35-44 | 84 |
| 45-54 | 146 |
| 55-64 | 211 |
| 65+ | 1019 |
| **Total** | **1539** |

*Date of birth unknown for eighteen cases

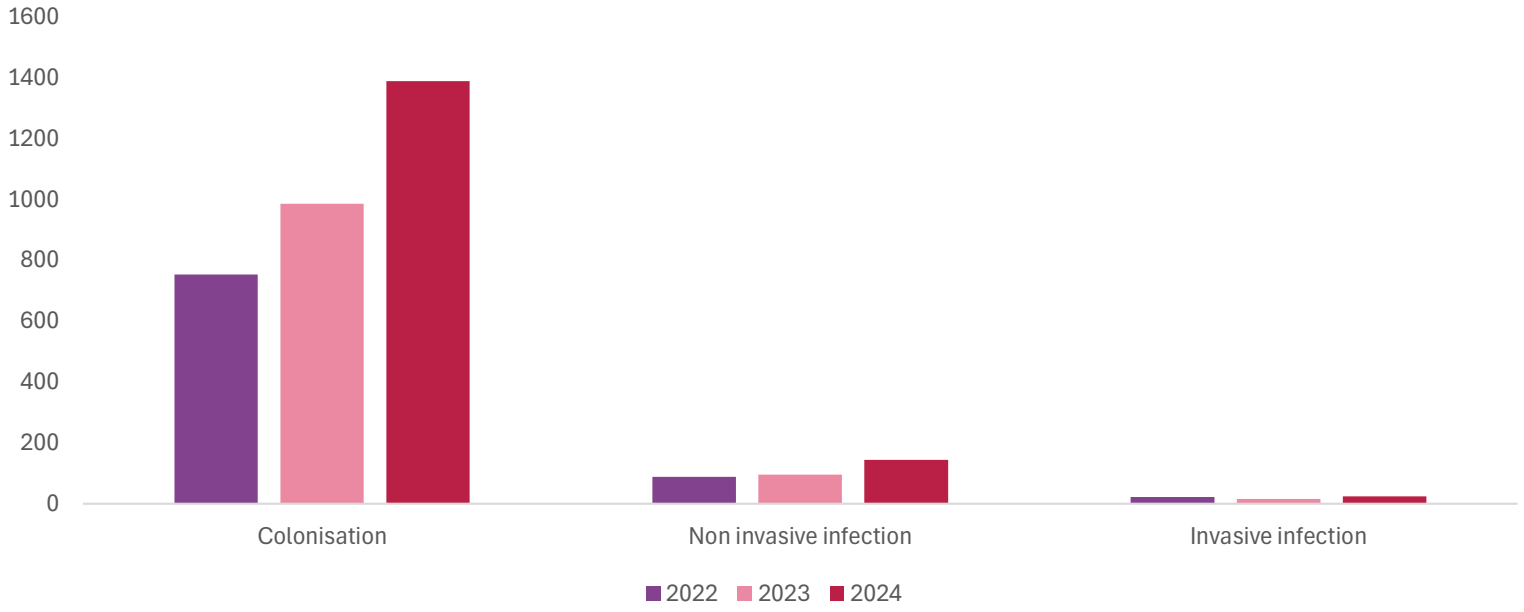



*(includes OXA-181 and OXA-244; and in combination with KPC, NDM and VIM)

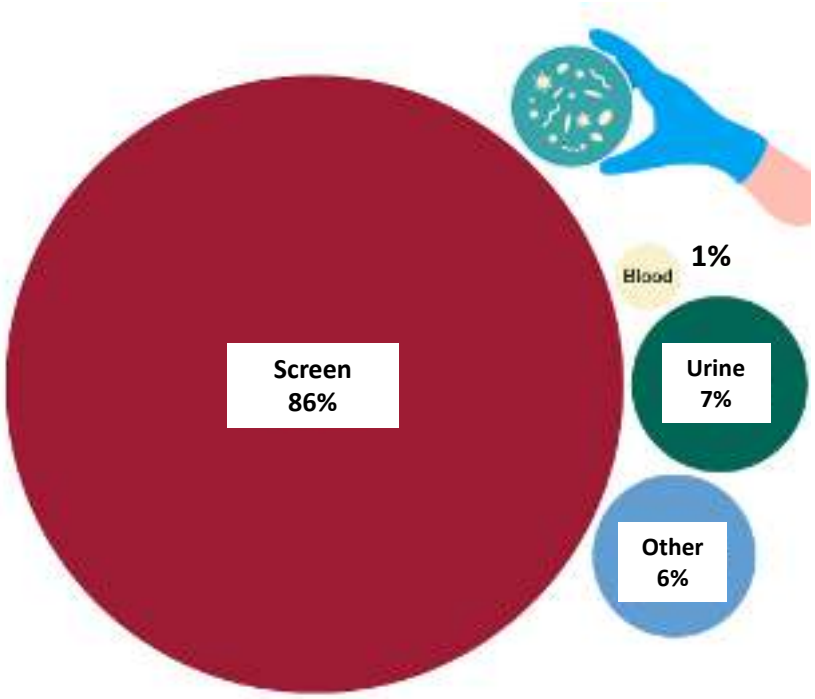
# Summary of reported CPE cases by infection type in 2024

- The majority (89%) of cases in 2024 were associated with colonisation (patients carrying CPE in their guts without any signs or symptoms of infection).
- This is in line with the previous years where almost 9 out of 10 cases were due to colonisation.
- Just 9% of cases were from patients with non-invasive infections, while 2% were due to invasive infection, similar to previous years.

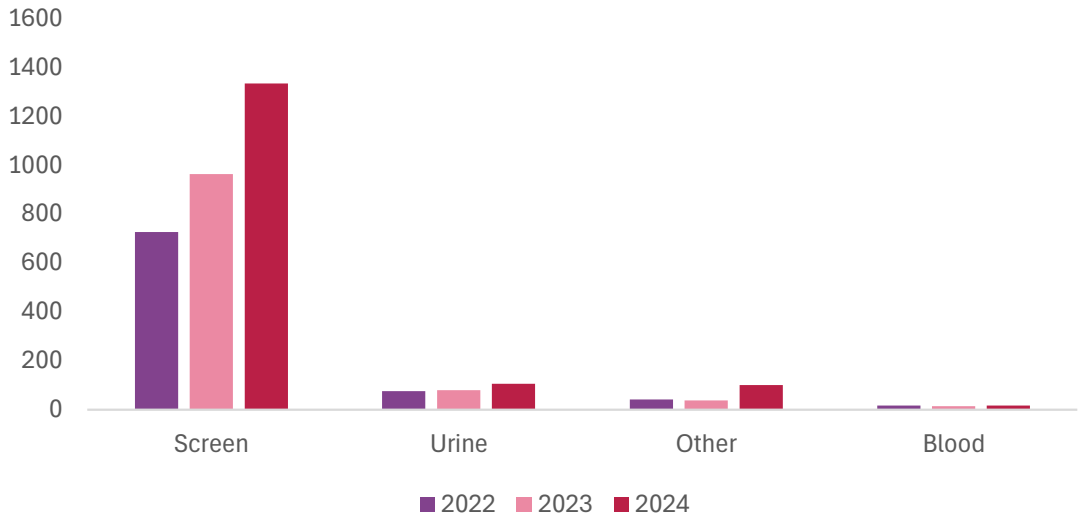
| Infection type | 2022 | 2023 | 2024 |
|---|---|---|---|
| Colonisation | 753 (87%) | 986 (90%) | 1390 (89%) |
| Non invasive infection | 87 (10%) | 95 (9%) | 144 (9%) |
| Invasive infection | 21 (3%) | 15 (1%) | 23 (2%) |
| **Total** | **861 (100%)** | **1096 (100%)** | **1557 (100%)** |



# Summary of reported CPE cases by specimen type, 2024




% CPE cases by specimen type, 2024



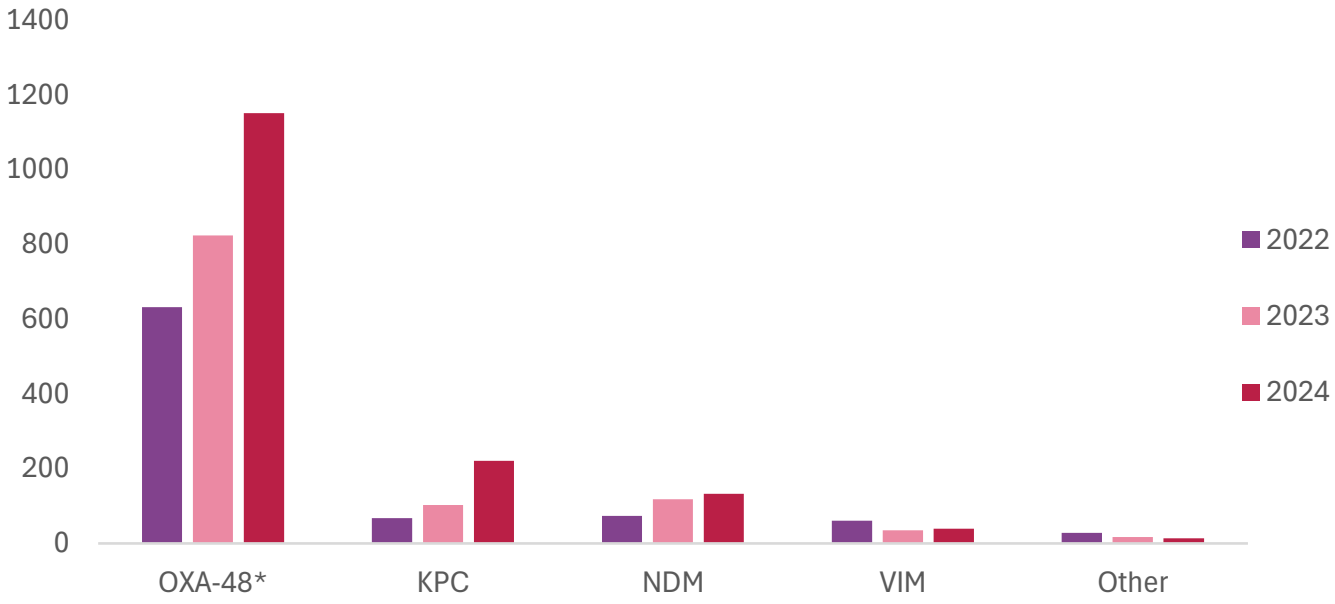

- The majority (86%) of CPE cases in 2024 were identified from screening samples. This correlates with the high rate (89%) of colonisation noted previously.
- Urine samples accounted for 7% of samples, 1% of samples were from blood and 6% were from other sterile and non-sterile sites.
- There were twenty-three cases of **invasive** CPE infection, sixteen (70%) of which were identified from blood samples.

# Summary of reported CPE cases by pathogen and specimen type, 2024

| Pathogen | Screen | Urine | Other | Blood | Total |
|---|---|---|---|---|---|
| *E. coli* | 485 | 44 | 31 | 4 | **564** |
| *K. pneumoniae* | 237 | 39 | 26 | 6 | **308** |
| *E. cloacae* | 266 | 10 | 19 | 3 | **298** |
| *C. freundii* | 153 | 1 | 2 | 0 | **156** |
| *Other* | 74 | 5 | 8 | 1 | **88** |
| *K. oxytoca* | 43 | 5 | 6 | 2 | **56** |
| *Klebsiella spp* | 40 | 0 | 1 | 0 | **41** |
| *Citrobacter spp* | 30 | 2 | 4 | 0 | **36** |
| *Enterobacter spp* | 7 | 0 | 3 | 0 | **10** |
| **Total** | **1335 (86%)** | **106 (7%)** | **100 (6%)** | **16 (1%)** | **1557 (100%)** |

- The most commonly identified pathogen in 2024 was *E. coli*, accounting for 36% of screening samples and almost half of all urine samples

# Summary of reported CPE cases by enzyme type, 2024




*includes OXA-181 and OXA-244; and in combination with KPC, NDM and VIM

- Similar to previous years, OXA-48 represented the most common enzyme identified in 2024 accounting for 74% of all reported CPE. (This also includes OXA-48-like enzymes such as OXA-244 and OXA-181)
- The number of NDM and KPC isolates both increased slightly in 2024, while the number of VIM isolates reported remained similar to 2023

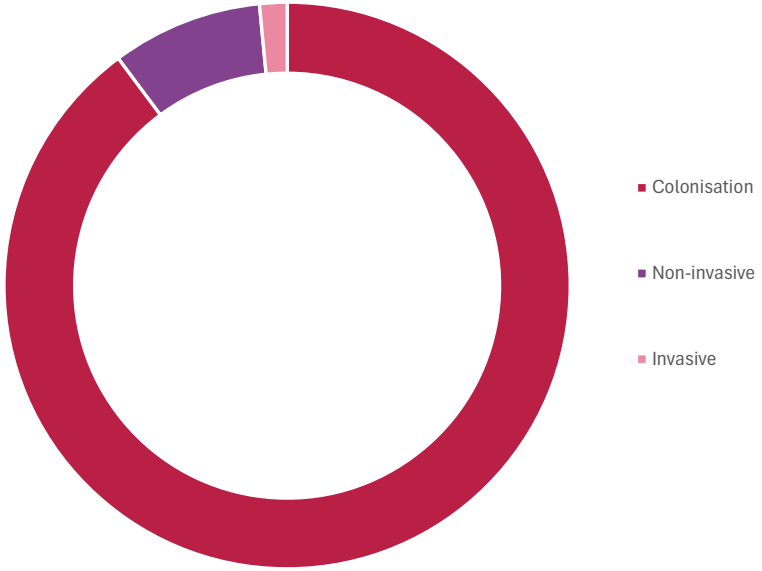
| Enzyme Type | 2022 | 2023 | 2024 |
|---|---|---|---|
| OXA-48* | 632 (73%) | 824 (72%) | 1151 (74%) |
| KPC | 67 (8%) | 103 (10%) | 221 (14%) |
| NDM | 74 (9%) | 118 (11%) | 133 (9%) |
| VIM | 60 (7%) | 34 (3%) | 39 (2%) |
| Other | 28 (3%) | 17 (4%) | 13 (1%) |
| **Total** | **861 (100%)** | **1096 (100%)** | **1557 (100%)** |

# Summary of reported CPE cases by enzyme and infection type, 2024

| | Colonisation | Non-invasive | Invasive | Total |
|---|---|---|---|---|
| OXA-48 * | 1034 | 99 | 18 | 1151 |
| KPC | 193 | 26 | 2 | 221 |
| NDM | 114 | 16 | 3 | 133 |
| VIM | 36 | 3 | 0 | 39 |
| Other | 13 | 0 | 0 | 13 |
| **Total** | **1390 (89%)** | **144 (9%)** | **23 (2%)** | **1557 (100%)** |

*includes OXA-181 and OXA-244; and in combination with KPC, NDM and VIM

- OXA-48* accounted for 74% of patient colonisations, 68% of non-invasive cases and 78% of invasive cases reflecting its overall commonality




OXA-48* by infection type, 2024

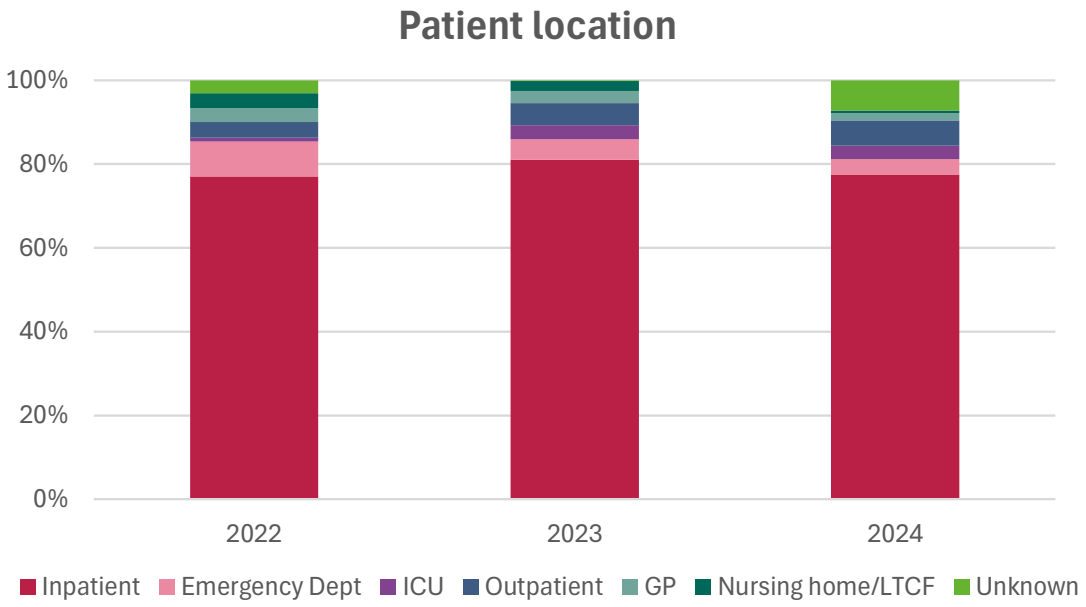
# Summary of reported CPE cases by pathogen and enzyme type, 2024

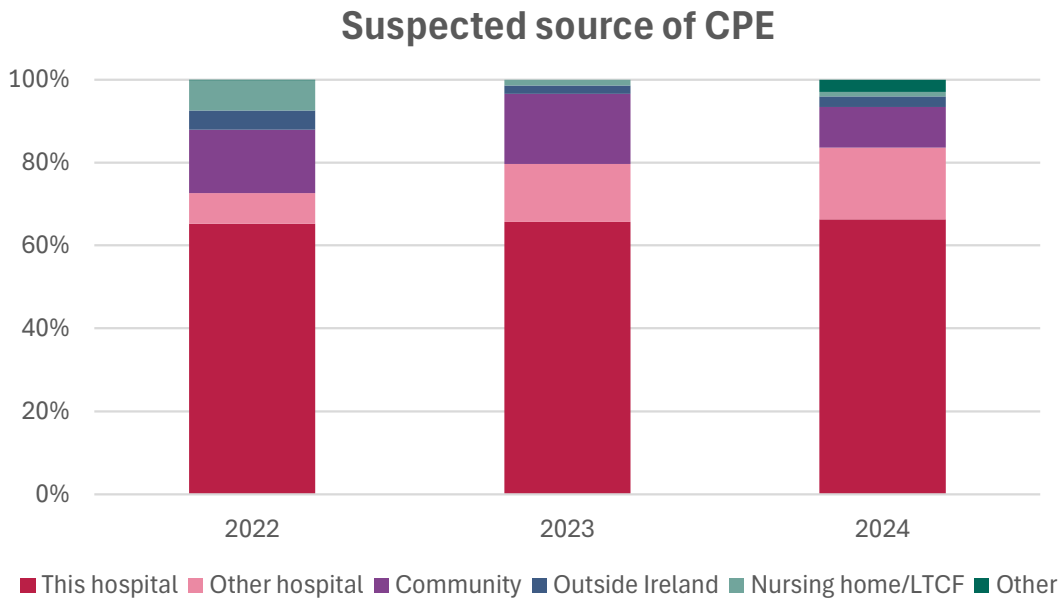
| Pathogen | OXA-48* | KPC | NDM | VIM | Other | Total |
|---|---|---|---|---|---|---|
| *E. coli* | 481 | 12 | 68 | 3 | 0 | **564** |
| *K. pneumoniae* | 196 | 84 | 27 | 1 | 0 | **308** |
| *E. cloacae* | 207 | 40 | 18 | 27 | 6 | **298** |
| *C. freundii* | 86 | 58 | 6 | 6 | 0 | **156** |
| *Other* | 61 | 13 | 11 | 0 | 3 | **88** |
| *K. oxytoca* | 51 | 2 | 0 | 0 | 3 | **56** |
| *Klebsiella spp* | 31 | 5 | 2 | 2 | 1 | **41** |
| *Citrobacter spp* | 29 | 7 | 0 | 0 | 0 | **36** |
| *Enterobacter spp* | 9 | 0 | 1 | 0 | 0 | **10** |
| **Total** | **1151 (74%)** | **221 (14%)** | **133 (9%)** | **39 (2%)** | **13 (1%)** | **1557 (100%)** |

*includes OXA-181 and OXA-244; and in combination with KPC, NDM and VIM

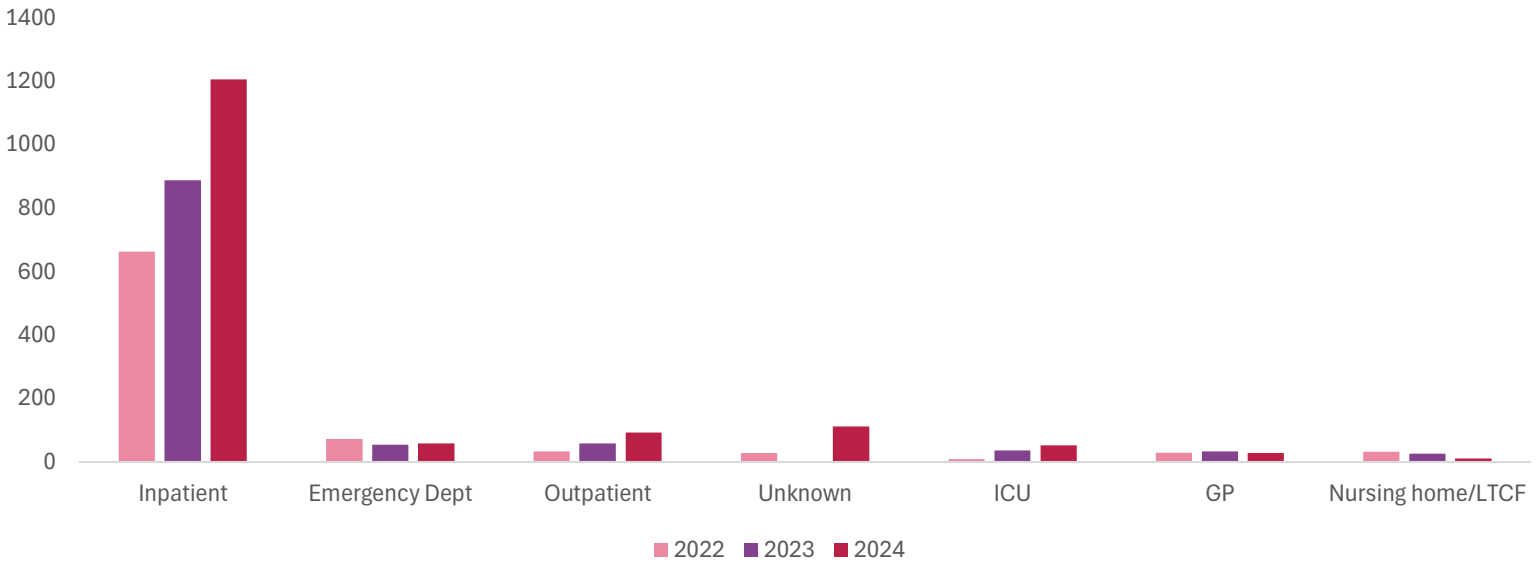
- *E. coli* was the most common pathogen identified in 2024, accounting for over one-third (36%) of CPE infections compared to 38% of CPE infections in 2023
- OXA-48 was responsible for the majority (85%) of *E. coli* infections
- The majority (86%) of *E. coli* infections were identified via routine screening
- *K. pneumoniae* was the second most common pathogen identified in 2024 (19% of all CPE). This is a slight increase from 2023 where it accounted for 17% of CPE infections
- *E. cloacae* decreased slightly, from 22% of CPE infections in 2023 to 19% in 2024

# Summary of reported CPE cases by patient location and suspected source



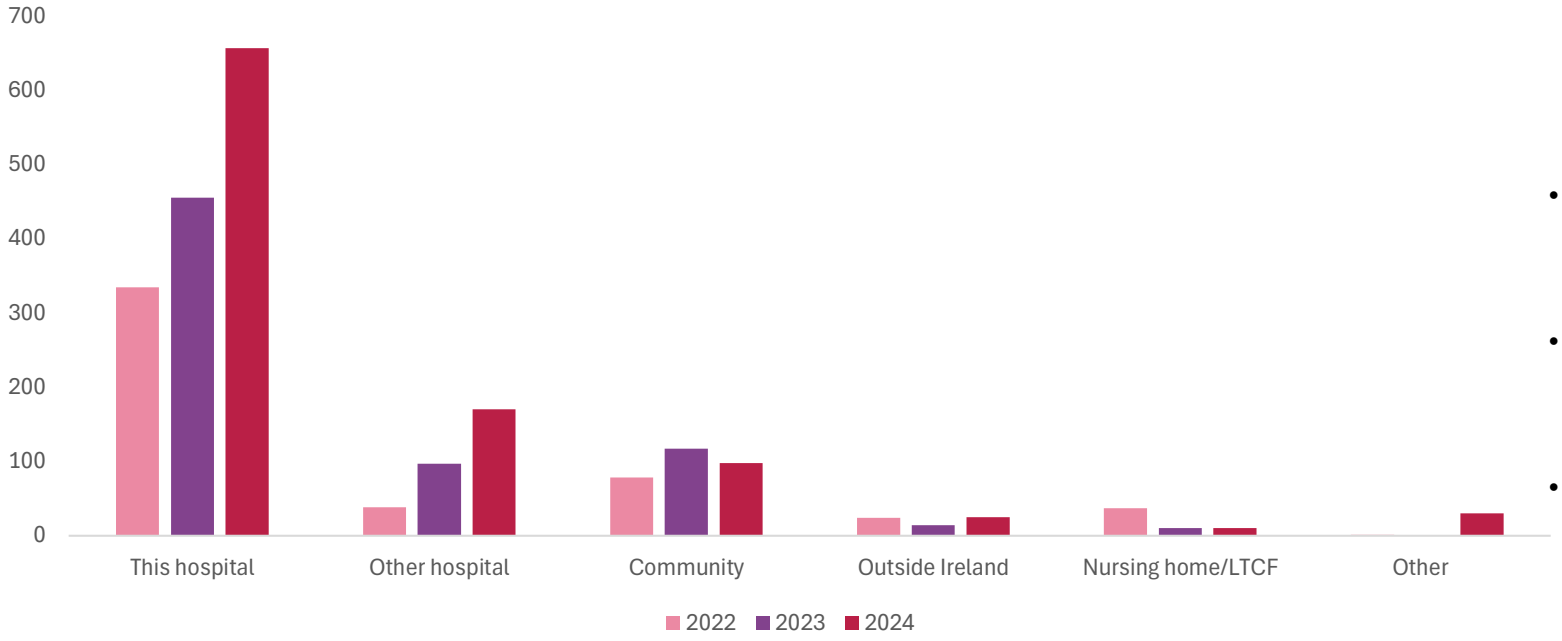



# Summary of reported CPE cases by location, 2024




- The majority (90%) of CPE cases in 2024 were associated with hospitals – this includes in-patients, ICU patients and hospital outpatients. This is in line with 2023 figures (90%) and a slight increase on the previous year (82% in 2022)
- Less than 1% of cases were associated with residents in nursing homes and long-term care facilities compared to 2% in 2023 and 4% in 2022
- 2% of samples were from GP patients in line with previous years

# Most likely origin of reported CPE cases, 2024




- The most likely origin of CPE cases in 2024 (where known, n = 989) was in the hospital of current admission (66%) or another hospital (17%). This is in line with previous years – 79% of cases in 2023 and 73% of cases in 2022 were associated with hospital admission (current or another hospital)
- Just 10% of cases acquired their infection in the community compared to 17% the previous year and 9% in 2022
- 1% of cases originated in nursing homes or LTCFs compared to 1% in 2023 and 4% in 2022
- 2% (n = 25) of cases were reported to have originated from outside Ireland in line with previous years figures. Eight out of these twenty-five cases in 2024 reported having surgery or hospital admission abroad

# Summary of invasive CPE cases and outbreaks reported on CIDR, 2024

**The following slides relate to cases of invasive CPE and outbreaks of CPE colonisation which have been notified to HPSC via CIDR (Computerised Infectious Disease Reporting System).**

# Summary of invasive CPE cases and CPE outbreaks reported on CIDR, 2024

- On CIDR, there were **23 cases** of **invasive** CPE reported with an epidemiological date in 2024.
- Nineteen cases were isolated from blood culture, accounting for over 3 in 4 invasive cases (see Table below).
- **OXA-48** was the predominant enzyme associated with invasive CPE accounting for 14 cases (61%).

| Specimen type | Number of invasive isolates |
|---|---|
| Blood culture | 19 |
| Bone | 1 |
| Other | 1 |
| Not Specified | 2 |
| **Total** | **23** |

| Enzyme type | Number of invasive cases |
|---|---|
| OXA-48 | 14 |
| NDM | 2 |
| KPC | 2 |
| Not Specified | 5 |
| **Total** | **23** |

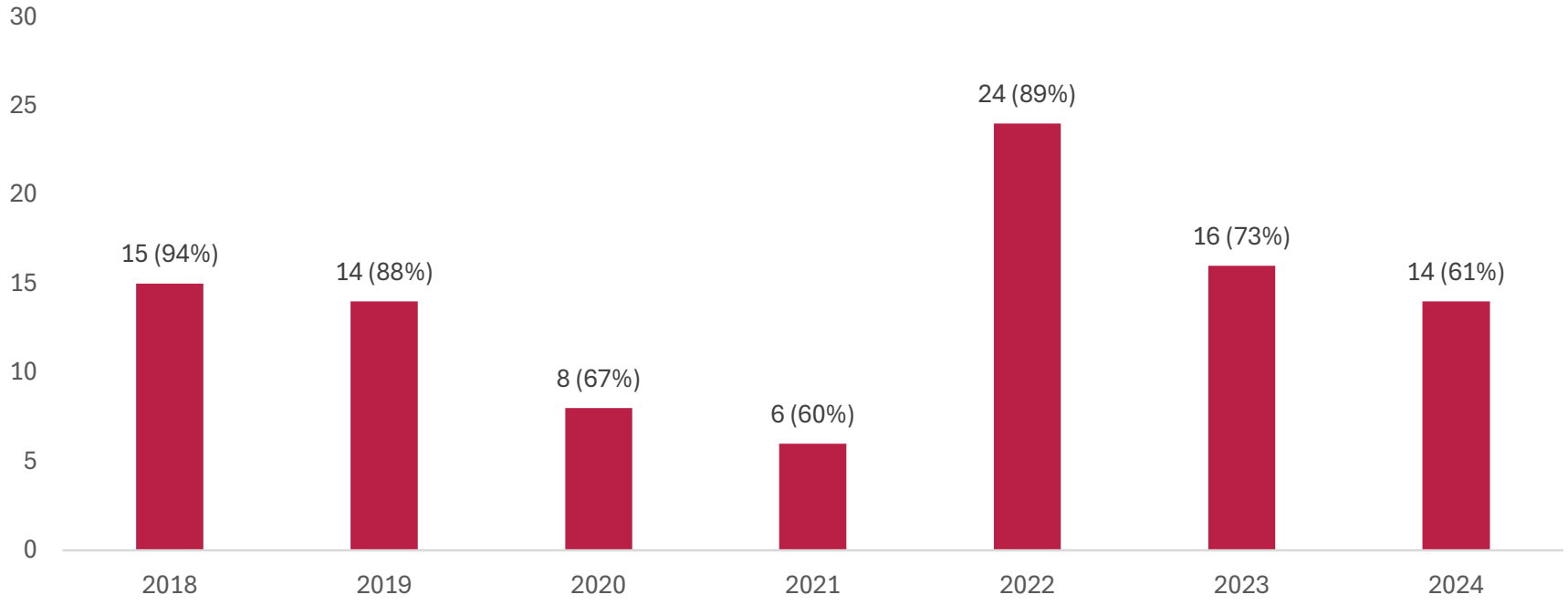
- There were 39 **outbreaks** of CPE **colonisation** reported to CIDR in 2024 compared to 33 in 2023 and 26 outbreaks in 2022.
- All of these outbreaks occurred in hospital or other healthcare settings.
- An enzyme was reported for 18 outbreaks:
  - 16 OXA-48 & OXA-48 like
  - 2 KPC

# Summary of invasive CPE cases reported on CIDR, 2018 to 2024

| | Enzyme | | | | |
|---|---|---|---|---|---|
| Year | OXA-48 | KPC | NDM | VIM | Total |
| 2018 | 15 | 0 | 0 | 1 | 16 |
| 2019 | 14 | 2 | 0 | 0 | 16 |
| 2020 | 8 | 2 | 2 | 0 | 12 |
| 2021 | 6 | 2 | 1 | 1 | 10 |
| 2022 | 24 | 3 | 0 | 0 | 27 |
| 2023 | 16 | 0 | 1 | 1 | 18 |
| 2024 | 14 | 2 | 2 | 0 | 18* |
| **Total** | **97 (83%)** | **11 (9%)** | **6 (5%)** | **3 (3%)** | **117 (100%)** |

*enzyme unknown/not specified for 5 cases

# Summary of invasive CPE cases reported on CIDR, 2018 to 2024



# Acknowledgements

**Sincere thanks to colleagues in the National CPE Reference Laboratory Service (NCPERLS), participating microbiology laboratories and public health departments.**