



Carbapenemase producing *Enterobacterales* (CPE) in HSE acute hospitals

Monthly report for the National Public Health Emergency Team (NPHE)

- Most recent surveillance period included in this report: January 2018
- Report date: 8th March 2018

Executive summary of the latest available data (data source)

- 1. Patients with newly-confirmed CPE (NCPERLS):** There were 30 patients in January, compared with 35 in December. There were 430 patients in total for 2017 versus 282 in 2016
- 2. Notification of patients with invasive CPE infection (Departments of Public Health):** There was one invasive CPE infection notified in January, compared with three in December. There were 15 notified invasive infections in total for 2017 versus 14 in 2016
- 3. Creation of new CPE outbreak events (Departments of Public Health):** In January, four new acute hospital CPE outbreak events were created compared with two in December. There were 15 new CPE outbreak events created in total for 2017 versus five in 2016
- 4. CPE screens and CPE detections (HSE acute hospitals reporting to BIU):** Data returned by 89% of hospitals, with 11,065 CPE screens performed in January and 34 CPE detected overall [91% returns in December = 10,054 screens; 34 CPE detected overall]
- 5. Inpatients with known CPE (HSE acute hospitals reporting to BIU):** Data returned by 87% of hospitals. There were 133 inpatients across 17 hospitals with known CPE colonisation or infection in January [91% returns in December = 158 known inpatients, across 22 hospitals]
- 6. Known CPE inpatients not accommodated in an *en suite* single room* for part of their admission (HSE acute hospitals reporting to BIU):** Data returned by 85% of hospitals. In January, six inpatients with known CPE across five hospitals were not accommodated in an *en suite* single room for part of their admission [91% returns in December = 11 inpatients in eight hospitals]
- 7. Total grams (g) of meropenem** issued by hospital pharmacies: (HSE acute hospitals reporting to BIU):** Data returned by 61% of hospitals. In January, 13,164g of meropenem were issued [74% returns in December = 13,802g]

Data provided by the HSE Business Information Unit (BIU) are provisional. Once the HSE's monthly performance and data governance process is completed and the National Performance Profile has been approved by the HSE Directorate, these data will be considered final. In the event of there being any changes to the data contained in this report, they will be adjusted in subsequent reports (this report incorporates BIU data as received by HPSC on 06/03/2018). Acute hospitals are required to report data for a given month to BIU by the 15th of the following month.

The terms carbapenem resistant Enterobacteriaceae (CRE) and carbapenemase-producing Enterobacteriaceae (CPE) have often been used interchangeably. For technical reasons the term Enterobacterales has now replaced Enterobacteriaceae.

*BIU indicator CPE006 currently defines any facility other than an *en suite* single room as unsuitable accommodation for a known CPE inpatient. While inpatients accommodated in a cohort with other known CPE inpatients of the same carbapenemase type also represents suitable accommodation, this is not captured in the current definition for CPE006. This will be revised in Q1 2018.

**Meropenem is a carbapenem, or an antimicrobial of last resort, used in hospitals and reserved for treatment of infections due to antimicrobial resistant bacteria and infections in seriously ill patients, with input from an infection specialist (clinical microbiologist or infectious diseases physician). Because antimicrobial consumption is a driver of antimicrobial resistance, increasing consumption of meropenem is undesirable, as it may contribute to the spread of CPE in hospitals.

1. Patients with CPE newly-confirmed by the National CPE Reference Laboratory Service (NCPERLS)

Microbiology laboratories are requested to submit all newly-detected isolates from both diagnostic and screening specimens that are suspected to contain CPE or locally-identified as positive for CPE to NCPERLS for confirmation or further characterisation. If a specific bacterial species and carbapenemase (e.g. OXA-48 *E. coli*) has previously been identified and confirmed from the patient, there is usually no need for the isolate to be resented to NCPERLS. *Data presented below are provisional and relate to the date that NCPERLS received the isolates, not the original specimen collection date.*

Appendix 1a displays annual CPE trends and carbapenemase trends from 2012 to 2017. **Appendix 1b** displays total patients with CPE newly-confirmed by NCPERLS, stratified by carbapenemase type, with totals by HSE acute hospital for 2017 (also see **Appendix 1c**).

In January 2018, 30 patients with newly-detected CPE were identified, compared with 35 in December 2017 (**Figure 1**).

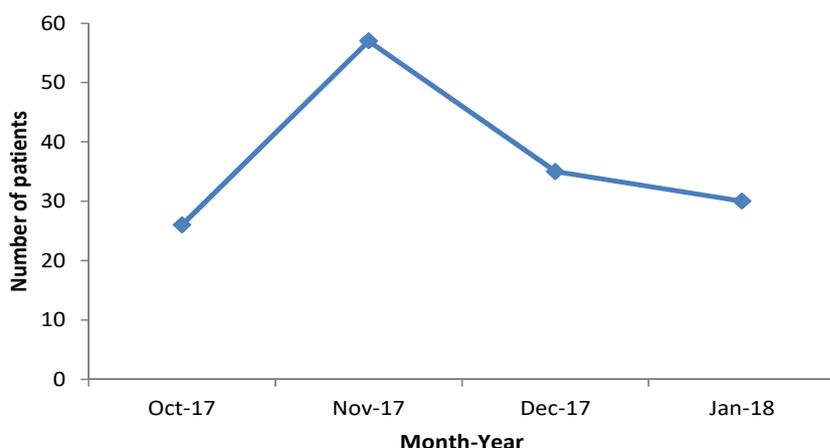


Figure 1. Monthly numbers of patients with CPE newly-confirmed by NCPERLS from Q4 2017. **Source:** NCPERLS

Of 30 patients in January 2018, 77% were newly-confirmed carriers detected on CPE screening (rectal swab/faeces) (**Figure 2**). OXA-48 is the predominant carbapenemase in Ireland (**Figure 3**).

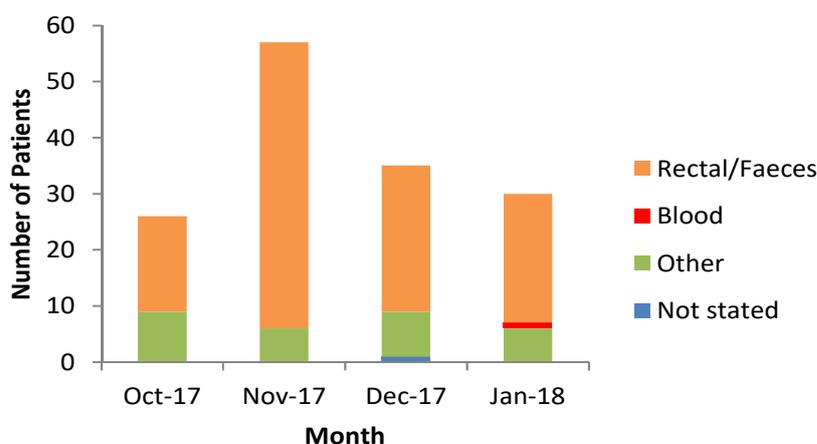


Figure 2. Monthly number of patients with CPE newly-confirmed by NCPERLS, by specimen type from Q4 2017. **Source:** NCPERLS

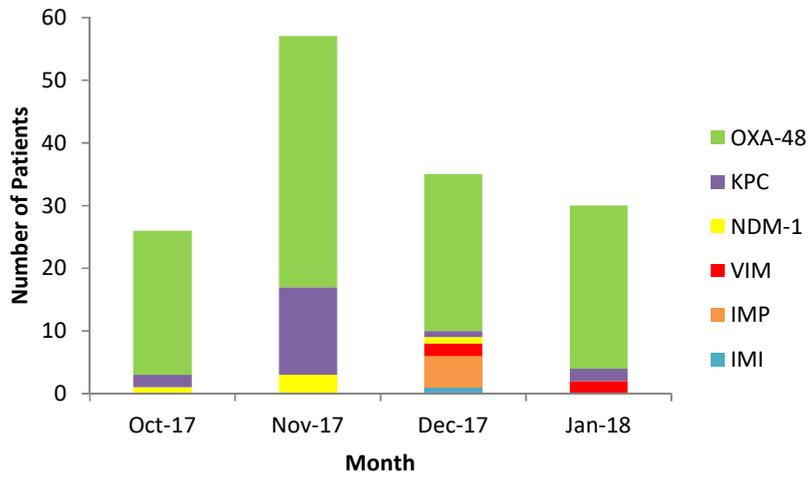


Figure 3. Monthly numbers of patients with CPE newly-confirmed by NCPERLS, by carbapenemase type from Q4 2017. **Source:** NCPERLS

2. Invasive CPE infections notified to Departments of Public Health

The current Infectious Diseases Regulations mandate notification of “invasive carbapenem resistant *Enterobacteriaceae* (CRE) infections” by laboratories (public and private) to Departments of Public Health. An infection is deemed to be invasive, when the causative organism is isolated from a body site which would normally be expected not to contain a pathogen (e.g., blood, cerebrospinal fluid). As CPE is likely to be the more widely-used term in the future, work is in progress to adjust the terminology currently used in the Infectious Diseases Regulations from CRE to CPE.

Cases are reported through the Computerised Infectious Disease Reporting (CIDR) system. **Appendix 2a** displays annual total cases of notified invasive CPE infections from 2012 to 2017. National data are analysed by HPSC. *The data presented below are **provisional** and relate to the date that cases were reported on CIDR, not the specimen collection date.*

Figure 4 displays monthly notifications of invasive CPE infection from Q4 2017 and **Figure 5** displays cumulative monthly notifications from 2012 onwards. One case was notified in January 2018.

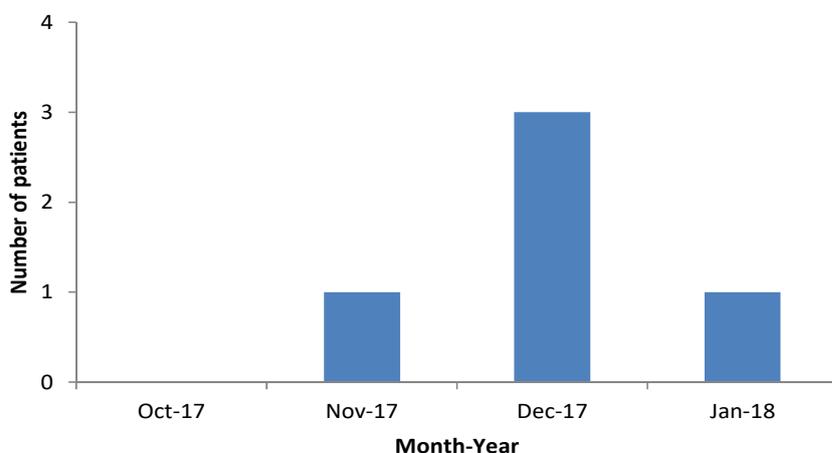


Figure 4. Monthly notifications of invasive CPE infection from Q4 2017. **Source:** CIDR

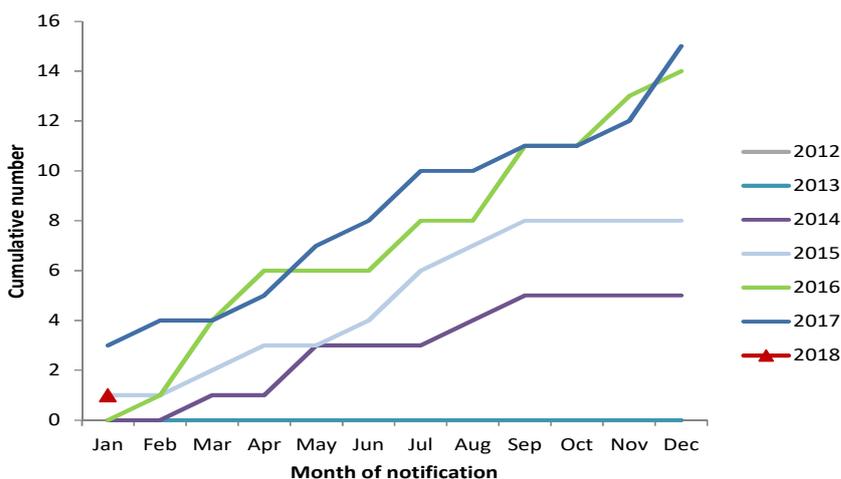


Figure 5. Cumulative monthly notifications of invasive CPE infection (2012 – January 2018). **Source:** CIDR

3. Unique CPE outbreak events created by Departments of Public Health

Under Infectious Diseases Regulations, outbreaks (infections and/or colonisations) must be notified to the Department of Public Health, by both public and private healthcare facilities. The Department of Public Health then creates a unique outbreak event on CIDR.

The data presented below are **provisional** and relate to the date an outbreak event was created on CIDR, not the date the outbreak was first detected or notified by the healthcare facility. At the time of this report's creation, HPSC is aware of additional notified outbreaks that remain to be reported on CIDR by the Departments of Public Health.

Appendix 2b displays annual total of CPE outbreaks created on CIDR from 2012 to 2017.

Figure 6 displays monthly CPE outbreaks created on CIDR from Q4 2017. Four new outbreak events were created on CIDR in January, with the latest on 29th January.

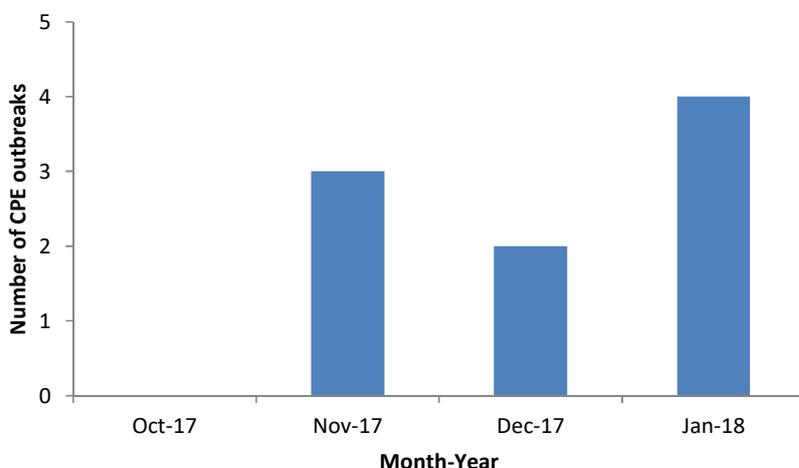


Figure 6. Monthly CPE outbreak events created by Departments of Public Health from Q4 2017.
Source: CIDR

4. Monthly CPE screens performed and CPE positives reported to BIU

All 46 acute HSE hospitals are asked to report data on the total number of CPE screens performed (rectal swab or faeces) and on the number of patients with newly-detected CPE from either screening or diagnostic specimens to the HSE's Business Information Unit (BIU), with monthly data available from October 2017. The monthly data reported by NCPERLS will not match the monthly data reported to BIU for the following reasons:

1. NCPERLS accepts specimens from both acute HSE hospital and private hospital microbiology laboratories – Acute HSE hospitals report data to BIU whereas private hospitals do not report to BIU
2. For the purposes of this monthly report, NCPERLS, CIDR and BIU data are available to the end of the preceding month
3. NCPERLS reports positive specimens based on the date the specimen was received by NCPERLS, not the date the specimen was taken. BIU reports positive specimens based on the date the specimen was taken

Appendix 3 describes the CPE-related performance indicators currently reported to BIU by HSE acute hospitals and **Appendix 4** displays compliance with monthly data returns of each hospital for the preceding two months. **Table 1** displays national monthly data totals from Q4 2017.

Data provided by the HSE Business Information Unit (BIU) are provisional. Once the HSE's monthly performance and data governance process is completed and the National Performance Profile has been approved by the HSE Directorate, these data will be considered final. In the event of there being any changes to the data contained in this report, they will be adjusted in subsequent reports (this report incorporates BIU data as received by HPSC on 06/03/2018). Acute hospitals are required to report data for a given month to BIU by the 15th of the following month.

Table 1. Monthly national CPE screening activity and confirmed CPE cases from Q4 2017. **Source:** BIU

	N (%) HSE acute hospitals providing data (CPE004)	Total monthly CPE screens (CPE004)	Total monthly confirmed CPE cases (CPE002+003)
October 2017	42 (91)	9,821	36
November 2017	43 (93.5)	11,280	45
December 2017	42 (91)	10,054	34
January 2018	41 (89)	11,065	34

The monthly total number of patients who had a CPE screen performed is likely to be less than the total screens, as some patients may have been tested more than once (e.g., admission and weekly CPE screening on selected high-risk wards, patients identified as contacts of CPE carriers requiring weekly screening for four weeks while they remain an inpatient, etc.). The monthly number of CPE screens performed and CPE positive results from both screening and diagnostic specimens, by hospital group and hospital is displayed in **Appendix 5**.

In January, there were 34 patients reported from whom CPE were newly-detected, either from a screen or other body site (**Table 1** and **Figure 7**). **Figures 8** and **9** display the number of CPE screens and number of newly detected patients with CPE in January by hospital group, respectively. All hospital groups reported newly-detected patients with CPE in January. Considerable variation in the volume of CPE screens performed between each hospital group during January was observed, which suggests variable local implementation of national CPE screening guidance.

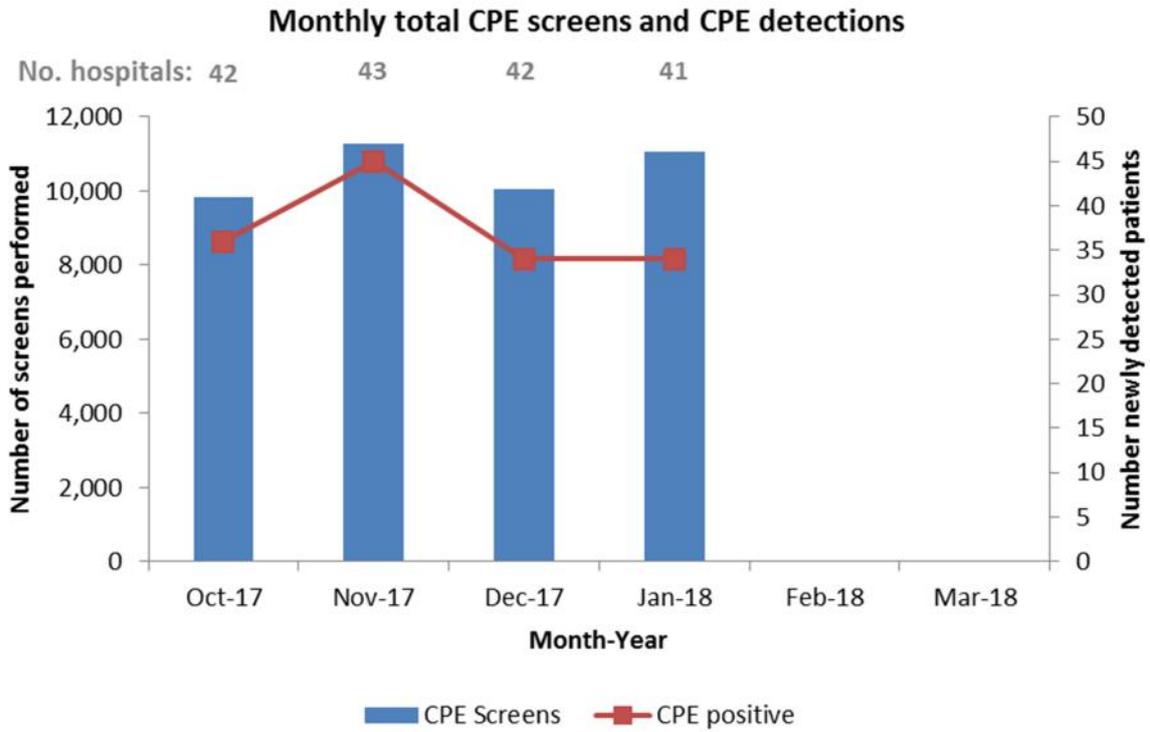


Figure 7. Monthly total CPE screens (blue bars) and total CPE detections (red boxes) in acute HSE hospitals. Number of hospitals reporting cited above each bar. **Source:** BIU

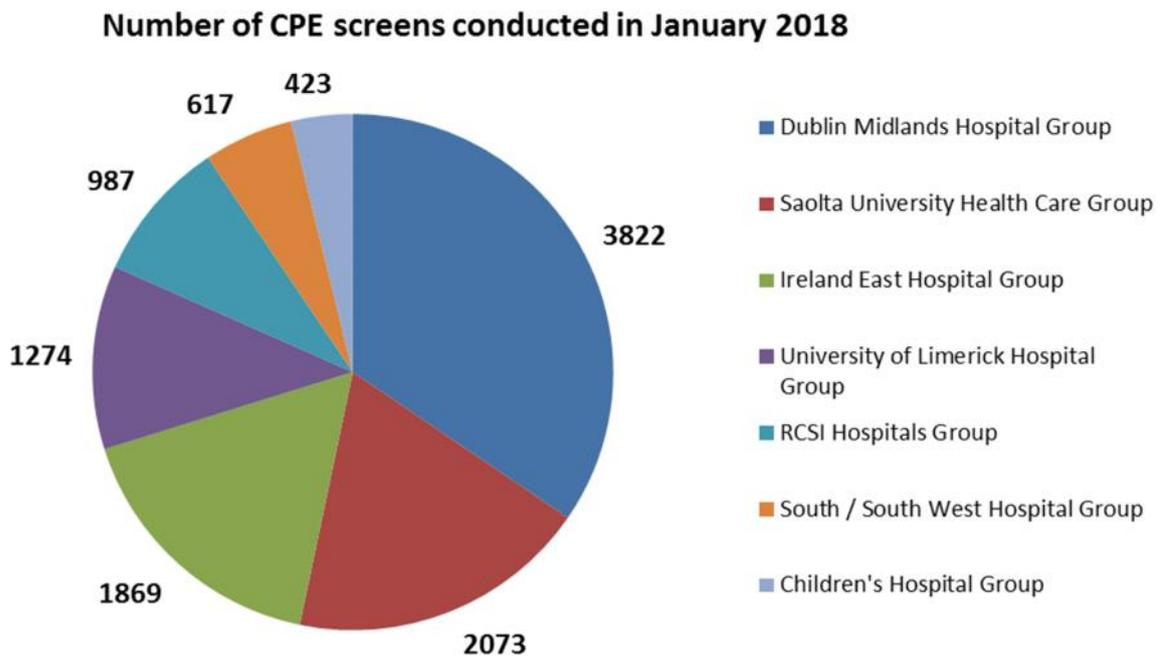


Figure 8. Distribution of CPE screening by acute HSE hospital group (January 2018). **Source:** BIU

Number of newly detected patients with CPE, January 2018

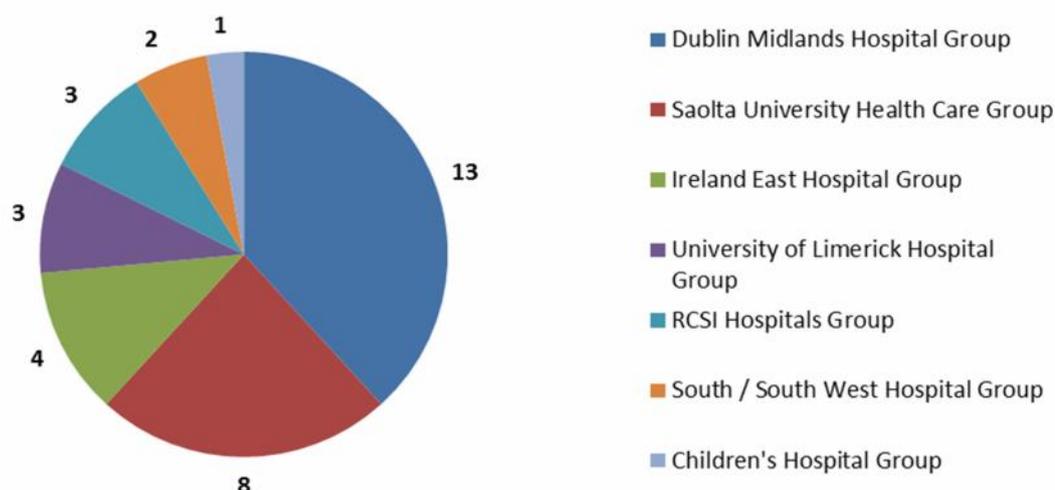


Figure 9. Distribution of newly detected patients with CPE (screening and diagnostic) by acute HSE hospital group (January 2018). **Source:** BIU

5. Additional CPE performance indicators reported to BIU

All 46 acute HSE hospitals are asked to report data on additional CPE-related performance indicators to the BIU, with monthly data available from October 2017. **Appendix 3** describes the CPE-related performance indicators currently reported to BIU by HSE acute hospitals and **Appendix 4** displays compliance with monthly data returns of each hospital for the preceding two months. **Table 2** displays national monthly data from Q4 2017.

Table 2. Monthly national inpatients with known CPE & those not accommodated in an *en suite* single room for part of admission from Q4 2017. **Source:** BIU

	N (%) HSE acute hospitals providing data (CPE005)	Total inpatients with known CPE	N (%) HSE acute hospitals providing data (CPE006)	Total inpatients not accommodated in an <i>en suite</i> single room for part of admission
October 2017	41 (89)	131	40 (87)	11
November 2017	42 (91)	170	42 (91)	19
December 2017	42 (91)	158	42 (91)	11
January 2018	40 (87)	133	39 (85)	6

5.1 Inpatients with known CPE infection or colonisation (Indicator: CPE005)

In January 2018, 40 HSE acute hospitals (87%) provided data. There were 133 inpatients with known CPE infection or colonisation accommodated in 17 HSE acute hospitals (range = 1 – 45 inpatients) and 23 hospitals reported no inpatients with CPE (**Figure 10** and **Appendix 5**).

Inpatients with CPE colonisation/infection

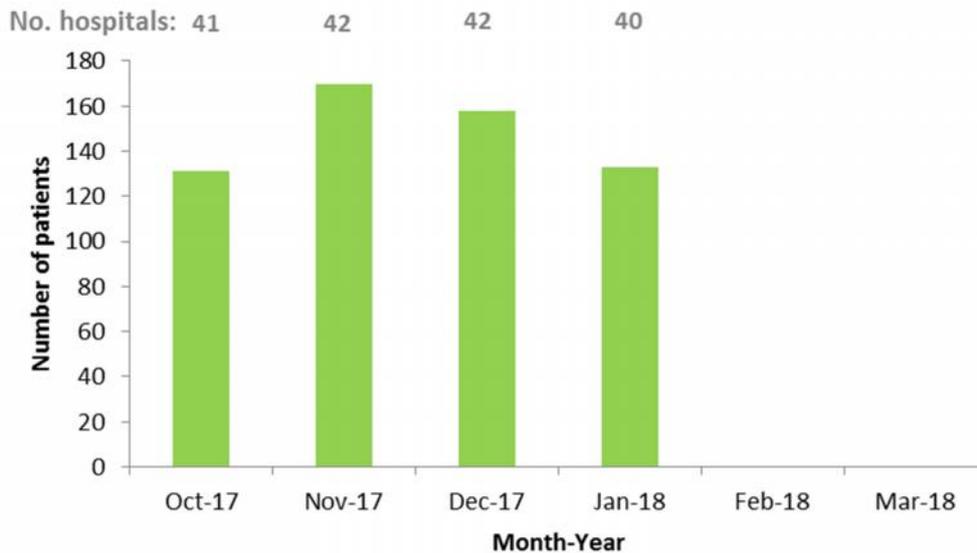


Figure 10. Monthly total of known CPE inpatients (green bars) in acute HSE hospitals. Number of hospitals reporting cited above each bar. **Source:** BIU

5.2 Known CPE inpatients not accommodated in an *en suite* single room* for part of their admission (Indicator: CPE006)

In January 2018, 39 HSE acute hospitals (85%) provided data. A total of six inpatients with known CPE across five acute HSE hospitals (13% of those providing data) were not accommodated in an *en suite* single room* for part of their admission, increasing the risk of further CPE transmission (**Figure 11** and **Appendix 5**).

*BIU indicator CPE006 currently defines any facility other than an *en suite* single room as unsuitable accommodation for a known CPE inpatient. While inpatients accommodated in a cohort with other known CPE inpatients of the same carbapenemase type also represents suitable accommodation, this is not captured in the current definition for CPE006. This will be revised in Q1 2018.

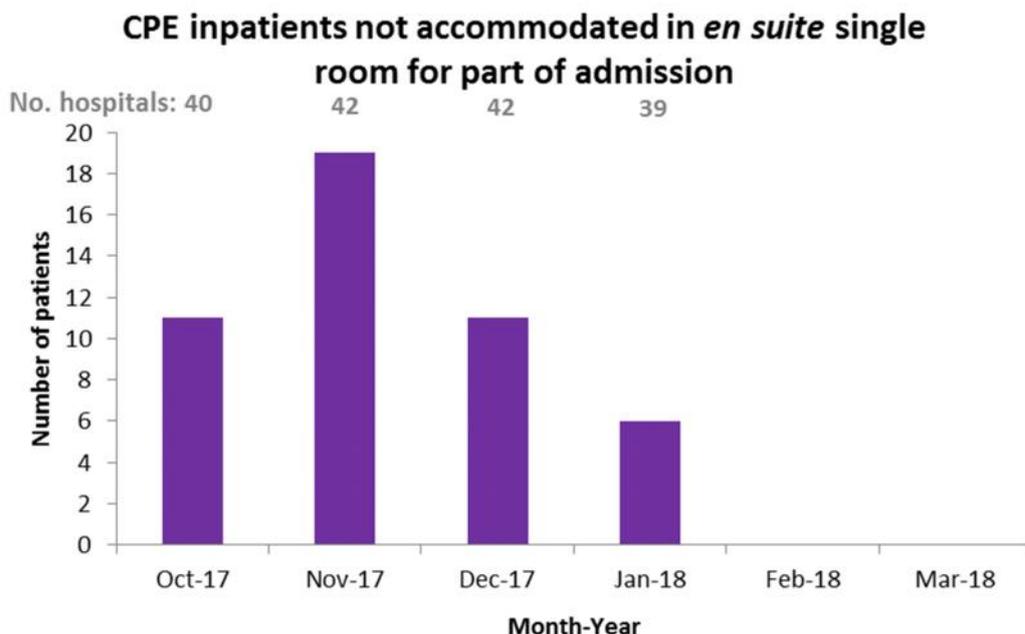


Figure 11. Monthly total known CPE inpatients (purple bars) not accommodated in an *en suite* single room for part of admission in acute HSE hospitals. Number of hospitals reporting cited above each bar. **Source:** BIU

6. Meropenem use

6.1 Acute HSE hospital pharmacy dispensing of meropenem, as reported to BIU (indicator: CPE008)

All 46 acute HSE hospitals are asked to report data on net monthly grams of meropenem dispensed by the pharmacy, with monthly data available from October 2017. **Appendix 3** describes the CPE-related performance indicators currently reported to BIU by HSE acute hospitals and **Appendix 4** displays compliance with monthly data returns of each hospital for the preceding two months.

Meropenem is a carbapenem, or an antimicrobial of last resort, used in hospitals and reserved for treatment of infections due to antimicrobial resistant bacteria and infections in seriously ill patients, with input from an infection specialist (clinical microbiologist or infectious diseases physician). Because antimicrobial consumption is a driver of antimicrobial resistance, increasing consumption of meropenem is undesirable, as it may contribute to the spread of CPE in hospitals. **Table 3** and **Figure 12** display national monthly data from Q4 2017 and **Appendix 5** displays data by hospital and hospital group. In January 2018, 28 HSE acute hospitals (61%) provided data, with 13,164 net grams of meropenem dispensed by 24 pharmacies (86% of those providing data), and four dispensing no meropenem.

Table 3. Monthly national net grams of meropenem dispensed from Q4 2017. **Source:** BIU

	N (%) HSE acute hospitals providing data (CPE008)	Net grams of meropenem dispensed monthly	Number of pharmacies dispensing meropenem
October 2017	32 (70)	13,478	29
November 2017	33 (72)	13,624	27
December 2017	34 (74)	13,802	29
January 2018	28 (61)	13,164	24

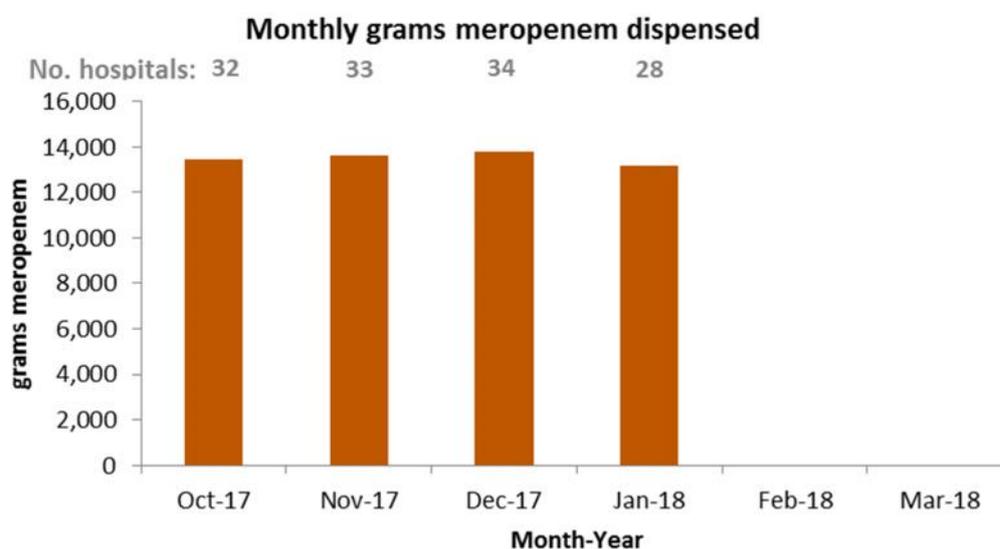


Figure 12. Monthly net** grams of meropenem dispensed by acute HSE hospital pharmacies (orange bars). Number of hospitals reporting cited above each bar. **Source:** BIU

**Not all meropenem dispensed by the hospital pharmacy may be administered to patients within the month. Pharmacy dispenses Xg in a month, but Yg is returned at the end of the month: Net = X-Y. For example, 400g issued in January, with 100g returned in February: 100g is deductible from the total issued in February (net = 300g).

6.2 National carbapenem use data, as reported to HPSC

The majority of HSE acute hospitals (n=42) submit data on antimicrobial use to the HPSC. Data are published nationally and by participating hospital on the HPSC website. Overall use and use by antimicrobial class, including carbapenems (meropenem, ertapenem and imipenem), are reported. Data are expressed as a rate of defined daily doses (DDD) per 100 bed days used (BDU), using the WHO standard method. **Figure 13** displays annual national carbapenem use trends to end Q2 2017.

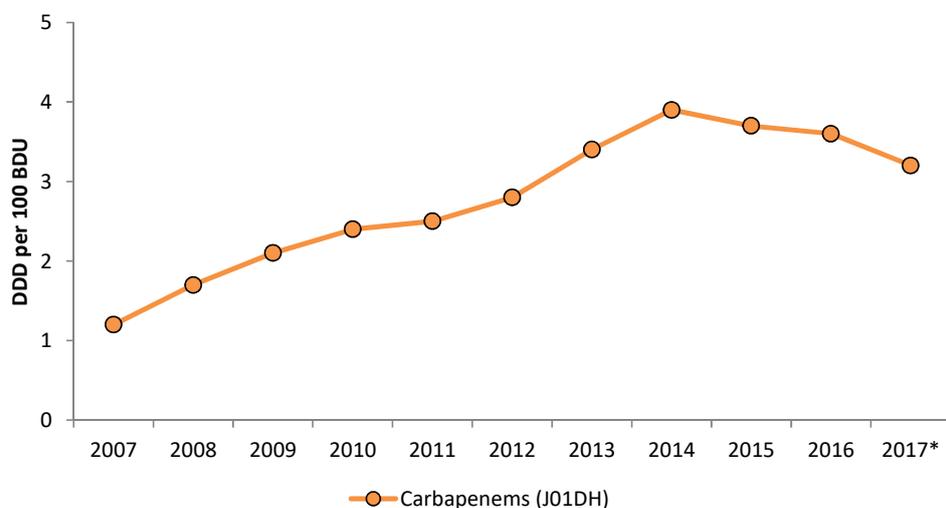


Figure 13. Annual national carbapenem use in acute HSE hospitals (*2017 data to end of Q2).
Source: HPSC

<http://www.hpsc.ie/a-z/microbiologyantimicrobialresistance/europeansurveillanceofantimicrobialconsumptionesac/PublicMicroB/SACHC/Report1.html>

7. Enhanced surveillance of CPE, as reported to HPSC

In January 2017, a mandatory CPE enhanced surveillance scheme was launched, with quarterly data reported by microbiology laboratories to HPSC, including those serving public and private hospitals. While all 39 microbiology laboratories in Ireland provided data in Q1 2017, one laboratory suspended their participation in this surveillance system as of Q2 2017, citing staff shortages. CPE enhanced surveillance collects information based on the first CPE isolate per patient per quarter from acute HSE and private hospitals, patient age, gender, location at the time of positive CPE specimen, specimen type, and carbapenemase type. For inpatients, additional information is sought on patient isolation status within 24 hours of a suspected CPE result, whether or not the patient had required antimicrobial therapy for suspected CPE infection by the time of reporting and patient outcome.

The latest CPE enhanced surveillance report is available on the HPSC website: <http://www.hpsc.ie/a-z/microbiologyantimicrobialresistance/strategyforthecontrolofantimicrobialresistanceinirelandsari/carbapenemresistantenterobacteriaceae/surveillanceofcreinireland/>

Appendix 1

Appendix 1a. Annual NCPERLS data (2012 – 2017)

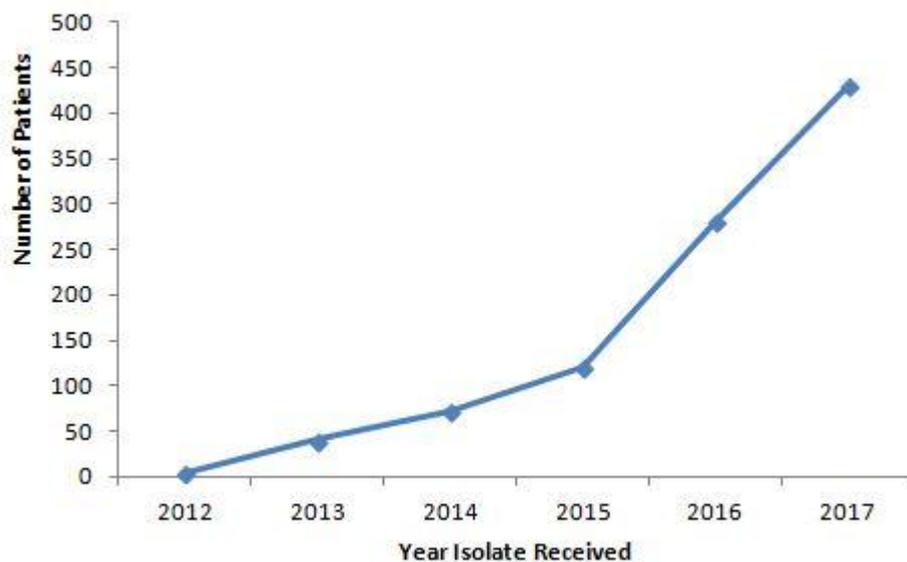


Figure 14. Annual numbers of patients with CPE newly-confirmed (2012 – 2017). Source: NCPERLS

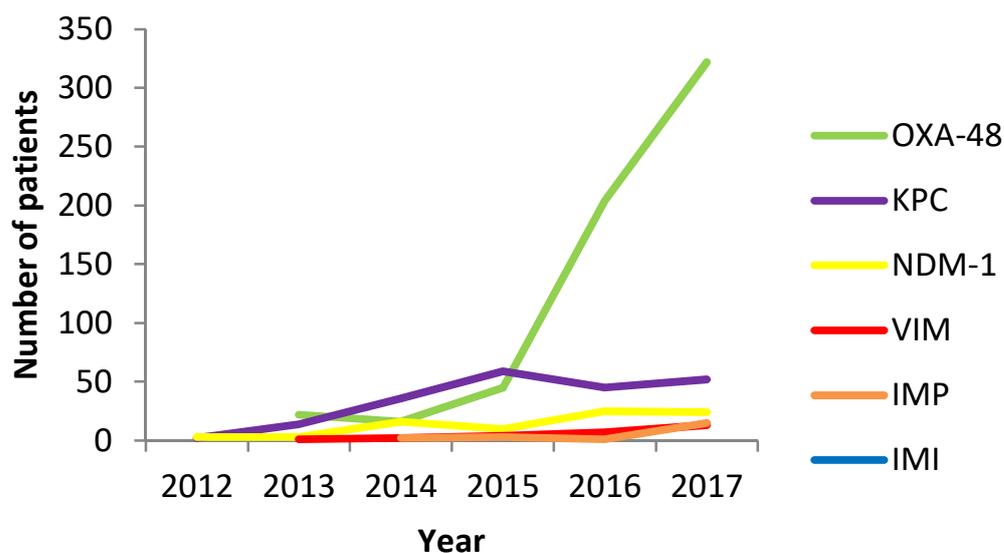


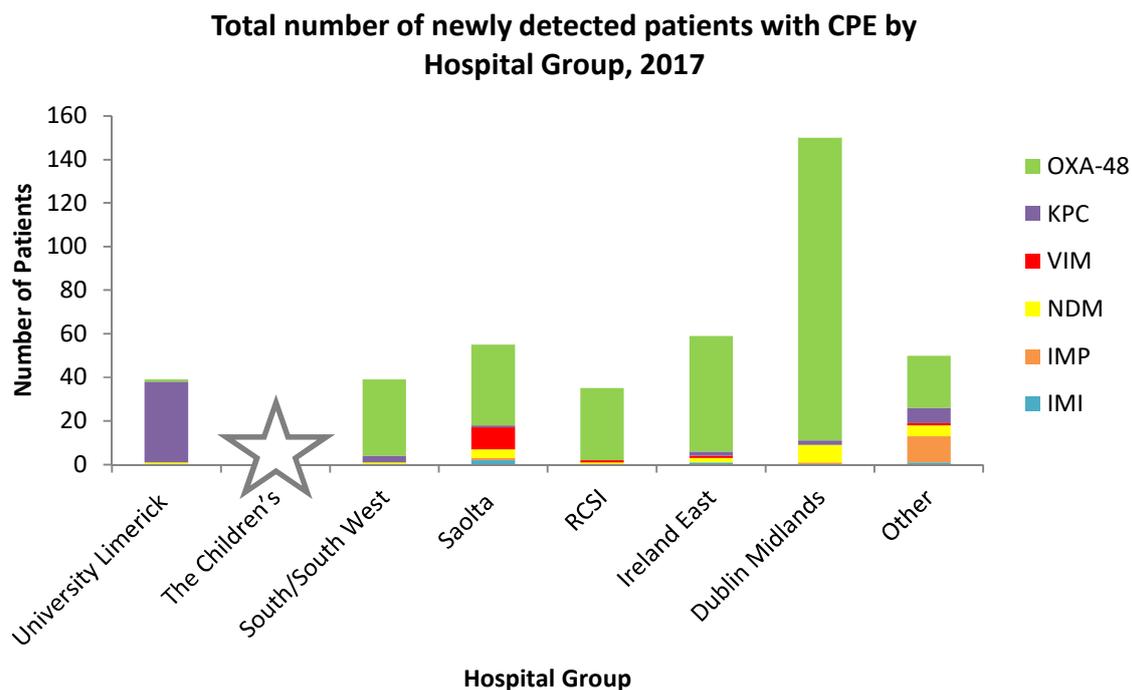
Figure 15. Annual numbers of patients with CPE newly-confirmed, by carbapenemase type (2012 – 2017). Source: NCPERLS

Appendix 1b. Total patients with newly-confirmed CPE, by carbapenemase and HSE acute hospital (2017). Source: NCPERLS

	KPC	OXA-48	NDM	VIM	IMP	IMI
The Children's Hospital Group						
Our Lady's Children's Hospital, Crumlin			*		*	
Temple Street Children's University Hospital			*			
Dublin Midlands Hospital Group						
St James' Hospital Dublin		25	*			
Tallaght Hospital, Dublin	*	96	7		*	
Naas General Hospital		16				
St Luke's Radiation Oncology Network		*				
Ireland East Hospital Group						
The Mater Misericordiae University Hospital Dublin	*	13	*			
St Vincent's University Hospital Dublin		12	*	*		*
Wexford General Hospital		7				
St Luke's General Hospital, Kilkenny		16				
Our Lady's Hospital, Navan		*				
National Maternity Hospital, Holles St, Dublin		*				
Midlands Regional Hospital, Mullingar		*				
RCSI Hospitals Group						
Beaumont Hospital Dublin		29				
Connolly Hospital Dublin		*		*		
Our Lady of Lourdes Hospital Drogheda		*	*			
Rotunda Hospital Dublin		*				
Saolta Hospital Group						
University Hospital Galway/ Merlin Park	*	32	*	6	*	*
Letterkenny University Hospital		*				
Mayo General Hospital				*		
Sligo Regional Hospital		*		*		
Roscommon County Hospital				*		
South/South West Hospital Group						
Cork University Hospital	*	*				
University Hospital Waterford	*	24				
University Hospital Kerry			*			
South Tipperary General Hospital		8				
Mercy University Hospital Cork		*				
University Limerick Hospital Group						
University Hospital Limerick	35	*	*			
Ennis Hospital	*					
St. John's Hospital	*					
Other Healthcare facilities	7	24	5	*	12	*
TOTAL (n=430)#	52	322	24	13	15	*

Data are based on bacterial cultures submitted to NCPERLS. Patients are counted once only in the hospital/hospital group from which their first CPE isolate was submitted. It should not be assumed that the location of the patient at the time of first detection represents the hospital/hospital group in which colonisation/infection was acquired. An asterisk represents <5 patients. This convention is used to avoid designating a single patient or a very small number of patients in any context where there is a risk that the information might be linked to an individual patient. *Data are preliminary and may be revised upon end-of-year analysis and validation.* (#Does not include a small number of NDM-producing *Acinetobacter species* isolates detected in 2017, because *Acinetobacter species* are not members of the order *Enterobacterales*). Other healthcare facilities includes specimens from: Private hospitals, long-term care facilities and GP surgeries

Appendix 1c. Total patients with newly-confirmed CPE, by carbapenemase and HSE Hospital Group (2017). Source: NCPERLS



☆=Figures less than 5.

Figure 16. Patients with CPE newly-confirmed in 2017, by carbapenemase type and hospital group. **Source:** NCPERLS

Data are based on bacterial cultures submitted to NCPERLS. Patients are counted once only in the hospital/hospital group from which their first CPE isolate was submitted. It should not be assumed that the location of the patient at the time of first detection represents the hospital/hospital group in which colonisation/infection was acquired. Other*: Private hospitals, long-term care facilities and GP surgeries. *Data are preliminary and may be revised upon end-of-year analysis and validation.*

Appendix 2

Appendix 2a. Annual notifications of invasive CPE infections (2012 – 2017). Source: CIDR

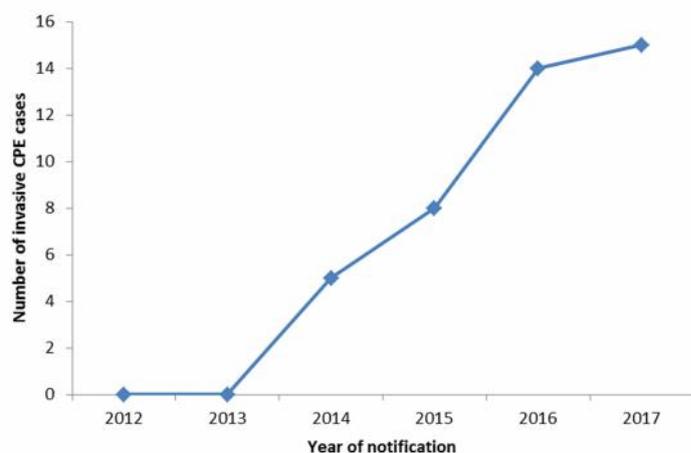


Figure 17. Annual notifications of invasive CPE infection (2012 – 2017). **Source:** CIDR

Appendix 2b. Annual CPE outbreak events created by Departments of Public Health. Source: CIDR

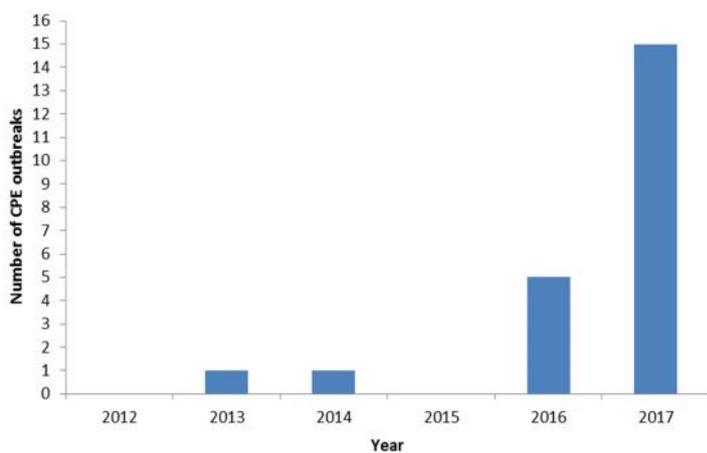


Figure 18. Annual CPE outbreak events created by Departments of Public Health (2012 – 2017). **Source:** CIDR

Appendix 3. CPE-related performance indicators reported monthly by acute HSE hospitals to the BIU.



Carbapenemase Producing Enterobacteriaceae (CPE) and Meropenem use

Reference	Indicator
CPE002	Number of patients confirmed with newly detected CPE from rectal swabs/ faeces*
CPE003	Number of patients confirmed with newly detected CPE from any other site*
CPE004	Total number of rectal swabs/ faeces samples tested for CPE
CPE005	Number of patients with known CPE infection or colonisation who were inpatients at any time during the month
CPE006	Number of in-patients with known CPE who were accommodated overnight in unsuitable accommodation for any part of their admission. (Any facility other than an en-suite single room is unsuitable. Include time spent in the emergency department. Overnight means present at midnight).
CPE007	Did you or the IPC team consider that there was evidence of person to person transmission of CPE in your hospital in the past month
CPE008	Net number of grams of meropenem issued from pharmacy in this month**
CPE009	Hospital Manager approved all information included in CPE002- CPE 008 inclusive confirm Yes/ No***

Note:

It is acknowledged that this information does not of itself form a basis for meaningful comparisons between hospitals and this is not its intended purpose. The data is intended to provide real time system wide information on the detection and distribution of patients colonised or infected with CPE and the challenges in containing further spread.

*To avoid duplication confirmed CPE should be counted once only and for the purpose of this return it should be associated with the month during which a molecular result performed either in house or at reference laboratory becomes available to the Infection Prevention Control team at the hospital making the return.

**It is acknowledged that the dispensing of meropenem by the hospital pharmacy does not mean that the agent was used in patients in that month. The quantity returned should be the net quantity issued. For example if in a given month a pharmacy issues 400g but receives 100g returned from the wards the number for this return is 300g. For example, 400grams was issued in January, but 100 grams was returned in February, this is deducted from the total issued in February.

***It is important that the name of the Hospital Manager approving the return is included in each return

Appendix 4. Monthly CPE returns received by the BIU:

December 2017 and January 2018

The table highlights how many of the following 5 questions were answered by month:

Questions (1) CPE002&CPE003 combined, (2) CPE004, (3) CPE005, (4) CPE006, (5) CPE008

Provider	Dec-17		Jan-18	
	Questions completed	% completed	Questions completed	% completed
Beaumont Hospital	4	80%	4	80%
Cappagh National Orthopaedic Hospital	5	100%	5	100%
Cavan General Hospital	4	80%	4	80%
Children's University Hospital Temple Street	5	100%	5	100%
Connolly Hospital - Blanchardstown	4	80%	4	80%
Coombe Women and Infants University Hospital	5	100%	5	100%
Cork University Hospital	2	40%	2	40%
Croom Hospital	5	100%	5	100%
Ennis Hospital	5	100%	5	100%
Galway University Hospitals	5	100%	5	100%
Letterkenny University Hospital	3	60%	No return	
Lourdes Orthopaedic Hospital Kilcreene	No return		5	100%
Louth County Hospital	5	100%	4	80%
Mater Misericordiae University Hospital	5	100%	5	100%
Mayo University Hospital	5	100%	4	80%
Mercy University Hospital Cork	5	100%	5	100%
Midland Regional Hospital - Portlaoise	5	100%	5	100%
Midland Regional Hospital - Tullamore	4	80%	4	80%
Midland Regional Hospital Mullingar	5	100%	5	100%
Naas General Hospital	5	100%	5	100%
National Maternity Hospital	5	100%	5	100%
Nenagh Hospital	5	100%	4	80%
Our Lady of Lourdes Hospital Drogheda	5	100%	4	80%
Our Lady's Children's Hospital, Crumlin	4	80%	5	100%
Our Ladys Hospital - Navan	5	100%	4	80%
Portiuncula University Hospital	4	80%	4	80%
Roscommon University Hospital	4	80%	4	80%
Rotunda Hospital	5	100%	5	100%
Royal Victoria Eye and Ear Hospital	5	100%	5	100%
Sligo University Hospital	4	80%	4	80%
South Infirmary/Victoria University Hospital Cork	5	100%	5	100%
South Tipperary General Hospital	5	100%	5	100%
St John's Hospital	5	100%	5	100%
St. Columcille's Hospital	4	80%	5	100%
St. James's Hospital	5	100%	5	100%
St. Luke's Hospital Kilkenny	5	100%	5	100%
St. Luke's Radiation Oncology Network	5	100%	5	100%
St. Michael's Hospital	5	100%	5	100%
St. Vincent's University Hospital	5	100%	5	100%
Tallaght Hospital - Adults	5	100%	5	100%
University Hospital Waterford	5	100%	5	100%
University Hospital, Limerick	5	100%	5	100%
Wexford General Hospital	5	100%	No return	
Kerry General Hospital	No return		No return	
Mallow General Hospital	No return		No return	
Bantry General Hospital	5	100%	No return	
Total submitted	43		41	
Did not submit	3		5	
% of providers who submitted data	93.5%		89.1%	

Appendix 5. Monthly BIU CPE performance indicator data by Hospital Group

5a. National:

Performance Indicators:	
CPE002	Number of patients confirmed with newly detected CPE from rectal swabs/faeces
CPE003	Number of patients confirmed with newly detected CPE from any other site
CPE004	Total number of rectal swabs/faeces samples tested for CPE
CPE005	Number of patients with known CPE infection or colonisation who were inpatients at any time during the month
CPE006	Number of in-patients with known CPE who were not in en-suite accommodation for any part of their admission.
CPE008	Net number of grams of meropenem issued from pharmacy in this month
No data submitted by provider	

Hospital Group	Performance indicator	Q4 2017			Q1 2018
		Oct-17	Nov-17	Dec-17	Jan-18
Children's Hospital Group	CPE002+003	0	0	0	***
	CPE004	383	411	322	423
	CPE005	***	***	***	6
	CPE006	0	0	0	0
	CPE008	53	76	61	350
Dublin Midlands Hospital Group	CPE002+003	13	5	15	13
	CPE004	3,574	3,533	3,169	3,822
	CPE005	57	75	75	67
	CPE006	***	***	***	0
	CPE008	3,354	3,681	3,883	3,157
Ireland East Hospital Group	CPE002+003	***	***	***	***
	CPE004	1,967	1,925	1,557	1,869
	CPE005	15	20	21	13
	CPE006	***	5	***	***
	CPE008	5,643	5,491	5,683	5,712
RCSI Hospitals Group	CPE002+003	9	11	0	***
	CPE004	1,078	1,749	970	987
	CPE005	13	18	12	8
	CPE006	0	8	***	***
	CPE008	345	311	432	32
Saoita University Health Care Group	CPE002+003	6	9	7	8
	CPE004	1,395	1,881	2,343	2,073
	CPE005	16	25	26	23
	CPE006	***	***	***	***
	CPE008	1,130	1,542	1,088	1,110
South / South West Hospital Group	CPE002+003	***	6	8	***
	CPE004	381	549	640	617
	CPE005	7	9	13	10
	CPE006	***	***	***	***
	CPE008	1,603	1,270	1,064	1,336
University of Limerick Hospital Group	CPE002+003	***	10	0	***
	CPE004	1,043	1,232	1,053	1,274
	CPE005	19	19	8	6
	CPE006	0	***	***	0
	CPE008	1,350	1,253	1,591	1,467
National Total (All Groups)	CPE002+003	36	45	34	34
	CPE004	9,821	11,280	10,054	11,065
	CPE005	131	170	158	133
	CPE006	11	19	11	85
	CPE008	13,478	13,624	13,802	13,164

*** = Figures <5

5b. Children's Hospital Group:

Performance Indicators:	
CPE002	Number of patients confirmed with newly detected CPE from rectal swabs/ faeces
CPE003	Number of patients confirmed with newly detected CPE from any other site
CPE004	Total number of rectal swabs/ faeces samples tested for CPE
CPE005	Number of patients with known CPE infection or colonisation who were inpatients at any time during the month
CPE006	Number of in-patients with known CPE who were not in en-suite accommodation for any part of their admission.
CPE008	Net number of grams of meropenem issued from pharmacy in this month
No data submitted by provider	

Provider	Performance indicator	Q4 2017			Q1 2018
		Oct-17	Nov-17	Dec-17	Jan-18
Our Lady's Children's Hospital, Crumlin	CPE002+003	0	0	0	***
	CPE004	274	308	230	310
	CPE005	***	***	***	5
	CPE006	0	0	0	0
	CPE008				289
Temple Street Children's University Hospital	CPE002+003	0	0	0	0
	CPE004	109	103	92	113
	CPE005	***	***	***	***
	CPE006	0	0	0	0
	CPE008	53	76	61	61
Children's Hospital Group	CPE002+003	0	0	0	***
	CPE004	383	411	322	423
	CPE005	***	***	***	6
	CPE006	0	0	0	0
	CPE008	53	76	61	350

*** = Figures <5

5c. Dublin Midlands Hospital Group:

CPE002	Number of patients confirmed with newly detected CPE from rectal swabs/ faeces
CPE003	Number of patients confirmed with newly detected CPE from any other site
CPE004	Total number of rectal swabs/ faeces samples tested for CPE
CPE005	Number of patients with known CPE infection or colonisation who were inpatients at any time during the month
CPE006	Number of in-patients with known CPE who were not in en-suite accommodation for any part of their admission.
CPE008	Net number of grams of meropenem issued from pharmacy in this month
No data submitted by provider	

Provider	Performance indicator	Q4 2017			Q1 2018
		Oct-17	Nov-17	Dec-17	Jan-18
Coombe Women and Infants University Hospital	CPE002+003	0	0	0	0
	CPE004	18	23	13	27
	CPE005	0	0	0	0
	CPE006	0	0	0	0
	CPE008	70	118	12	59
MRH Portlaoise	CPE002+003	0	0	0	0
	CPE004	37	33	43	40
	CPE005	***	0	0	0
	CPE006	0	0	0	0
	CPE008	73	45	53	23
MRH Tullamore	CPE002+003	0	0	***	0
	CPE004	168	187	172	234
	CPE005	***	***	***	0
	CPE006	***	***	0	0
	CPE008				
Naas General Hospital	CPE002+003	***	***	***	0
	CPE004	655	609	526	801
	CPE005	***	5	5	5
	CPE006	***	***	0	0
	CPE008	187	120	56	140
St. James's Hospital	CPE002+003	***	0	***	***
	CPE004	706	673	655	507
	CPE005	9	27	25	17
	CPE006	0	0	0	0
	CPE008	2,438	2,692	3,161	2,217
St. Luke's Radiation Oncology Network	CPE002+003	0	***	0	0
	CPE004	217	206	184	234
	CPE005	0	***	0	0
	CPE006	0	0	0	0
	CPE008	10	5	0	0
Tallaght Hospital - Adults	CPE002+003	7	***	8	10
	CPE004	1,773	1,802	1,576	1,979
	CPE005	42	41	44	45
	CPE006	0	0	***	0
	CPE008	576	701	601	718
Dublin Midlands Hospital Group	CPE002+003	13	5	15	13
	CPE004	3,574	3,533	3,169	3,822
	CPE005	57	75	75	67
	CPE006	***	***	***	0
	CPE008	3,354	3,681	3,883	3,157

*** = Figures <5

5d. Ireland East Hospital Group:

Performance Indicators:	
CPE002	Number of patients confirmed with newly detected CPE from rectal swabs/ faeces
CPE003	Number of patients confirmed with newly detected CPE from any other site
CPE004	Total number of rectal swabs/ faeces samples tested for CPE
CPE005	Number of patients with known CPE infection or colonisation who were inpatients at any time during the month
CPE006	Number of in-patients with known CPE who were not in en-suite accommodation for any part of their admission.
CPE008	Net number of grams of meropenem issued from pharmacy in this month
No data submitted by provider	

Provider	Performance indicator	Q4 2017			Q1 2018
		Oct-17	Nov-17	Dec-17	Jan-18
Cappagh National Orthopaedic Hospital	CPE002+003	0	0	0	0
	CPE004	0	0	0	0
	CPE005	0	0	0	0
	CPE006	0	0	0	0
	CPE008	10	0	0	23
Mater Misericordiae University Hospital	CPE002+003	***	***	***	***
	CPE004	394	374	319	395
	CPE005	6	8	11	8
	CPE006	***	0	***	***
	CPE008	2,710	2,860	2,571	2,756
MRH Mullingar	CPE002+003	0	0	0	0
	CPE004	116	109	136	87
	CPE005	0	***	0	0
	CPE006	0	***	0	0
	CPE008	136	122	380	355
National Maternity Hospital	CPE002+003	0	0	0	0
	CPE004	81	77	67	68
	CPE005	0	0	0	0
	CPE006	0	0	0	0
	CPE008	0	20	13	20
Our Lady's Hospital Navan	CPE002+003	***	0	0	0
	CPE004	41	106	46	46
	CPE005		***	***	***
	CPE006		***	0	0
	CPE008	13	53	103	
Royal Victoria Eye and Ear Hospital	CPE002+003	0	0	0	0
	CPE004	22	24	16	34
	CPE005	***	0	0	0
	CPE006	***	0	0	0
	CPE008	0	0	52	68

*** = Figures <5

5d. Ireland East Hospital Group (continued):

Performance Indicators:	
CPE002	Number of patients confirmed with newly detected CPE from rectal swabs/ faeces
CPE003	Number of patients confirmed with newly detected CPE from any other site
CPE004	Total number of rectal swabs/ faeces samples tested for CPE
CPE005	Number of patients with known CPE infection or colonisation who were inpatients at any time during the month
CPE006	Number of in-patients with known CPE who were not in en-suite accommodation for any part of their admission.
CPE008	Net number of grams of meropenem issued from pharmacy in this month
No data submitted by provider	

Provider	Performance indicator	Q4 2017			Q1 2018
		Oct-17	Nov-17	Dec-17	Jan-18
St. Columcille's Hospital	CPE002+003	0	0	0	0
	CPE004	103	102		119
	CPE005	0	0	0	0
	CPE006	0	0	0	0
	CPE008	10	0	10	10
St Luke's General Hospital Kilkenny	CPE002+003	0	***	0	0
	CPE004	82	79	82	76
	CPE005	***	***	0	0
	CPE006	***	***	0	0
	CPE008	400	161	141	37
St. Michael's Hospital	CPE002+003	0	0	0	0
	CPE004	111	78	63	60
	CPE005	0	0	0	0
	CPE006	0	0	0	0
	CPE008	10	13	63	70
St. Vincent's University Hospital	CPE002+003	***	***	***	***
	CPE004	931	855	723	984
	CPE005	6	5	7	***
	CPE006	***	0	***	***
	CPE008	2,046	2,088	2,270	2,373
Wexford General Hospital	CPE002+003	0	***	0	
	CPE004	86	121	105	
	CPE005	***	***	***	
	CPE006	0	0	0	
	CPE008	308	174	80	
Ireland East Hospital Group	CPE002+003	***	***	***	***
	CPE004	1,967	1,925	1,557	1,869
	CPE005	15	20	21	13
	CPE006	***	5	***	***
	CPE008	5,643	5,491	5,683	5,712

*** = Figures <5

5e. RCSI Hospitals Group:

Performance Indicators:	
CPE002	Number of patients confirmed with newly detected CPE from rectal swabs/ faeces
CPE003	Number of patients confirmed with newly detected CPE from any other site
CPE004	Total number of rectal swabs/ faeces samples tested for CPE
CPE005	Number of patients with known CPE infection or colonisation who were inpatients at any time during the month
CPE006	Number of in-patients with known CPE who were not in en-suite accommodation for any part of their admission.
CPE008	Net number of grams of meropenem issued from pharmacy in this month
No data submitted by provider	

Provider	Performance indicator	Q4 2017			Q1 2018
		Oct-17	Nov-17	Dec-17	Jan-18
Beaumont Hospital	CPE002+003	8	10	0	***
	CPE004	699	1,389	678	696
	CPE005	12	16	11	7
	CPE006	0	8	***	***
	CPE008				
Cavan General Hospital	CPE002+003	0	0	0	0
	CPE004	44	35	42	24
	CPE005	0	0	0	0
	CPE006	0	0	0	0
	CPE008			167	
Connolly Hospital	CPE002+003	0	0	0	0
	CPE004	113	125	113	94
	CPE005	***	***	***	***
	CPE006	0	0	0	0
	CPE008				
Louth County Hospital	CPE002+003	0	***	0	0
	CPE004	***	5	5	0
	CPE005	0	***	0	0
	CPE006	0	0	0	0
	CPE008	0	0	0	
Our Lady of Lourdes Hospital	CPE002+003	0	0	0	0
	CPE004	78	77	55	71
	CPE005	0	0	0	0
	CPE006		0	0	0
	CPE008	237	204	214	
Rotunda Hospital	CPE002+003	***	0	0	0
	CPE004	140	118	77	102
	CPE005	0	0	0	0
	CPE006	0	0	0	0
	CPE008	108	107	51	32
RCSI Hospitals Group	CPE002+003	9	11	0	***
	CPE004	1,078	1,749	970	987
	CPE005	13	18	12	8
	CPE006	0	8	***	***
	CPE008	345	311	432	32

*** = Figures <5

5f. Saolta Hospital Group:

Performance Indicators:	
CPE002	Number of patients confirmed with newly detected CPE from rectal swabs/ faeces
CPE003	Number of patients confirmed with newly detected CPE from any other site
CPE004	Total number of rectal swabs/ faeces samples tested for CPE
CPE005	Number of patients with known CPE infection or colonisation who were inpatients at any time during the month
CPE006	Number of in-patients with known CPE who were not in en-suite accommodation for any part of their admission.
CPE008	Net number of grams of meropenem issued from pharmacy in this month
No data submitted by provider	

Provider	Performance indicator	Q4 2017			Q1 2018
		Oct-17	Nov-17	Dec-17	Jan-18
Galway University Hospitals	CPE002+003	6	8	***	6
	CPE004	775	1,214	1,647	1,205
	CPE005	12	20	17	14
	CPE006	***	***	***	***
	CPE008	1,107	1,326	886	1,110
Letterkenny University Hospital	CPE002+003	0			
	CPE004	79	84	85	
	CPE005	0	0	***	
	CPE006	0	0	0	
	CPE008				
Mayo University Hospital	CPE002+003	0	0	***	***
	CPE004	223	215	292	382
	CPE005	***	***	5	***
	CPE006	***	0	0	***
	CPE008		216	202	
Portiuncula University Hospital	CPE002+003	0	0	0	0
	CPE004	144	179	181	182
	CPE005	0	0	0	0
	CPE006	0	0	0	0
	CPE008				
Roscommon University Hospital	CPE002+003	0	0	0	0
	CPE004	42	55	34	72
	CPE005	0	0	0	0
	CPE006	0	0	0	0
	CPE008				
Sligo University Hospital	CPE002+003	0	***	***	***
	CPE004	132	134	104	232
	CPE005	***	***	***	5
	CPE006	0	0	***	0
	CPE008	23			
Saolta University Health Care Group	CPE002,003	6	9	7	8
	CPE004	1,395	1,881	2,343	2,073
	CPE005	16	25	26	23
	CPE006	***	***	***	80
	CPE008	1,130	1,542	1,088	1,110

*** = Figures <5

5g. South / South West Hospital Group:

Performance Indicators:	
CPE002	Number of patients confirmed with newly detected CPE from rectal swabs/ faeces
CPE003	Number of patients confirmed with newly detected CPE from any other site
CPE004	Total number of rectal swabs/ faeces samples tested for CPE
CPE005	Number of patients with known CPE infection or colonisation who were inpatients at any time during the month
CPE006	Number of in-patients with known CPE who were not in en-suite accommodation for any part of their admission.
CPE008	Net number of grams of meropenem issued from pharmacy in this month
No data submitted by provider	

Provider	Performance indicator	Q4 2017			Q1 2018
		Oct-17	Nov-17	Dec-17	Jan-18
Bantry General Hospital	CPE002+003	0		0	
	CPE004			0	
	CPE005	0		0	
	CPE006	0		0	
	CPE008	42		29	
Cork University Hospital	CPE002+003	0	***	***	0
	CPE004	189	237	209	287
	CPE005				
	CPE006				
	CPE008				
Lourdes Orthopaedic Hospital Kilcreene	CPE002+003		0		0
	CPE004		0		0
	CPE005		0		0
	CPE006		0		0
	CPE008		0		0
Mallow General Hospital	CPE002+003				
	CPE004				
	CPE005				
	CPE006				
	CPE008				
Mercy University Hospital	CPE002+003	0	0	***	***
	CPE004	9	15	7	73
	CPE005	***	0	***	***
	CPE006	0	0	0	0
	CPE008	695	560	417	445

*** = Figures <5

5g. South / South West Hospital Group (continued):

Performance Indicators:	
CPE002	Number of patients confirmed with newly detected CPE from rectal swabs/ faeces
CPE003	Number of patients confirmed with newly detected CPE from any other site
CPE004	Total number of rectal swabs/ faeces samples tested for CPE
CPE005	Number of patients with known CPE infection or colonisation who were inpatients at any time during the month
CPE006	Number of in-patients with known CPE who were not in en-suite accommodation for any part of their admission.
CPE008	Net number of grams of meropenem issued from pharmacy in this month
No data submitted by provider	

Provider	Performance indicator	Q4 2017			Q1 2018
		Oct-17	Nov-17	Dec-17	Jan-18
South Infirmary Victoria University Hospital	CPE002+003	0	0	0	0
	CPE004	9	9	***	7
	CPE005	0	0	0	0
	CPE006	0	0	0	0
	CPE008	***	0	0	0
South Tipperary General Hospital	CPE002+003	***	0	0	0
	CPE004	68	81	85	100
	CPE005	***	***	***	***
	CPE006	***	***	***	***
	CPE008	152	114	226	112
UH Kerry	CPE002+003				
	CPE004				
	CPE005				
	CPE006				
	CPE008				
UH Waterford	CPE002+003	0	5	5	0
	CPE004	106	207	336	150
	CPE005	***	8	10	6
	CPE006	0	0	0	0
	CPE008	712	596	392	779
South / South West Hospital Group	CPE002,003	***	6	8	***
	CPE004	381	549	640	617
	CPE005	7	9	13	10
	CPE006	***	***	***	***
	CPE008	1,603	1,270	1,064	1,336

*** = Figures <5

5h. University of Limerick Hospital Group:

Performance Indicators:	
CPE002	Number of patients confirmed with newly detected CPE from rectal swabs/ faeces
CPE003	Number of patients confirmed with newly detected CPE from any other site
CPE004	Total number of rectal swabs/ faeces samples tested for CPE
CPE005	Number of patients with known CPE infection or colonisation who were inpatients at any time during the month
CPE006	Number of in-patients with known CPE who were not in en-suite accommodation for any part of their admission.
CPE008	Net number of grams of meropenem issued from pharmacy in this month
No data submitted by provider	

Provider	Performance indicator	Q4 2017			Q1 2018
		Oct-17	Nov-17	Dec-17	Jan-18
Croom Orthopaedic Hospital	CPE002+003	0	0	0	0
	CPE004	23	22	15	26
	CPE005	0	0	0	0
	CPE006	0	0	0	0
	CPE008		5	0	0
Ennis Hospital	CPE002+003	0	0	0	0
	CPE004	79	83	76	103
	CPE005	***	***	***	0
	CPE006	0	0	0	0
	CPE008	44	22	78	64
Nenagh Hospital	CPE002+003	0	***	0	0
	CPE004	28	54	64	43
	CPE005	0	***	0	0
	CPE006	0	0	0	0
	CPE008	70	50	96	
St. John's Hospital Limerick	CPE002+003	0	0	0	***
	CPE004	79	99	99	135
	CPE005	***	***	***	0
	CPE006	0	0	***	0
	CPE008	53	31	55	39
UH Limerick	CPE002+003	***	9	0	***
	CPE004	834	974	799	967
	CPE005	16	16	6	6
	CPE006	0	***	0	0
	CPE008	1,183	1,145	1,362	1,364
University of Limerick Hospital Group	CPE002,003	***	10	0	***
	CPE004	1,043	1,232	1,053	1,274
	CPE005	19	19	8	6
	CPE006	0	***	***	0
	CPE008	1,350	1,253	1,591	1,467

*** = Figures <5

Appendix 6. Data sources for CPE indicators in Ireland – Provisional data is typically deemed final by the end of the following quarter.

Indicator	Data source	Frequency collated	Unit being measured based on
Invasive CPE infections	CIDR (HPSC)	Weekly	New notifications of invasive CRE/CPE infection by clinicians and laboratories (public and private) to Departments of Public Health. BASED ON DATE REPORTED ON CIDR
CPE outbreaks	CIDR (HPSC)	Weekly	New notifications of CPE outbreaks in healthcare settings to Departments of Public Health and created as a new event on CIDR BASED ON DATE OUTBREAK CREATED ON CIDR
Patients with CPE, newly-confirmed by NCPERLS	NCPERLS	Monthly	Number of patients newly-confirmed by NCPERLS with CPE from any specimen type. Patient counted once per year, except where a second carbapenemase type is identified when the patient is counted again. BASED ON DATE SPECIMEN RECEIVED AT NCPERLS
CPE positive screens (Indicator: CPE002)	BIU	Monthly	Number of patients with newly detected CPE from screens (rectal swabs/faeces) reported by acute HSE hospitals BASED ON DATE NEW CPE CONFIRMED
Newly detected patients with CPE (Indicator: CPE003)	BIU	Monthly	Number of patients with newly detected CPE from clinical specimens reported by acute HSE hospitals BASED ON DATE NEW CPE CONFIRMED
CPE screens (Indicator: CPE004)	BIU	Monthly	Number of CPE screens performed by acute HSE hospital BASED ON REPORTING MONTH
Inpatients with CPE (Indicator: CPE005)	BIU	Monthly	Number of inpatients with known CPE infection admitted to acute HSE hospitals at any time during the month BASED ON REPORTING MONTH
Unsuitable accommodation (Indicator: CPE006)	BIU	Monthly	Number of in-patients with known CPE who were accommodated overnight in unsuitable accommodation for any part of their admission in acute HSE hospitals. (Any facility other than an <i>en suite</i> single room is unsuitable. Include time spent in the emergency department. Overnight means present at midnight). BASED ON REPORTING MONTH
Evidence of CPE transmission (Indicator: CPE007)	BIU	Monthly	Number of acute HSE hospitals reporting evidence of person-to-person transmission BASED ON REPORTING MONTH – NOT YET INCLUDED IN THIS REPORT
Meropenem dispensed (Indicator: CPE008)	BIU	Monthly	Net number of grams of meropenem dispensed by acute HSE hospital pharmacies BASED ON REPORTING MONTH
Carbapenem use	HPSC	Quarterly	Carbapenem use data from public acute hospitals measured in defined daily doses (DDD) per 100 bed days used (BDU) BASED ON REPORTING QUARTER
CPE Enhanced surveillance	HPSC	Quarterly	Laboratories (public and private) report detailed information on the first positive CPE isolate per patient per quarter (invasive and non-invasive infections and positive screens) BASED ON SPECIMEN DATE

Appendix 7 Glossary of Terms

AMR	Antimicrobial resistance
BIU	Business Intelligence Unit
CIDR	Computerised Infectious Disease Reporting system
CPE	Carbapenemase-producing <i>Enterobacteriaceae/Enterobacterales</i>
CRE	Carbapenem-resistant <i>Enterobacteriaceae/Enterobacterales</i>
HCAI	Healthcare-associated infection
HPSC	Health Protection Surveillance Centre
HSE	Health Service Executive
NCPERL	National Carbapenemase-Producing <i>Enterobacterales</i> Reference Laboratory
NPHET	National Public Health Emergency Team