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## Enhanced Surveillance of Carbapenemase-Producing Enterobacterales (CPE) 2023

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# Enhanced Surveillance of Carbapenemase-Producing Enterobacterales (CPE) 2023



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  
\(\[hpsc.ie\]\(https://www.hpsc.ie\)\)](#)

# HE 2023 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.



# HE 2023 Surveillance Report - Introduction

- 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).



# HE 2023 Surveillance Report – Key Points

- In 2023, **1096** confirmed CPE isolates were reported to this surveillance system compared to **861** in 2022.
- Data was received from 32 out of 37 laboratories in 2023 compared to 31 laboratories 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 = 1096) in addition to the number of isolates reported by the twenty-seven laboratories (n = 1020) who submitted data in **both** 2022 and 2023.
- Comparing **just** these 27 laboratories, there was a **35%** increase in reported cases in 2023.

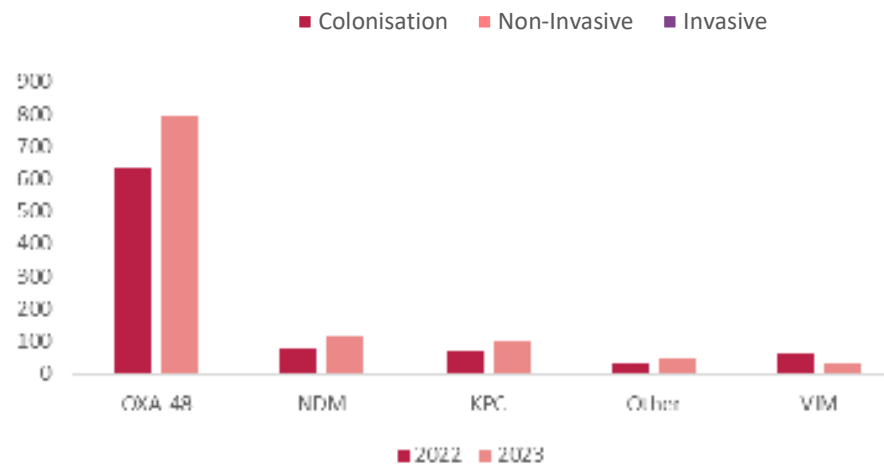
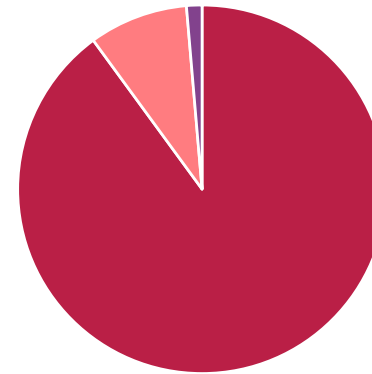
	2022	2023	Change	
N CPE (all labs)	861	1096		
N CPE (27 labs*)	757	1020	↑	<b>+35%</b>
Invasive	2%	<2%		
Non-invasive	10%	9%		
Colonisation	88%	90%		
OXA	73%	72%		
NDM	9%	11%	↑	
KPC	8%	10%	↑	
VIM	7%	3%	↓	
Others	3%	4%		

\*Labs that reported data for both years



# HE 2023 Surveillance Report – Key Points

- Approximately 90% of all CPE in 2023 were associated with colonisation, 9% with non-invasive infection and <2% with invasive infection.
- OXA-48 represented the most common enzyme reported in both years.
- The number of NDM and KPC isolates both increased slightly in 2023, while there was a decrease in the number of VIM isolates reported, from 7% of cases in 2022 to 3% in 2023.
- Over half of all CPEs were reported in older adults (aged 65 years and older).



Age Group	Number of cases
0-4	10
5-9	2
10-14	1
15-19	4
20-24	11
25-34	33
35-44	59
45-54	91
55-64	148
65+	729
<b>Total</b>	<b>1088</b>

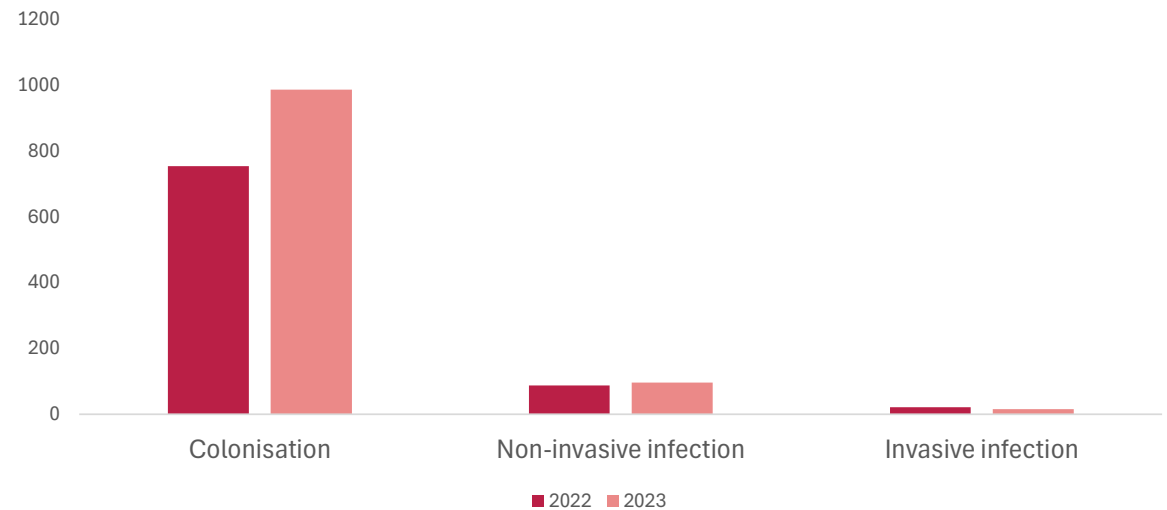
\*Date of birth unknown for eight cases



## Summary of reported CPE cases by infection type in 2023

- The majority (90%) of cases in 2023 were associated with colonisation (patients carrying CPE in their guts without any signs or symptoms of infection).
- This is in line with the previous year where almost 9 out of 10 cases (87%) were due to colonisation.
- Just 9% of cases were from patients with non-invasive infections, while 1% were due to invasive infection.

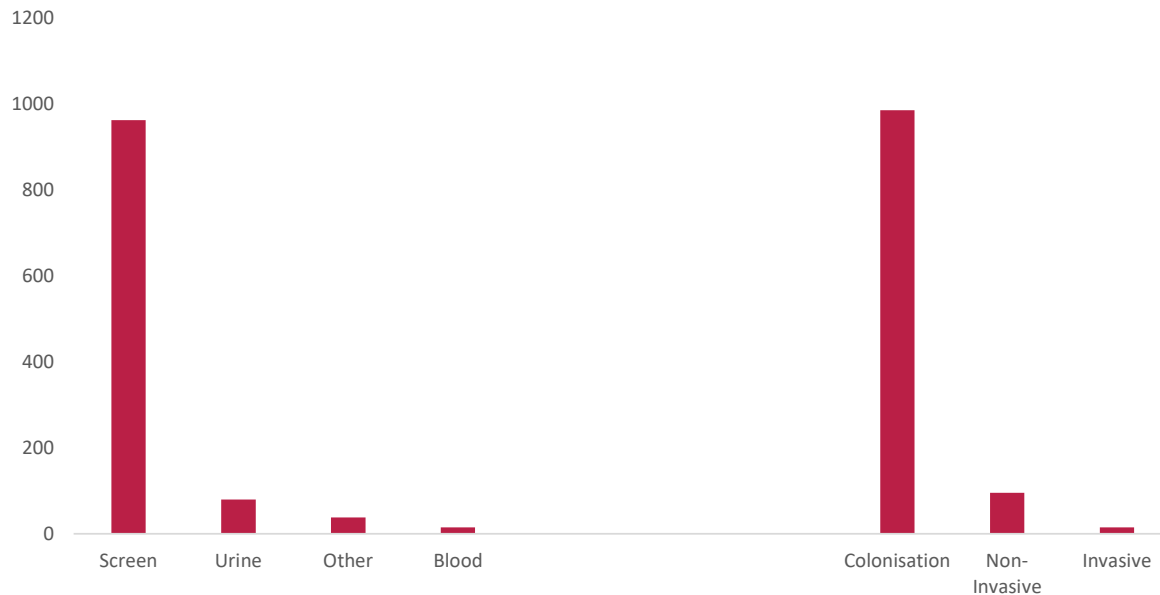
Infection Type	2022	2023
Colonisation	753 (87%)	986 (90%)
Non-invasive infection	87 (10%)	95 (9%)
Invasive infection	21 (3%)	15 (1%)
<b>Total</b>	<b>861 (100%)</b>	<b>1096 (100%)</b>





## Summary of reported CPE cases by specimen type, 2023

Specimen Type	Screen	Urine	Other	Blood	Total
Number (%) isolates	963 (89%)	80 (7%)	38 (3%)	15 (1%)	1096 (100%)



- The majority (89%) of CPE cases were identified from screening samples. This correlates with the high rate (90%) of colonisation noted previously.
- 7% of CPE cases were identified from urine samples and 3% from other non-sterile sites.
- There were fifteen cases of invasive CPE infection identified from blood samples, comprising 1% of cases in 2023.





## Summary of reported CPE cases by pathogen and specimen type, 2023

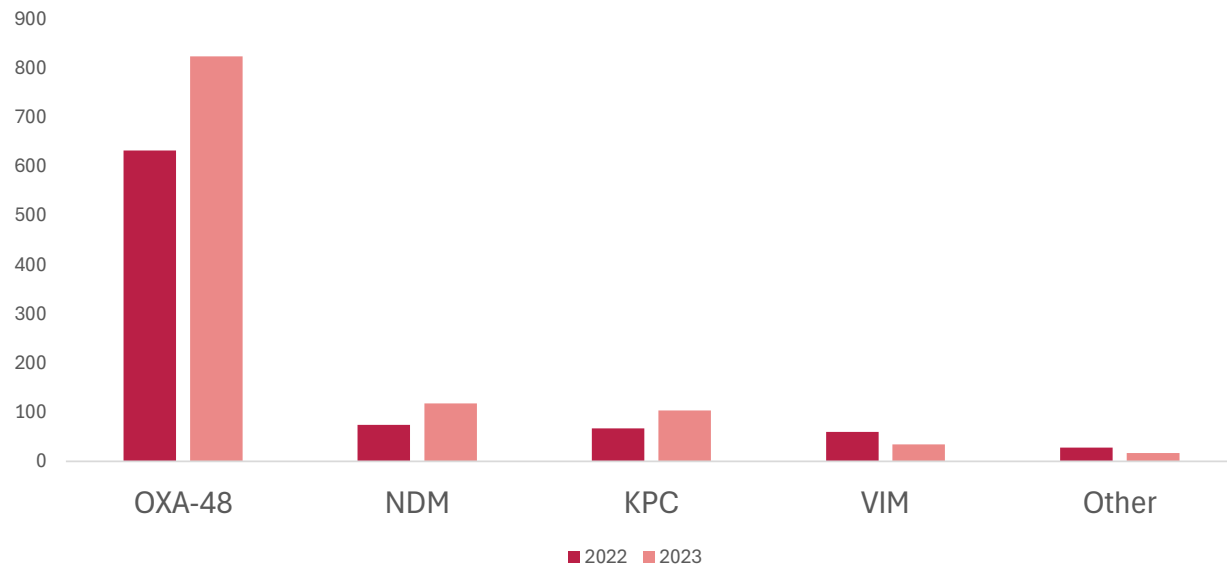
Pathogen	Specimen Type				Total
	Screen	Urine	Other	Blood	
<i>E. coli</i>	371	35	12	3	<b>421</b>
<i>E. cloacae</i>	211	19	9	1	<b>240</b>
<i>K. pneumoniae</i>	158	17	5	9	<b>189</b>
<i>C. freundii</i>	103	2	1	1	<b>107</b>
<i>K. oxytoca</i>	70	4	4	0	<b>78</b>
<i>Citrobacter</i> spp	14	1	1	0	<b>16</b>
<i>Klebsiella</i> spp	12	1	1	1	<b>15</b>
<i>Enterobacter</i> spp	11	1	1	0	<b>13</b>
Other	13	0	4	0	<b>17</b>
<b>Total</b>	<b>963 (89%)</b>	<b>80 (7%)</b>	<b>38 (3%)</b>	<b>15 (1%)</b>	<b>1096 (100%)</b>

- The most commonly identified pathogen in 2023 was *E. coli*, accounting for 39% of screening samples and almost half of all urine samples.





## Summary of reported CPE cases by enzyme type, 2023



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

- OXA-48 represented the most common enzyme reported in both years accounting for 75% of all reported CPE in 2023 and 73% in 2022. (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 2023, while there was a decrease in the number of VIM isolates reported, from 7% of cases in 2022 to 3% in 2023.

Enzyme Type	2022	2023
OXA-48*	632 (73%)	824 (75%)
NDM	74 (9%)	118 (12%)
KPC	67 (8%)	103 (9%)
VIM	60 (7%)	34 (3%)
Other	28 (3%)	17 (1%)
<b>Total</b>	<b>861 (100%)</b>	<b>1096 (100%)</b>



## Summary of reported CPE cases by pathogen and enzyme type, 2023

Pathogen	OXA-48*	NDM	KPC	VIM	Other	Total
<i>E. coli</i>	352	52	12	3	2	<b>421</b>
<i>E. cloacae</i>	158	32	15	25	10	<b>240</b>
<i>K. pneumoniae</i>	141	20	24	4	0	<b>189</b>
<i>C. freundii</i>	67	4	35	0	1	<b>107</b>
<i>K. oxytoca</i>	61	3	12	1	1	<b>78</b>
<i>Citrobacter</i> spp	11	1	3	0	1	<b>16</b>
<i>Klebsiella</i> spp	13	0	1	1	0	<b>15</b>
<i>Enterobacter</i> spp	11	1	0	0	1	<b>13</b>
Other	10	5	1	0	1	<b>17</b>
<b>Total</b>	<b>824 (75%)</b>	<b>118 (12%)</b>	<b>103 (9%)</b>	<b>34 (3%)</b>	<b>17 (1%)</b>	<b>1096 (100%)</b>

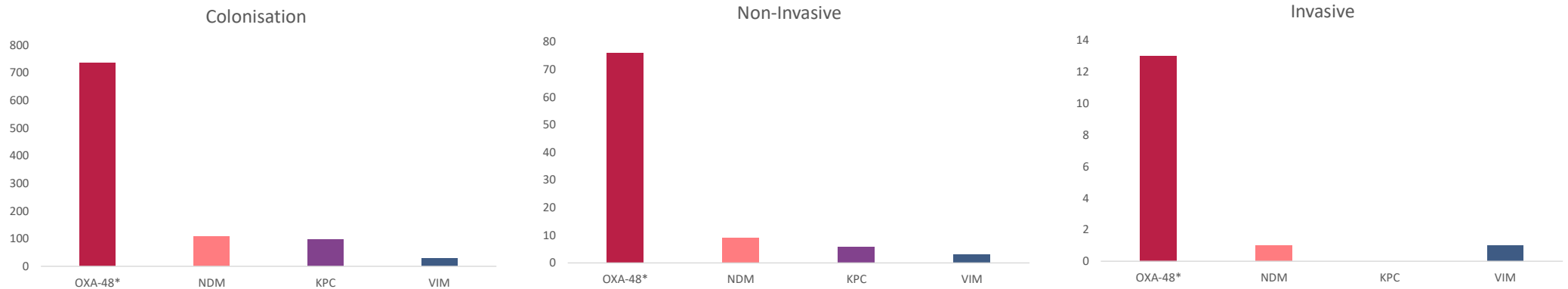
\*includes OXA-181 and OXA-244; and in combination with KPC, NDM and VIM





# Summary of reported CPE cases by enzyme and infection type, 2023

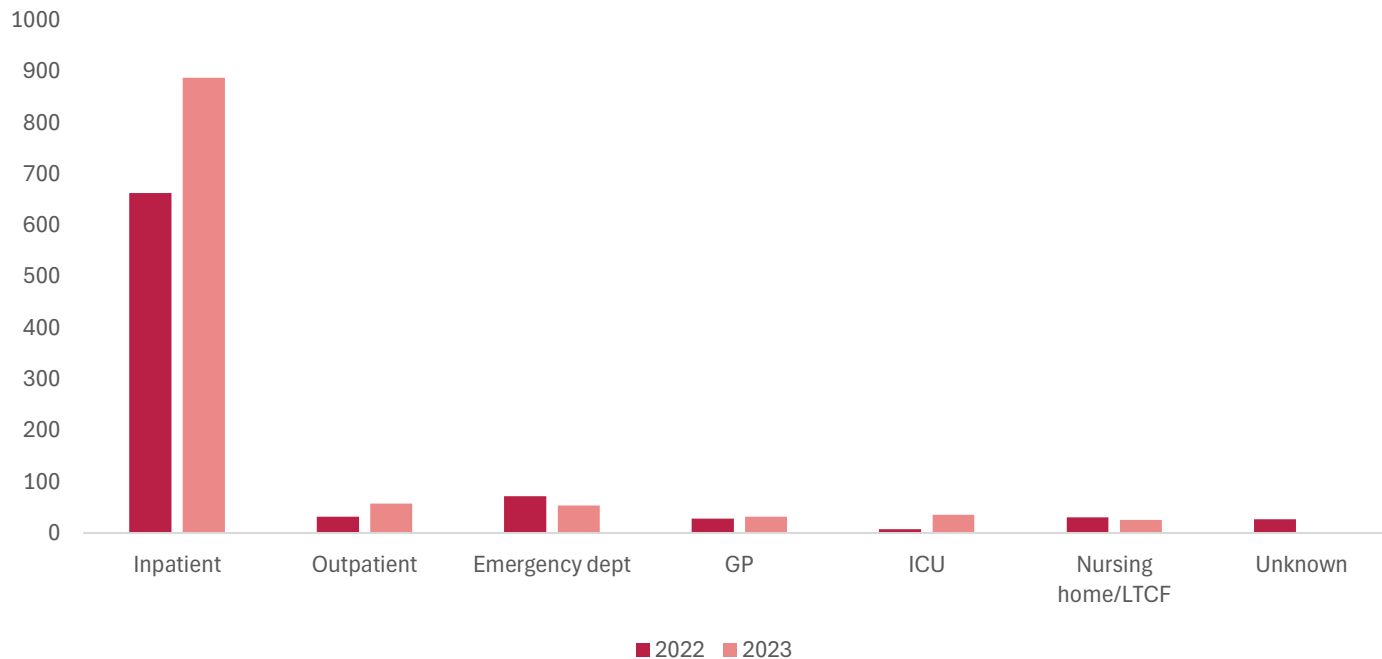
Infection Type	OXA-48*	NDM	KPC	VIM	Other	Total
Colonisation	735	108	97	30	16	986
Non-Invasive	76	9	6	3	1	95
Invasive	13	1	0	1	0	15
<b>Total</b>	<b>824 (75%)</b>	<b>118 (12%)</b>	<b>103 (9%)</b>	<b>34 (3%)</b>	<b>17 (1%)</b>	<b>1096 (100%)</b>



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



## Summary of reported CPE cases by location, 2023

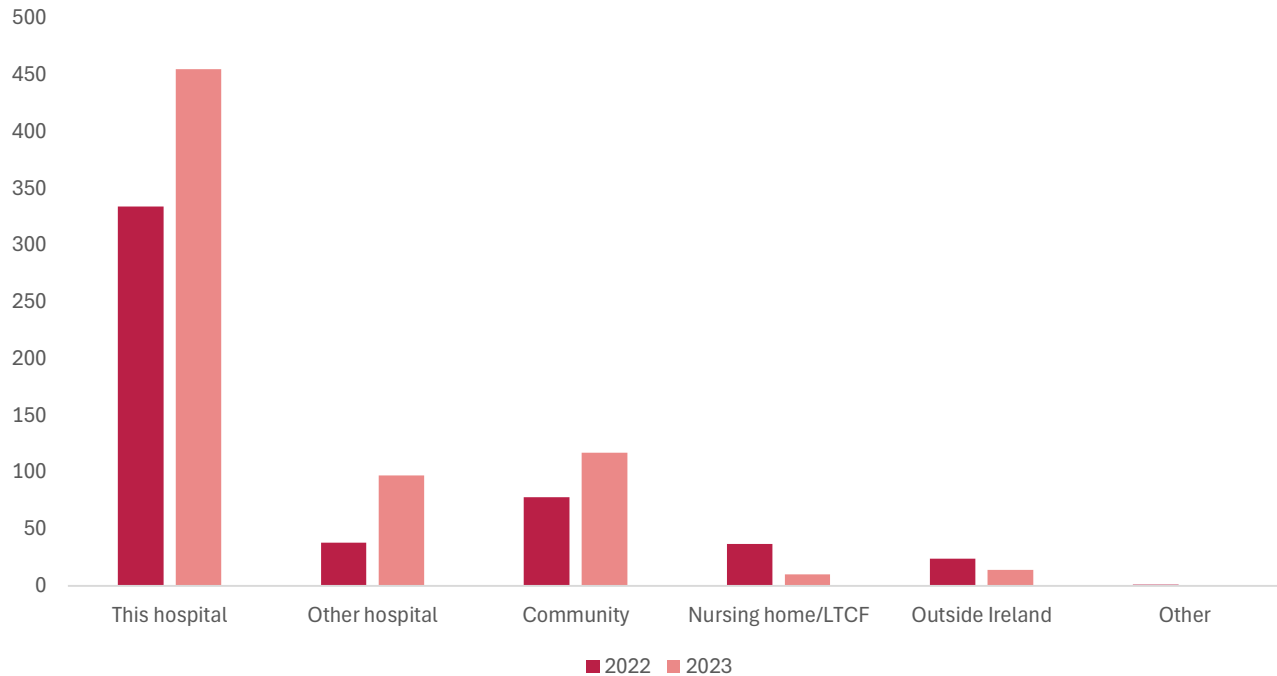


- The majority (90%) of CPE cases in 2023 were associated with hospitals – this includes in-patients, ICU patients and hospital outpatients. This is a slight increase on the previous year (82%).
- 2% of cases were associated with residents in nursing homes and long-term care facilities compared to 4% in 2022.
- 3% were from GP patients in line with the same number the previous year.





## Most likely origin of reported CPE cases, 2023



- The most likely origin of CPE cases (where known, n = 693) was in the hospital of current admission (65%) or another hospital (14%). This is an increase on the previous year where the comparable levels were 39% and 4% respectively.
- Just 17% of cases acquired their infection in the community compared to 9% the previous year.
- 1% of cases originated in nursing homes or LTCFs compared to 4% in 2022.
- 2% of cases were reported to have originated from outside Ireland in line with 2022 figures.
- Origin of infection was unknown for 37% of cases, a slight drop from 2022 where 4 in 10 cases (41%) were of unknown origin.





## Summary of invasive CPE cases reported on CIDR, 2023

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





## Summary of reported CPE outbreaks, 2023

- There were 33 outbreaks of CPE colonisation reported in 2023 compared to 26 outbreaks in 2022.
- All but one of these outbreaks occurred in hospital settings.
- An enzyme was reported for 13 outbreaks:
  - 11 OXA-48
  - 2 KPC





## Summary of invasive CPE cases reported on CIDR, 2023

- On CIDR, there were **22** cases of invasive CPE reported with an epidemiological date in 2023 (of which 21 were notified in 2023 and one in 2024).
- Seventeen cases were isolated from blood culture, accounting for just over 3 in 4 invasive cases (see Table below).
- **OXA-48** was the predominant enzyme associated with invasive CPE accounting for 16 cases (73%).



Specimen type	Number of invasive isolates
Blood culture	17
Other	3
Not Specified	2
<b>Total</b>	<b>22</b>

Enzyme type	Number of invasive cases
OXA-48	16
NDM	1
VIM	1
Not Specified	4
<b>Total</b>	<b>22</b>



## Summary of invasive CPE cases reported on CIDR, 2018 to 2023

Year	Enzyme				Total
	OXA-48	KPC	NDM	VIM	
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*
<b>Total</b>	<b>83 (84%)</b>	<b>9 (9%)</b>	<b>4 (4%)</b>	<b>3 (3%)</b>	<b>99 (100%)</b>

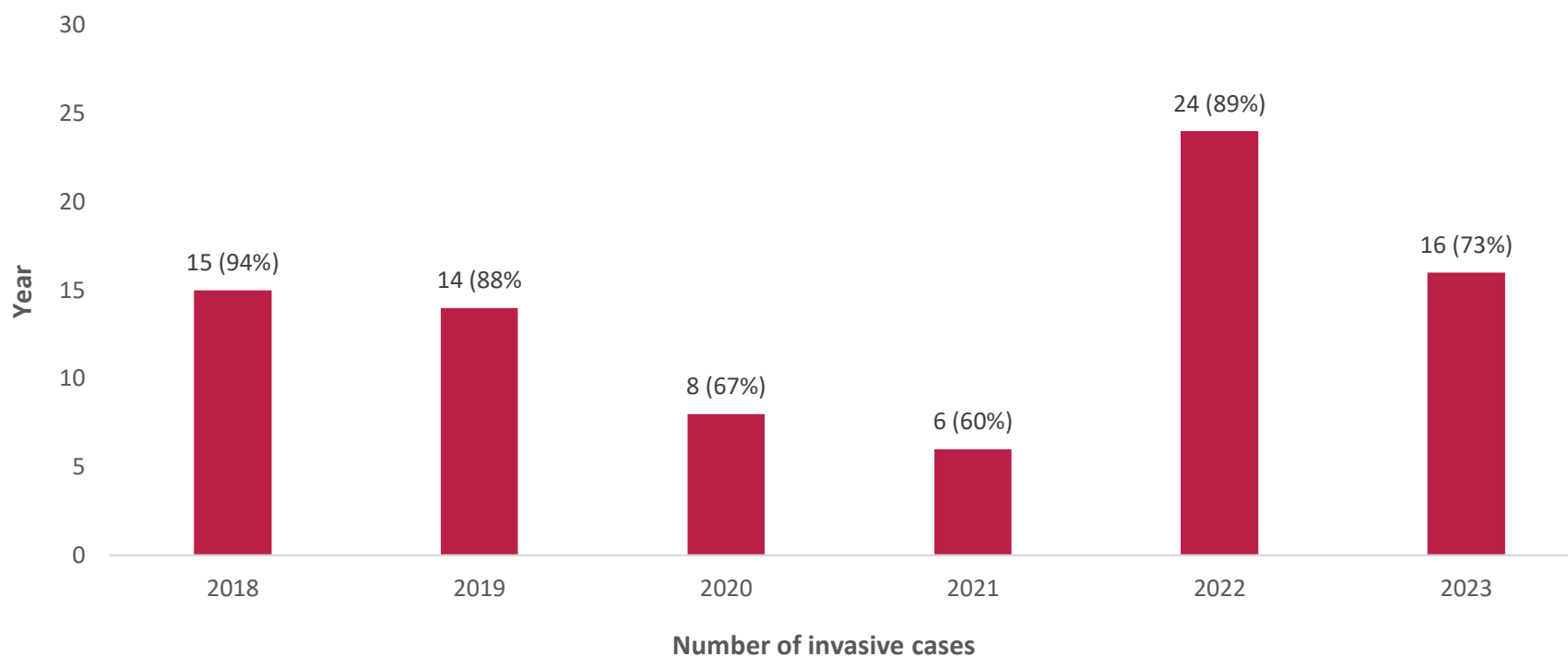
\*enzyme unknown/not specified for 4 cases





# Summary of invasive CPE cases reported on CIDR, 2018 to 2023

Cases of OXA-48 as percentage of total invasive cases, 2018 to 2023





# Acknowledgements

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

