



Carbapenemase-producing *Enterobacteriaceae* (CPE) in HSE acute hospitals in Ireland monthly report – December 2017

The terms carbapenem resistant *Enterobacteriaceae* (CRE) and carbapenemase-producing *Enterobacteriaceae* (CPE) are often used interchangeably. 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. The data in this and subsequent reports will refer to CPE.

Executive Summary of the Latest Available Data (Source)

- 1. Patients with newly-confirmed CPE (NCPERLS):** The number of patients increased to 435 in 2017, of whom 35 were detected in December alone [2016 = 282]
- 2. Notification of patients with invasive CPE infection (Departments of Public Health):** There were 15 invasive CPE infections notified in 2017 [2016 = 14]
- 3. Creation of new CPE outbreak events (Departments of Public Health):** In 2017, 15 new acute hospital CPE outbreak events were created. There have been additional CPE outbreaks notified in 2017 that await event creation by the Departments of Public Health [2016 = 5 CPE outbreaks created]
- 4. CPE screens and CPE detections (HSE acute hospitals reporting to BIU):** Data returned by 91% of hospitals, with 11,196 CPE screens performed in November and 46 CPE detected overall [October = 9,821 screens; 36 CPE detected overall]
- 5. Inpatients with known CPE (HSE acute hospitals reporting to BIU):** Data returned by 89% of hospitals: There were 170 inpatients with known CPE colonisation or infection in November [October = 131 known inpatients]
- 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 89% of hospitals: In November, 19 inpatients with known CPE across nine hospitals were not accommodated in an *en suite* single room for part of their admission [October = 11 inpatients]
- 7. Total grams of meropenem** issued by hospital pharmacies: (HSE acute hospitals reporting to BIU):** Data returned by 70% of hospitals: In November, 13,624 grams of meropenem were issued [October = 13,478 g]

*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, which means it is a last resort antimicrobial used in hospitals and should be 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 successful 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 resent to NCPERLS. *Data presented below are provisional and relate to the date that NCPERLS received the isolates, not the original specimen collection date.*

In December 2017, 35 patients with newly-detected CPE were identified. The total for 2017 was 435, versus 282 in 2016 (**Figure 1**).

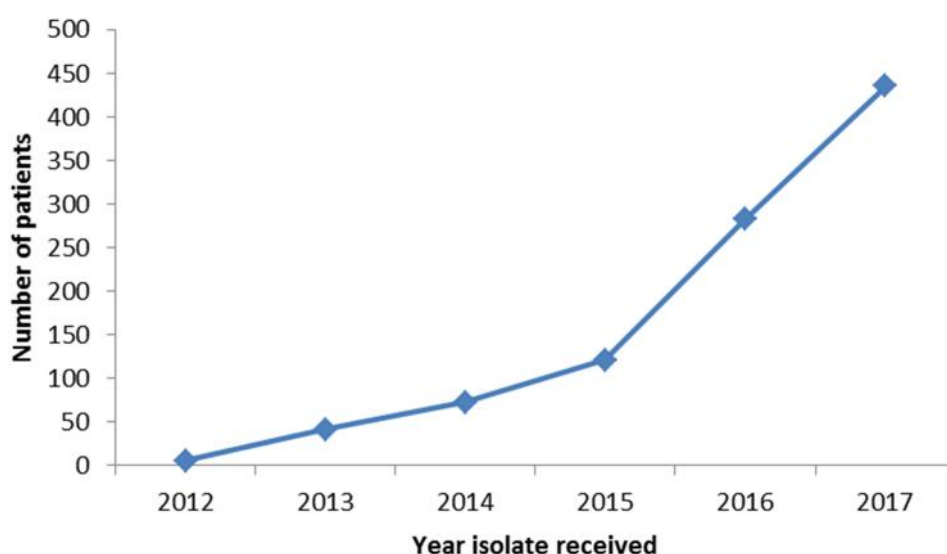


Figure 1. Annual numbers of patients with CPE newly-confirmed by NCPERLS (2012 – 2017). **Source:** NCPERLS

Of 435 patients, 76% were newly-confirmed carriers detected on CPE screening (rectal swab/faeces) (**Figure 2**). OXA-48 is the predominant carbapenemase in Ireland and continued to increase in 2017 (**Figure 3**). The total number of patients with CPE newly-confirmed by NCPERLS, stratified by carbapenemase type and HSE acute hospital in 2017 is presented in **Appendix 1**.

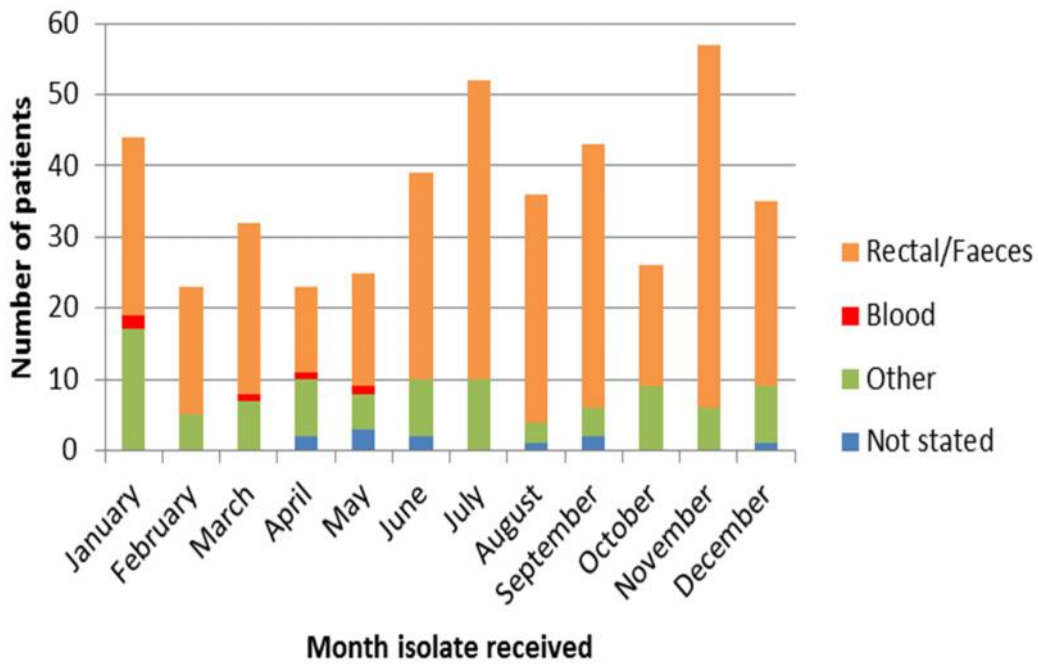


Figure 2. Monthly number of patients with CPE newly-confirmed by NCPERLS, by specimen type (January – December 2017). **Source:** NCPERLS

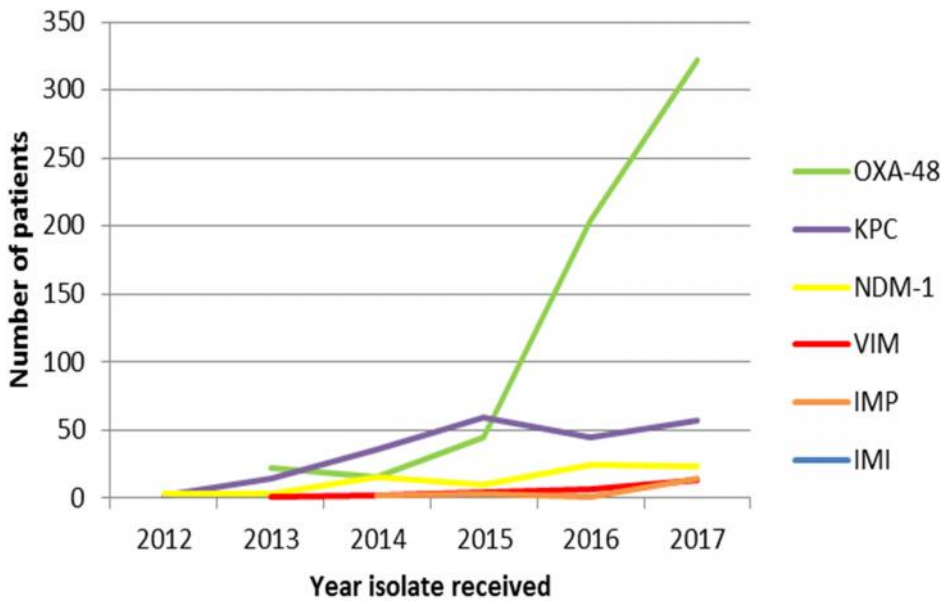


Figure 3. Annual numbers of patients with CPE newly-confirmed by NCPERLS, by carbapenemase type (2012 – 2017). **Source:** NCPERLS

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 grown from a body site which would normally be expected not to contain a pathogen (e.g., blood, cerebrospinal fluid)

Cases may be reported through the Computerised Infectious Disease Reporting (CIDR) system. 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.*

Three cases of invasive CPE infection were notified in December 2017. In total, 15 cases were notified in 2017, versus 14 in 2016. A sharp increase in invasive CPE infections notified between 2013 and 2016 was observed (Figures 4 & 5).

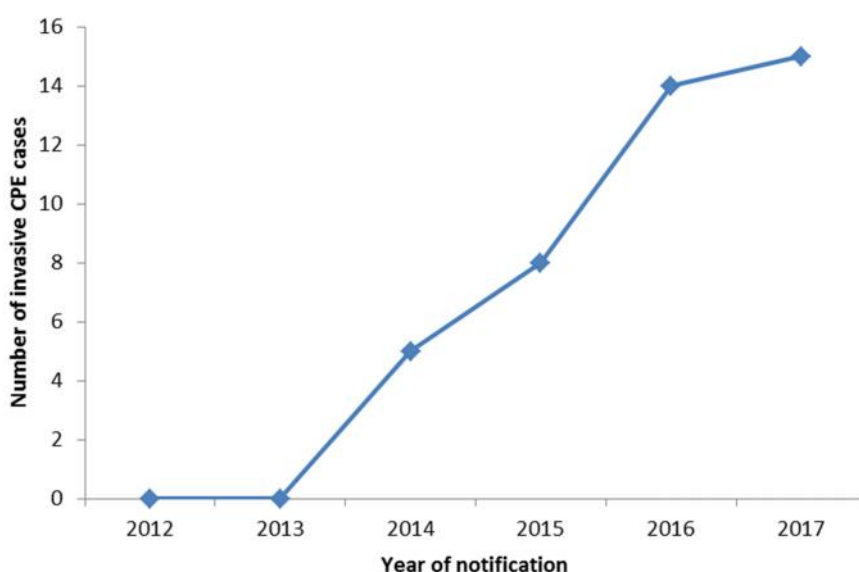


Figure 4. Annual notifications of invasive CPE infection (2012 – 2017). Source: CIDR

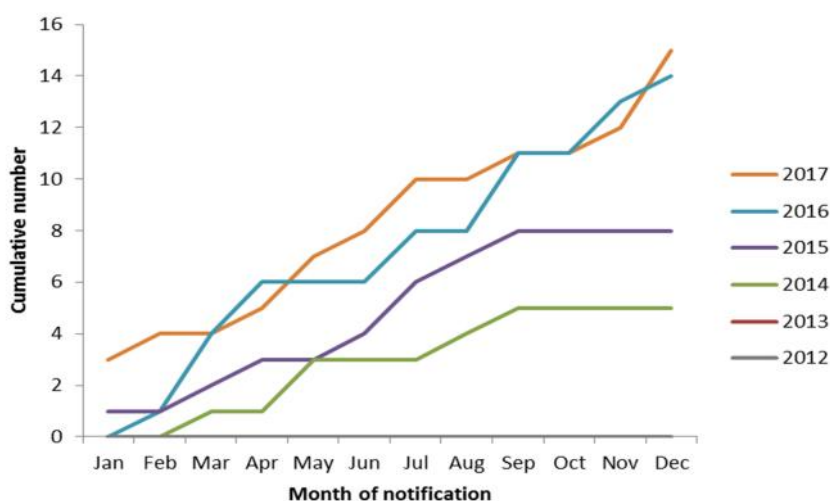


Figure 5. Cumulative monthly notifications of invasive CPE infection (2012 – 2017). Source: CIDR

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

Under Infectious Diseases Regulations, CRE 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 placed on CIDR by the Departments of Public Health. In 2017, 15 CPE outbreak events relating to infections and/or colonisations were created on CIDR, compared with five in 2016 (**Figure 6**). The latest CPE outbreak notified on CIDR was on 22nd December 2017.

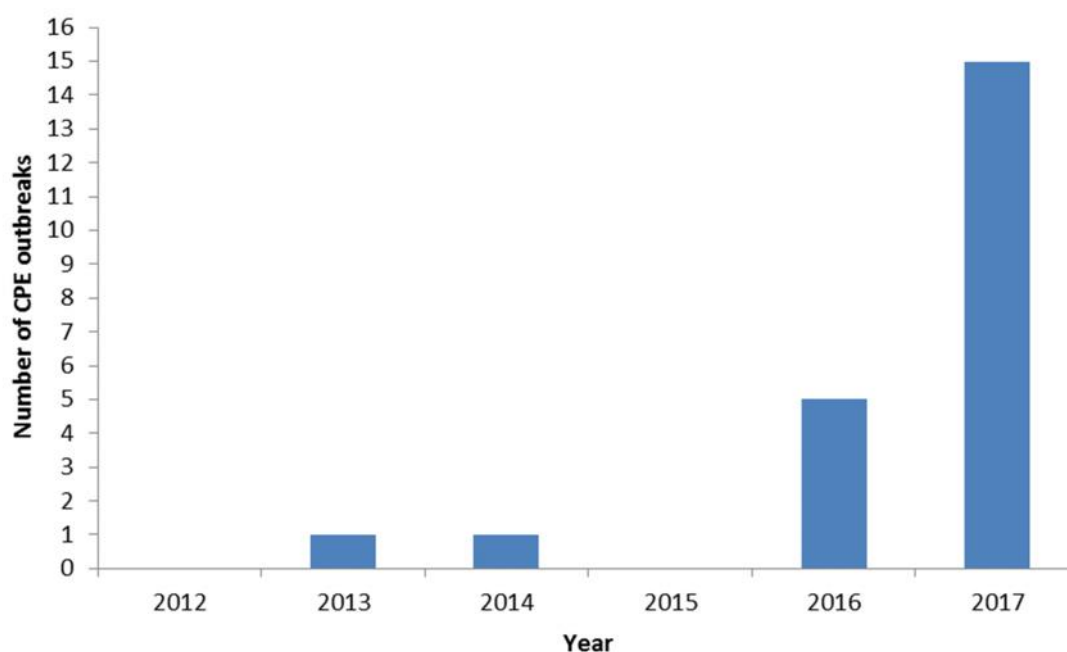


Figure 6. Annual CPE outbreak events created by Departments of Public Health (2012 – 2017).
Source: CIDR

4. Monthly CPE screens performed & 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. **Appendix 2** describes the CPE performance indicators currently reported to BIU by HSE acute hospitals.

In November 2017, 42 HSE acute hospitals (91%) provided data, with 11,196 screens performed (**Appendix 3**) [October = 43 hospitals (93.5%); 9,821 screens]. 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). The monthly number of CPE screens performed, by Hospital Group and within each Group is displayed in **Appendix 4**.

In November, there were 46 patients reported from whom CPE were newly-detected, either from a screen or other body site [October = 36 CPE].

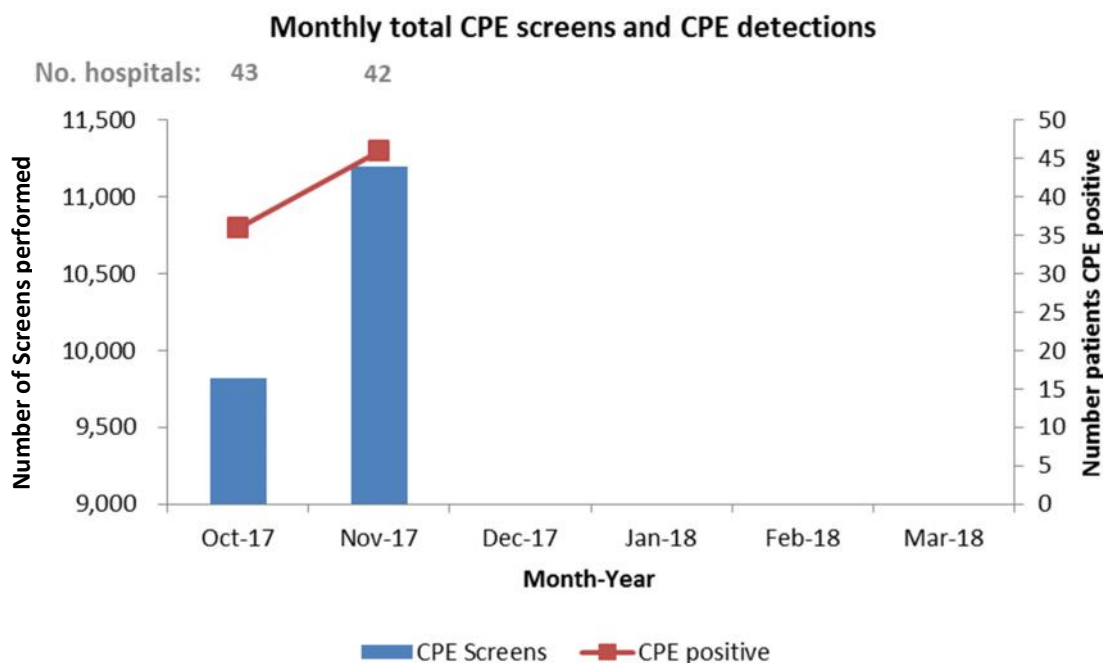


Figure 7. Monthly total CPE screens (blue bars) and total CPE detections (red boxes) in acute HSE hospitals. Number of hospitals reporting cited above each bar. **Source:** BIU

5. Additional CPE performance indicators reported to BIU

All 46 acute HSE hospitals are asked to report data on additional CPE performance indicators to the BIU, with monthly data available from October 2017. **Appendix 2** describes the CPE performance indicators currently reported to BIU by HSE acute hospitals.

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

In November 2017, 41 HSE acute hospitals (89%) provided data. [October = 41 (89%)]. There were 170 inpatients (range = 0 – 41 inpatients) with known CPE infection or colonisation accommodated in HSE acute hospitals in November [October = 131] (**Appendix 4**).

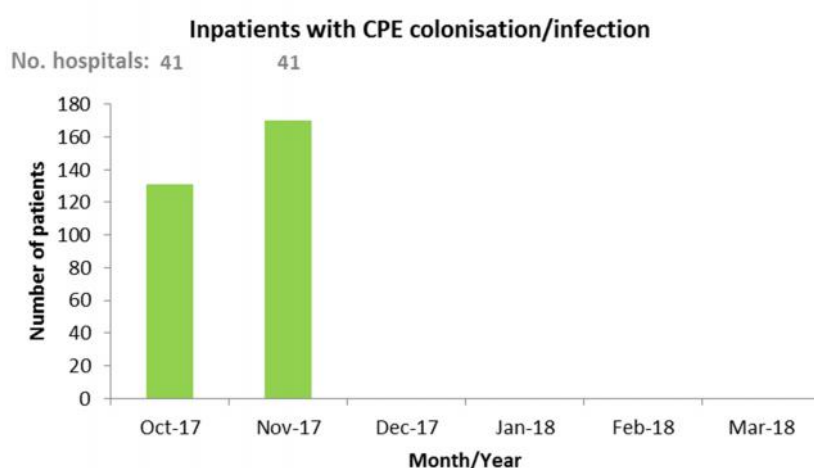


Figure 8. Monthly total of known CPE inpatients (green bars) in acute HSE hospitals. Number of hospitals reporting cited above each bar. **Source:** BIU

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

In November 2017, 41 HSE acute hospitals (89%) provided data [October = 40 (87%)]. A total of 19 inpatients with known CPE across nine acute HSE hospitals (22% 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 (**Appendix 4**) [October = 11].

*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.

CPE inpatients not accommodated in *en suite* single room for part of admission

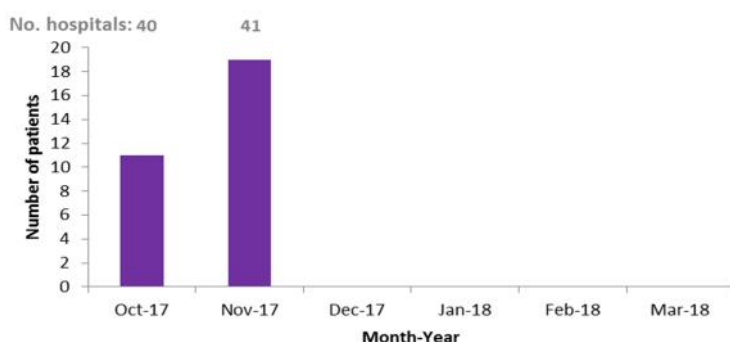


Figure 9. Monthly total known CPE inpatients (purple bars) not accommodated in *en suite* single room for part of admission in acute HSE hospitals. Number of hospitals reporting cited above each bar. **Source:** BIU

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 2** describes the CPE performance indicators currently reported to BIU by HSE acute hospitals.

Meropenem is a carbapenem, which means it is a last resort antimicrobial used in hospitals and should be reserved for treatment of infections due to antimicrobial resistant bacteria and infections in seriously ill patients, with the input of 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 successful spread of CPE in hospitals.

In November 2017, 32 HSE acute hospitals (70%) provided data [October = 32 (70%)]. In November 2017, 13,624 grams of meropenem were dispensed by 27 pharmacies (84% of those providing data), with five dispensing no meropenem [October = 13,478 gm. dispensed by 29 pharmacies and three dispensed no meropenem] (**Appendix 4**).

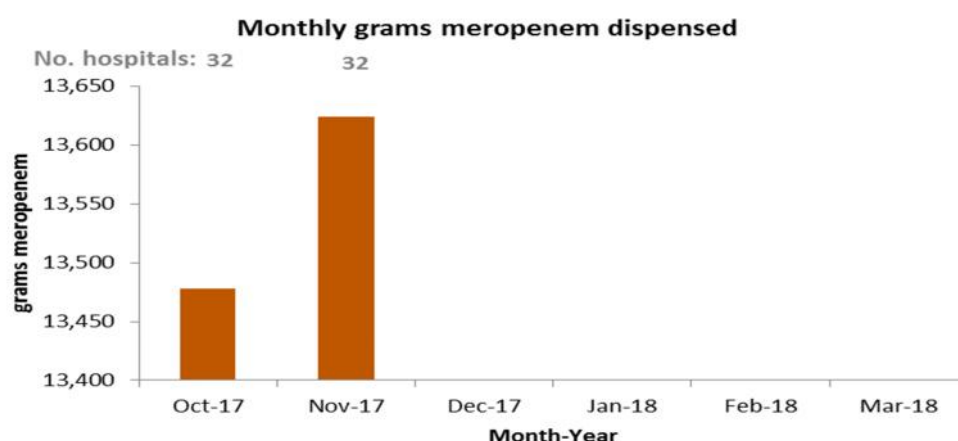


Figure 10. Monthly net** grams of meropenem dispensed by acute HSE hospital pharmacies (orange bars). Number of hospitals reporting cited above each bar. **Source:** BIU

**Meropenem dispensed by the hospital pharmacy may not all be used up within the month. Pharmacy dispenses Xgm in a month, but Ygm is returned at the end of the month: Net = X-Y. For example, 400gm issued in January, with 100 gm returned in February: 100gm is deductible from the total issued in February.

6.2 National carbapenem use data, as reported to HPSC

The majority of HSE acute hospitals (n=42) submit data on antimicrobial use to HPSC. Data is published nationally and by participating hospital on the HPSC's website. Overall use and use by antimicrobial class, including carbapenems (meropenem, ertapenem and imipenem) is reported. Data is expressed as a rate of defined daily doses (DDD) per 100 bed days used (BDU), using the WHO standard method. **Figure 11** displays annual national carbapenem use trends to end Q2 2017.

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

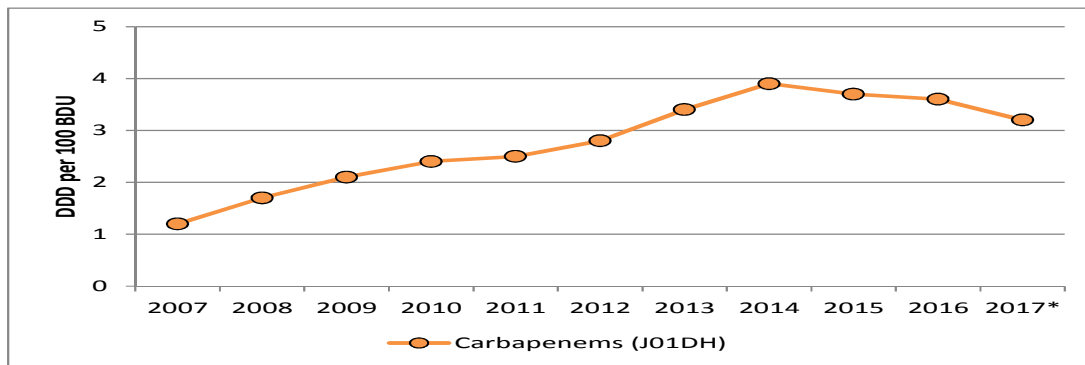


Figure 11. Annual national carbapenem use in acute HSE hospitals (*2017 data to end of Q2).

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 positive CPE specimen, specimen type and carbapenemase. 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. Total number of patients with CPE newly-confirmed by NCPERLS in 2017, stratified by carbapenemase and HSE acute hospital. **Source:** NCPERLS [An asterix represents <5 patients].

Data is 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. Data is preliminary and may alter upon end-of-year data analysis and validation.

	KPC	OXA-48	NDM	VIM	IMP	IMI
University Limerick Hospital Group						
University Hospital Limerick	45	*	*			
Ennis Hospital	*					
The Children's Hospital Group						
Our Lady's Children's Hospital, Crumlin			*		*	
Temple Street Children's University Hospital			*			
South/South West Hospital Group						
Cork University Hospital	*	*				
University Hospital Waterford	*	26				
University Hospital Kerry			*			
South Tipperary General Hospital		8				
Mercy University Hospital Cork		*				
Saolta Hospital Group						
University Hospital Galway/ Merlin Park	*	32	*	6	*	*
Letterkenny University Hospital		*				
Mayo General Hospital				*		
Sligo Regional Hospital		*		*		
Roscommon County Hospital				*		
RCSI Hospitals Group						
Beaumont Hospital Dublin		29				
Connolly Hospital Dublin		*		*		
Our Lady of Lourdes Hospital Drogheda		*	*			
Rotunda Hospital Dublin		*				
Ireland East Hospital Group						
The Mater Misericordiae University Hospital Dublin	*	13	*			
St Vincent's University Hospital Dublin		12	*	*		*
Wexford General Hospital		6				
St Luke's General Hospital, Kilkenny		15				
Our Lady's Hospital, Navan		*				
National Maternity Hospital, Holles St, Dublin		*				
Midlands Regional Hospital, Mullingar		*				
Dublin Midlands Hospital Group						
St James' Hospital Dublin		25	*			
Tallaght Hospital, Dublin	*	96	7		*	
Naas General Hospital		16				
St Luke's Radiation Oncology Network		*				
Other Healthcare facilities	*	21	*	*	12	*
Total (n=435)	57	322	24	13	15	*

Appendix 2. CPE 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, 400 grams 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 3. Monthly CPE returns received by the BIU.

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	Oct-17		Nov-17	
	Questions completed	% completed	Questions completed	% completed
Beaumont Hospital	4	80%	4	80%
Cappagh National Orthopaedic Hospital	5	100%	No return	
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	4	80%	5	100%
Ennis Hospital	5	100%	5	100%
Galway University Hospitals	5	100%	5	100%
Letterkenny University Hospital	4	80%	2	40%
Lourdes Orthopaedic Hospital Kilcreene	No return		5	100%
Louth County Hospital	5	100%	5	100%
Mater Misericordiae University Hospital	5	100%	5	100%
Mayo University Hospital	4	80%	5	100%
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%	5	100%
Our Lady of Lourdes Hospital Drogheda	4	80%	5	100%
Our Lady's Children's Hospital, Crumlin	4	80%	4	80%
Our Ladys Hospital - Navan	3	60%	5	100%
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	5	100%	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	5	100%	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%	5	100%
Kerry General Hospital	No return		No return	
Mallow General Hospital	No return		No return	
Bantry General Hospital	4	80%	No return	
Total submitted	43		42	
Did not submit	3		4	
% of providers who submitted data	93.5%		91.3%	

Appendix 4. Monthly BIU CPE performance indicator data by Hospital Group

4a. 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	Oct-17	Nov-17	Dec-17
Ireland East Hospital Group	CPE002+003	★	★	
	CPE004	1,967	1,925	
	CPE005	15	20	
	CPE006	☆	5	
	CPE008	5,643	5,491	
Dublin Midlands Hospital Group	CPE002+003	13	5	
	CPE004	3,574	3,533	
	CPE005	57	75	
	CPE006	☆	☆	
	CPE008	3,354	3,681	
RCSI Hospitals Group	CPE002+003	9	11	
	CPE004	1,078	1,749	
	CPE005	13	18	
	CPE006	0	8	
	CPE008	345	311	
South / South West Hospital Group	CPE002+003	★	6	
	CPE004	381	549	
	CPE005	7	9	
	CPE006	☆	☆	
	CPE008	1,603	1,270	
UL Hospitals Group	CPE002+003	★	10	
	CPE004	1,043	1,232	
	CPE005	19	19	
	CPE006	0	☆	
	CPE008	1,350	1,253	
Saoilta University Health Care Group	CPE002+003	6	9	
	CPE004	1,395	1,797	
	CPE005	16	25	
	CPE006	☆	☆	
	CPE008	1,130	1,542	
Children's Hospital Group	CPE002+003	0	0	
	CPE004	383	411	
	CPE005	☆	☆	
	CPE006	0	0	
	CPE008	53	76	
National Total (All Groups)	CPE002+003	36	45	
	CPE004	9,821	11,196	
	CPE005	131	170	
	CPE006	11	19	
	CPE008	13,478	13,624	

☆=Figures less than 5.

4b. 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	

Hospital Group	Performance indicator	Oct-17	Nov-17	Dec-17
Cappagh National Orthopaedic Hospital	CPE002+003	0	0	
	CPE004	0	0	
	CPE005	0	0	
	CPE006	0	0	
	CPE008	10	0	
Mater Misericordiae University Hospital	CPE002+003	☆	☆	
	CPE004	394	374	
	CPE005	6	8	
	CPE006	☆	0	
	CPE008	2,710	2,860	
Midland Regional Hospital Mullingar	CPE002+003	0	0	
	CPE004	116	109	
	CPE005	0	☆	
	CPE006	0	☆	
	CPE008	136	122	
National Maternity Hospital	CPE002+003	0	0	
	CPE004	81	77	
	CPE005	0	0	
	CPE006	0	0	
	CPE008	0	20	
Our Ladys Hospital - Navan	CPE002+003	☆	0	
	CPE004	41	106	
	CPE005		☆	
	CPE006		☆	
	CPE008	13	53	
Royal Victoria Eye and Ear Hospital	CPE002+003	0	0	
	CPE004	22	24	
	CPE005	☆	0	
	CPE006	☆	0	
	CPE008	0	0	

☆=Figures less than 5.

4b. 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	

St. Columcille's Hospital	CPE002+003	0	0	
	CPE004	103	102	
	CPE005	0	0	
	CPE006	0	0	
	CPE008	10	0	
St. Luke's Hospital Kilkenny	CPE002+003	0	★	
	CPE004	82	79	
	CPE005	★	3	
	CPE006	★	3	
	CPE008	400	161	
St. Michael's Hospital	CPE002+003	0	0	
	CPE004	111	78	
	CPE005	0	0	
	CPE006	0	0	
	CPE008	10	13	
St. Vincent's University Hospital	CPE002+003	★	★	
	CPE004	931	855	
	CPE005	6	5	
	CPE006	★	0	
	CPE008	2,046	2,088	
Wexford General Hospital	CPE002+003	0	★	
	CPE004	86	121	
	CPE005	★	★	
	CPE006	0	0	
	CPE008	308	174	
Ireland East Hospital Group	CPE002+003	★	★	
	CPE004	1,967	1,925	
	CPE005	15	20	
	CPE006	★	5	
	CPE008	5,643	5,491	

★=Figures less than 5.

4c. 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	

Hospital Group	Performance indicator	Oct-17	Nov-17	Dec-17
Coombe Women and Infants University Hospital	CPE002+003	0	0	
	CPE004	18	23	
	CPE005	0	0	
	CPE006	0	0	
	CPE008	70	118	
Midland Regional Hospital - Portlaoise	CPE002+003	0	0	
	CPE004	37	33	
	CPE005	☆	0	
	CPE006	☆	0	
	CPE008	73	45	
Midland Regional Hospital - Tullamore	CPE002+003	0	0	
	CPE004	168	187	
	CPE005	☆	☆	
	CPE006	☆	☆	
	CPE008			
Naas General Hospital	CPE002+003	☆	☆	
	CPE004	655	609	
	CPE005	☆	5	
	CPE006	☆	☆	
	CPE008	187	120	
St. James's Hospital	CPE002+003	☆	0	
	CPE004	706	673	
	CPE005	9	27	
	CPE006	0	0	
	CPE008	2,438	2,692	
St. Luke's Radiation Oncology Network	CPE002+003	0	☆	
	CPE004	217	206	
	CPE005	0	☆	
	CPE006	0	0	
	CPE008	10	5	
Tallaght Hospital - Adults	CPE002+003	7	☆	
	CPE004	1,773	1,802	
	CPE005	42	41	
	CPE006	0	0	
	CPE008	576	701	
Dublin Midlands Hospital Group	CPE002+003	13	5	
	CPE004	3,574	3,533	
	CPE005	57	75	
	CPE006	☆	☆	
	CPE008	3,354	3,681	

4d. 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	

Hospital Group	Performance indicator	Oct-17	Nov-17	Dec-17
Beaumont Hospital	CPE002+003	8	10	
	CPE004	699	1,389	
	CPE005	12	16	
	CPE006	0	8	
	CPE008			
Cavan General Hospital	CPE002+003	0	0	
	CPE004	44	35	
	CPE005	0	0	
	CPE006	0	0	
	CPE008			
Connolly Hospital - Blanchardstown	CPE002+003	0	0	
	CPE004	113	125	
	CPE005	☆	☆	
	CPE006	0	0	
	CPE008			
Louth County Hospital	CPE002+003	0	☆	
	CPE004	☆	5	
	CPE005	0	☆	
	CPE006	0	0	
	CPE008	0	0	
Our Lady of Lourdes Hospital Drogheda	CPE002+003	0	0	
	CPE004	78	77	
	CPE005	0	0	
	CPE006		0	
	CPE008	237	204	
Rotunda Hospital	CPE002+003	☆	0	
	CPE004	140	118	
	CPE005	0	0	
	CPE006	0	0	
	CPE008	108	107	
RCSI Hospitals Group	CPE002+003	9	11	
	CPE004	1,078	1,749	
	CPE005	13	18	
	CPE006	☆	8	
	CPE008	345	311	

4e. 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	

Hospital Group	Performance indicator	Oct-17	Nov-17	Dec-17
Bantry General Hospital	CPE002+003	0		
	CPE004			
	CPE005	0		
	CPE006	0		
	CPE008	42		
Cork University Hospital	CPE002+003	0	★	
	CPE004	189	237	
	CPE005			
	CPE006			
	CPE008			
Lourdes Orthopaedic Hospital Kilcreene	CPE002+003		0	
	CPE004		0	
	CPE005		0	
	CPE006		0	
	CPE008		0	
Mallow General Hospital	CPE002+003			
	CPE004			
	CPE005			
	CPE006			
	CPE008			
Mercy University Hospital Cork	CPE002+003	0	0	
	CPE004	9	15	
	CPE005	★	0	
	CPE006	0	0	
	CPE008	695	560	

★=Figures less than 5.

4e. 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	

South Infirmary/Victoria University Hospital Cork	CPE002+003	0	0
	CPE004	9	9
	CPE005	0	0
	CPE006	0	0
	CPE008	☆	0
University Hospital Kerry	CPE002+003		
	CPE004		
	CPE005		
	CPE006		
	CPE008		
University Hospital Waterford	CPE002+003	0	5
	CPE004	106	207
	CPE005	☆	8
	CPE006	0	0
	CPE008	712	596
South Tipperary General Hospital	CPE002+003	☆	0
	CPE004	68	81
	CPE005	☆	☆
	CPE006	☆	☆
	CPE008	152	114
South / South West Hospital Group	CPE002,003	☆	6
	CPE004	381	549
	CPE005	7	9
	CPE006	☆	☆
	CPE008	1,603	1,270

☆=Figures less than 5.

4f. 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	

Hospital Group	Performance indicator	Oct-17	Nov-17	Dec-17
Croom Hospital	CPE002+003	0	0	
	CPE004	23	22	
	CPE005	0	0	
	CPE006	0	0	
	CPE008		5	
Ennis Hospital	CPE002+003	0	0	
	CPE004	79	83	
	CPE005	☆	☆	
	CPE006	0	0	
	CPE008	44	22	
Nenagh Hospital	CPE002+003	0	☆	
	CPE004	28	54	
	CPE005	0	☆	
	CPE006	0	0	
	CPE008	70	50	
St John's Hospital	CPE002+003	0	0	
	CPE004	79	99	
	CPE005	☆	☆	
	CPE006	0	0	
	CPE008	53	31	
University Hospital, Limerick	CPE002+003	☆	9	
	CPE004	834	974	
	CPE005	16	16	
	CPE006	0	☆	
	CPE008	1,183	1,145	
UL Hospitals Group	CPE002,003	☆	10	
	CPE004	1,043	1,232	
	CPE005	19	19	
	CPE006	0	☆	
	CPE008	1,350	1,253	

4g. 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	

Hospital Group	Performance indicator	Oct-17	Nov-17	Dec-17
Galway University Hospitals	CPE002+003	6	8	
	CPE004	775	1,214	
	CPE005	12	20	
	CPE006	☆	☆	
	CPE008	1,107	1,326	
Letterkenny University Hospital	CPE002+003	0		
	CPE004	79		
	CPE005	0	0	
	CPE006	0	0	
	CPE008			
Mayo University Hospital	CPE002+003	0	0	
	CPE004	223	215	
	CPE005	☆	☆	
	CPE006	☆	0	
	CPE008		216	
Portiuncula University Hospital	CPE002+003	0	0	
	CPE004	144	179	
	CPE005	0	0	
	CPE006	0	0	
	CPE008			
Roscommon University Hospital	CPE002+003	0	0	
	CPE004	42	55	
	CPE005	0	0	
	CPE006	0	0	
	CPE008			
Sligo University Hospital	CPE002+003	0	☆	
	CPE004	132	134	
	CPE005	☆	☆	
	CPE006	0	0	
	CPE008	23		
Saolta University Health Care Group	CPE002,003	6	9	
	CPE004	1,395	1,797	
	CPE005	16	25	
	CPE006	☆	☆	
	CPE008	1,130	1,542	

4h. 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	

Hospital Group	Performance indicator	Oct-17	Nov-17	Dec-17
Children's University Hospital Temple Street	CPE002+003	0	0	
	CPE004	109	103	
	CPE005	☆	☆	
	CPE006	0	0	
	CPE008	53	76	
Our Lady's Children's Hospital, Crumlin	CPE002+003	0	0	
	CPE004	274	308	
	CPE005	☆	☆	
	CPE006	0	0	
	CPE008			
Children's Hospital Group	CPE002+003	0	0	
	CPE004	383	411	
	CPE005	☆	☆	
	CPE006	0	0	
	CPE008	53	76	

☆ = Figures less than 5.

Appendix 5. Data sources used to measure 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
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 6 Glossary of Terms

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