



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

Monthly report on November 2018 data for the National Public Health Emergency Team (NPHE)

Executive summary of the latest available data (data source)

- 1. Patients with newly-confirmed CPE (NCPERLS):** There were 78 patients in November, compared with 68 in October. There were 433 patients in total for 2017 versus 282 in 2016
- 2. Notification of patients with invasive CPE infection (Departments of Public Health):** Four invasive CPE infections were notified in November with two in October. There were 14 notifications in both 2017 and 2016
- 3. Creation of new CPE outbreak events (Departments of Public Health):** In November, one new acute hospital CPE outbreak event was created, with two in October. There were 15 new CPE outbreaks created in 2017 versus five in 2016
- 4. Active/current CPE hospital outbreak events (HSE acute hospitals reporting to BIU):** Data returned by 89% of hospitals, with 11 reporting events in November [October = 96% returns & 13 outbreak events]
- 5. CPE screens and CPE detections (HSE acute hospitals reporting to BIU):** Data returned by 96% of hospitals, with 19,824 CPE screens performed in November and 72 CPE detected overall, 68 from screening specimens [October = 100% returns; 19,703 screens; 81 CPE detected overall, 74 from screening specimens]
- 6. Inpatients with known CPE (HSE acute hospitals reporting to BIU):** Data returned by 98% of hospitals. There were 250 inpatients of 27 hospitals with known CPE colonisation or infection in November, representing the highest monthly figure to date [October = 100% returns; 228 inpatients of 27 hospitals]
- 7. Known CPE inpatients not accommodated in an *en suite* single room/appropriate cohort area* for part of their admission (HSE acute hospitals reporting to BIU):** Data returned by 98% of hospitals. In November, 13 inpatients of six hospitals were not accommodated in an *en suite* single room/appropriate cohort area for part of their admission [October = 100% returns; 19 inpatients of five hospitals]
- 8. Total grams (g) of meropenem** issued by hospital pharmacies: (HSE acute hospitals reporting to BIU):** Data returned by 32% of hospitals. In November, 7,513g of meropenem were issued [October; 32% returns; 8,635g]

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 received by HPSC after review by the National HCAI Steering Group on 03/01/2019). Acute hospitals are required to report data for a given month to BIU by the 15th of the following month.

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

*Case definition changed in January 2018: see section 6 for details

**See section 7 for details

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 to NCPERLS. 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.

1. Isolates that are suspected carbapenemase producers should be referred for confirmatory testing, if confirmation cannot be performed locally. A rapid immunological assay (lateral flow device) is performed by NCPERLS for preliminary confirmation of the most commonly encountered carbapenemases, pending further characterisation
2. Locally-confirmed CPE should also be referred to NCPERLS for further characterisation

Since July 2018, NCPERLS has begun whole genome sequencing (WGS) on CPE isolates received. WGS provides improved information for comparison of isolates of the same carbapenemase type from different regions. *Data presented below are provisional. The data in this monthly report is based on latest preliminary rapid test results. WGS results may provide additional information. For example, the less common IMI or GES carbapenemases are not detected by rapid assays, but will be detected by WGS. Data relate to the date that NCPERLS received the isolates, not the original specimen collection date.*

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

In November 2018, 78 patients with newly-detected CPE were identified, compared with 68 in October (**Figure 1**). The previously reported figure for October did not include an isolate detected in the interim by WGS.

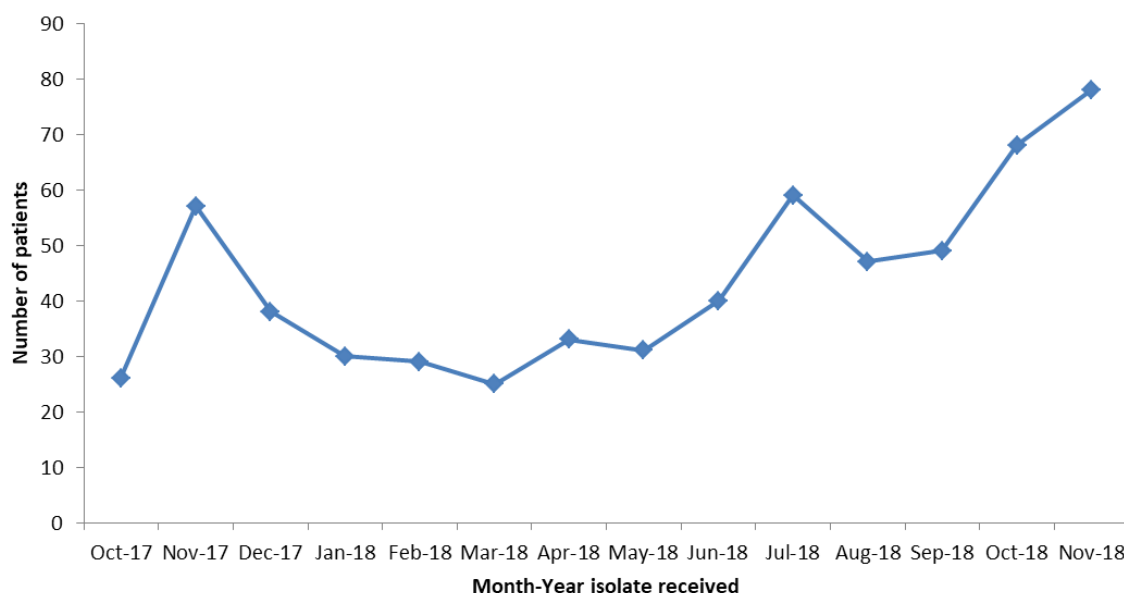


Figure 1. Monthly numbers of patients with CPE newly-confirmed by NCPERLS from Q4 2017. **Source:** NCPERLS

Of 78 patients in November 2018, 87% were newly-confirmed carriers detected on CPE screening (rectal swab/faeces) (**Figure 2**). OXA-48 is the predominant carbapenemase in Ireland. Increased detection of KPC carbapenemase has been observed in 2018 (**Figure 3**).

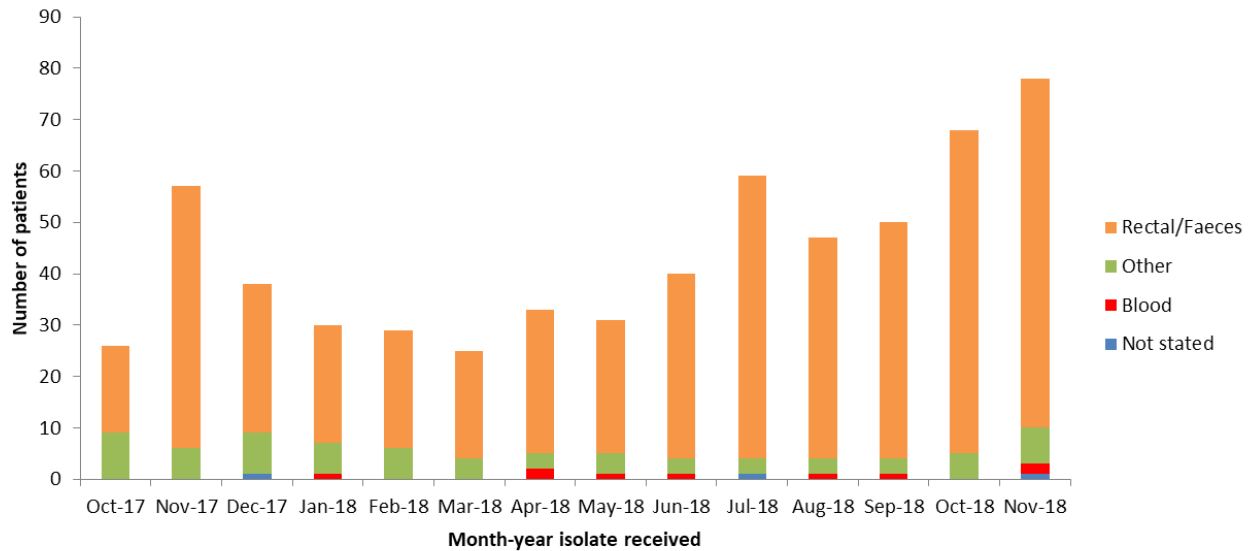


Figure 2. Monthly number of patients with CPE newly-confirmed by NCPERLS, by specimen type from Q4 2017. **Source:** NCPERLS

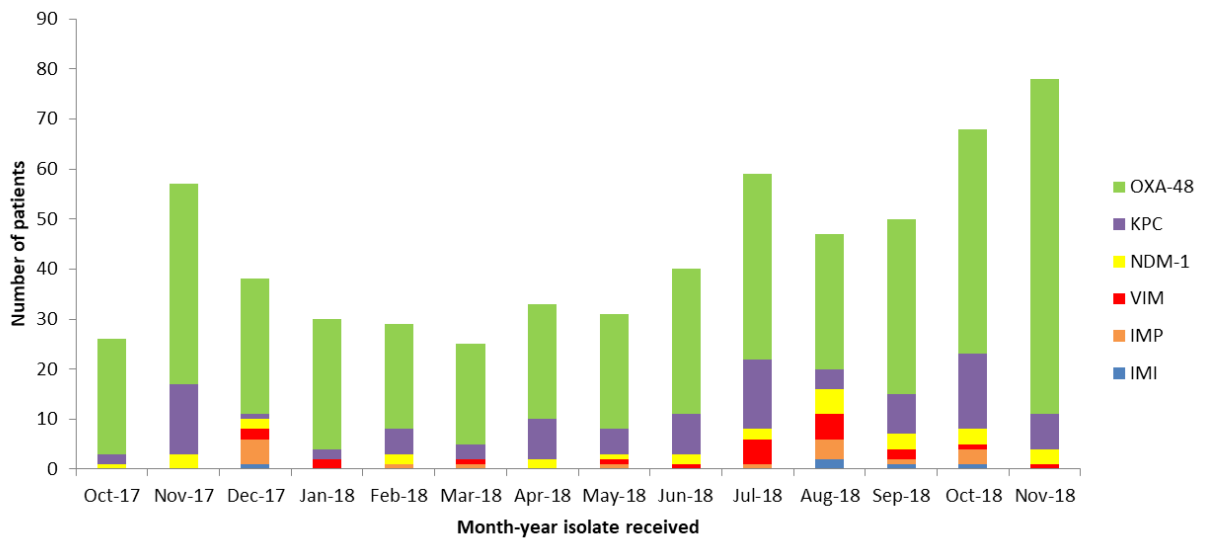


Figure 3. Monthly numbers of patients with CPE newly-confirmed by NCPERLS, by carbapenemase type from Q4 2017. **Source:** NCPERLS

2. Invasive CPE infections notified to Departments of Public Health

In December 2018, the Infectious Diseases Regulations were updated, changing the terminology from CRE to CPE and expanding requirement to notify not only invasive “carbapenemase producing *Enterobacteriaceae* (CPE) infection, but also non-invasive infection and colonisation” by laboratories (public and private) to Departments of Public Health.

To date, invasive CPE infection 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 or illness onset date.*

Figure 4 displays monthly notifications of invasive CPE infection since Q4 2017 and **Figure 5** displays cumulative monthly notifications from 2012 onwards. Four cases of invasive CPE infection were notified in November.

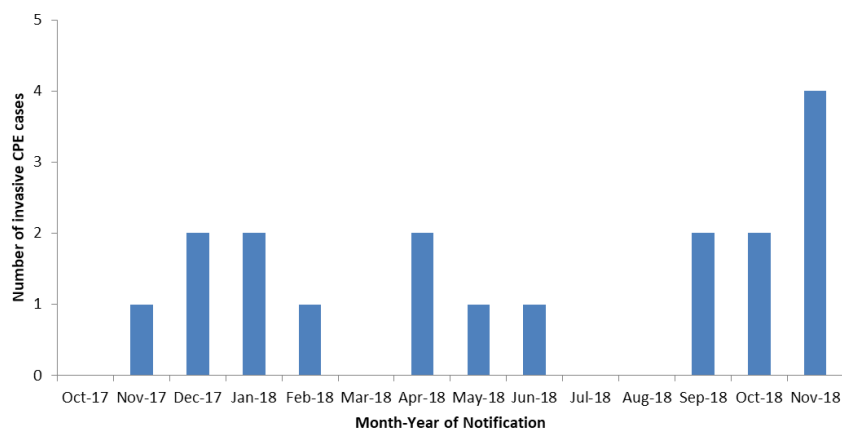


Figure 4. Quarterly notifications of invasive CPE infection from Q4 2017. **Source:** CIDR

*These data have been modified from those previously reported (see Appendix 2a for details)

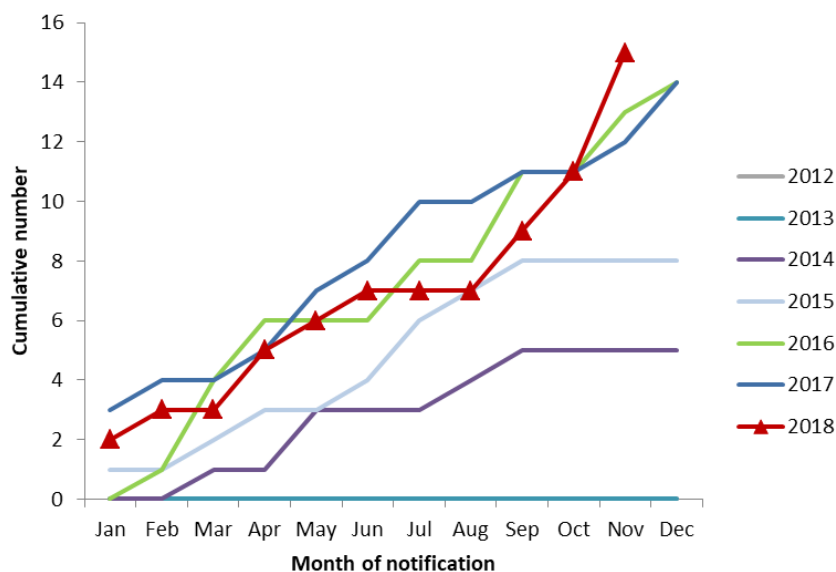


Figure 5. Cumulative monthly notifications of invasive CPE infection (2012 – November 2018).

Source: CIDR

*These data have been modified from those previously reported (see Appendix 2a for details)

3. New 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, with creation of a unique outbreak event on CIDR. Legislation applies to all healthcare facility types regardless of ownership or acuity. *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.*

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. In November 2018, one new acute hospital CPE outbreak event was created on CIDR on the 11th November.

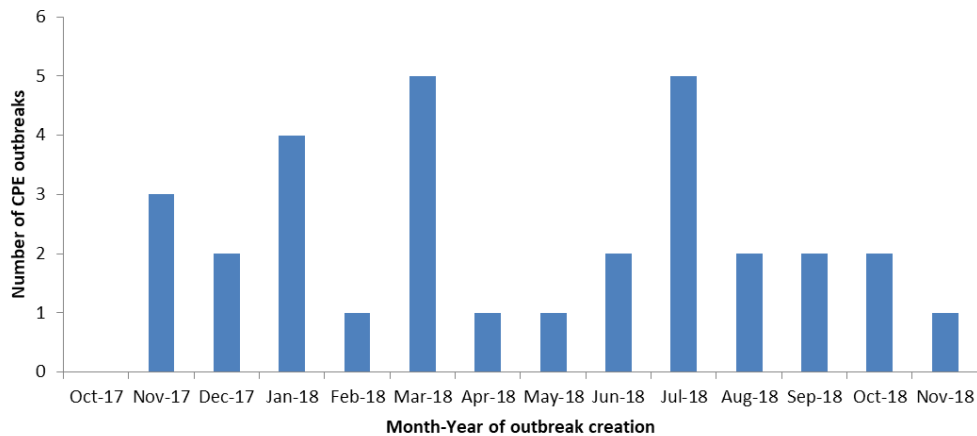


Figure 6. Monthly new CPE outbreak events created by Departments of Public Health from Q4 2017. **Source:** CIDR

4. Active/current CPE hospital outbreak events reported to BIU

All 47 acute HSE hospitals are asked to report data on the number of active or current CPE outbreaks to the HSE’s Business Information Unit (BIU), with monthly data available from January 2018. **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.

Figure 7 displays the total number of hospitals reporting active/current CPE outbreaks from Q1 2018. In November, a current/active CPE outbreak was being managed by 11 (26%) of the 42 hospitals (89%) that reported this data.

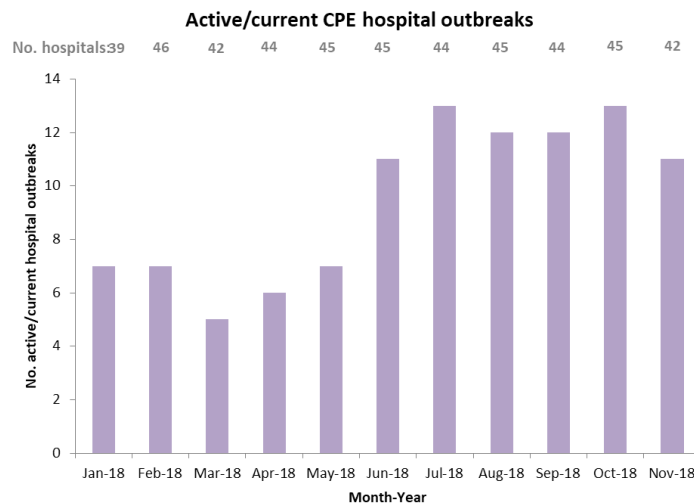


Figure 7. Monthly CPE active/current outbreaks (lilac bars) from Q1 2018. Number of hospitals reporting cited above each bar. **Source:** BIU

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

All 47 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 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 and private hospital microbiology laboratories – Acute HSE hospitals are required to report data to BIU, whereas private hospitals are not required to report
2. NCPERLS reports positive specimens based on the date the specimen was received by NCPERLS, not the date the specimen was taken. Hospitals return data to BIU based on specimen collection date

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** and **Figure 8** display national monthly data totals from Q4 2017, with a monthly increase in CPE screens performed observed and the highest to date in November. The number of confirmed CPE cases has increased in line with additional screening.

Data provided by 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 received by HPSC after review by the National HCAI Steering Group on 03/01/2019). Acute hospitals are required to report data for a given month to BIU by the 15th of the following month.

Table 1. Monthly 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 screening & diagnostic (CPE002+003)	Total confirmed CPE cases from screening (CPE002)	Percentage of positive CPE screens (CPE002/CPE004)
October 2017	42 (89)	9,821	36	30	0.31
November 2017	43 (91)	11,280	45	41	0.36
December 2017	43 (91)	10,157	34	28	0.28
January 2018	44 (94)	11,293	34	29	0.26
February 2018	45 (96)	10,518	25	22	0.21
March 2018	46 (98)	10,648	25	20	0.19
April 2018	46 (98)	11,468	37	34	0.30
May 2018	47 (100)	13,416	24	21	0.16
June 2018	47 (100)	13,062	49	45	0.35
July 2018	47 (100)	15,471	56	49	0.32
August 2018	47 (100)	17,486	50	45	0.26
September 2018	47 (100)	16,341	49	45	0.28
October 2018	47 (100)	19,703	81	74	0.38
November 2018	45 (96)	19,824	72	68	0.34

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 November, there were 72 patients from whom CPE were newly-detected (**Table 1** and **Figure 8**). Of these, a screening specimen accounted for 68 new detections (0.34% of all screening specimens n=19,824; **Table 1** and **Figure 9**). **Figures 10** and **11** display the rate of CPE screens and number of newly-detected patients with CPE in November by hospital group, respectively. Considerable variation

in screening activity between each group was observed in November, as is evident from the differences in the screening rate by hospital group in **Figure 10**, which suggests variable local implementation of national CPE screening guidance.

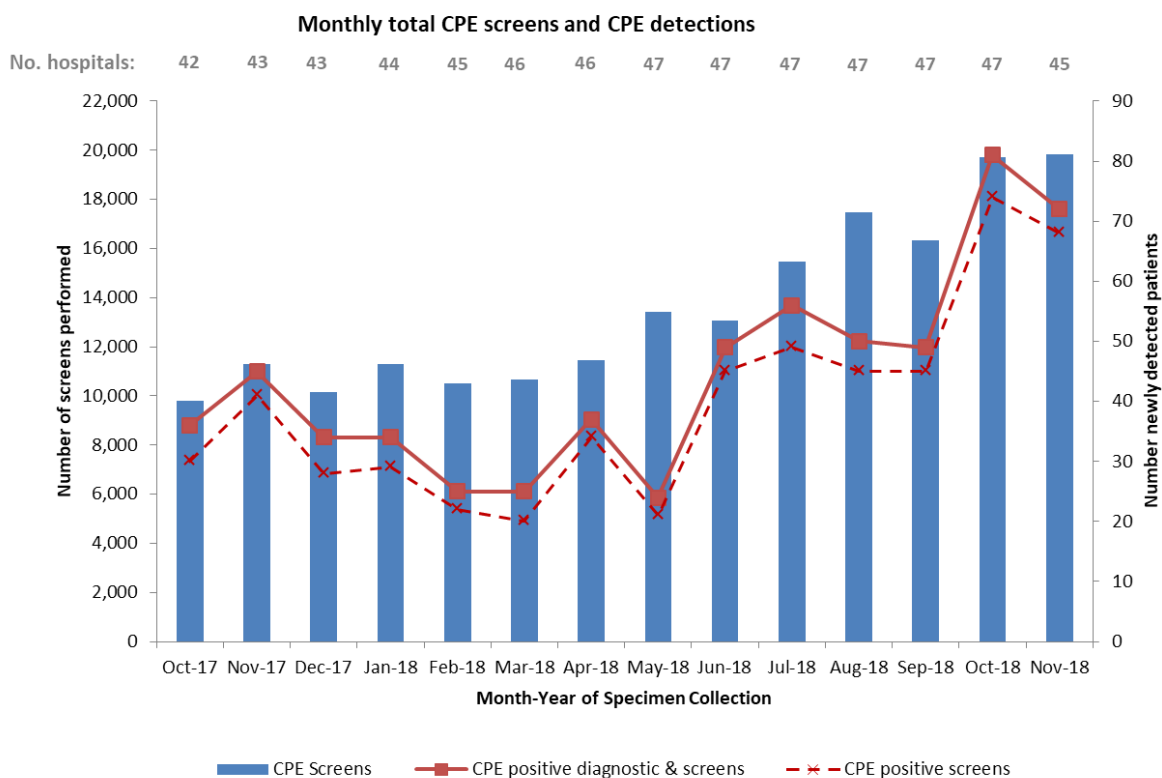


Figure 8. Monthly total CPE rectal swab/faecal screening specimens (blue bars), CPE diagnostic and screening detections from all sites (red line) and CPE detections from rectal swab/faecal screening specimens (red dashed line) in acute HSE hospitals from Q4 2017. Number of hospitals reporting cited above each bar. **Source:** BIU

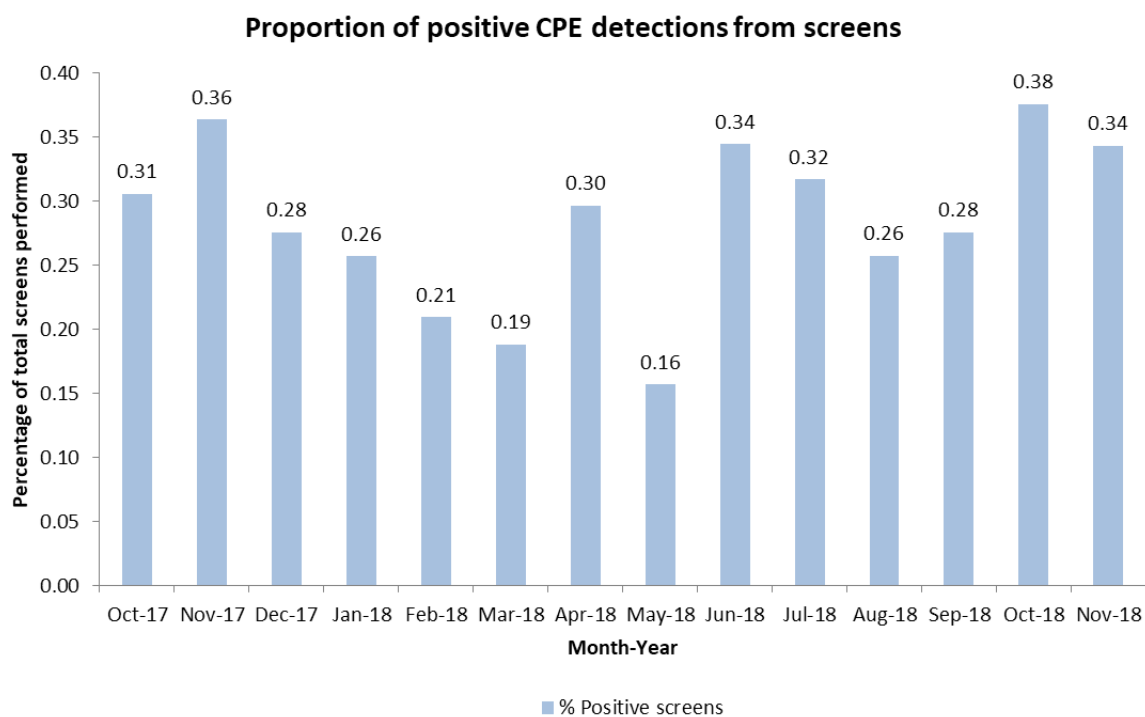


Figure 9. Proportion (%) of positive CPE rectal swab/faecal sample screens from Q4 2017. **Source:** BIU

Rate of CPE screens by BDU conducted by hospital group

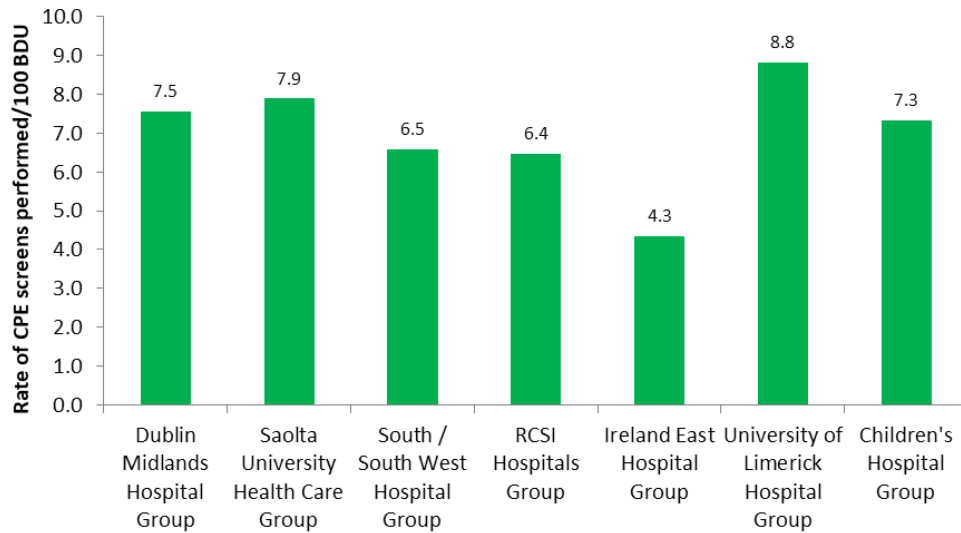


Figure 10. Rate of CPE screens per 100 bed days used (BDU), by acute HSE hospital group (November 2018). **Source:** BIU

Denominator used in rate calculations derived from average monthly bed days used by hospital group for 2013-2017 inclusive.

Newly detected patients with CPE by hospital group

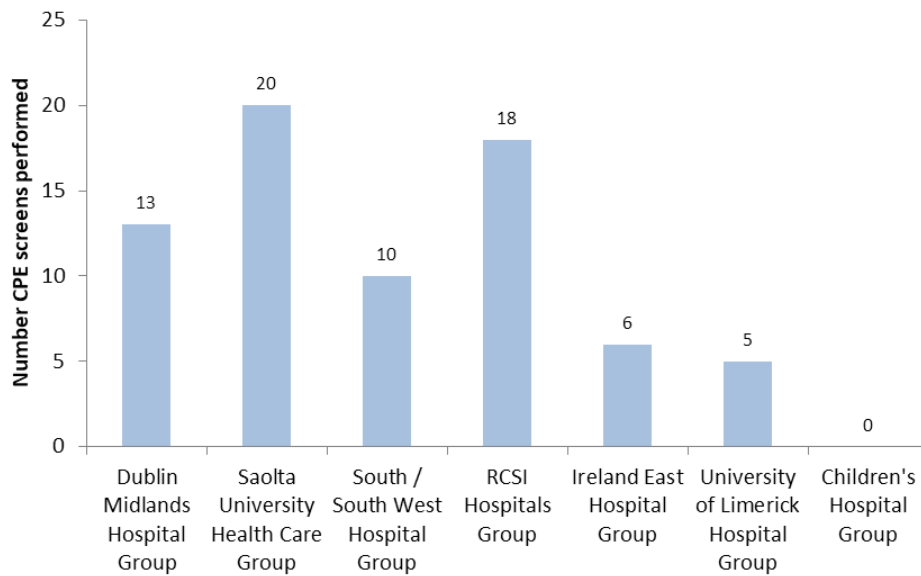


Figure 11. Distribution of newly-detected patients with CPE (from either screens or diagnostic specimens) by acute HSE hospital group (November 2018). **Source:** BIU

6. Additional CPE performance indicators reported to BIU

All 47 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 and those not accommodated in an *en suite* single room or appropriate cohort for part of their admission from Q1 2018*. **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 suitably for part of admission
October 2017	41 (87)	131	40 (85)	11
November 2017	42 (89)	170	42 (89)	19
December 2017	42 (89)	158	42 (89)	11
January 2018	44 (94)	150	44 (94)	7
February 2018	44 (94)	149	46 (98)	9
March 2018	46 (98)	152	45 (96)	5
April 2018	46 (98)	141	46 (98)	18
May 2018	47 (100)	142	46 (98)	10
June 2018	47 (100)	170	47 (100)	9
July 2018	47 (100)	167	47 (100)	12
August 2018	47 (100)	191	46 (98)	10
September 2018	47 (100)	197	47 (100)	11
October 2018	47 (100)	228	47 (100)	19
November 2018	46 (98)	250	46 (98)	13

*BIU indicator CPE006 currently defines any facility other than an *en suite* single room or appropriate cohort area 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 was not captured in the definition for CPE006 in use from October to December 2017 (grey font).

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

In November 2018, 46 HSE acute hospitals (98%) provided data. There were 250 inpatients with known CPE infection or colonisation accommodated in 27 (59%) reporting HSE acute hospitals (range = 1 – 39 inpatients), with 19 hospitals reporting no known inpatients with CPE (**Figure 12** and **Appendix 5**).

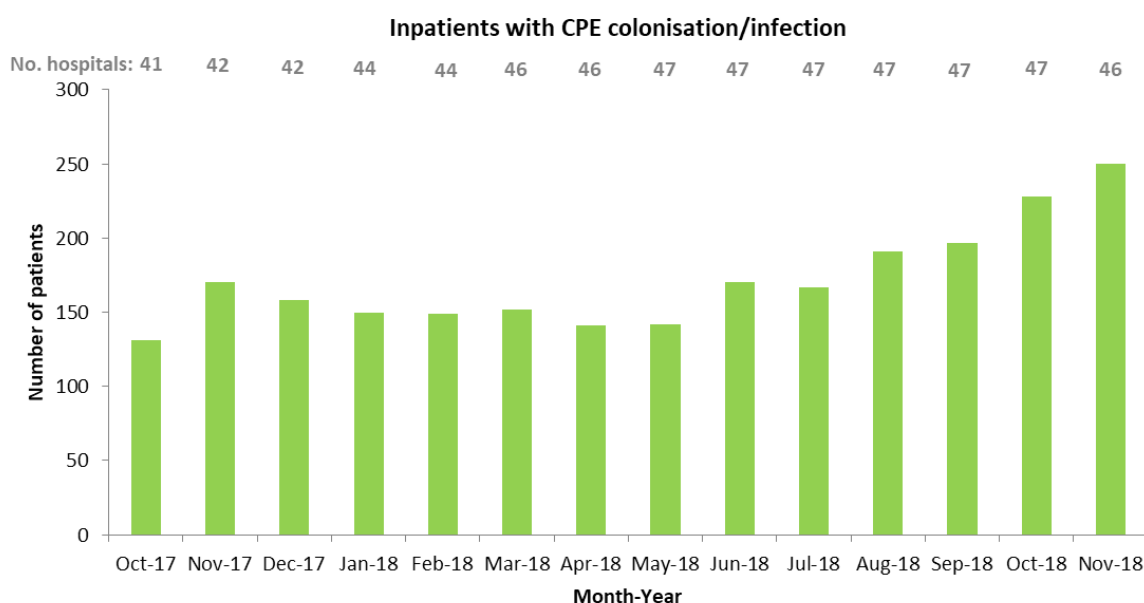


Figure 12. Monthly total of known inpatients with CPE (green bars) in acute HSE hospitals. Number of hospitals reporting cited above each bar. **Source:** BIU

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

In November 2018, 46 HSE acute hospitals (98%) provided data. A total of 13 inpatients of six acute HSE hospitals (13% of those providing data) were not accommodated in an *en suite* single room or appropriate cohort* for part of their admission, increasing the risk of further CPE transmission (**Figure 13** and **Appendix 5**). The University of Limerick Hospital Group reported five patients, Ireland East and South/South West Hospital Groups each reported three patients and the Saolta University Hospital Group reported two patients.

*BIU indicator CPE006 currently defines any facility other than an *en suite* single room or appropriate cohort area 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 was not captured in the definition for CPE006 in use from October to December 2017.

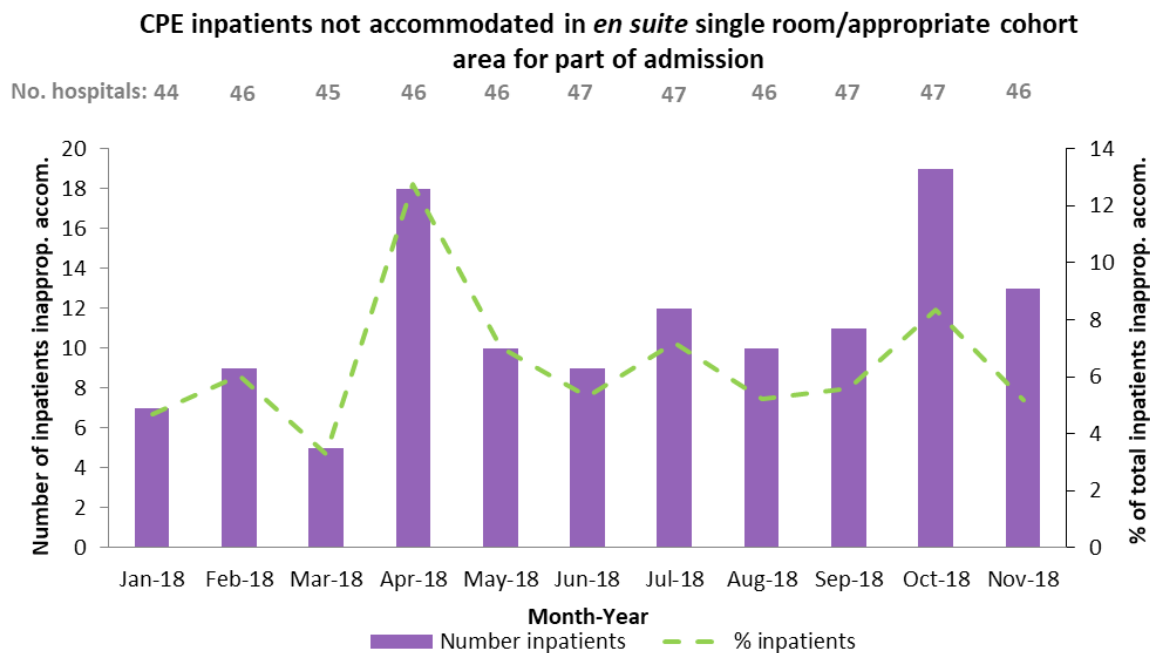


Figure 13. Monthly total known CPE inpatients (purple bars) not accommodated in an *en suite* single room or appropriate cohort area for part of their admission to acute HSE hospitals. Proportion (%) of total CPE inpatients not accommodated appropriately (green dashed line). Number of hospitals reporting cited above each bar. **Source:** BIU

7. Meropenem use

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

All 47 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 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, excessive consumption of meropenem is undesirable, as it may contribute to the spread of CPE in hospitals. **Table 3** and **Figure 14** display national monthly data from Q4 2017 and **Appendix 5** displays data by hospital and hospital group. A decline in reporting hospitals has been observed in 2018, bringing the total to just 15 HSE acute hospitals (32%) in November. This reduction in reporting is the reason for the reduction in monthly meropenem dispensing, to 7,513 net grams dispensed by 13 pharmacies (87% of those providing data), and two hospitals reported having dispensed no meropenem in November.

Table 3. Monthly 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 (68)	13,478	29
November 2017	33 (70)	13,624	27
December 2017	34 (72)	13,802	29
January 2018	32 (68)	13,627	28
February 2018	32 (68)	11,201	28
March 2018	30 (64)	11,534	23
April 2018	26 (55)	10,413	17
May 2018	19 (40)	9,594	15
June 2018	16 (34)	7,554	13
July 2018	14 (30)	8,097	12
August 2018	14 (30)	7,715	13
September 2018	14 (30)	7,671	12
October 2018	15 (32)	8,635	12
November 2018	15 (32)	7,513	13

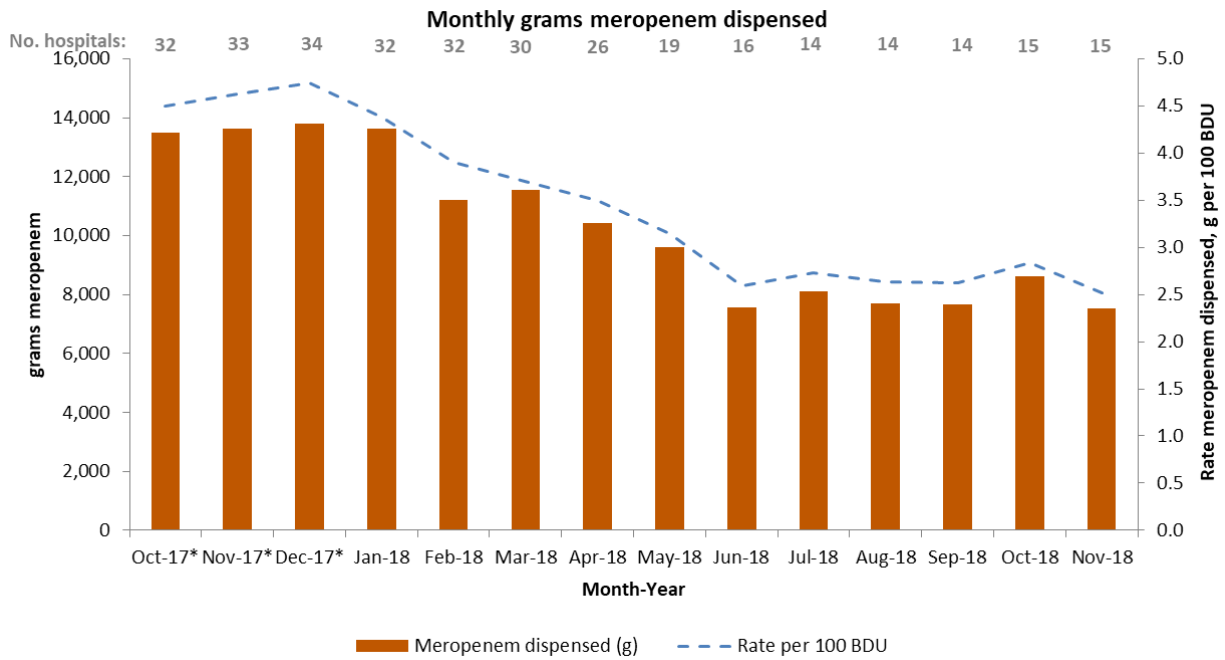


Figure 14. Monthly net** grams of meropenem dispensed by acute HSE hospital pharmacies (orange bars) and rate of meropenem dispensed per 100 bed days used (blue dashed line). Note monthly reduction in number of hospitals reporting data, cited above each bar. **Source:** BIU

**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). Denominator used in rate calculations derived from average monthly bed days used for 2013-2017 inclusive (*2012-2016 used for Oct-Nov 2017 figures).

7.2 National carbapenem use data, as reported to HPSC

The majority of HSE acute hospitals 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 15** displays annual national carbapenem use trends to end Q2 2018, with a consistent decline in carbapenem use observed since a peak in 2014.

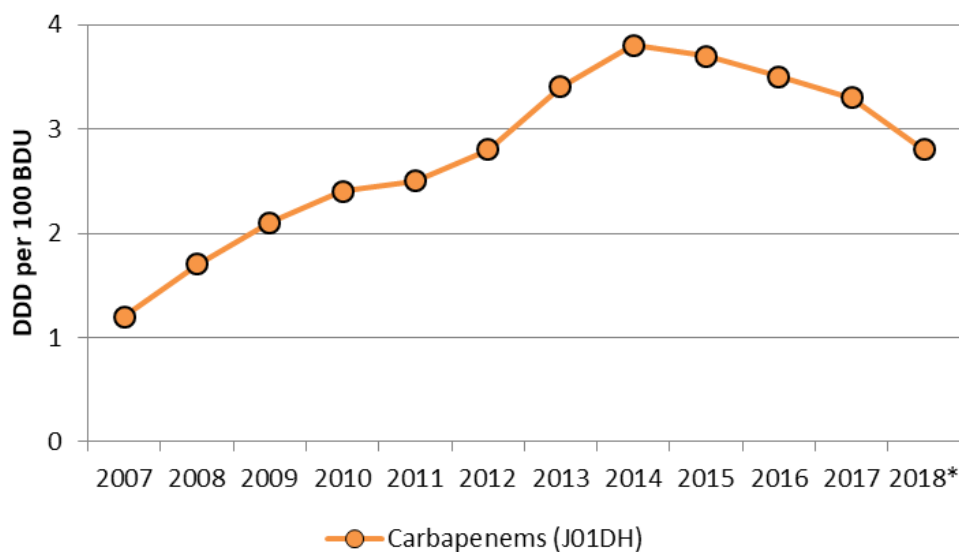


Figure 15. Annual national carbapenem use in acute HSE hospitals (results are provisional for *2018 data to end Q2). **Source:** HPSC

8. 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. CPE enhanced surveillance collects information based on the first CPE isolate per patient per year of any *Enterobacteriales* species confirmed as a carbapenemase producer 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. In 2017, 449 CPE were reported from 447 patients by 32 microbiology laboratories. The vast majority were inpatients in acute hospitals at the time of CPE detection (84%) and where data was reported, 1% were not isolated within 24 hours of the CPE result being available. The remaining patients were outpatients, long-term care facility residents and patients attending general practitioners (GPs).

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

Appendix 1

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

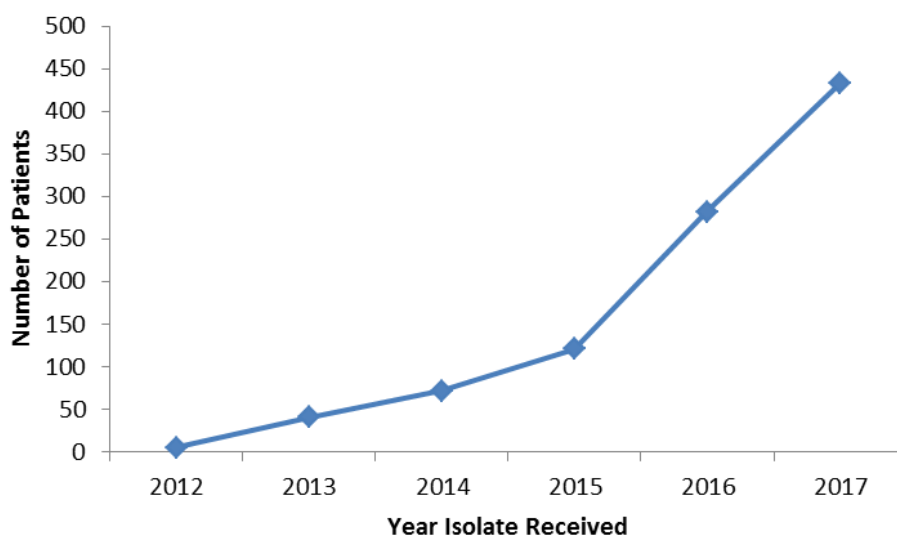


Figure 16. Annual numbers of patients with CPE newly-confirmed: 2012 – 2017*. **Source:** NCPERLS

*Total numbers differ from those in previous reports due to late submission of isolates.

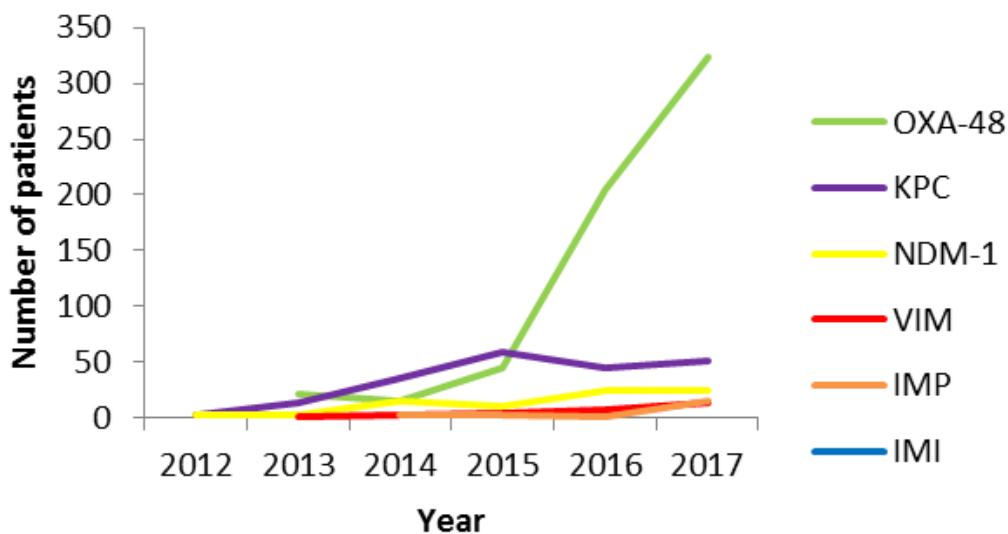


Figure 17. Annual numbers of patients with CPE newly-confirmed, by carbapenemase type: 2012 – 2017*. **Source:** NCPERLS

*Total numbers differ from those in previous reports due to late submission of isolates.

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

	KPC	OXA-48	NDM	VIM	IMP	IMI
University Limerick Hospital Group						
University Hospital Limerick	35	1	1			
Ennis Hospital	1					
St. John's Hospital	1					
The Children's Hospital Group						
Our Lady's Children's Hospital, Crumlin			1		1	
Temple Street Children's University Hospital			1			
South/South West Hospital Group						
Cork University Hospital	2	2				
University Hospital Waterford	1	24				
University Hospital Kerry			1			
South Tipperary General Hospital		8				
Mercy University Hospital Cork		1				
Saolta Hospital Group						
University Hospital Galway/ Merlin Park	1	32	4	6	1	2
Letterkenny University Hospital		1				
Mayo General Hospital				2		
Sligo Regional Hospital		4		1		
Roscommon County Hospital				1		
RCSI Hospitals Group						
Beaumont Hospital Dublin		29				
Connolly Hospital Dublin		1		1		
Our Lady of Lourdes Hospital Drogheda		1	1			
Rotunda Hospital Dublin		2				
Ireland East Hospital Group						
Mater Misericordiae University Hospital Dublin	2	13	1			
St Vincent's University Hospital Dublin		12	1	1		1
Wexford General Hospital		7				
St Luke's General Hospital, Kilkenny		16				
Our Lady's Hospital, Navan		3				
National Maternity Hospital, Holles St, Dublin		1				
Midlands Regional Hospital, Mullingar		1				
Dublin Midlands Hospital Group						
St James' Hospital Dublin		27	2			
Tallaght Hospital, Dublin	2	96	7		1	
Naas General Hospital		16				
St Luke's Radiation Oncology Network		2				
Other Healthcare facilities	7	24	5	1	12	1
TOTALS (n=433)#	52	324	25	13	15	4

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 include specimens from: Private hospitals, long-term care facilities and GP surgeries. Total numbers differ from those in previous reports due to late submission of isolates.

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

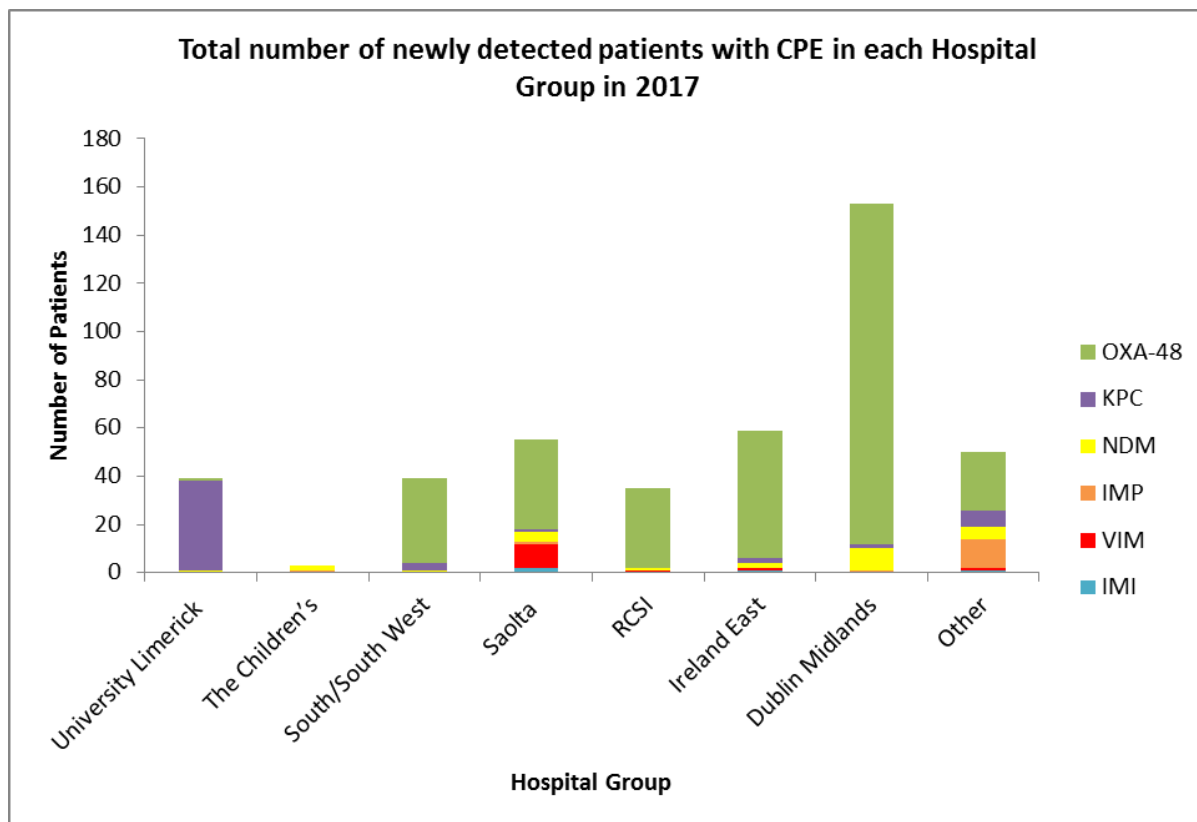


Figure 18. Patients with CPE newly-confirmed in 2017*, by carbapenemase type and hospital group. Source: NCPERLS

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.

*Total numbers differ from those in previous reports due to late submission of isolates.

Appendix 2

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

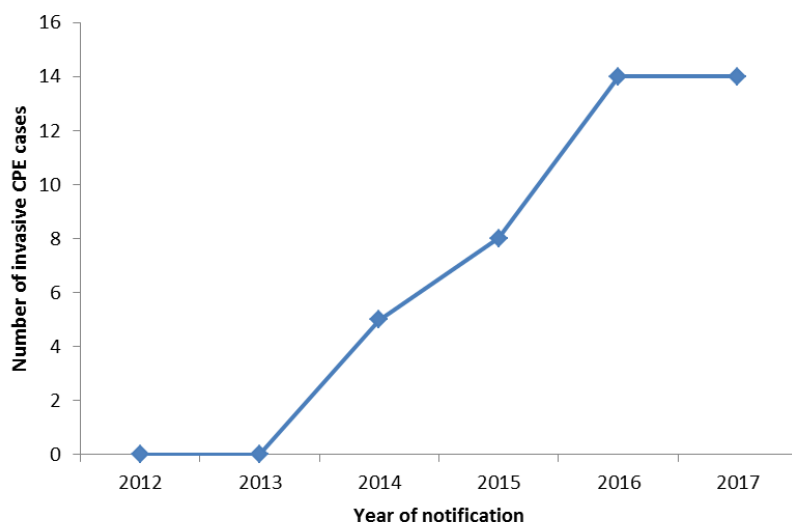


Figure 19. Annual notifications of invasive CPE infection: 2012 – 2017*. Source: CIDR

*These data are based on the date of notification of a case on CIDR, and have been modified from previous report. A case previously notified in 2017 was reclassified to a different Public Health area and a new notification created on CIDR in January 2018. Thus the total notifications for 2017 has been changed from that reported previously.

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

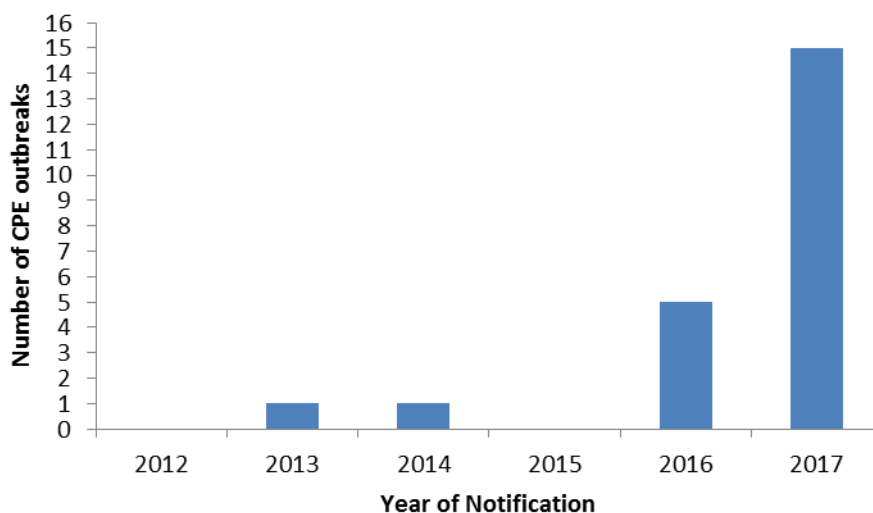


Figure 20. Annual CPE outbreak events created by Departments of Public Health: 2012 – 2017. Source: CIDR

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 any accommodation other than an en-suite single room or appropriate cohort area, for any part of their admission. (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 ***
CPE010	Do you have an active/current CPE outbreak in your hospital during this month? ****

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

****For definition and help with determining if your hospital has an outbreak, please refer to the policy document HCAI/AMR P003 "Guide to Assessing if there is Evidence of Carbapenemase Producing Enterobacteriaceae (CPE) Transmission in an Acute Hospital"

Appendix 4. Monthly CPE returns received by the BIU:

October and November 2018

Provider	Oct-18		Nov-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	4	80%	4	80%
Connolly Hospital - Blanchardstown	4	80%	4	80%
Coombe Women and Infants University Hospital	4	80%	4	80%
Cork University Hospital	4	80%	4	80%
Croom Hospital	4	80%	4	80%
Ennis Hospital	4	80%	4	80%
Galway University Hospitals	5	100%	5	100%
Letterkenny University Hospital	4	80%	4	80%
Lourdes Orthopaedic Hospital Kilcreene	4	80%	4	80%
Louth County Hospital	4	80%	4	80%
Mater Misericordiae University Hospital	5	100%	5	100%
Mayo University Hospital	4	80%	4	80%
Mercy University Hospital Cork	5	100%	5	100%
Midland Regional Hospital - Portlaoise	5	100%	4	80%
Midland Regional Hospital - Tullamore	4	80%	3	60%
Midland Regional Hospital Mullingar	4	80%	4	80%
Naas General Hospital	5	100%	5	100%
National Maternity Hospital	4	80%	4	80%
Nenagh Hospital	4	80%	4	80%
Our Lady of Lourdes Hospital Drogheda	4	80%	4	80%
Our Lady's Children's Hospital, Crumlin	4	80%	4	80%
Our Ladys Hospital - Navan	4	80%	Data outstanding	
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	4	80%	4	80%
St John's Hospital	4	80%	4	80%
St. Columcille's Hospital	5	100%	5	100%
St. James's Hospital	5	100%	5	100%
St. Luke's Hospital Kilkenny	4	80%	4	80%
St. Luke's Radiation Oncology Network	5	100%	5	100%
St. Michael's Hospital	4	80%	4	80%
St. Vincent's University Hospital	5	100%	5	100%
Tallaght University Hospital	5	100%	5	100%
University Hospital Waterford	4	80%	5	100%
University Hospital, Limerick	4	80%	4	80%
UMH Limerick	4	80%	4	80%
Wexford General Hospital	4	80%	4	80%
Kerry General Hospital	4	80%	4	80%
Mallow General Hospital	4	80%	4	80%
Bantry General Hospital	5	100%	5	100%
Total submitted	47		46	
Did not submit	0		1	
% of providers who submitted data	100%		98%	

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 accommodated overnight in accommodation other than an en-suite single room or appropriate cohort area for any part of their admission. <i>Please note that CPE inpatients accommodated in appropriate cohort areas were not captured in the definition for CPE006 in use from October to December 2017</i>
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			Q2 2018			Q3 2018			Q4 2018	
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18
Children's Hospital Group	CPE002+003	0	0	0	2	0	1	0	0	0	0	1	0	2	0
	CPE004	383	411	322	423	352	367	458	439	372	441	458	488	519	563
	CPE005	4	4	3	6	4	5	3	4	3	1	3	3	4	4
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE008	53	76	61	350	520	321	399	630	0	0	0	0	0	0
Dublin Midlands Hospital Group	CPE002+003	13	5	15	13	7	9	11	8	12	8	13	15	18	13
	CPE004	3,574	3,533	3,169	3,822	3,247	3,189	3,049	3,786	3,571	3,839	4,210	3,895	4,823	4,302
	CPE005	57	75	75	67	63	58	49	60	65	65	65	62	72	64
	CPE006	2	2	1	0	1	0	0	2	2	0	0	1	0	0
	CPE008	3,354	3,681	3,883	3,157	2,145	2,789	2,708	3,943	3,101	3,136	2,539	2,983	3,204	2,299
Ireland East Hospital Group	CPE002+003	3	4	4	3	5	5	3	3	8	10	4	5	7	6
	CPE004	1,967	1,925	1,660	1,976	1,825	1,842	2,161	2,292	2,399	2,687	2,659	2,450	2,832	2,762
	CPE005	15	20	21	14	21	13	15	17	22	21	22	30	30	25
	CPE006	4	5	3	2	5	2	5	3	5	2	3	3	7	3
	CPE008	5,643	5,491	5,683	5,822	5,344	4,856	4,132	3,424	3,230	3,717	3,377	2,735	3,489	3,093
RCSI Hospitals Group	CPE002+003	9	11	0	1	1	0	4	1	3	6	11	12	10	18
	CPE004	1,078	1,749	970	987	881	931	1,004	1,163	1,115	1,444	2,178	2,260	3,121	2,977
	CPE005	13	18	12	8	5	7	9	4	8	5	17	19	18	37
	CPE006	0	8	3	2	1	2	3	0	1	3	0	1	1	0
	CPE008	345	311	432	242	288	30	55	75	65	49	35	83	75	62
Saulita University Health Care Group	CPE002+003	6	9	7	8	5	1	4	7	10	12	10	7	14	20
	CPE004	1,395	1,881	2,343	2,172	2,425	2,146	2,413	3,035	2,653	3,281	3,363	3,095	3,651	3,889
	CPE005	16	25	26	26	24	28	25	27	30	31	41	35	43	60
	CPE006	3	1	2	2	1	1	5	4	0	3	2	2	1	2
	CPE008	1,130	1,542	1,088	1,189	688	745	593	665	677	657	1,242	1,307	936	854
South / South West Hospital Group	CPE002+003	1	6	8	3	2	6	7	3	8	8	5	4	25	10
	CPE004	381	549	640	639	635	1,037	1,114	1,443	1,689	2,115	2,689	2,374	2,974	3,550
	CPE005	7	9	13	10	15	17	18	12	18	13	23	16	36	33
	CPE006	2	1	1	1	1	0	3	1	1	1	1	1	0	3
	CPE008	1,603	1,270	1,064	1,400	1,140	1,065	921	857	481	538	522	563	931	1,205
University of Limerick Hospital Group	CPE002+003	4	10	0	4	5	3	8	2	8	12	6	6	5	5
	CPE004	1,043	1,232	1,053	1,274	1,153	1,136	1,269	1,258	1,263	1,664	1,929	1,779	1,783	1,781
	CPE005	19	19	8	19	17	24	22	18	24	31	20	32	25	27
	CPE006	0	2	1	0	0	0	2	0	0	3	4	3	10	5
	CPE008	1,350	1,253	1,591	1,467	1,076	1,728	1,605	0	0	0	0	0	0	0
National Total (All Groups)	CPE002+003	36	45	34	34	25	25	37	24	49	56	50	49	81	72
	CPE004	9,821	11,280	10,157	11,293	10,518	10,648	11,468	13,416	13,062	15,471	17,486	16,341	19,703	19,824
	CPE005	131	170	158	150	149	152	141	142	170	167	191	197	228	250
	CPE006	11	19	11	7	9	5	18	10	9	12	10	11	19	13
	CPE008	13,478	13,624	13,802	13,627	11,201	11,534	10,413	9,594	7,554	8,097	7,715	7,671	8,635	7,513

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 accommodated overnight in accommodation other than an en-suite single room or appropriate cohort area for any part of their admission. <i>Please note that CPE inpatients accommodated in appropriate cohort areas were not captured in the definition for CPE006 in use from October to December 2017</i>
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			Q2 2018			Q3 2018			Q4 2018	
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18
Our Lady's Children's Hospital, Crumlin	CPE002+003	0	0	0	2	0	1	0	0	0	0	1	0	2	0
	CPE004	274	308	230	310	263	270	320	340	298	347	371	394	370	417
	CPE005	3	3	2	5	3	4	2	3	2	1	3	3	4	4
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE008				289	380	246	325	630						
Temple Street Children's University Hospital	CPE002+003	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE004	109	103	92	113	89	97	138	99	74	94	87	94	149	146
	CPE005	1	1	1	1	1	1	1	1	1	0	0	0	0	0
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE008	53	76	61	61	140	75	74							
Children's Hospital Group	CPE002+003	0	0	0	2	0	1	0	0	0	0	1	0	2	0
	CPE004	383	411	322	423	352	367	458	439	372	441	458	488	519	563
	CPE005	4	4	3	6	4	5	3	4	3	1	3	3	4	4
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE008	53	76	61	350	520	321	399	630	0	0	0	0	0	0

5c. Dublin Midlands 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 accommodated overnight in accommodation other than an en-suite single room or appropriate cohort area for any part of their admission. <i>Please note that CPE inpatients accommodated in appropriate cohort areas were not captured in the definition for CPE006 in use from October to December 2017</i>
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			Q2 2018			Q3 2018			Q4 2018	
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18
Coombe Women and Infants University Hospital	CPE002+003	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE004	18	23	13	27	36	38	28	31	33	55	37	68	38	51
	CPE005	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE008	70	118	12	59	35	59	15	16	16	43				
MRH Portlaoise	CPE002+003	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE004	37	33	43	40	38	35	64	60	61	60	75	158	301	327
	CPE005	1	0	0	0	0	0	0	0	0	0	1	1	0	0
	CPE006	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	CPE008	73	45	53	23	26	34					70	4	122	
MRH Tullamore	CPE002+003	0	0	1	0	0	1	1	0	1	0	0	0	0	1
	CPE004	168	187	172	234	222	229	262	297	289	294	341	507	671	
	CPE005	1	1	1	0	0	1	1	0	1	1	0	0	0	1
	CPE006	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	CPE008														
Naas General Hospital	CPE002+003	3	1	2	0	0	0	0	1	1	0	1	0	0	0
	CPE004	655	609	526	801	639	483	299	397	459	521	396	377	489	511
	CPE005	4	5	5	5	5	4	4	4	4	4	9	3	4	4
	CPE006	1	1	0	0	0	0	0		0	0	0	0	0	0
	CPE008	187	120	56	140	7	117	0	21	121	123	106		260	130
St. James's Hospital	CPE002+003	3	0	4	3	0	1	2	2	2	0	7	8	6	6
	CPE004	706	673	655	507	582	722	656	813	815	900	1,283	760	1,051	1,168
	CPE005	9	27	25	17	15	10	9	14	11	13	11	15	23	18
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE008	2,438	2,692	3,161	2,217	1,685	1,922	1,985	2,955	2,262	2,366	2,353	2,493	2,303	1,700
St. Luke's Radiation Oncology Network	CPE002+003	0	1	0	0	0	0	0	1	0	0	1	0	0	1
	CPE004	217	206	184	234	175	127	181	219	194	207	216	182	194	248
	CPE005	0	1	0	0	1	1	1	0	0	1	2	2	1	2
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE008	10	5	0	0	10	20	1	0	19	15	10	14	49	4
Tallaght University Hospital	CPE002+003	7	3	8	10	7	7	8	4	8	8	4	7	12	5
	CPE004	1,773	1,802	1,576	1,979	1,555	1,555	1,559	1,969	1,720	1,802	1,862	1,843	2,079	1,997
	CPE005	42	41	44	45	42	42	34	42	49	46	42	41	44	39
	CPE006	0	0	1	0	1	0	0	2	2	0		0	0	0
	CPE008	576	701	601	718	382	637	707	951	683	589		472	470	465
Dublin Midlands Hospital Group	CPE002+003	13	5	15	13	7	9	11	8	12	8	13	15	18	13
	CPE004	3,574	3,533	3,169	3,822	3,247	3,189	3,049	3,786	3,571	3,839	4,210	3,895	4,823	4,302
	CPE005	57	75	75	67	63	58	49	60	65	65	65	62	72	64
	CPE006	2	2	1	0	1	0	0	2	2	0	0	1	0	0
	CPE008	3,354	3,681	3,883	3,157	2,145	2,789	2,708	3,943	3,101	3,136	2,539	2,983	3,204	2,299

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 accommodated overnight in accommodation other than an en-suite single room or appropriate cohort area for any part of their admission. <i>Please note that CPE inpatients accommodated in appropriate cohort areas were not captured in the definition for CPE006 in use from October to December 2017</i>
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			Q2 2018			Q3 2018			Q4 2018	
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18
Cappagh National Orthopaedic Hospital	CPE002+003	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE004	0	0	0	0	0	0	17	46	47	52	139	139	165	187
	CPE005	0	0	0	0	0	0	0	0	0	1	1	0	0	0
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE008	10	0	0	23	50	15	11	6	20	0	10	8	0	61
Mater Misericordiae University Hospital	CPE002+003	1	1	2	2	3	2	2	2	3	6	4	2	3	4
	CPE004	394	374	319	395	335	382	439	513	464	611	603	578	689	666
	CPE005	6	8	11	8	10	8	4	5	9	9	9	13	13	13
	CPE006	1	0	1	1	2	1	1	0	2	2	2	2	3	0
	CPE008	2,710	2,860	2,571	2,756	2,429	2,239	2,330	2,150	2,024	2,090	1,780	1,546	1,464	1,145
MRH Mullingar	CPE002+003	0	0	0	0	0	0	0	0	1	0	0	0	0	1
	CPE004	116	109	136	87	100	139	183	200	216	184	196	182	216	271
	CPE005	0	1	0	0	0	0	1	1	0	1	0	1	0	0
	CPE006	0	1	0	0	0	0	1	0	0	0	0	0	0	0
	CPE008	136	122	380	355	169	255	0							
National Maternity Hospital	CPE002+003	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE004	81	77	67	68	92	120	129	173	135	163	160	182	182	169
	CPE005	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE008	0	20	13	20	0	0								
Our Lady's Hospital Navan	CPE002+003	1	0	0	0	0	1	0	0	1	0	0	0	0	
	CPE004	41	106	46	46	41	84	67	71	89	107	58	47	59	
	CPE005		1	1	1	2	1	2	0	2	1	2	2	2	
	CPE006		1	0	0	0	1	1	0	1	0	0	0	0	
	CPE008	13	53	103											
Royal Victoria Eye and Ear Hospital	CPE002+003	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	CPE004	22	24	16	34	20	22	25	49	38	48	26	39	57	37
	CPE005	1	0	0	0	2	0	0	1	0	0	0	0	0	0
	CPE006	1	0	0	0	2	0	0	1	0	0	1	0	0	0
	CPE008	0	0	52	68	0	0	0	0	0	0	0	0	0	0

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 accommodated overnight in accommodation other than an en-suite single room or appropriate cohort area for any part of their admission. <i>Please note that CPE inpatients accommodated in appropriate cohort areas were not captured in the definition for CPE006 in use from October to December 2017</i>
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			Q2 2018			Q3 2018			Q4 2018	
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18
St. Columcille's Hospital	CPE002+003	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE004	103	102	103	119	103	94	102	123	109	108	119	111	130	145
	CPE005	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE008	10	0	10	10	0	10	0	10	11	10	23	0	0	0
St. Luke's General Hospital Kilkenny	CPE002+003	0	1	0	0	1	1	1	0	2	1	0	1	3	0
	CPE004	82	79	82	76	116	86	105	92	211	164	240	107	166	161
	CPE005	1	3	0	0	2	1	2	4	4	2	0	2	5	3
	CPE006	1	3	0	0	1	0	2	2	2	0	0	1	4	3
	CPE008	400	161	141	37	37	337		0						
St. Michael's Hospital	CPE002+003	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE004	111	78	63	60	66	65	80	65	84	122	95	105	117	137
	CPE005	0	0	0	0	1	0	2	1	1	0	1	0	0	1
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE008	10	13	63	70	3	15								
St. Vincent's University Hospital	CPE002+003	1	1	2	1	1	1	0	0	1	3	0	0	1	1
	CPE004	931	855	723	984	856	749	897	837	864	1,005	876	843	902	869
	CPE005	6	5	7	4	2	2	3	2	4	5	8	8	6	6
	CPE006	1	0	2	1	0	0	0	0	0	0	0	0	0	0
	CPE008	2,046	2,088	2,270	2,373	2,495	1,985	1,791	1,258	1,175	1,617	1,564	1,181	2,025	1,887
Wexford General Hospital	CPE002+003	0	1	0	0	0	0	0	0	0	0	0	2	0	0
	CPE004	86	121	105	107	96	101	117	123	142	123	147	117	149	120
	CPE005	1	2	2	1	2	1	1	3	2	2	1	4	4	2
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE008	308	174	80	110	161		0							
Ireland East Hospital Group	CPE002+003	3	4	4	3	5	5	3	3	8	10	4	5	7	6
	CPE004	1,967	1,925	1,660	1,976	1,825	1,842	2,161	2,292	2,399	2,687	2,659	2,450	2,832	2,762
	CPE005	15	20	21	14	21	13	15	17	22	21	22	30	30	25
	CPE006	4	5	3	2	5	2	5	3	5	2	3	3	7	3
	CPE008	5,643	5,491	5,683	5,822	5,344	4,856	4,132	3,424	3,230	3,717	3,377	2,735	3,489	3,093

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 accommodated overnight in accommodation other than an en-suite single room or appropriate cohort area for any part of their admission. <i>Please note that CPE inpatients accommodated in appropriate cohort areas were not captured in the definition for CPE006 in use from October to December 2017</i>
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			Q2 2018			Q3 2018			Q4 2018	
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18
Beaumont Hospital	CPE002+003	8	10	0	1	0	0	3	0	2	2	10	9	8	6
	CPE004	699	1,389	678	696	633	591	610	743	658	685	920	896	1,474	889
	CPE005	12	16	11	7	4	6	7	3	6	2	15	18	14	21
	CPE006	0	8	3	2	1	2	3	0	0	1	0	1	1	0
Cavan General Hospital	CPE002+003	0	0	0	0	0	0	0	0	0	4	0	3	1	12
	CPE004	44	35	42	24	33	42	52	100	61	297	796	872	982	1,469
	CPE005	0	0	0	0	0	0	0	0	0	2	0	0	2	14
	CPE006	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Connolly Hospital	CPE002+003	0	0	0	0	0	0	1	0	1	0	1	0	1	0
	CPE004	113	125	113	94	73	92	135	138	133	156	165	171	236	183
	CPE005	1	1	1	1	1	1	2	1	2	1	2	1	2	2
	CPE006	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Louth County Hospital	CPE002+003	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	CPE004	4	5	5	0	3	1	5	1	1	0	0	5	50	38
	CPE005	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Our Lady of Lourdes Hospital	CPE002+003	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	CPE004	78	77	55	71	59	71	69	77	151	169	176	204	223	251
	CPE005	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rotunda Hospital	CPE002+003	1	0	0	0	0	0	0	1	0	0	0	0	0	0
	CPE004	140	118	77	102	80	134	133	104	111	137	121	112	156	147
	CPE005	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RCSI Hospitals Group	CPE002+003	9	11	0	1	1	0	4	1	3	6	11	12	10	18
	CPE004	1,078	1,749	970	987	881	931	1,004	1,163	1,115	1,444	2,178	2,260	3,121	2,977
	CPE005	13	18	12	8	5	7	9	4	8	5	17	19	18	37
	CPE006	0	8	3	2	1	2	3	0	1	3	0	1	1	0
RCSI Hospitals Group	CPE008	345	311	432	242	288	30	55	75	65	49	35	83	75	62

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 accommodated overnight in accommodation other than an en-suite single room or appropriate cohort area for any part of their admission. <i>Please note that CPE inpatients accommodated in appropriate cohort areas were not captured in the definition for CPE006 in use from October to December 2017</i>
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			Q2 2018			Q3 2018			Q4 2018	
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18
Galway University Hospitals	CPE002+003	6	8	4	6	4	1	4	3	5	10	5	5	5	8
	CPE004	775	1,214	1,647	1,205	1,316	1,179	1,400	1,927	1,560	1,898	1,841	1,660	1,973	1,827
	CPE005	12	20	17	14	13	13	11	13	14	16	20	19	25	24
	CPE006	2	1	1	1	0	0	0	2	0	1	1	1	1	1
	CPE008	1,107	1,326	886	1,110	601	745	593	665	677	657	1,242	1,307	936	854
Letterkenny University Hospital	CPE002+003	0			0	1	0	0	0	0	0	2	0	0	1
	CPE004	79	84	85	99	125	107	77	111	90	206	199	282	404	542
	CPE005	0	0	1	3	4	6	5	5	5	2	6	3	2	5
	CPE006	0	0	0	0	1	0	1	2	0	0	1	0	0	0
	CPE008							0							
Mayo University Hospital	CPE002+003	0	0	1	1	0	0	0	0	0	2	1	0	0	2
	CPE004	223	215	292	382	404	345	410	373	397	482	579	537	470	475
	CPE005	3	3	5	4	1	3	3	1	1	3	5	4	1	7
	CPE006	1	0	0	1	0	1	0	0	0	0	0	0	0	0
	CPE008		216	202	79	87									
Portiuncula University Hospital	CPE002+003	0	0	0	0	0	0	0	0	0	0	1	0	1	0
	CPE004	144	179	181	182	176	199	215	242	254	251	261	219	269	252
	CPE005	0	0	0	0	0	1	1	0	1	1	2	1	1	1
	CPE006	0	0	0	0	0		0	0	0	0	0	0	0	1
	CPE008						0								
Roscommon University Hospital	CPE002+003	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE004	42	55	34	72	57	54	49	65	57	54	73	72	61	72
	CPE005	0	0	0	0	1	0	0	1	1	0	0	0	1	1
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE008														
Sligo University Hospital	CPE002+003	0	1	2	1	0	0	0	4	5	0	1	2	8	9
	CPE004	132	134	104	232	347	262	262	317	295	390	410	325	474	721
	CPE005	1	2	3	5	5	5	5	7	8	9	8	8	13	22
	CPE006	0	0	1	0	0	0	4	0	0	2	0	1	0	0
	CPE008	23													
Saolta University Health Care Group	CPE002+003	6	9	7	8	5	1	4	7	10	12	10	7	14	20
	CPE004	1,395	1,881	2,343	2,172	2,425	2,146	2,413	3,035	2,653	3,281	3,363	3,095	3,651	3,889
	CPE005	16	25	26	26	24	28	25	27	30	31	41	35	43	60
	CPE006	3	1	2	2	1	1	5	4	0	3	2	2	1	2
	CPE008	1,130	1,542	1,088	1,189	688	745	593	665	677	657	1,242	1,307	936	854

Please Note: Mayo data regarding CPE006 above for January is not confirmed

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 accommodated overnight in accommodation other than an en-suite single room or appropriate cohort area for any part of their admission. <i>Please note that CPE inpatients accommodated in appropriate cohort areas were not captured in the definition for CPE006 in use from October to December 2017</i>
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			Q2 2018			Q3 2018			Q4 2018	
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18
Bantry General Hospital	CPE002+003	0		0	0	0	0	1	0	0	0	0	0	0	0
	CPE004			0			33	41	52	40	42	42	51	115	111
	CPE005	0		0	0	0	0	1	0	0	0	0	0	0	0
	CPE006	0		0	0	0	0	1	0	0	0	0	0	0	0
Cork University Hospital	CPE002+003	0	1	1	0	1	0	1	0	2	2	1	1	9	2
	CPE004	189	237	209	287	261	307	279	316	313	494	771	537	684	552
	CPE005					1	0	1	1	2	3	4	1	10	7
	CPE006					0	0	0	0	1	0	0	0	0	0
Lourdes Orthopaedic Hospital Kilcreene	CPE002+003	0		0	0	0	0	0	0	0	0	0	0	0	0
	CPE004	0		0	0	0	0	8	12	8	7	15	18	13	11
	CPE005	0		0	0	0	0	0	0	0	0	0	0	0	0
	CPE006	0		0	0	0	0	0	0	0	0	0	0	0	0
Mallow General Hospital	CPE002+003				0	0	0	0	0	0	0	2	0	0	0
	CPE004				22	25	36	33	48	53	66	93	94	89	96
	CPE005				0	0	0	0	0	0	0	2	0	0	0
	CPE006				0	0	0	0	0	0	0	0	0	0	0
Mercy University Hospital	CPE002+003	0	0	2	3	1	2	2	0	3	0	0	1	2	1
	CPE004	9	15	7	73	85	287	277	533	585	577	583	587	680	595
	CPE005	1	0	2	3	3	2	3	1	2	1	2	3	2	3
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	CPE008	695	560	417	445	332	567	304	314	364	520	420	350	590	510

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 accommodated overnight in accommodation other than an en-suite single room or appropriate cohort area for any part of their admission. <i>Please note that CPE inpatients accommodated in appropriate cohort areas were not captured in the definition for CPE006 in use from October to December 2017</i>
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			Q2 2018			Q3 2018			Q4 2018	
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18
South Infirmary Victoria University Hospital	CPE002+003	0	0	0	0	0	0	0	0	0	0	1	0	1	0
	CPE004	9	9	3	7	9	13	6	17	62	83	153	166	200	199
	CPE005	0	0	0	0	0	0	0	0	0	0	1	1	0	0
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE008	2	0	0	0	80	0	0	10			18	32	60	164
South Tipperary General Hospital	CPE002+003	1	0	0	0	0	1	1	0	0	3	0	1	0	1
	CPE004	68	81	85	100	96	89	89	104	102	405	564	498	510	523
	CPE005	4	1	1	1	2	0	2	1	0	1	2	1	1	2
	CPE006	2	1	1	1	1	0	2	1	0	1	1	1	0	2
	CPE008	152	114	226	112	190									
UH Kerry	CPE002+003					0	0	0	0	0	0	0	0	0	0
	CPE004					73	66	62	53	45	69	60	103	111	218
	CPE005					1	1	1	0	0	0	0	0	0	0
	CPE006					0	0	0	0	0	0	0	0	0	0
	CPE008					164									
UH Waterford	CPE002+003	0	5	5	0	0	3	2	3	3	3	1	1	13	6
	CPE004	106	207	336	150	86	206	319	308	481	372	408	320	572	1,245
	CPE005	2	8	10	6	8	14	10	9	14	8	12	10	23	21
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE008	712	596	392	779	334	468	607	449						505
South / South West Hospital Group	CPE002,003	1	6	8	3	2	6	7	3	8	8	5	4	25	10
	CPE004	381	549	640	639	635	1,037	1,114	1,443	1,689	2,115	2,689	2,374	2,974	3,550
	CPE005	7	9	13	10	15	17	18	12	18	13	23	16	36	33
	CPE006	2	1	1	1	1	0	3	1	1	1	1	1	0	3
	CPE008	1,603	1,270	1,064	1,400	1,140	1,065	921	857	481	538	522	563	931	1,205

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 accommodated overnight in accommodation other than an en-suite single room or appropriate cohort area for any part of their admission. <i>Please note that CPE inpatients accommodated in appropriate cohort areas were not captured in the definition for CPE006 in use from October to December 2017</i>
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			Q2 2018			Q3 2018			Q4 2018	
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18
Croom Orthopaedic Hospital	CPE002+003	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE004	23	22	15	26	18	23	27	26	21	19	25	29	31	37
	CPE005	0	0	0	0	0	0	0	1	1	0	0	1	1	0
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE008	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Ennis Hospital	CPE002+003	0	0	0	0	0	0	2	0	0	0	0	0	0	0
	CPE004	79	83	76	103	104	90	90	102	89	89	113	117	109	131
	CPE005	2	1	1	0	0	2	2	3	3	2	1	2	2	5
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE008	44	22	78	64	133	82	22	0	0	0	0	0	0	0
Nenagh Hospital	CPE002+003	0	1	0	0	0	0	0	0	2	2	0	0	0	0
	CPE004	28	54	64	43	59	49	46	63	98	86	75	64	59	84
	CPE005	0	1	0	0	0	1	0	1	2	4	2	2	0	2
	CPE006	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CPE008	70	50	96	0	0	0	0	0	0	0	0	0	0	0
St. John's Hospital Limerick	CPE002+003	0	0	0	1	0	0	0	0	1	3	1	0	0	0
	CPE004	79	99	99	135	128	148	113	121	125	164	175	183	190	184
	CPE005	1	1	1	0	1	1	1	0	0	1	0	1	3	0
	CPE006	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	CPE008	53	31	55	39	53	74	105	0	0	0	0	0	0	0
UH Limerick	CPE002+003	4	9	0	3	5	3	6	2	5	7	5	6	5	5
	CPE004	834	974	799	967	844	826	993	943	929	1,286	1,521	1,364	1,379	1,299
	CPE005	16	16	6	19	16	20	19	13	18	24	17	26	19	20
	CPE006	0	2	0	0	0	0	2	0	0	3	4	3	10	5
	CPE008	1,183	1,145	1,362	1,364	890	1,572	1,478	0	0	0	0	0	0	0
UMH Limerick	CPE002+003														
	CPE004								3	1	20	20	22	15	46
	CPE005								0	0	0	0	0	0	0
	CPE006								0	0	0	0	0	0	0
	CPE008														
University of Limerick Hospital Group	CPE002,003	4	10	0	4	5	3	8	2	8	12	6	6	5	5
	CPE004	1,043	1,232	1,053	1,274	1,153	1,136	1,269	1,258	1,263	1,664	1,929	1,779	1,783	1,781
	CPE005	19	19	8	19	17	24	22	18	24	31	20	32	25	27
	CPE006	0	2	1	0	0	0	2	0	0	3	4	3	10	5
	CPE008	1,350	1,253	1,591	1,467	1,076	1,728	1,605	0	0	0	0	0	0	0

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 or designated cohort area 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 year (invasive and non-invasive infections, colonisations and positive screens) BASED ON SPECIMEN DATE

Appendix 7 Glossary of Terms

AMR	Antimicrobial resistance
BIU	Business Information 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
NCPERLS	National Carbapenemase-Producing <i>Enterobacterales</i> Reference Laboratory Service
NPHE	National Public Health Emergency Team