Point Prevalence Survey 2023

National Report

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Summary

Between 2022 and 2023, the third European point prevalence survey (PPS) of healthcare-associated infections (HAI) and antimicrobial use (AMU) was conducted across EU/EEA countries.

In Ireland, the PPS took place in May 2023.

This was the third PPS, organised by the European Centre for Disease Prevention and Control (ECDC), in which Ireland has participated.

All acute hospitals in Ireland took part with 12,650 patients included.

We are very grateful to all staff across the Irish healthcare sector who participated in the study with no extra resources provided during a period of sustained stress on the healthcare system.

Hospital and patient characteristics

- 65 acute hospitals participated in PPS 2023, including all 50 public (comprising HSE and voluntary) hospitals and 15 private hospitals. The breakdown of public hospitals by type included: tertiary (n=9), secondary (n=17), primary (n=10), paediatric (n=3) and specialist (n=11)
- All hospitals have different patient populations and case-mixes depending on their ownership (public vs private) and type
- Bed occupancy varied greatly between the public and private sector and by hospital type. Overall, the occupancy was highest in tertiary level hospitals at 96.6%. Almost one-in-five hospitals (n=12) reported >100% bed occupancy during the study period which represents an ongoing risk to patients. The median bed occupancy in Irish hospitals at the time of the PPS was 89.8%. By comparison, the median occupancy across Europe was reported to be 73.3% (2022-2023). ECDC have reported that univariate analysis shows that the level of bed occupancy correlates with the prevalence of HAIs
- Nationally, 33.9% of beds were in single rooms, while the equivalent figure for public hospitals only was 30.4%. The average proportion of single patient rooms has increased across all hospital types since the last survey in 2017 (figures for comparison in brackets): tertiary, 33.8% (2017, 29%); secondary, 24.0% (2017, 20%); primary, 29.2% (2017, 15%); and private, 59.7% (2017, 52%). This compares to a median of 25% across European hospitals surveyed
- Infection control staffing levels across all categories (dedicated IPC nurses, doctors and pharmacists) have improved since the last survey in 2017, with only six hospitals having no nominated IPC doctor compared to 17 in 2017, and 12 having no IPC pharmacist (more commonly known as antimicrobial pharmacist) compared to 17 in 2017
- Data were collected on 12,650 eligible patients with:
  - 49.1% male (2017, 48.0%)
  - 7.2% aged <10 years (2017, 8.7%) and 58.2% aged >=65 years (2017, 53.9%)

- Compared with the previous surveys, the mean age increased from 54 years in 2012 and 59 years in 2017 to 62 years in 2023. Similarly, the proportion of inpatients aged >=65 years increased from 48.0% in 2012 and 53.8% in 2017 to 58.2% in 2023
- 18.0% of patients had a surgical procedure since admission (2017, 17.6%), while 19.7% had at least one invasive device *in situ* (2017, 18.7%)
- Using the McCabe score as an indicator of the underlying disease prognosis (or severity), 28.1% of Irish patients were identified as having a life-limiting or rapidly fatal condition. This is higher than the European average (20.6%)

Healthcare-associated infections (HAI)

- In PPS 2023, the definition of HAI was changed to include infections due to COVID-19, as well as infections that were acquired in long-term care facilities (LTCFs). The expected effect of this would be to increase the overall prevalence of HAIs in Ireland compared with the results from the previous surveys in 2012 and 2017, in which only hospital-acquired infections were counted as HAIs
- 932 patients had an active HAI at the time of the survey resulting in an overall HAI prevalence of 7.4%. This represents an increase on the previous survey in 2017, when the HAI prevalence was 6.1%; however, it is important to take into account changes to the protocol (see above)
  - When the Irish data are adjusted for changes in the protocol (i.e. by removing HAIs originating in LTCFs, and HAIs due to COVID-19), the HAI prevalence for Irish hospitals in 2023 is 6.0% (as a result of 764 patients with HAI compared with 932 in the unadjusted data), which is similar to that in 2017
- Overall, 966 HAIs were identified, with 28 patients having 2 or more HAIs
- Almost one-in-three HAIs (31.6%) were reported as being present on admission to the hospital:
  - 33.1% were associated with the current hospital
  - 27.9% with another acute hospital
  - 36.1% with a long-term care facility (or just over 11% of all HAIs)

  The high proportion of HAIs present on admission that originated in a residential care facility reflects a significant burden on our healthcare system and requires further evaluation. The impact of the ongoing recruitment embargo in the Health Services Executive (HSE) has meant that Ireland is unable to participate in the 2024 ECDC PPS within residential care settings (known as HALT). There is currently no active national surveillance of HAIs within this sector
- HAI prevalence was higher in public hospitals (7.8%) than in private hospitals (4.1%). Among public hospitals, the highest prevalence was in tertiary hospitals (9.0%), while the lowest was in paediatric and specialist hospitals (both 5.2%). These differences are as expected due to the fundamental differences in the services provided by different hospital types

- The HAI prevalence was highest in adult intensive care units (19.0%), followed by neonatalogy (12.6%; which includes neonatal ICU) and surgical specialties (8.5%). The lowest prevalence was in gynaecology/obstetrics (1.6%)
- The top three HAI types, which together comprised 55.6% of all HAIs, were:
  - Pneumonia - 265 cases, accounting for 27.4% of all HAIs (HAI prevalence in the patient population of 2.1%)
  - Urinary tract infections - 141 cases, or 14.6% of all HAIs (HAI prevalence, 1.1%)
  - Surgical site infections - 131 cases, or 13.6% of all HAIs (HAI prevalence, 1.0%)

  In addition, COVID-19 infections accounted for 7.6% of all HAIs, with a prevalence of 0.6%
- Among all bloodstream infections (n=83), 15, or 18.1%, were due to infection of an indwelling catheter
- The top five most common pathogens associated with HAIs were *E. coli* (n=73; 15.1%), *Staphylococcus aureus* (n=71; 14.7%), SARS-CoV-2 (n=45; 9.3%), *Clostridioides difficile* (n=43; 8.9%) and *Enterococcus faecium* (n=29; 6.0%)
- While 6.7% of Enterobacterales spp. were resistant to third-generation cephalosporins and 23.4% of *S. aureus* were meticillin-resistant (i.e. MRSA), no microoorganisms were found to be pan-drug resistant in this survey

Antimicrobial use (AMU)

- 5,087 patients were being prescribed an antimicrobial at the time of the survey resulting in an overall AMU prevalence of 40.2%. This represents a slight increase on the previous survey in 2017 when the AMU prevalence was 39.7%
- Overall, 6,715 antimicrobials were prescribed, with 1,307 patients receiving two or more antimicrobials
- AMU prevalence was higher in private hospitals (48.1%) than in public hospitals (39.3%). Among public hospitals, the highest prevalence was in tertiary hospitals (42.1%), while the lowest was in specialist hospitals (21.6%). These differences are expected due to the fundamental differences in the services provided by different hospital types
- The AMU prevalence was highest in adult intensive care units (70.4%), followed by surgical specialties (51.0%). The lowest prevalence was in rehabilitation (13.0%)
- Most antimicrobials (70.0%) were administered via the parenteral, or intravenous (IV), route. This is an increase from 63.0% in 2017
- For almost one-in-ten antimicrobial prescriptions (9.3%), the indication for use was not documented anywhere in the patient's healthcare records, which is similar to the finding in PPS 2017
- For 90.7% of prescriptions where the indication was documented:

  - 79.9% were to treat infection, of which the majority (72.4%) were community-acquired infections, with infections from hospital (24.1%) and LTCF (3.5%) accounting for the remainder
  - 10.1% were for surgical prophylaxis
  - 8.0% were for medical prophylaxis

  The four most common infection sites for antimicrobial treatment were:

  - Respiratory tract, i.e. pneumonia and bronchitis (n=1903, 35.5%) of all infections being treated
  - Skin and soft tissue and surgical site (n=711, or 13.2%)
  - Intraabdominal (n=605, or 11.3%)
  - Urinary tract (n=342, or 6.4%)

- Of antimicrobials prescribed for surgical prophylaxis (SP), the majority (64.5%) still exceed a single dose; however, this is a decrease from 69.4% in 2017. Of note, SP exceeding 24 hours accounted for 29.5% of these prescriptions, which is a sustained reduction compared to PPS 2017 (35.9%) and PPS 2012 (46.7%)
- The top 10 antimicrobials prescribed accounted for 68.7% of all antimicrobials prescribed, which is slightly lower than the comparable figure for 2017 (70.9%)
  - The most commonly prescribed antimicrobials were amoxicillin-clavulanic acid (or co-amoxiclav) and piperacillin-tazobactam, both of which are broad-spectrum beta-lactam/beta-lactamase inhibitor combination antimicrobials, and together accounted for 37.1% of all prescriptions, with a combined AMU prevalence of 19.7% in the survey population
  - Meropenem comprised 3.5% of prescriptions (AMU prevalence, 1.9%), up from 2.9% in 2017 (AMU prevalence, 1.6%)

Results of the European PPS 2022-2023 from ECDC

The ECDC surveillance report on the point prevalence survey of healthcare-associated infections and antimicrobial use in European acute care hospitals, including a file with country summary sheets for all EU/EEA countries, was published on the 6th May 2024:

https://www.ecdc.europa.eu/sites/default/files/documents/healthcare-associated-point-prevalence-survey-acute-care-hospitals-2022-2023.pdf

A factsheet for Ireland is also available: https://www.ecdc.europa.eu/en/publications-data/country-factsheet-ireland

Some key findings and considerations from this report relating to the Irish data and comparisons with other European countries:

- Following submission of the Irish data to ECDC, further validation at local and national levels resulted in a number of additional patient forms being returned to HPSC, and some minor updates to certain data fields. The impact of these changes is minimal but as a result there are slight differences in terms of the Irish data between this and the ECDC report
- Ireland was one of just a few countries with almost complete participation at the national level. All EU/EEA countries participated in PPS 2022-2023 except for Denmark. Participation was considered to be optimal for most countries, although the coverage of all hospital beds included ranged from 3-100%. The degree of completion of different parts of the survey varied from country-to-country
- It is important to consider the make up of the participating hospitals in terms of ownership, hospital type and case mix
- Figure 1 shows the prevalence of HAI and AMU reported in Ireland compared with the overall EU/EEA results for the three European PPS studies conducted to date
- In PPS 2023, Ireland reported a HAI prevalence of 7.4% and an AMU prevalence of 40.2%. These are above the EU/EEA median but below the 75th percentile
- In terms of burden of HAIs, ECDC estimate that there are almost 44,000 patients (43,766; 95%CI, 28,823-62,151) with HAI per year in Ireland. The overall figure for Europe is just under 3 million (2,881,829; 95%CI, 1,874,792-4,203,395)
- Ireland had one of the lowest proportions of HAIs with positive microbiology on the day of the PPS (43.5%), indicating that microbiology results were not available at the time of the survey (data collectors were instructed not to look for missing data after the survey was conducted) or not performed
- ECDC calculated a composite index of antimicrobial resistance (AMR), based on the sum of meticillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococci (VRE), Enterobacterales resistant to third-generation cephalosporins, *Pseudomonas aeruginosa* and *Acinetobacter baumannii* resistant to carbapenems as a proportion of the total number of these

pathogens reported. Ireland had an index of 14.0%, which is in the lowest third of all EU/EEA countries

- Meropenem, which is considered to be a high priority reserve antibiotic, comprised 5.4% of all prescriptions across Europe. The prevalence of carbapenem use in Ireland was 1.9%, while the majority of countries (17/31) reported a prevalence of >2% (range, 0.6-11.5%)
- The numbers of IPC nurses per 250 beds, beds with alcohol hand rub dispenser at point-of-care and % beds in single rooms were all better that the EU/EEA country median and the 75th percentile; while the number of blood culture sets per 1,000 patient days was better than the EU/EEA median but worse than the 75th percentile

Table 1. Summary of PPS 2011/2012, 2016/2017 and 2022/2023 results

	Ireland	EU/EEA
PPS 2011/2012		
HAI prevalence	5.2%	6.0%
AMU prevalence	34.0%	35.0%
PPS 2016/2017		
HAI prevalence	6.1%	5.5%
AMU prevalence	39.7%	35.5%
PPS 2023/2023		
HAI prevalence	7.4%	7.1%
AMU prevalence	40.2%	35.5%

Introduction

This report presents the findings of the third national Point Prevalence Survey (PPS) of healthcare-associated infections and antimicrobial use that was conducted in all Irish acute hospitals in May 2023.

In Ireland, the first two European PPSs were conducted in May 2012 and May 2017, respectively. The third PPS was due to take place in May 2022 but was re-scheduled to May 2023 as a result of the COVID-19 pandemic.

Sixty-five acute hospitals participated in PPS 2023, representing the first time that all acute hospitals in Ireland have taken part. This is an increase from 60 and 50 hospitals in 2017 and 2012, respectively.

The hospitals are classified by ownership as either HSE/public or private; with public hospitals further broken down by their HSE Model type. In addition, the data for paediatric hospitals are presented separately to other specialist hospitals:

- Public/Tertiary (or Model 4) - 9 hospitals
- Public/Secondary (or Model 3) - 17 hospitals
- Public/Primary (or Model 2) - 10 hospitals
- Public/Paediatric - 3 hospitals
- Public/Specialist - 11 hospitals
- Private - 15 hospitals

Other specialist hospitals include obstetrics and gynaecology (n=5), orthopaedics (n=4), radiation and oncology (n=1), and ENT/ophthalmology (n=1).

For the list of HSE hospitals by Hospital Model, see:

https://www.hse.ie/eng/staff/leadership-education-development/met/publications/model-3-report1.pdf

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Methods

For full details of the protocol, including data collection forms and definitions, please refer to:

https://www.hpsc.ie/a-z/microbiologyantimicrobialresistance/infectioncontrolandhai/surveillance/hospitalpointprevalencesurveys/2023/

It is important to note that amendments are made to the PPS protocol from survey-to-survey. In addition, the number and profiles of participating hospitals has changed over time. Consequently, the results between surveys are not directly comparable and any trends should be interpreted with caution.

The most significant changes (at patient level) between protocols are summarised here:

PPS 2022/2023 from PPS 2016/2017

- Removed: PVC presence - Added: COVID-19 vaccination status - Added: HAI codes for COVID-19 (COV-ASY, asymptomatic; COV-MM, mild or moderate; COV-SEV, severe)
- Added: Microroganism code for SARS-CoV-2 (VIRCOV) - Changed: Case definition of 'active HAI' to include HAIs associated with a stay in other healthcare facilities, not just acute care hospitals
- Added: HAI origin code for long-term care facility (LTCF) - Added: HAIs in newborns (now explicit, not just a footnote) - Added: Criteria for healthcare-associated COVID-19

PPS 2016/2017 from PPS 2011/2012

- Changed: Two chest X-rays (CXR) or CT scans in patients with cardiac or pulmonary disease to meet PN surveillance definition no longer required. One CXR or CT sufficient as long as there is a prior CXR or CT scan taken within the past year with which to compare it

In 2017, the relaxation of the pneumonia (PN) surveillance definition resulted in an increase in HAIs due to PN. This was also confirmed among hospitals that participated in both surveys.

With the addition of COVID-19 and inclusion of HAIs associated with LTCFs, it is expected that the overall prevalence of HAIs in 2023 will increase from the previous PPS.

Prevalence versus Relative frequency

Both are percentages but the prevalence uses the overall population as the denominator, while the relative frequency uses the total count within the category being examined

Prevalence of HAIs in the total PPS population = Total N patients with HAI / Total N of patients surveyed in PPS

Relative frequency of each HAI type = The N of patients with a particular HAI type (e.g. pneumonia) / Total N of HAIs reported

Note: the number of patients with HAI and the number of HAIs reported are not the same, as a patient with HAI may have more than one HAI, i.e. in PPS 2023, we identified 932 patients with HAIs and a total of 966 HAIs. Similarly, this also applies to the data on antimicrobial use.

Participating hospitals

Table 2. PPS 2023 participants with hospital type and HSE regional health area

Hospital name	HSE model	Hospital type	Specialty	HSE Health Region*	Ownership
Bantry General Hospital	Model 2	Primary		HSE-SW	Public
Beacon Hospital, Sandyford		Private		Private	Private
Beaumont Hospital	Model 4	Tertiary		HSE-D/NE	Public
Blackrock Health Blackrock Clinic		Private		Private	Private
Blackrock Health Galway Clinic		Private		Private	Private
Blackrock Health Hermitage Clinic		Private		Private	Private
Bon Secours Hospital, Cork		Private		Private	Private
Bon Secours Hospital, Galway		Private		Private	Private
Bon Secours Hospital, Glasnevin		Private		Private	Private
Bon Secours Hospital, Limerick at Barringtons		Private		Private	Private
Bon Secours Hospital, Tralee		Private		Private	Private
Cappagh National Orthopaedic Hospital	Specialist	Specialist	Orthopaedic	HSE-D/NE	Public
Cavan General Hospital	Model 3	Secondary		HSE-D/NE	Public
Children's Health Ireland at Crumlin	Specialist	Paediatric		CHI	Public
Children's Health Ireland at Tallaght	Specialist	Paediatric		CHI	Public
Children's Health Ireland at Temple Street	Specialist	Paediatric		CHI	Public
Connolly Hospital, Blanchardstown	Model 3	Secondary		HSE-D/NE	Public
Coombe Women and Infant's University Hospital	Specialist	Specialist	Obstetrics/ gynaecology	HSE-D/Mid	Public
Cork University Hospital	Model 4	Tertiary		HSE-SW	Public
Cork University Maternity Hospital	Specialist	Specialist	Obstetrics/ gynaecology	HSE-SW	Public
Croom Orthopaedic Hospital	Specialist	Specialist	Orthopaedic	HSE-MW	Public
Galway University Hospital	Model 4	Tertiary		HSE-W/NW	Public
Kilcreene Regional Orthopaedic Hospital, Kilkenny	Specialist	Specialist	Orthopaedic	HSE-D/SE	Public
Letterkenny University Hospital	Model 3	Secondary		HSE-W/NW	Public
Louth County Hospital, Dundalk	Model 2	Primary		HSE-D/NE	Public
Mallow General Hospital	Model 2	Primary		HSE-SW	Public
Mater Misericordiae University Hospital	Model 4	Tertiary		HSE-D/NE	Public
Mater Private Hospital, Cork		Private		Private	Private
Mater Private Hospital, Dublin		Private		Private	Private
Mayo University Hospital, Castlebar	Model 3	Secondary		HSE-W/NW	Public
Mercy University Hospital	Model 3	Secondary		HSE-SW	Public
Midland Regional Hospital, Mullingar	Model 3	Secondary		HSE-D/Mid	Public
Midland Regional Hospital, Portlaoise	Model 3	Secondary		HSE-D/Mid	Public

Hospital name	HSE model	Hospital type	Specialty	HSE Health Region*	Ownership
Midland Regional Hospital, Tullamore	Model 3	Secondary		HSE-D/Mid	Public
Naas General Hospital	Model 3	Secondary		HSE-D/Mid	Public
National Maternity Hospital, Holles Street	Specialist	Specialist	Obstetrics/ gynaecology	HSE-D/SE	Public
National Rehabilitation Hospital, Dun Laoghaire	Specialist	Specialist	Rehabilitation	HSE-D/SE	Public
Our Lady of Lourdes Hospital, Drogheda	Model 3	Secondary		HSE-D/NE	Public
Our Lady's Hospital, Navan	Model 3	Secondary		HSE-D/NE	Public
Portiuncula University Hospital, Ballinasloe	Model 3	Secondary		HSE-W/NW	Public
Roscommon University Hospital	Model 2	Primary		HSE-W/NW	Public
Rotunda Hospital	Specialist	Specialist	Obstetrics/ gynaecology	HSE-D/NE	Public
Royal Victoria Eye and Ear Hospital	Specialist	Specialist	ENT/ Ophthalmology	HSE-D/SE	Public
Sligo University Hospital	Model 3	Secondary		HSE-W/NW	Public
South Infirmary-Victoria University Hospital	Model 2	Primary		HSE-SW	Public
St Columcille's Hospital, Loughlinstown	Model 2	Primary		HSE-D/SE	Public
St James's Hospital	Model 4	Tertiary		HSE-D/Mid	Public
St John's Hospital, Limerick	Model 2	Primary		HSE-MW	Public
St Luke's General Hospital, Kilkenny	Model 3	Secondary		HSE-D/SE	Public
St Luke's Hospital, Rathgar	Specialist	Specialist	Radiation/ oncology	HSE-D/Mid	Public
St Michael's Hospital, Dun Laoghaire	Model 2	Primary		HSE-D/SE	Public
St Vincent's Private Hospital		Private		Private	Private
St Vincent's University Hospital	Model 4	Tertiary		HSE-D/SE	Public
Tallaght University Hospital	Model 4	Tertiary		HSE-D/Mid	Public
Tipperary University Hospital, Clonmel	Model 3	Secondary		HSE-D/SE	Public
UPMC Aut Even Hospital, Kilkenny		Private		Private	Private
UPMC Sports Surgery Clinic, Santry		Private	Orthopaedic	Private	Private
UPMC Whitfield Hospital, Waterford		Private		Private	Private
University Hospital Ennis	Model 2	Primary		HSE-MW	Public
University Hospital Kerry, Tralee	Model 3	Secondary		HSE-SW	Public
University Hospital Limerick	Model 4	Tertiary		HSE-MW	Public
University Hospital Nenagh	Model 2	Primary		HSE-MW	Public
University Hospital Waterford	Model 4	Tertiary		HSE-D/SE	Public
University Maternity Hospital, Limerick	Specialist	Specialist	Obstetrics/ gynaecology	HSE-MW	Public
Wexford General Hospital	Model 3	Secondary		HSE-D/SE	Public

* HSE Health Regions took over responsibility for Hospital Groups in Spring 2024; some hospitals were re-assigned as a result.

CHI, Children's Health Ireland; HSE-D/Mid, HSE-Dublin/Midlands; HSE-D/NE, HSE-Dublin/North-East; HSE-D/SE, HSE-Dublin/South-East; HSE-MW, HSE-Mid-West, HSE-SW, HSE-South-West, HSE-W/NE, HSE-West/North-West

Hospital characteristics

Denominator data

HSE, or public, hospitals make up the majority of acute care medical facilities in Ireland in terms of acute beds (87.2%), airborne isolation rooms (86.9%), ICU beds (88.1%), patient days (89.1%) and patient discharges (84.3%).

The average length of stay (LOS) in hospital is longer in public hospitals (5.7 days) than in private hospitals (3.7 days). The equivalent figures for 2017 were 4.5 and 3.5 days, respectively.

Among public hospitals, tertiary hospitals have the longest average LOS at 8.3 days, followed by secondary and specialist hospitals (4.9 and 4.7 days, respectively). The lowest average LOS are found in primary and paediatric hospitals (2.8 and 2.6 days, respectively).

Overall, the occupancy of acute hospital beds in Irish hospitals was 87.3% in 2022. However, the occupancy varied by hospital ownership with public hospitals operating at 89.3% capacity compared with almost 74.0% for private hospitals.

Among public hospitals, the highest occupancy is seen in paediatric hospitals (over 100%) followed by tertiary and secondary hospitals (both over 95%).

Table 3a. Hospital characteristics: denominator data by hospital ownership

	Hospital onwership		National
	Public	Private	
N hospitals	50	15	65
% of hospitals	76.9%	23.1%	100.0%
N wards surveyed	623	84	707
Median number of wards surveyed	10	5	8
N hospitals where ward(s) excluded	13	2	15
Total beds	13427	1832	15259
Total acute beds	12227	1798	14025
Median N of acute beds	194.5	91.0	160
N of airborne isolation rooms	374	42	416
N of hospitals with ICU	33	6	39
N of ICU beds	408	55	463
N patient days (2022)	3985424	485466	4470890
N of discharges (2022)	702139	130787	832926
Average patient length of stay (days)	5.7	3.7	5.4
Average bed occupancy (2022)*	89.3%	74.0%	87.3%

*Acute beds only

Table 3a (continued). Hospital characteristics: denominator data by hospital type

	Hospital type					
	Tertiary	**Secondary**	**Primary**	**Paediatric**	**Specialist**	**Private**
N hospitals	9	17	10	3	11	15
% of hospitals	13.8%	26.2%	15.4%	4.6%	16.9%	23.1%
N wards surveyed	256	247	43	25	52	84
Median number of wards surveyed	29	14	4	10	5	5
N hospitals where ward(s) excluded	3	8	1	0	1	2
Total beds	6200	4682	773	382	1390	1832
Total acute beds	5574	4334	773	315	1231	1798
Median N of acute beds	635	234	63	104	102	91
N of airborne isolation rooms	237	98	8	16	15	42
N of hospitals with ICU	9	17	0	2	5	6
N of ICU beds	181	92	0	32	103	55
N patient days (2022)	1964512	1435267	182914	124808	277923	485466
N of discharges (2022)	237714	293175	64955	47623	58672	130787
Average patient length of stay (days)	8.3	4.9	2.8	2.6	4.7	3.7
Average bed occupancy (2022)*	96.6%	90.7%	64.8%	108.6%	61.9%	74.0%

*Acute beds only

Staffing

Overall, there were:

- 3.6 whole time equivalent (WTE) infection prevent and control nurse (IPCN) posts per 250 beds (public, 3.6; private, 3.6)
- 0.7 WTE infection prevent and control (IPC) doctor posts per 250 beds (public, 0.6; private, 1.3)
- 1.0 WTE infection prevent and control (IPC) pharmacist (or antimicrobial pharmacist) posts per 250 beds (public, 1.0; private, 0.7)

IPC staffing across all categories has increased since the previous survey in 2017, which may be in part due to the COVID-19 pandemic.

In 2023, only six hospitals (of 65) reported having no nominated IPC doctor compared with 17 (of 60) in 2017, while 12 hospitals had no nominated IPC pharmacist (more commonly known as antimicrobial pharmacist) compared with 17 in 2017. This indicates that improvements still need to be made to ensure all hospitals are sufficiently staffed.

Table 3b. Hospital characteristics: infection control staffing levels by ownership

	Hospital onwership		National
	Public	Private	
N hospitals	50	15	65
Total acute beds	12227	1798	14025
Infection Control Staff			
N of WTE IPC nurses	174.3	25.9	200.2
Mean N IPCNs per hospital	3.5	1.7	3.1
N IPCNs per 250 acute beds	3.6	3.6	3.6
N of WTE IPC doctors	30.9	9.3	40.1
Mean N IPC doctors per hospital	0.6	0.6	0.6
N IPC doctors per 250 acute beds	0.6	1.3	0.7
N of WTE IPC pharmacists	49.0	4.7	53.7
Mean N IPC pharmacists per hospital	1.0	0.3	0.8
N IPC pharmacists per 250 acute beds	1.0	0.7	1

WTE, Whole time equivalent; IPC, Infection prevention and control

Table 3b (continued). Hospital characteristics: infection control staffing levels by hospital type

	Hospital type					
	Tertiary	Secondary	Primary	Paediatric	Specialist	Private
N hospitals	9	17	10	3	11	15
Total acute beds	5574	4334	773	315	1231	1798
Infection Control Staff						
N of WTE IPC nurses	78.1	59.9	13.3	8.8	14.2	25.9
Mean N IPCNS per hospital	8.7	3.5	1.3	2.9	1.3	1.7
N IPCNs per 250 acute beds	3.5	3.5	4.3	7.0	2.9	3.6
N of WTE IPC doctors	7.2	12.4	3.7	2.3	5.2	9.3
Mean N IPC doctors per hospital	0.8	0.7	0.4	0.8	0.5	0.6
N IPC doctors per 250 acute beds	0.3	0.7	1.2	1.8	1.1	1.3
N of WTE IPC pharmacists	18.4	18.2	5.3	1.8	5.3	4.7
Mean N IPC pharmacists per hospital	2.0	1.1	0.5	0.6	0.5	0.3
N IPC pharmacists per 250 acute beds	0.8	1.0	1.7	1.4	1.1	0.7

WTE, Whole time equivalent; IPC, Infection prevention and control

Microbiology laboratory testing

The number of blood culture sets and faeces samples (for *C. difficile* investigations) per 1,000 patient days was 53.6 and 14.3, respectively. These figures are slightly higher than in 2017 (52.5 and 12.0, respectively).

The availability of microbiology laboratory services at weekends indicates that 27 hospitals do not have access to a Saturday service for processing clinical samples, with a further 8 hospitals not having access to a Sunday service.

COMMENTARY: It is probable that people completing this questionnaire were unaware of the weekend services provided by their local laboratory, for many of whom this may be off-site. For instance, only 4 tertiary hospitals are reported to provide a service on Saturday, which is reduced to 3 on Sunday.

Table 3c. Hospital characteristics: microbiology laboratory testing by hospital ownership

	Hospital onwership		National
	Public	Private	
N hospitals	50	15	65
N patient days (2022)	3985424	485466	4470890
Microbiology laboratory testing			
N of blood cultures (2022)	222498	17044	239542
N of blood cultures per 1,000 patient days	55.8	35.1	53.6
N of faeces for CDI (2022)	59451	4535	63986
N of faeces for CDI per 1,000 patient days	14.9	9.3	14.3
N of hospitals with laboratory processing:			
Clinical samples on Sat	28	10	38
Clinical samples on Sun	24	6	30
Screening samples on Sat	24	8	32
Screening samples on Sun	24	8	32

CDI, Clostridoides difficile infections

Table 3c (continued). Hospital characteristics: microbiology laboratory testing by hospital type

	Hospital type					
	Tertiary	**Secondary**	**Primary**	**Paediatric**	**Specialist**	**Private**
N hospitals	9	17	10	3	11	15
N patient days (2022)	1964512	1435267	182914	124808	277923	485466
Microbiology laboratory testing						
N of blood cultures (2022)	120472	74972	5722	13719	7613	17044
N of blood cultures per 1,000 patient days	61.3	52.2	31.3	109.9	27.4	35.1
N of faeces for CDI (2022)	31841	24035	1835	1216	524	4535
N of faeces for CDI per 1,000 patient days	16.2	16.7	10.0	9.7	1.9	9.3
N of hospitals with laboratory processing:						
Clinical samples on Sat	4	8	8	2	6	10
Clinical samples on Sun	3	8	7	1	5	6
Screening samples on Sat	3	7	7	1	6	8
Screening samples on Sun	3	7	7	1	6	8

CDI, Clostridoides difficile infections

COVID-19 and other infection control indicators

Following the COVID-19 pandemic (2020-2022), questions were introduced to look at the burden of COVID-19 on hospitals both at the time of the survey and in the previous year (2022).

Overall, hospitals reported over 40,000 cases and over 900 outbreaks in 2022. At the time of the survey, there were 200 patients with COVID-19, of whom 14 were in ICU. In 2022, 93% of all COVID-19 cases were in public hospitals, with the majority occurring in secondary and tertiary facilities.

Almost all hospitals (63 of 65) reported that they have an annual IPC plan and report that are approved by their hospital's CEO. Most hospitals reported that they take part in a number of surveillance programs, especially for CDI, AMR and AMC.

It is possible that people completing this questionnaire were unaware of all of these. For example, almost 100% of laboratories participate in AMR surveillance (EARS-Net and enhanced CPE) but this is not reflected in the numbers below, i.e. only 42 of 65.

Data on COVID-19 vaccination among HCWs was provided by 31 hospitals, with 17 reporting coverage of 90% or higher. Data on influenza vaccination was provided by 55 hospitals, with coverage ranging from 26-76%.

Although not included in the PPS questionnaire and so there is no European data to compare with, hand hygiene audit (HHA) compliance for Ireland for the two periods conducted in 2023 were 92.0% (period 25; May) and 92.5% (period 26; October), respectively.

Table 3d. Hospital characteristics: other infection control indicators by hospital ownership

	Hospital onwership		National
	Public	Private	
N hospitals	50	15	65
Other infection control indicators			
N COVID-19 all hospital cases last year	37889	2825	40714
N COVID-19 outbreaks last year	874	29	903
N COVID-19 all cases current	198	2	200
N COVID-19 all ICU cases current	13	1	14
Alcohol hand rub (AHR) consumption, litres (2022)	195298	22291	217589
AHR consumption per 1,000 patient days	49.0	45.9	48.7
N hand hygiene opportunities (2022)	96688	32959	129647
N hospitals with:			
IPC plan approved by CEO	49	14	63
IPC report approved by CEO	49	14	63
Universal masking policy for routine care	11	3	14
Multi-modal strategy in place	40	13	53
Part of surveillance network for:			
SSI	3	3	6
CDI	50	13	63
ICU	4	1	5
AMR	33	9	42
AMC	37	7	44
Vaccine uptake			
HCW Flu vacc. coverage (% range)	0-76	27-50	0-76
HCW COVID vacc. coverage (% range)	0-100	80-98	0-100

SSI, Surgical site infection ; CDI, Clostridioides difficile infections; ICU, Intensive care units; AMR, Antimicrobial resistance; AMC, Antimicrobial consumption

Table 3d (continued). Hospital characteristics: other infection control indicators by hospital type

	Hospital type					
	Tertiary	**Secondary**	**Primary**	**Paediatric**	**Specialist**	**Private**
N hospitals	9	17	10	3	11	15
Other infection control indicators						
N COVID-19 all hospital cases last year	11566	20411	3836	441	1635	2825
N COVID-19 outbreaks last year	351	422	79	1	21	29
N COVID-19 all cases current	63	125	7	1	2	2
N COVID-19 all ICU current	9	4	0	0	0	1
Alcohol hand rub (AHR) consumption, litres (2022)	105788	54485	10101	5263	19661	22291
AHR consumption per 1,000 patient days	53.8	38.0	55.2	42.2	70.7	45.9
N hand hygiene opportunities (2022)	36104	25035	22663	1773	11113	32959
N hospitals with:						
IPC plan approved by CEO	8	17	10	3	11	14
IPC report approved by CEO	8	17	10	3	11	14
Universal masking policy for routine care	2	5	0	1	3	3
Multi-modal strategy in place	8	15	7	3	7	13
Part of surveillance network for:						
SSI	0	1	0	1	1	3
CDI	9	17	10	3	11	13
ICU	0	3	0	1	0	1
AMR	7	11	7	2	6	9
AMC	7	13	8	2	7	7
Vaccine uptake						
HCW Flu vacc. coverage (% range)	54-76	0-74	0-74	65-65	35-72	27-50
HCW COVID vacc. coverage (% range)	0-90	0-99	0-87	70-70	22-100	80-98

SSI, Surgical site infection ; CDI, Clostridioides difficile infections; ICU, Intensive care units; AMR, Antimicrobial resistance; AMC, Antimicrobial consumption

Degree, feasibility and availability of automation

This section (Tables 3e-3g) examines the degree of automation available among Irish hospitals for taking part in a number of key HAI surveillance programs.

This is an area that needs further attention as it appears that the majority of hospitals undertaking these surveillance tasks are still fully manual.

Certain programs are not currently co-ordinated at a national level, e.g. surgical site infection, ventilator-associated pneumonia, which explains why the numbers where these are not performed is so high.

Table 3e. Hospital characteristics: degree of automation

Data for all hospitals combined

	Bloodstream infection	Central line-associated bloodstream infection	Surgical site infection	Catheter-associated urinary tract infections	Healthcare-associated pneumonia	Ventilator-associated pneumonia	Clostridoides difficile infections
Fully manual	33	32	26	22	19	18	36
Automated denominator collection	9	8	5				11
Semi-automated	9	7	4	5	2	2	8
Fully automated	1			1			2
Other	6	5	2	2		2	6
Not performed	5	11	26	33	42	41	1
Unknown	1	1	1	1	1	1	1
No response	1	1	1	1	1	1	
Total	65	65	65	65	65	65	65

Certain key data items are more readily available for automation across hospitals, e.g. admission dates (at both hospital and ward level) and microbiology results. It would appear that other data items do not currently lend themselves to automation, but again this needs further attention as this may not reflect what is actually feasible across hospitals.

Table 3f. Hospital characteristics: feasibility of automation

Data for all hospitals combined

	Surgical procedures	Admission dates (hospital)	Admission dates (ward)	Central line use	Mechanical ventilation use	Urinary catheter use	Microbiology results	Antimicrobial prescriptions
Yes, hospital-wide	27	56	57	8	7	9	56	10
Yes, specific wards only	6	2	1	11	10	7		6
No	25	4	4	39	40	43	5	45
Unknown	4	1	1	4	5	3	2	1
No response	3	2	2	3	3	3	2	3
Total	65	65	65	65	65	65	65	65

A large proportion of hospitals did not answer parts of this question, which may be due to overlap with the preceding question (3f) as feasibility of automation is innately linked with the availability of structured information.

Table 3g. Hospital characteristics: availability of structured information

Data for all hospitals combined

	Surgical procedures	Admission dates (hospital)	Admission dates (ward)	Central line use	Mechanical ventilation use	Urinary catheter use	Microbiology results	Antimicrobial prescriptions
Yes	27	51	51	15	13	14	49	16
No	11			9	6	9	2	12
Unknown	7	7	7	6	8	4	5	4
No response	20	7	7	35	38	38	9	33
Total	65	65	65	65	65	65	65	65

Multi-modal strategies

Participating hospitals were asked to report on their multi-modal strategies (MMS) to prevent HAI and promote antimicrobial stewardship. One-in-six hospitals did not answer this. Of those that did reply, the majority reported using all the different aspects described as part of their MMS.

Of 54 hospitals that answered this question, all but one have multi-disciplinary teams (possibly an error in their response), while all link in with QIPS colleagues to develop, promote and implement their MMS.

Fifty-one hospitals reported that they use bundles or checklists as part of their strategies.

Table 3h. Hospital characteristics: multi-modal strategies

Data for all hospitals combined

	National
N hospitals in PPS	65
Multi-modal strategy:	
Question on MMS not answered	11
MMS in place	54
Elements included in MMS:	
System change	53
Education and training	54
Monitoring and feedback	54
Communications and reminders	54
Safety climate and change culture	52
Multidisciplinary team used to implement IPC MMS	53
Link with QIPS colleagues to develop and promote IPC MMS	54
Strategies include bundles or checklists	51

QIPS, Quality Improvement and Patient Safety; IPC, Infection Prevention and Control; MMS, Multi-Modal Strategies

Ward characteristics

Among the 707 wards surveyed, there were 14,695 beds. Just over one-in-three (34%) beds were in single rooms.

A greater proportion of beds in private hospitals (60%) were in single rooms compared to public hospitals (30%).

The average number of ward beds was 20.8, with the average number of ward beds occupied at midnight at 18.3, indicating that an occupancy of 88.0%.

Most ward beds were reported to have an alcohol hand rub dispenser (85.1%).

Public hospitals had a higher average number of HCWs (8.7) on the ward at the time of the PPS than private hospitals (5.9).

Table 4. Ward characteristics, by hospital ownership

	Hospital ownership		National
	Public	Private	
N wards	623	84	707
N ward beds	12902	1793	14695
N ward rooms	6017	1364	7381
N ward single rooms	3916	1070	4986
% beds in single rooms	30.4%	59.7%	33.9%
Average N patients*	18	16	17.8
Average N ward beds	20.7	21.3	20.8
Average N ward rooms	9.7	16.2	10.4
Average N single rooms	6.3	12.7	7.1
Average N ward beds with AHR dispenser	17.9	16.9	17.7
Average N HCWs on ward*	8.7	5.9	8.4
Average N ward beds occupied at midnight	18.5	17.0	18.3

AHR, Alcohol hand rub

*on ward at time of PPS

Table 4 (continued). Ward characteristics, by hospital type

	Hospital type					
	Tertiary	**Secondary**	**Primary**	**Paediatric**	**Specialist**	**Private**
N wards	256	247	43	25	52	84
N ward beds	5790	4733	807	357	1215	1793
N ward rooms	2788	2017	397	288	527	1364
N ward single rooms	1957	1136	236	240	347	1070
% beds in single rooms	33.8%	24.0%	29.2%	67.2%	28.6%	59.7%
Average N patients*	21.3	16.0	13.7	11.6	18.5	16.0
Average N ward beds	22.6	19.2	18.8	14.3	23.4	21.3
Average N ward rooms	10.9	8.2	9.2	11.5	10.1	16.2
Average N single rooms	7.6	4.6	5.5	9.6	6.7	12.7
Average N ward beds with AHR dispenser	19.8	16.5	17.7	11.7	17.9	16.9
Average N HCWs on ward*	9.0	8.9	6.9	6.0	9.0	5.9
Average N ward beds occupied at midnight	21.6	16.9	15.3	11.7	16.8	17.0

AHR, Alcohol hand rub

*on ward at time of PPS

Distribution of wards by Ward specialty

Medical specialties (38.8%) and surgical specialties (19.1%) comprised amost 60% of all the wards surveyed. Notably, the proportion of wards categorised as medical was greatest (40.4% vs 26.2%) in public hospitals, while the proportion that were surgical was greatest (36.9% vs 16.7%) in private hospitals.

For PPS 2017, the categorisation of ward specialties was changed. Previously (PPS 2012), a category 'augmented care' included all adult, paediatric and neonatal ICUs and high dependency units (HDU).

'Intensive care medicine' only includes adult ICUs. Paediatric and neonatal ICUs are categorised among 'paediatrics' and 'neonatology', respectively. High dependency units are classified as either medical or surgical specialties.

Table 5. Wards by specialty, by hospital ownership and hospital type

	Hospital ownership		National
	Public	Private	
Medical specialties	252 (40.4%)	22 (26.2%)	274 (38.8%)
Surgical specialties	104 (16.7%)	31 (36.9%)	135 (19.1%)
Mixed	41 (6.6%)	18 (21.4%)	59 (8.3%)
Paediatrics	49 (7.9%)	1 (1.2%)	50 (7.1%)
Gynaecology/Obstetrics	48 (7.7%)	0 (0.0%)	48 (6.8%)
Other	35 (5.6%)	4 (4.8%)	39 (5.5%)
Intensive care medicine	32 (5.1%)	6 (7.1%)	38 (5.4%)
Geriatrics	24 (3.9%)	2 (2.4%)	26 (3.7%)
Neonatology	18 (2.9%)	0 (0.0%)	18 (2.5%)
Rehabilitation	18 (2.9%)	0 (0.0%)	18 (2.5%)
Long-term care	1 (0.2%)	0 (0.0%)	1 (0.1%)
Psychiatry	1 (0.2%)	0 (0.0%)	1 (0.1%)
Total	623 (100.0%)	84 (100.0%)	707 (100.0%)

Table 5 (continued). Wards by specialty, by hospital type

	Hospital type					
	Tertiary	Secondary	Primary	Paediatric	Specialist	Private
Medical specialties	111 (43.4%)	112 (45.3%)	28 (65.1%)	0 (0.0%)	1 (1.9%)	22 (26.2%)
Surgical specialties	62 (24.2%)	26 (10.5%)	8 (18.6%)	0 (0.0%)	8 (15.4%)	31 (36.9%)
Mixed	20 (7.8%)	21 (8.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	18 (21.4%)
Paediatrics	7 (2.7%)	16 (6.5%)	1 (2.3%)	24 (96.0%)	1 (1.9%)	1 (1.2%)
Gynaecology/Obstetrics	5 (2.0%)	20 (8.1%)	0 (0.0%)	0 (0.0%)	23 (44.2%)	0 (0.0%)
Other	14 (5.5%)	18 (7.3%)	0 (0.0%)	0 (0.0%)	3 (5.8%)	4 (4.8%)
Intensive care medicine	15 (5.9%)	17 (6.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	6 (7.1%)
Geriatrics	16 (6.2%)	6 (2.4%)	2 (4.7%)	0 (0.0%)	0 (0.0%)	2 (2.4%)
Neonatology	3 (1.2%)	9 (3.6%)	0 (0.0%)	1 (4.0%)	5 (9.6%)	0 (0.0%)
Rehabilitation	2 (0.8%)	2 (0.8%)	3 (7.0%)	0 (0.0%)	11 (21.2%)	0 (0.0%)
Long-term care	0 (0.0%)	0 (0.0%)	1 (2.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Psychiatry	1 (0.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Total	256 (100.0%)	247 (100.0%)	43 (100.0%)	25 (100.0%)	52 (100.0%)	84 (100.0%)

Other, <80% of patients on the ward belong to a single specialty, but there are mixed medical and surgical patients admitted to the ward (includes admitted patients who remain in the ED or who are accommodated on a Day ward as admitted patients); Mixed, <80% of patients on the ward belong to a single specialty but there are only two specialties of patients admitted to the ward (e.g. haematology & oncology)

Intensive care medicine (highlighted above) corresponds to adult ICUs only

Patient demographics

Data were collected on 12,650 eligible patients, with 49.1% male and a mean age of 62 years (range, 0-102 years).

Compared with the previous surveys, the mean age increased from 54 years in 2012 and 59 years in 2017. Similarly, the proportion of inpatients aged >=65 years increased from 48.0% in 2012 and 53.8% in 2017 to 58.2% in 2023.

The proportion of inpatients aged <10 years decreased from 11% in 2012 and 10% in 2017 to 7.2% in 2023.

The patient age profile in private hospitals is older compared with public hospitals in terms of mean age and proportion aged >=65 years. Only a small proportion of inpatients in private hospitals are aged <10 years.

This highlights that the inpatient population profile in Irish acute care hospitals has changed, i.e. an ageing population, across the surveys in Ireland.

Table 6. Patient demographics, by hospital ownership

	Hospital ownership		National
	Public	Private	
N patients	11307	1343	12650
Mean age	61	68	62
Age range	0-102	0-102	0-102
% Male	49.1%	48.9%	49.1%
% Aged >=65 years	57.1%	67.4%	58.2%
% Aged <10 years	7.9%	0.6%	7.2%
% had Surgery	15.9%	36.6%	18.1%
% with CVC	8.2%	9.7%	8.3%
% with Urinary catheter	14.8%	10.2%	14.3%
% Intubated	1.5%	0.6%	1.4%
McCabe score			
% McCabe: non-fatal	70.6%	78.0%	71.4%
% McCabe: life-limiting	25.1%	17.8%	24.4%
% McCabe: end-of-life	3.7%	3.7%	3.7%
Vaccination status against COVID-19			
% Fully vaccinated*	46.8%	83.3%	50.7%
% Partially vaccinated	0.7%	0.5%	0.7%
% Not vaccinated	10.1%	3.1%	9.4%
% Unknown	42.2%	13.0%	39.1%
HAI and AMU prevalence			
N with HAI	877	55	932
% with HAI	7.8%	4.1%	7.4%
N receiving AMs	4441	646	5087
% receiving AMs	39.3%	48.1%	40.2%

CVC, Central Venous Catheter; HAI, Healthcare-Associated Infection; AMU, Antimicrobial Use; AM, Antimicrobial

*Full vaccination also includes those that have received one or two additional doses

Table 6 (continued). Patient demographics by hospital type

	Hospital type					
	Tertiary	**Secondary**	**Primary**	**Paediatric**	**Specialist**	**Private**
N patients	5420	3986	648	307	946	1343
Mean age	65	64	76	6	30	68
Age range	0-102	0-101	0-101	0-17	0-95	0-102
% Male	52.5%	48.7%	44.9%	52.8%	33.0%	48.9%
% Aged >=65 years	60.3%	62.5%	85.5%	0.0%	14.6%	67.4%
% Aged <10 years	2.2%	5.9%	0.9%	71.7%	33.4%	0.6%
% had Surgery	19.6%	9.7%	7.9%	25.1%	23.7%	36.6%
% with CVC	12.0%	4.6%	1.1%	16.6%	3.7%	9.7%
% with Urinary catheter	17.7%	14.4%	9.9%	4.9%	6.2%	10.2%
% Intubated	2.0%	0.9%	0.0%	5.2%	1.4%	0.6%
McCabe score						
% McCabe: non-fatal	64.1%	72.6%	67.4%	93.5%	94.1%	78.0%
% McCabe: life-limiting	30.7%	23.7%	27.9%	4.6%	4.1%	17.8%
% McCabe: end-of-life	4.6%	3.3%	4.5%	0.3%	1.3%	3.7%
Vaccination status against COVID-19						
% Fully vaccinated*	37.6%	64.6%	44.4%	2.0%	40.5%	83.3%
% Partially vaccinated	0.9%	0.5%	0.2%	0.0%	0.8%	0.5%
% Not vaccinated	4.1%	12.0%	1.4%	17.3%	40.7%	3.1%
% Unknown	57.3%	22.7%	53.9%	77.9%	18.0%	13.0%
HAI and AMU prevalence						
N with HAI	486	287	39	16	49	55
% with HAI	9.0%	7.2%	6.0%	5.2%	5.2%	4.1%
N receiving AMs	2280	1613	217	127	204	646
% receiving AMs	42.1%	40.5%	33.5%	41.4%	21.6%	48.1%

CVC, Central Venous Catheter; HAI, Healthcare-Associated Infection; AMU, Antimicrobial Use; AM, Antimicrobial

*Full vaccination also includes those that have received one or two additional doses

Table 7. Data by age group and sex for all acute hospital inpatients

This table and the figure below show data for all acute hospital inpatients included in the PPS 2023.

Age group	Female	Male	Total
<1m	224 (3.5%)	214 (3.4%)	438 (3.5%)
1-23m	93 (1.4%)	137 (2.2%)	230 (1.8%)
2-17	240 (3.7%)	217 (3.5%)	457 (3.6%)
18-64	2,206 (34.4%)	1,945 (31.3%)	4,151 (32.9%)
65-74	1,030 (16.0%)	1,335 (21.5%)	2,365 (18.7%)
75+	2,629 (40.9%)	2,357 (38.0%)	4,986 (39.5%)
Total	6,422 (100.0%)	6,205 (100.0%)	12,627 (100.0%)

Excludes 18 patients with missing sex and 5 with missing age

Figure 1. Age and sex pyramid for acute hospital inpatients in all Irish hospitals

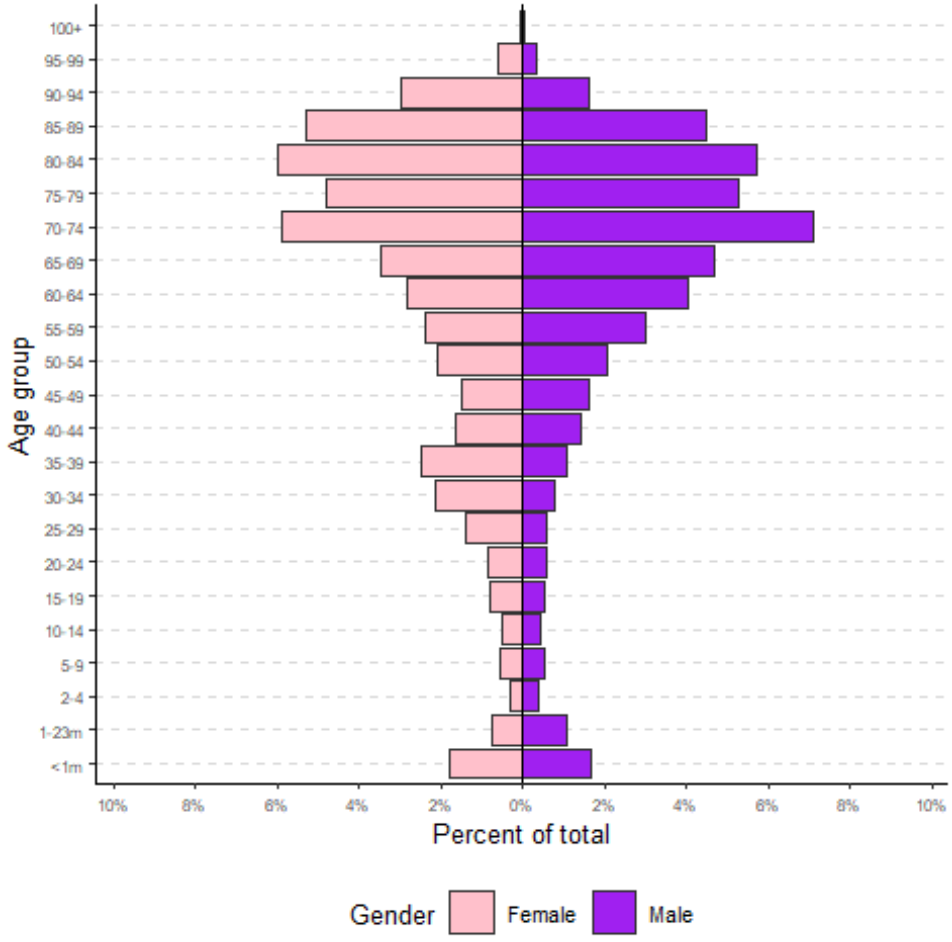


Figure 1 (continued). Age and sex pyramid for acute hospital inpatients, by hospital ownership. See separate report for similar figures by hospital type.

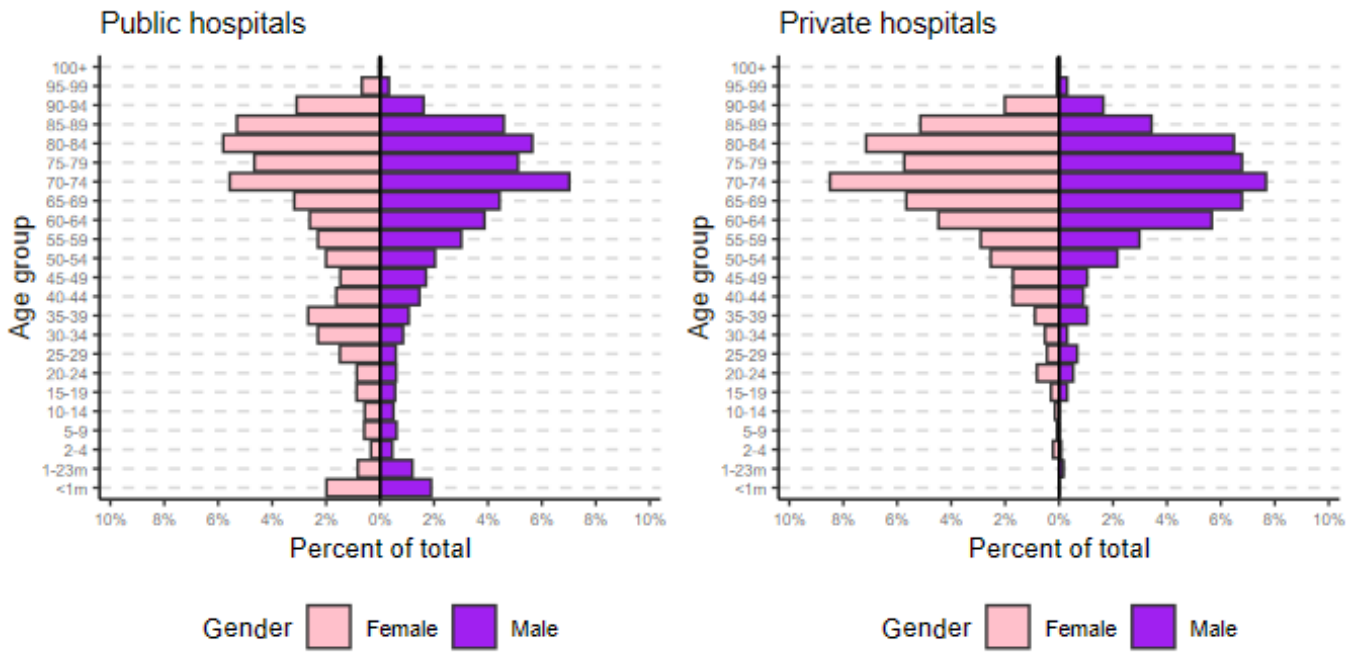
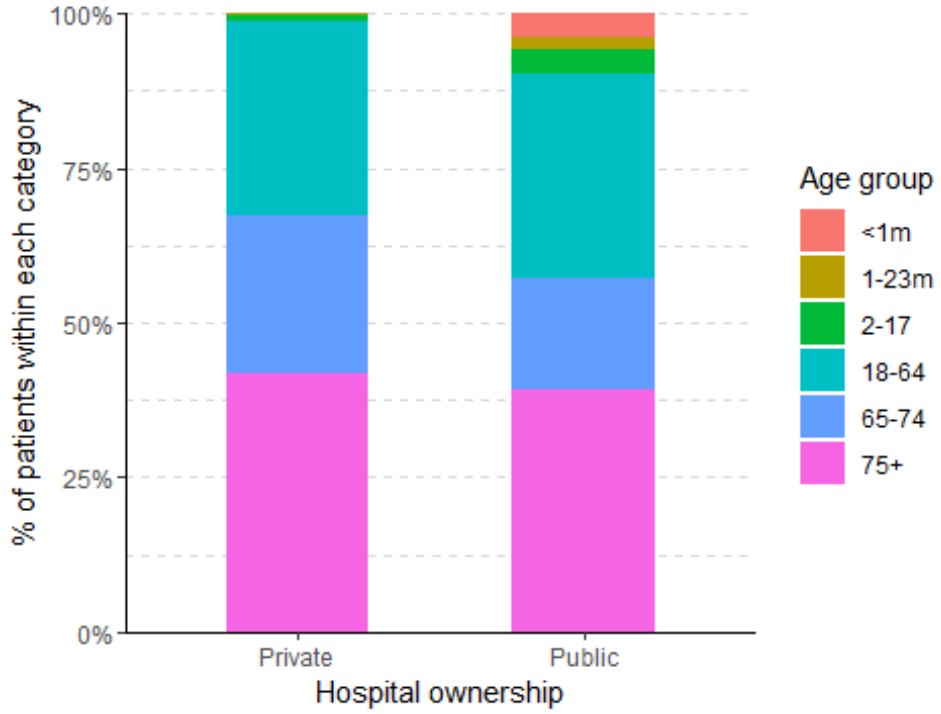


Figure 2. Data by age group, by hospital ownership



Risk factors

Data on surgery since admission, CVC use, intubation and urinary catheter use were reported for all eligible patients.

Of 12,650 patients, 2,272 (18.1%) had a surgical procedure since their admission, which was similar to 2017 (18.0%) and slightly higher than in 2012 (17.6%). NHSN and non-NHSN surgery accounted for 13.6% and 4.4% of surgical procedures, respectively.

Inpatients in private hospitals reported a higher proportion of surgery since admission (36.6%) compared to public hospitals (15.9%).

Of 12,650 patients, 2,495 (19.7%) had at least one invasive device *in situ*, which is higher than in 2017 (18.7%) and 2012 (16.3%). Data on PVC use was not collected in PPS 2023, hence 2012 and 2017 data were re-calculated accordingly.

Compared to 2017, the prevalence of CVC use was slightly higher (8.3% vs 7.7%), urinary catheter use was higher (14.3% vs 13.3%) and intubation was slightly lower (1.4% vs 1.7%).

CVCs, intubation and urinary catheters were more common among ICU patients (55.3%, 34.8% and 60.2%, respectively) than in non-ICU patients (6.8%, 0.4% and 12.8%, respectively).

Urinary catheters were more common in males (15.6%) than in females (13.1%); and in patients aged 50 years or over (16.5%) than in those aged under 50 years (7.7%).

Figure 3. Risk factors for all eligible patients

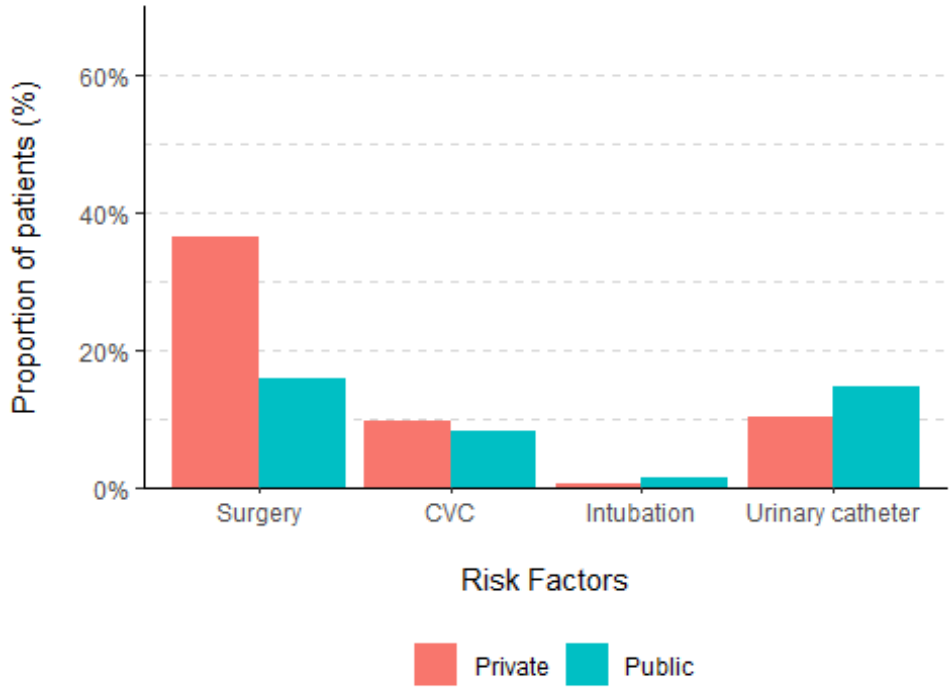


Table 8. Surgery since admission, public vs private hospital inpatients

Surgery since admission	Public	Private	National
No surgery	9,503 (84.1%)	851 (63.4%)	10,354 (81.9%)
NHSN surgery	1,360 (12.0%)	354 (26.4%)	1,714 (13.6%)
Non-NHSN surgery	422 (3.7%)	136 (10.1%)	558 (4.4%)
Unknown	20 (0.2%)	2 (0.1%)	22 (0.2%)
Total	11,305 (100.0%)	1,343 (100.0%)	12,648 (100.0%)

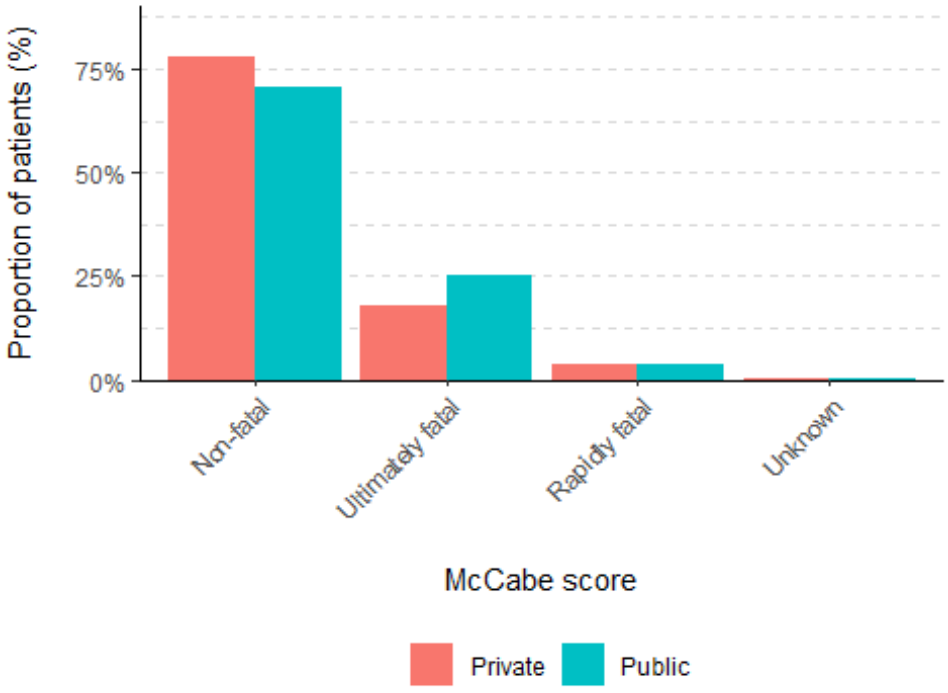
NHSN, National Healthcare Safety Network

Not answered for 2 cases

The McCabe score is subjective and gives an indication of the underlying disease prognosis (or severity) for each hospital inpatient.

The majority of acute hospital inpatients presented with a non-fatal disease (71.4%) as indicated by the McCabe score. The proportion of patients with life-limiting or end-of-life was higher in public hospitals (28.8%) compared to private hospitals (21.5%).

Figure 4. McCabe score for all public vs private hospital inpatients

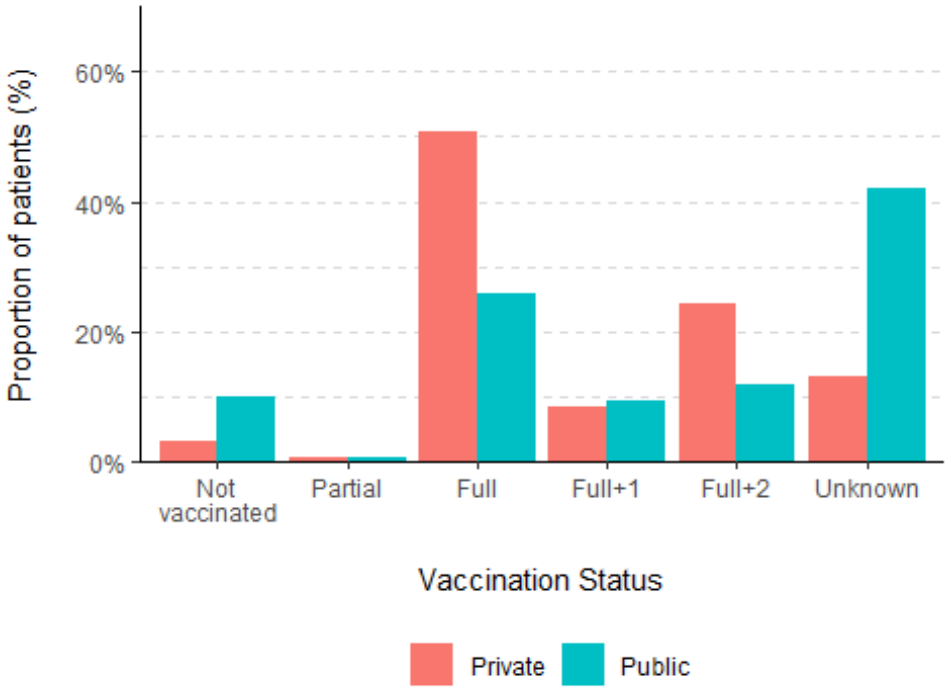


Just over half (50.7%) of all inpatients were fully vaccinated against COVID-19, with over 80% fully vaccinated in private hospitals compared to just under 1-in-2 in public hospitals.

Unvaccinated patients accounted for 10.1% of all inpatients in public hospitals compared to 3.1% in private hospitals.

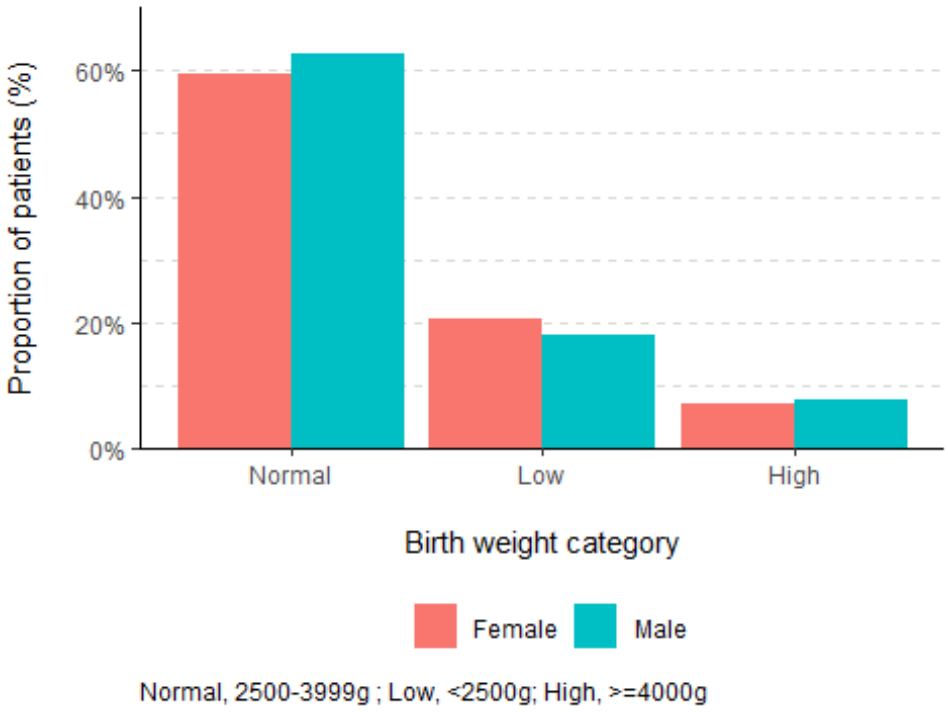
Public hospitals also had a higher number of inpatients for whom vaccination status was unknown (42.2%) compared to private hospitals (13.0%).

Figure 5. COVID-19 vaccination status, by hospital ownership



Birth weight is an important risk factor for neonates. Of 440 neonates surveyed, 85 (19.3%) were found to be low birth weight (<2500g) and 33 (7.5%) were of high birth weight (>=4000g). All neonates were inpatients in acute public hospitals.

Figure 6. Birth weight category for all neonates by gender



Distribution of patients by ward specialty

Almost 2-in-3 eligible patients (n=8083; 63.9%) were admitted to either a medical or a surgical ward. A higher proportion of patients in public hospitals were on medical wards (44.3%) than on surgical wards (19.1%). This contrasts with private hospitals where a higher proportion of patients were on surgical wards (37.6%) than on medical wards (30.3%).

Overall, 2.2% of patients were in ICU (intensive care medicine) but this figure excludes neonatal and paediatric ICU patients.

Table 9. Patients by ward specialty, by hospital ownership

Ward Speciality	Public	Private	Total
Geriatrics	630 (5.6%)	20 (1.5%)	650 (5.1%)
Gynaecology/Obstetrics	929 (8.2%)	0 (0.0%)	929 (7.3%)
Intensive care medicine	237 (2.1%)	37 (2.8%)	274 (2.2%)
Long-term care	23 (0.2%)	0 (0.0%)	23 (0.2%)
Medical specialties	5,014 (44.3%)	407 (30.3%)	5,421 (42.9%)
Mixed	737 (6.5%)	291 (21.7%)	1,028 (8.1%)
Neonatology	207 (1.8%)	0 (0.0%)	207 (1.6%)
Other	548 (4.8%)	77 (5.7%)	625 (4.9%)
Paediatrics	563 (5.0%)	6 (0.4%)	569 (4.5%)
Psychiatry	10 (0.1%)	0 (0.0%)	10 (0.1%)
Rehabilitation	252 (2.2%)	0 (0.0%)	252 (2.0%)
Surgical specialties	2,157 (19.1%)	505 (37.6%)	2,662 (21.0%)
Total	11,307 (100.0%)	1,343 (100.0%)	12,650 (100.0%)

Other, <80% of patients on the ward belong to a single specialty, but there are mixed medical and surgical patients admitted to the ward (includes admitted patients who remain in the ED or who are accommodated on a Day ward as admitted patients); Mixed, <80% of patients on the ward belong to a single specialty but there are only two specialties of patients admitted to the ward (e.g. haematology & oncology)

See Appendix A for complete list of patient specialties

Distribution of patients by patient specialty

Table 10 shows the number of patients by patient specialty. The top four patient specialties were general medicine (31.5%), general surgery (7.3%), orthopaedics (6.7%) and geriatrics/care for the elderly (6.3%), which together accounted for over 50% of all hospital inpatients.

Note: In PPS 2017, data were collected on the admitting consultant's specialty, not the patient specialty.

Table 10. Patients by patient specialty, top 10, by hospital ownership

Rank	Public (n = 11307)		Private (n = 1343)		National (n = 12650)	
	Patient specialty	**n (%)**	**Patient specialty**	**n (%)**	**Patient specialty**	**n (%)**
1	General medicine	3,707 (32.9%)	General medicine	269 (20.0%)	General medicine	3,976 (31.5%)
2	General surgery	824 (7.3%)	Orthopaedics	233 (17.3%)	General surgery	918 (7.3%)
3	Geriatrics, care for the elderly	786 (7.0%)	Oncology	138 (10.3%)	Orthopaedics	843 (6.7%)
4	Orthopaedics	610 (5.4%)	Cardiology	133 (9.9%)	Geriatrics, care for the elderly	793 (6.3%)
5	Obstetrics /maternity	560 (5.0%)	General surgery	94 (7.0%)	Obstetrics /maternity	560 (4.4%)
6	Paediatrics general, not specialised	477 (4.2%)	Pneumology	84 (6.3%)	Oncology	521 (4.1%)
7	Oncology	383 (3.4%)	Cardio surgery	61 (4.5%)	Paediatrics general, not specialised	482 (3.8%)
8	Cardiology	339 (3.0%)	Urology	59 (4.4%)	Cardiology	472 (3.7%)
9	Pneumology	283 (2.5%)	Digestive tract surgery	57 (4.2%)	Pneumology	367 (2.9%)
10	Healthy neonates (maternity)	260 (2.3%)	Gastroenterology	41 (3.1%)	Gastroenterology	296 (2.3%)

Note: a number of patients did not have a patient specialty specified

See Appendix A for full list of patient specialties

Healthcare-Acquired Infections (HAI)

Of the 12,650 eligible patients, 932 were found to have an active HAI, as determined using the surveillance case definitions (see PPS 2023 protocol for further information), resulting in a national HAI prevalence of 7.4%.

This represents an increase on the national HAI prevalence in 2017 (6.1%) and 2012 (5.2%); however, it is important to consider changes to the PPS protocol when interpreting and comparing results across the three surveys.

The majority of patients with HAI (n=901; 96.7%) had just one HAI, while 28 patients (3.3%) were reported to have more than one HAI. Overall, 966 HAIs were reported.

Of 932 patients with an active HAI, 878 (94.2%) were receiving antimicrobials at the time of the survey.

The characteristics of patients with HAI, including age and sex profile and presence of risk factors, are shown by hospital ownership in Table 10 and Figure 11 below. This data is also available by hospital type for HSE/public hospitals (see separate report).

Table 11. Demographics of patients with HAI, by hospital ownership

	Public	Private	National
N patients	11307	1343	12650
N with HAI	877	55	932
Of whom has			
1 HAI	849	52	901
2 HAIs	25	3	28
3 HAIs	3	0	3
Total HAIs	908	58	966
% with HAI (or HAI prev)	7.8%	4.1%	7.4%
Of which N receiving AMs	824	54	878
% Male	52.5%	58.2%	52.8%
% Aged >=65 years	67.4%	69.1%	67.5%
% Aged <10 years	7.9%	0.6%	7.2%
% had Surgery	22.9%	54.5%	24.8%
% with CVC	19.2%	32.7%	20.0%
% with Urinary catheter	30.6%	20.0%	29.9%
% Intubated	4.7%	1.8%	4.5%
McCabe score			
% McCabe: non-fatal	57.9%	61.8%	58.2%
% McCabe: life-limiting	34.2%	29.1%	33.9%
% McCabe: end-of-life	7.2%	9.1%	7.3%
Vaccination status against COVID-19			
% Fully vaccinated*	47.3%	87.3%	49.7%
% Partially vaccinated	1.1%	0.0%	1.1%
% Not vaccinated	6.0%	0.0%	5.7%
% Unknown	45.3%	12.7%	43.3%

HAI, Healthcare-Associated Infection; AM, Antimicrobials; CVC, Central Venous Catheter

*Full vaccination also includes those that have received one or two additional doses

Figure 7. Age and sex pyramid for acute hospital inpatients with HAI

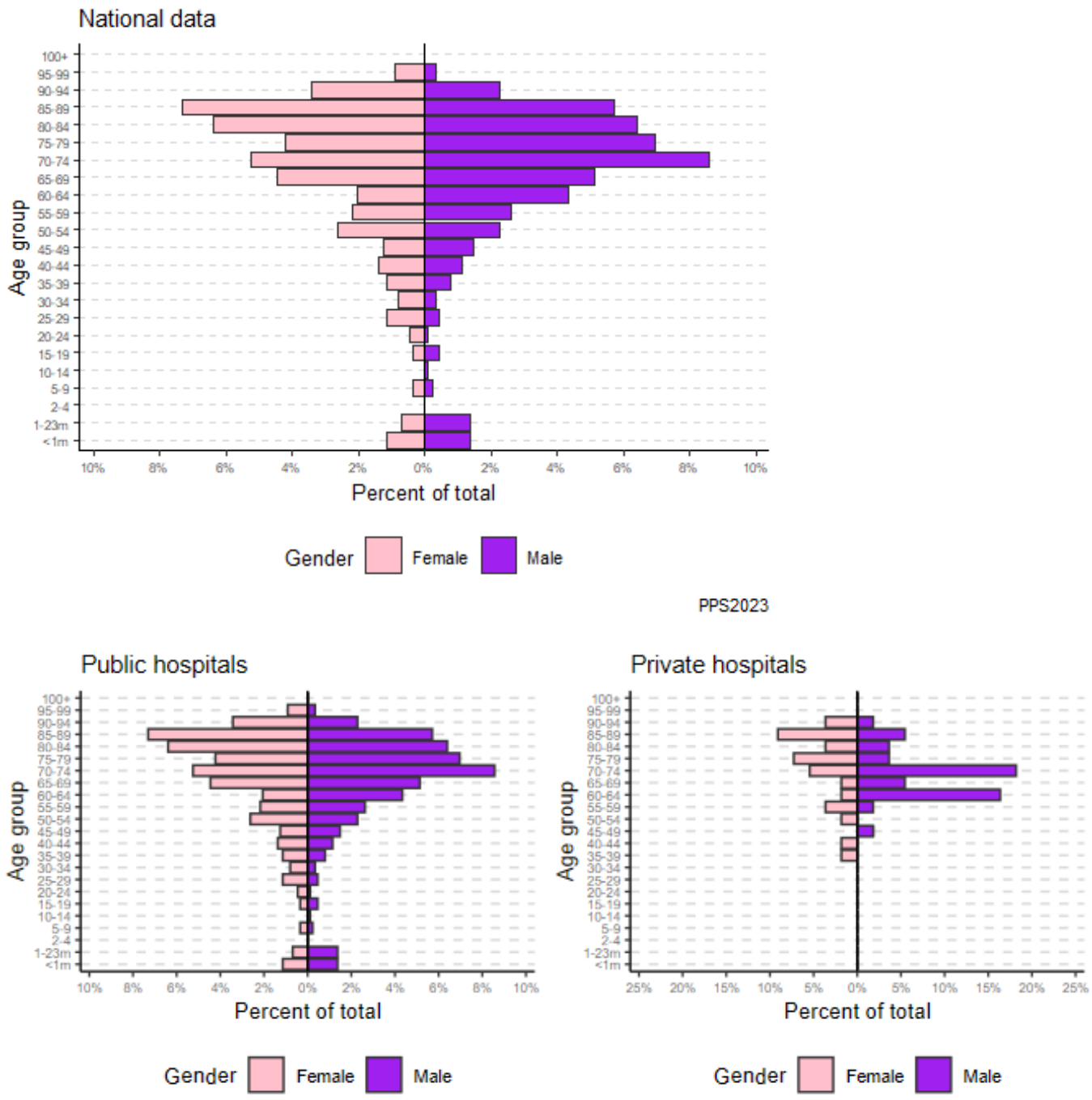
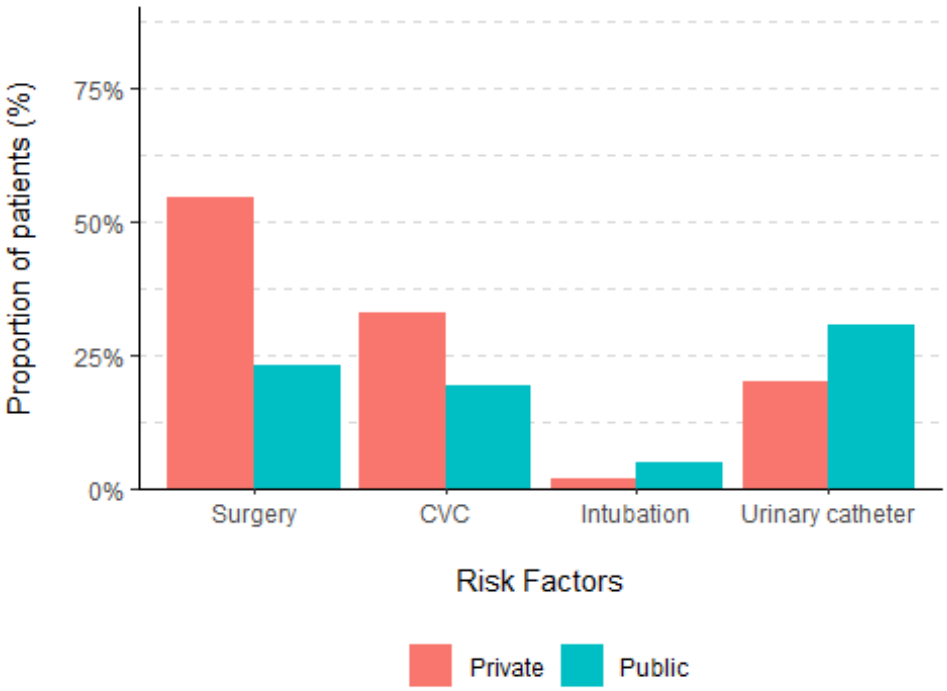


Figure 8. Risk factors for all patients with HAI, by hospital ownership



HAI Prevalence

HAI prevalence by gender, age, McCabe score and weight

The prevalence of HAI by gender, age and McCabe score is presented in Table 12.

Of the 932 patients with HAI, 52.8% (n=492) were male. The HAI prevalence was significantly higher in males (7.9%) than in females (6.8%) (p=0.029).

The majority of patients (n=882; 94.6%) with HAI were in adults aged >=18 years. The highest prevalence was in patients aged >=75 years (8.7%) and those aged 65-74 years (8.2%), both of which were significantly higher (p<0.001) than in the reference group (patients aged 18-64 years, 6.1%). The HAI prevalence was also high in children aged 1-23 months, but this was not a significant finding (7.8%; p=0.3). Children aged 2-17 years had a significantly lower HAI prevalence (2.2%; p=0.002).

The underlying disease prognosis, as measured by the McCabe score, was significantly associated with HAI prevalence (p<0.001). The highest HAI prevalence was reported for patients with rapidly fatal disease, i.e. an end-of-life prognosis (14.3%).

Table 12. HAI Prevalence and Odds Ratios by gender, age group and McCabe score

Risk factor	Category	N patients	N HAI	HAI Prev (%)	Prev 95% CI	OR	OR 95% CI	p-value
Gender	*Female*	*6,424*	*439*	*6.8*	*6.2 , 7.5*			
	Male	6,208	492	7.9	7.3 , 8.6	1.16	1.02, 1.33	**0.029**
Age group	<1m	440	22	5.0	3 , 7	0.85	0.53, 1.28	0.5
	1-23m	231	18	7.8	4.3 , 11.3	1.30	0.76, 2.08	0.3
	2-17	461	10	2.2	0.8 , 3.5	0.38	0.19, 0.66	**0.002**
	18-64	*4,155*	*253*	*6.1*	*5.4 , 6.8*			
	65-74	2,367	195	8.2	7.1 , 9.3	1.39	1.14, 1.68	**<0.001**
	75+	4,991	434	8.7	7.9 , 9.5	1.47	1.26, 1.73	**<0.001**
McCabe	*Non-fatal disease*	*9,029*	*542*	*6.0*	*5.5 , 6.5*			
	Ultimately fatal disease	3,082	316	10.3	9.2 , 11.3	1.79	1.55, 2.06	**<0.001**
	Rapidly fatal disease	474	68	14.3	11.2 , 17.5	2.60	1.97, 3.39	**<0.001**

N, Number; Prev, Prevalence; OR, Odds Ratio; CI, Confidence Interval

Reference groups for OR calculation are highlighted in italics; significant p-values are highlighted in bold

HAI prevalence by surgery since admission and invasive device use (CVC, intubation and urinary catheter)

The prevalence of HAI by surgery since admission and use of invasive devices is presented in Table 13.

Of the 932 patients with HAI, 24.8% (n=231) had a surgical procedure since their admission. Of these, 186 had an NHSN surgical procedure (see below), with a further 45 patients having a non-NHSN procedure.

An NHSN procedure is one that takes place during a single visit to the operating room, where the surgeon makes at least one incision through the skin or mucous membrane, including by laparoscopic approach, and closes the incision before the patient leaves the operating room.

The HAI prevalence was significantly higher (p<0.001) in patients who had an NHSN surgical procedure (10.9%) than in those who had no surgery (6.8%).

The HAI prevalence in patients with any invasive device (CVC, intubation and urinary catheter) *in situ* was significantly higher (p<0.001) than in those without an invasive device.

Table 13. HAI Prevalence and Odds Ratios by surgery since admission and invasive device use (CVC, intubation and urinary catheter)

Risk factor	Category	N patients	N HAI	HAI Prev (%)	Prev 95% CI	OR	OR 95% CI	p-value
Surgery since admission	*No surgery*	*10,354*	*701*	*6.8*	*6.3 , 7.3*			
	NHSN surgery	1,714	186	10.9	9.4 , 12.3	1.68	1.41, 1.98	**<0.001**
	Non-NHSN surgery	558	45	8.1	5.8 , 10.3	1.20	0.87, 1.62	0.25
CVC	*CVC absent*	*11,587*	*745*	*6.4*	*6 , 6.9*			
	CVC present	1,053	186	17.7	15.4 , 20	3.12	2.61, 3.70	**<0.001**
Intubation	*Intubation absent*	*12,458*	*888*	*7.1*	*6.7 , 7.6*			
	Intubation present	182	42	23.1	16.9 , 29.2	4.01	2.80, 5.63	**<0.001**
Urinary catheter (UC)	*UC absent*	*10,831*	*650*	*6.0*	*5.6 , 6.4*			
	UC present	1,805	279	15.5	13.8 , 17.1	2.85	2.45, 3.31	**<0.001**

N, Number; Prev, Prevalence; OR, Odds Ratio; CI, Confidence Interval

The number of patients (N patients) by risk factor does not always add up to 12,650, as responses that are unknown or not answered are excluded

Reference groups for OR calculation are highlighted in italics; significant p-values are highlighted in bold

HAI Prevalence by length-of-stay and birth weight (neonates aged <1 month)

The prevalence of HAI by length-of-stay (LOS) and birth weight (for neonates aged <1 month) is presented in Table 14.

LOS prior to onset of HAI (or up to the date of the survey for patients with no HAI) was significantly associated with HAI prevalence:

- Patients admitted 4 days or longer by the time of the survey or HAI onset date had a higher HAI prevalence than those with a LOS of 1-3 days (4.9%), which was used as the reference group
- For patients with a LOS of 4-7 days, the HAI prevalence increased to 6.6% (p=0.003)
- For patients with a LOS over 8 days, the HAI prevalence increased to 10% and higher (p<0.001)

Of 385 neonates for whom birth weight was provided, birth weight was normal (2.5-4.0 kg) for 267 (69.4%), low (<2.5 kg) for 85 (17.5%) and high (>4.0 kg) for 33 (8.6%).

The HAI prevalence was significantly higher for low birth weight neonates (12.9%; p=0.003) than than those with normal birth weight (3.7%), which was used as the reference group (Table 14).

Table 14. HAI Prevalence and Odds Ratios by length-of-stay and birth weight (for neonates aged <1 month)

Risk factor	Category	N patients	N HAI	HAI Prev (%)	Prev 95% CI	OR	OR 95% CI	p-value
Length of stay	*0-3 days*	*5,471*	*266*	*4.9*	*4.3 , 5.4*			
	4-7 days	2,190	145	6.6	5.6 , 7.7	1.38	1.12, 1.69	**0.003**
	8-14 days	1,763	189	10.7	9.3 , 12.2	2.33	1.91, 2.82	**<0.001**
	15-21 days	905	101	11.2	9.1 , 13.2	2.42	1.90, 3.07	**<0.001**
	22+ days	2,319	231	10.0	8.7 , 11.2	2.14	1.78, 2.57	**<0.001**
Birth weight (neonates only)	*Normal*	*267*	*10*	*3.7*	*1.5 , 6*			
	Low	85	11	12.9	5.8 , 20.1	3.82	1.55, 9.51	**0.003**
	High	33	1	3.0	-2.9 , 9	0.80	0.04, 4.40	0.84

N, Number; Prev, Prevalence; OR, Odds Ratio; CI, Confidence Interval

Reference groups for OR calculation are highlighted in italics; significant p-values are highlighted in bold

HAI Prevalence by hospital ownership and hospital type

The prevalence of HAI by hospital ownership and hospital type is presented in Table 15.

Of the 932 patients with HAI, 877 (94.1%) were in public (or HSE) hospitals, while 55 (5.9%) were in private hospitals. The HAI prevalence was significantly higher (p<0.001) in public hospitals (7.8%) than in private hospitals (4.1%).

Among the different hospital types, the highest HAI prevalence was found in tertiary hospitals (9.0%) with the lowest in private hospitals (4.1%). Both of these findings were significantly different (p=0.002 and <0.001, respectively) from the reference group (secondary hospitals, 7.2%).

Table 15. HAI Prevalence and Odds Ratios by hospital ownership and hospital type

Risk factor	Category	N patients	N HAI	HAI Prev (%)	Prev 95% CI	OR	OR 95% CI	p-value
Hospital ownership	*Public*	*11,307*	*877*	*7.8*	*7.3 , 8.2*			
	Private	1,343	55	4.1	3 , 5.2	0.50	0.38, 0.66	**<0.001**
Hospital type	Tertiary	5,420	486	9.0	8.2 , 9.7	1.27	1.09, 1.48	**0.002**
	Secondary	*3,986*	*287*	*7.2*	*6.4 , 8*			
	Primary	648	39	6.0	4.2 , 7.9	0.82	0.57, 1.14	0.26
	Paediatric	307	16	5.2	2.7 , 7.7	0.75	0.44, 1.20	0.26
	Specialist	946	49	5.2	3.8 , 6.6	0.70	0.51, 0.95	**0.024**
	Private	1,343	55	4.1	3 , 5.2	0.55	0.40, 0.73	**<0.001**

N, Number; Prev, Prevalence; OR, Odds Ratio; CI, Confidence Interval

Reference groups for OR calculation are highlighted in italics; significant p-values are highlighted in bold

HAI prevalence by ward specialty

The HAI prevalence by ward specialty is shown in Table 16.

HAI prevalence was highest in intensive care medicine (adult ICUs) and neonatology wards (includes neonatal ICUs) at 19.0% and 12.6%, respectively. These were significantly higher (p<0.001 and p=0.018, respectively) than in medical wards (7.9%), which was used as the reference group.

The lowest HAI prevalences were in gynaecology/obstetric (1.6%), paediatric (3.9%) and mixed (5.8%) wards, all of which were significantly lower (p<0.001, 0.002 and 0.021, respectively) than the reference group.

Table 16. HAI prevalence by ward specialty

Ward specialty	N patients	N HAI	HAI Prev (%)	Prev 95% CI	OR	OR 95% CI	p-value
Medical specialties	*5,421*	*428*	*7.9*	*7.2 , 8.6*			
Surgical specialties	2,662	226	8.5	7.4 , 9.5	1.09	0.92, 1.28	0.33
Mixed	1,028	60	5.8	4.4 , 7.3	0.72	0.54, 0.94	**0.021**
Gynaecology/Obstetrics	929	15	1.6	0.8 , 2.4	0.19	0.11, 0.31	**<0.001**
Geriatrics	650	47	7.2	5.2 , 9.2	0.90	0.65, 1.22	0.53
Other	625	38	6.1	4.2 , 8	0.77	0.54, 1.07	0.14
Paediatrics	569	22	3.9	2.3 , 5.5	0.51	0.33, 0.76	**0.002**
Intensive care medicine	274	52	19.0	14.3 , 23.6	2.72	1.96, 3.71	**<0.001**
Rehabilitation	252	17	6.7	3.6 , 9.8	0.84	0.49, 1.35	0.50
Neonatology	207	26	12.6	8 , 17.1	1.67	1.07, 2.50	**0.018**

N, Number; Prev, Prevalence; OR, Odds Ratio; CI, Confidence Interval

Reference group for OR calculation is highlighted in italics; significant p-values are highlighted in bold

Excluding 10 patients in psychiatry and 2 in long-term care

HAI Prevalence by patient specialty

The HAI prevalence for the top 10 patient specialties, which together account for 73% of all patients surveyed, is shown in Table 17.

HAI prevalence was broadly similar across seven of the top 10 patient specialties, ranging from 6.9-7.9%.

Three patient specialties (obstetrics/maternity, paediatrics and cardiology) had a significantly lower HAI prevalence (range, 2.0-2.8%; p<0.001) than general medicine (7.4%), which was used as the reference group.

See Appendix A for the full list of patient specialties by hospital ownership.

Table 17. HAI Prevalence and Odds Ratios by patient specialty

Patient specialty	N patients	N HAI	HAI Prev (%)	Prev 95% CI	OR	OR 95% CI	p-value
General medicine	*3,976*	*295*	*7.4*	*6.6 , 8.2*			
General surgery	918	72	7.8	6.1 , 9.6	1.05	0.80, 1.37	0.70
Orthopaedics	843	65	7.7	5.9 , 9.5	1.03	0.78, 1.36	0.81
Geriatrics, care for the elderly	793	55	6.9	5.2 , 8.7	0.94	0.69, 1.26	0.69
Obstetrics /maternity	560	11	2.0	0.8 , 3.1	0.25	0.13, 0.43	**<0.001**
Oncology	521	36	6.9	4.7 , 9.1	0.95	0.65, 1.33	0.76
Paediatrics general, not specialised	482	11	2.3	0.9 , 3.6	0.32	0.17, 0.54	**<0.001**
Cardiology	472	13	2.8	1.3 , 4.2	0.38	0.21, 0.63	**<0.001**
Pneumology	367	29	7.9	5.1 , 10.7	1.06	0.70, 1.55	0.76
Gastroenterology	296	21	7.1	4.2 , 10	0.95	0.58, 1.46	0.81

N, Number; Prev, Prevalence; OR, Odds Ratio; CI, Confidence Interval

Reference group for OR calculation is highlighted in italics; significant p-values are highlighted in bold

HAI Prevalence among ICU patients vs non-ICU patients

The HAI prevalence for ICU patients compared with non-ICU patients is shown in Table 18.

A total of 394 patients were determined to be in ICU at the time of the survey.

This figure combines the total for intensive care medicine (adults), with paediatric and neonatal ICUs that are included in paediatric and neonatology specialties, respectively.

The prevalence of HAI in ICU patients was 18.3% indicating that almost one-in-five ICU patients had a HAI at the time of the survey. This was significantly higher ($p<0.001$) than in non-ICU patients (7.0%).

A separate report on ICU patients is being prepared.

Table 18. HAI Prevalence and Odds Ratios among ICU patients vs non-ICU patients

Patient location	N patients	N HAI	HAI Prev (%)	Prev 95% CI	OR	OR 95% CI	P-value
Non-ICU	*12,256*	*860*	*7.0*	*6.6 , 7.5*			
ICU	394	72	18.3	14.5 , 22.1	2.94	2.24, 3.80	**<0.001**

N, Number; Prev, Prevalence; OR, Odds Ratio; CI, Confidence Interval

Reference group for OR calculation is highlighted in italics; significant p-values are highlighted in bold

HAI onset and origin

Onset

Of 966 HAIs reported in 932 patients, almost one-in-three HAIs, or 31.6% (n=305), were present on admission to the hospital, i.e. the onset was not associated with the current hospital admission.

660 HAIs (68.3%) were not evident upon the current admission to the hospital. The onset of one HAI was unknown.

Origin

Of the 305 HAIs with onset BEFORE the current admission, 101 (33.1%) were associated with the current hospital (following a previous discharge), 85 (27.9%) with another acute hospital and 110 (36.1%) with long-term care. For the remaining nine, the association was unknown (3.0%).

Of the 660 HAIs with onset AFTER the current admission, 648 (98.2%) were associated with the current hospital (following a previous discharge), six with another acute hospital (0.9%) and two with long-term care (0.3%). For the remaining six, the association was unknown (0.6%).

Association with the current ward

Of the 966 HAIs, 560 (58.0%) were reported as "associated with the current ward". This includes 46 HAIs that were present on admission (presumably following an earlier admission/discharge from the same hospital) and 514 that were not present on the current admission to the hospital.

Table 19. HAI onset, by hospital ownership

	Public	Private	National
Total patients with HAI	877	55	932
Total HAIs	908	58	966
N with HAI at admission	279	26	305
% HAI at admission	30.7%	44.8%	31.6%
N with HAI after admission	628	32	660
% HAI after admission	69.2%	55.2%	68.3%

Of HAIs that were identified as being present on admission to the current hospital (i.e. onset was prior to admission), one-in three (33.1%) were associated with the current hospital.

The proportion was higher in private hospitals compared to public hospitals (80.8% versus 28.7%).

Among public hospitals, there was a higher proportion of HAIs associated with other acute hospitals and long-term care facilities (29.4% and 38.7%, respectively) than in private hospitals (11.5% and 7.7%, respectively).

Table 20a. HAI origin, where HAI onset was BEFORE the current hospital admission, by hospital ownership

	Public	Private	National
Total patients with HAI	272	24	296
Total HAIs	279	26	305
% HAIs treated w/ vasopressor	2.9%	0.0%	2.6%
Association			
N assoc. with current hospital	80	21	101
% assoc. with current hospital	28.7%	80.8%	33.1%
N assoc. with other acute hospital	82	3	85
% assoc. with other acute hospital	29.4%	11.5%	27.9%
N assoc. with long-term care	108	2	110
% assoc. with long-term care	38.7%	7.7%	36.1%
N assoc. with other origin or unknown	9	0	9
% other origin or unknown	3.2%	0.0%	3.0%
Association with current ward			
N assoc. with current ward	29	17	46
% assoc. with current ward	10.4%	65.4%	15.1%

Of HAIs that were identified as having presented following admission to the current hospital (i.e. onset was after admission), almost all (98.2%) of these were associated with the current hospital. A small minority of cases (1.8%), where onset occurred within the first couple of days after admission, were determined to have originated in another acute hospital, LTCF or were unknown.

Table 20b. HAI origin, where HAI onset was AFTER the current hospital admission, by hospital ownership

	Public	Private	National
Total patients with HAI	605	32	637
Total HAIs	628	32	660
% HAIs treated w/ vasopressor	6.4%	3.1%	6.2%
Association			
N assoc. with current hospital	618	30	648
% assoc. with current hospital	98.4%	93.8%	98.2%
N assoc. with other acute hospital	5	1	6
% assoc. with other acute hospital	0.8%	3.1%	0.9%
N assoc. with long-term care	2	0	2
% assoc. with long-term care	0.3%	0.0%	0.3%
N assoc. with other origin or unknown	3	1	4
% other origin or unknown	0.5%	3.1%	0.6%
Association with current ward			
N assoc. with current ward	489	25	514
% assoc. with current ward	77.9%	78.1%	77.9%

This table excludes one HAI where it was unknown if the HAI was present at admission; hence, total number of HAIs is 660, and not 661 as in Table 21 below

In PPS 2023, 112 HAIs (11.6%) that were associated with LTCFs were reported.

Table 21. Onset of HAIs (based on LOS), by hospital ownership

LOS (days)	Public	Private	Total
0-3 days	123 (13.6%)	10 (17.2%)	133 (13.8%)
4-7 days	75 (8.3%)	3 (5.2%)	78 (8.1%)
8-14 days	117 (12.9%)	10 (17.2%)	127 (13.2%)
15-21 days	83 (9.2%)	4 (6.9%)	87 (9.0%)
22+ days	213 (23.5%)	5 (8.6%)	218 (22.6%)
Unknown	296 (32.6%)	26 (44.8%)	322 (33.4%)
Total	907 (100.0%)	58 (100.0%)	965 (100.0%)

This table excludes HAIs present at admission (n=305)

Device association

For the HAI types that could be associated with the presence of an invasive device:

- almost one-in-three (31.3%) bloodstream infections were associated with the presence of a CVC
- almost one-in-ten (8.7%) pneumonia were associated with intubation
- almost four-in-ten (38.3%) UTIs were associated with a urinary catheter

Table 22. HAI by invasive device, by hospital ownership

HAI	Public		Private		National	
	Invasive device present	Invasive device absent	Invasive device present	Invasive device absent	Invasive device present	Invasive device absent
BSI	26 (33.3%)	52 (66.7%)	0 (0.0%)	5 (100.0%)	26 (31.3%)	57 (68.7%)
PN	21 (8.2%)	236 (91.8%)	2 (25.0%)	6 (75.0%)	23 (8.7%)	242 (91.3%)
UTI	51 (38.1%)	83 (61.9%)	3 (42.9%)	4 (57.1%)	54 (38.3%)	87 (61.7%)
Total	98 (20.9%)	371 (79.1%)	5 (25.0%)	15 (75.0%)	103 (21.1%)	386 (78.9%)

BSI, bloodstream infection; PN, pneumonia; UTI, urinary tract infection

Distribution of HAIs

Table 23 shows the distribution of the 966 active HAIs by HAI group (see Appendix C for the complete data with specific HAI types).

Seven HAI groups were each represented by >50 cases.

The top three HAI groups nationally were:

- Pneumonia (PN) with 265 cases (27.4% of all HAIs; 2.1% prevalence in the hospital inpatient population)
- Urinary tract infections (UTI) with 141 cases (14.6% of all HAIs; 1.1% prevalence)
- Surgical site infections (SSI) with 131 cases (13.6% of all HAIs; 1.0% prevalence)

Together these 3 HAI types accounted for the majority (55.6%) of all HAIs.

Bloodstream (BSI), gastrointestinal (GI), systemic (SYS) and COVID-19 (COV) infections made up the rest of the top 7 HAI groups, each making up 7.6-8.6% of all HAIs, with a prevalence of 0.6-0.7%.

The ranking of HAI groups differed by hospital ownership (public/HSE vs private), as well as by hospital type:

- PN is the top HAI group in public hospitals, accounting for 28.3% of all HAIs and with a prevalence of 2.3%

- SSI is the top HAI group in private hospitals, accounting for 44.8% of all HAIs and with a prevalence of 1.9%

See separate report for breakdown by hospital type.

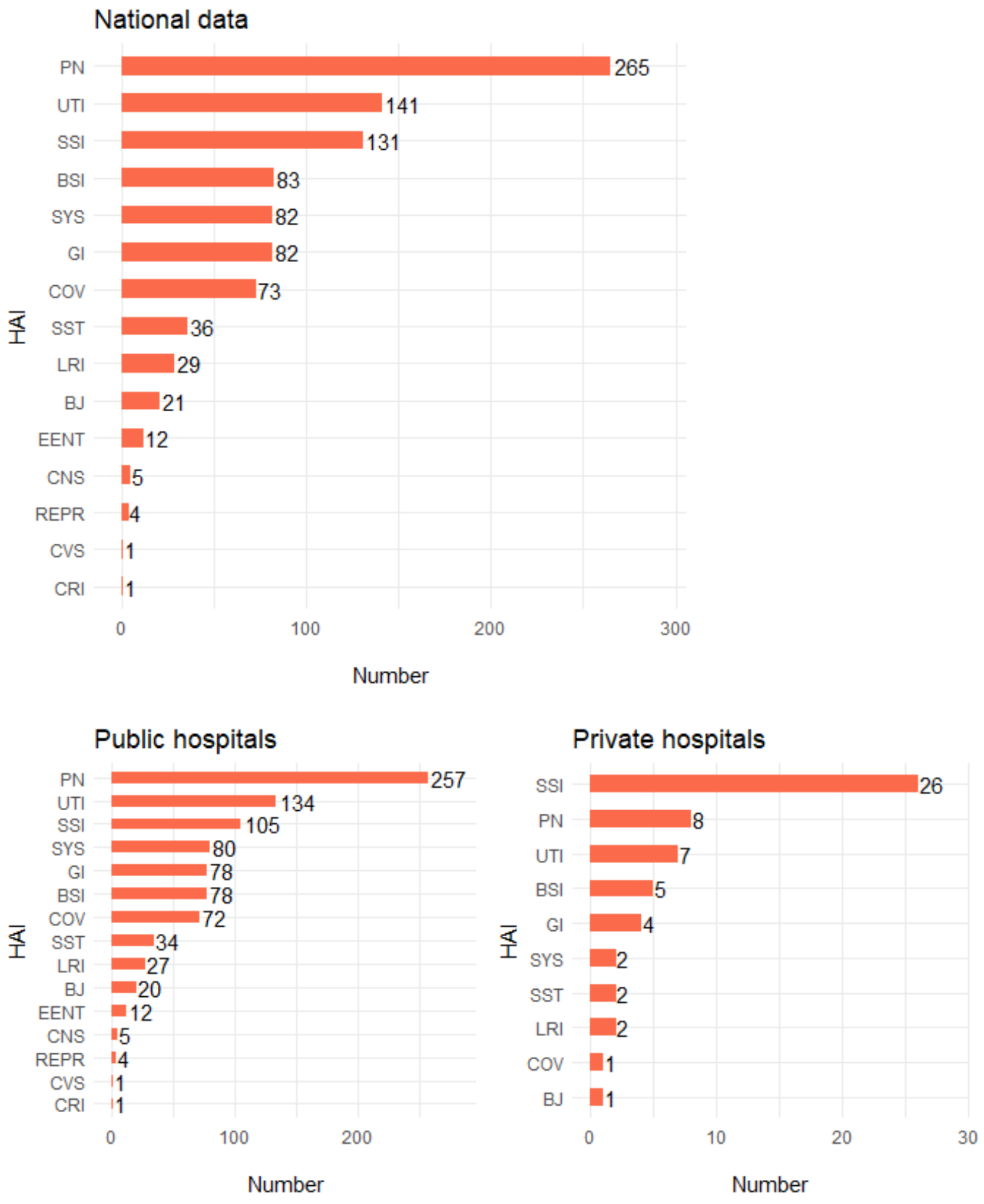
<>

Table 23. HAI prevalence by HAI groups, by hospital ownership

Rank	Public				Private				National			
	HAI	n	%	Prev	HAI	n	%	Prev	HAI	n	%	Prev
1	PN	257	28.3%	2.3%	SSI	26	44.8%	1.9%	PN	265	27.4%	2.1%
2	UTI	134	14.8%	1.2%	PN	8	13.8%	0.6%	UTI	141	14.6%	1.1%
3	SSI	105	11.6%	0.9%	UTI	7	12.1%	0.5%	SSI	131	13.6%	1.0%
4	SYS	80	8.8%	0.7%	BSI	5	8.6%	0.4%	BSI	83	8.6%	0.7%
5	BSI	78	8.6%	0.7%	GI	4	6.9%	0.3%	GI	82	8.5%	0.6%
6	GI	78	8.6%	0.7%	LRI	2	3.4%	0.1%	SYS	82	8.5%	0.6%
7	COV	72	7.9%	0.6%	SST	2	3.4%	0.1%	COV	73	7.6%	0.6%
8	SST	34	3.7%	0.3%	SYS	2	3.4%	0.1%	SST	36	3.7%	0.3%
9	LRI	27	3.0%	0.2%	BJ	1	1.7%	0.1%	LRI	29	3.0%	0.2%
10	BJ	20	2.2%	0.2%	COV	1	1.7%	0.1%	BJ	21	2.2%	0.2%
11	EENT	12	1.3%	0.1%					EENT	12	1.2%	0.1%
12	CNS	5	0.6%	0.0%					CNS	5	0.5%	0.0%
13	REPR	4	0.4%	0.0%					REPR	4	0.4%	0.0%
14	CRI	1	0.1%	0.0%					CRI	1	0.1%	0.0%
15	CVS	1	0.1%	0.0%					CVS	1	0.1%	0.0%

BJ, bone and joint infection; BSI, bloodstream infection [including catheter-related BSI (CRI3); and neonatal BSI (NEO-LCBI)]; CNS, central nervous system infection; COV, covid-19 infection; CRI, Catheter-related infection (without BSI); CVS, cardio-vascular system infection; EENT, eye, ear, nose and throat infection; GI, gastro-intestinal infection; LRI, lower respiratory tract infection; PN, pneumonia; REPR, reproductive tract infection; SSI, surgical site infection; SYS, systemic infection, SST, skin and soft tissue infection; UTI, urinary tract infection

Figure 9. HAI distribution, national data and by hospital ownership



Pneumonia (PN)

Pneumonia (PN) was the commonest HAI overall, accounting for almost three-in-ten HAIs (n=265; 27.4%), with a prevalence of 2.1% in the study population.

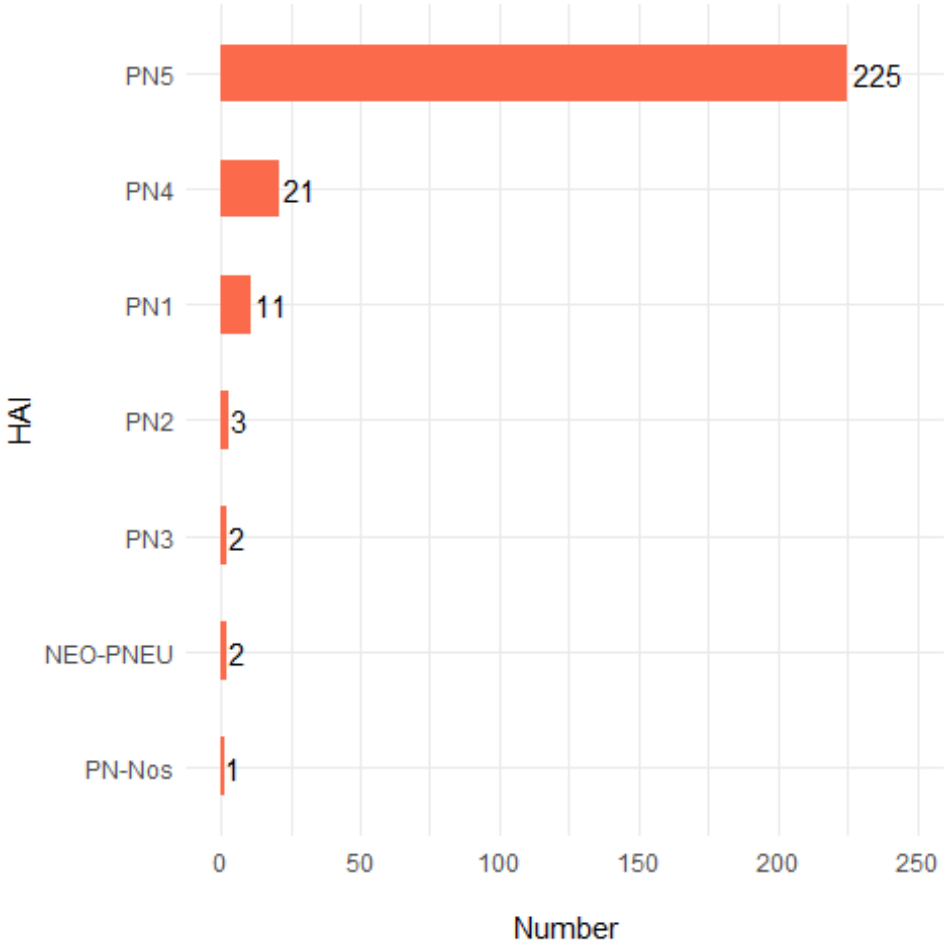
Figure 10 shows the classification of pneumonia cases based on the case definition (see protocol for further details). The majority (n=225, 84.9%) of pneumonia cases were not microbiologically-confirmed (PN5).

Of the 265 pneumonia cases, 23 (8.7%) had an invasive device present, i.e. were intubtated (see Table 22).

Compared with PPS 2017, the proportion of all HAIs that were pneumonia and the prevalence of pneumonia in the study population have remained relatively stable. In 2017, pneumonia represented 28.9% of all HAIs, with a prevalence of 1.9%.

By comparison, a large increase in pneumonia was seen between 2012 and 2017 following a change in the case definition, whereby radiological criteria for diagnosis of pneumonia were relaxed. In 2012, pneumonia represented 17.2% of all HAIs, with a prevalence of 1.0%.

Figure 10. Classification of pneumonia by case definition.



Urinary tract infections (UTI)

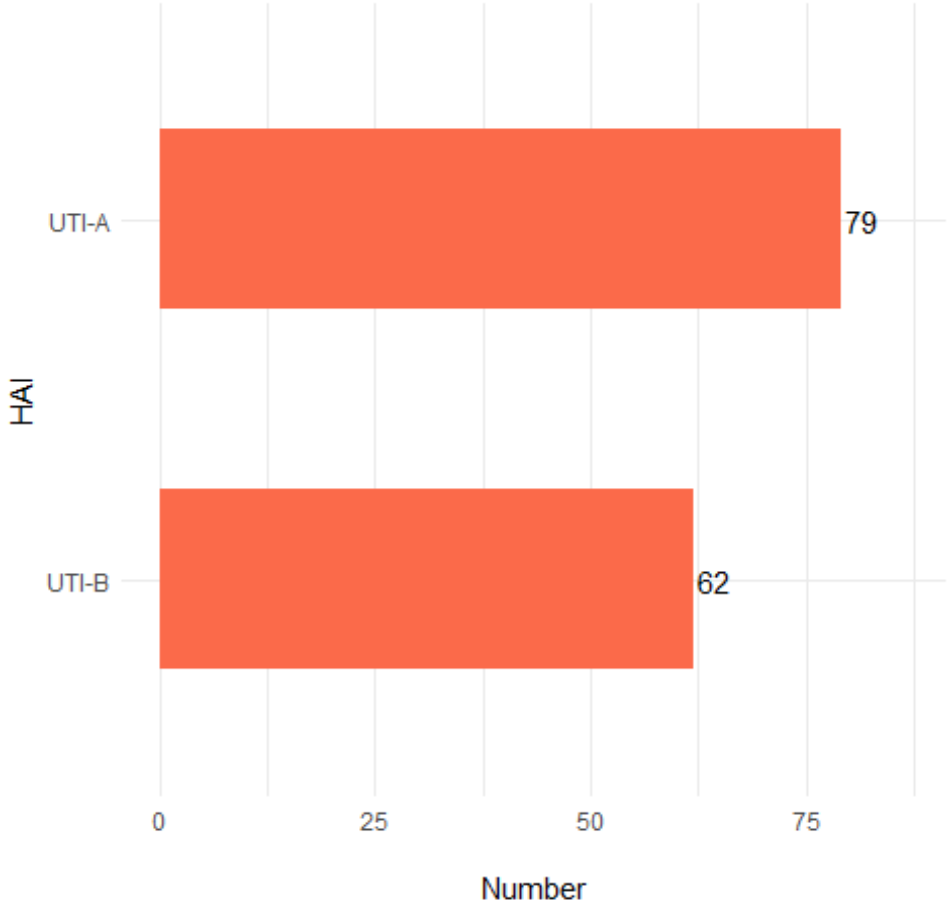
Urinary tract infections (UTI) were the second most common HAI overall (n=141), accounting for 14.6% of all HAIs, with a prevalence of 1.1% in the study population.

Figure 11 shows the classification of UTI cases based on the case definition (see protocol for further details). The majority (n=79, 56.0%) of UTI cases were microbiologically-confirmed (UTI-A).

Of the 141 UTI cases, 54 (38.3%) had an invasive device present, i.e. had a urinary catheter inserted (see Table 22).

Compared with PPS 2017, UTIs have overtaken surgical site infections as the second most common HAI. The proportion of all HAIs that were UTIs has remained stable, while the prevalence of UTI has increased slightly in the study population. In 2017, UTIs represented 14.5% of all HAIs, with a prevalence of 0.9%.

Figure 11. Classification of urinary tract infections by case definition



UTI-A, microbiologically-confirmed UTI; UTI-B, non-microbiologically-confirmed UTI

Surgical site infections (SSI)

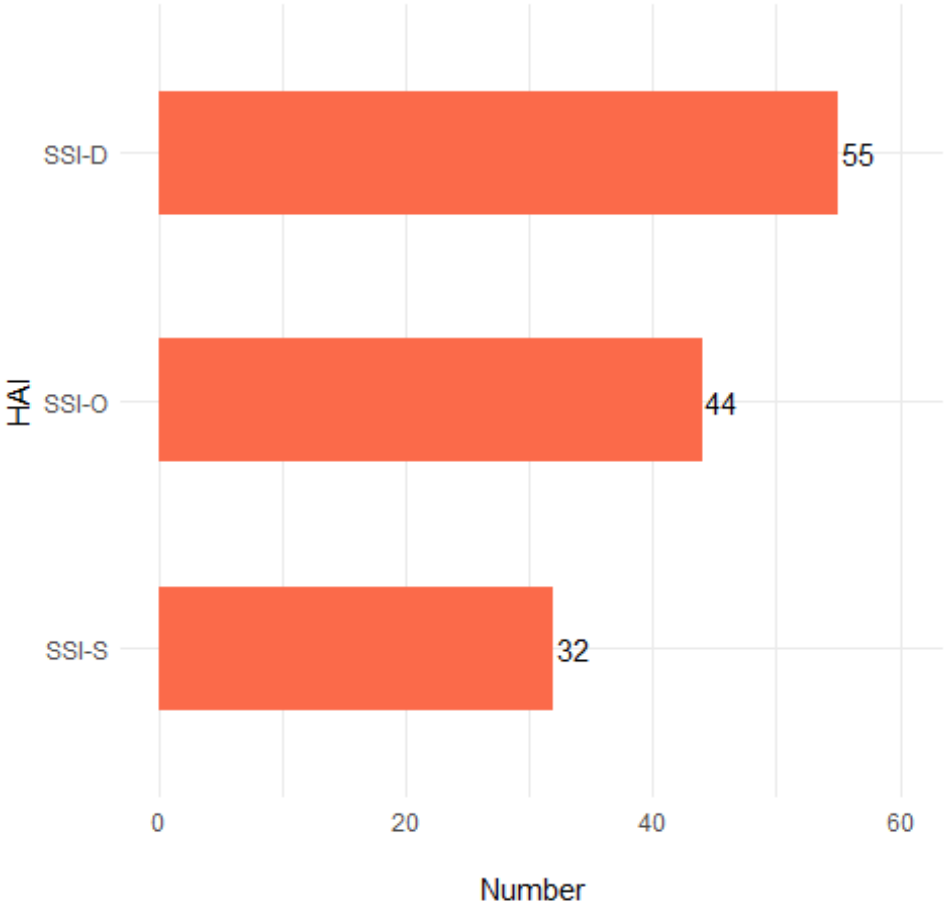
Surgical site infections (SSI) were the third most common HAI overall (n=131), accounting for 13.6% of all HAIs, with a prevalence of 1.0% in the study population.

Figure 12 shows the classification of SSI cases based on the case definition (see protocol for further details). The majority (n=99, 75.5%) of SSI cases were classified as either deep incisional (SSI-D) or organ/space SSI (SSI-O).

Compared with PPS 2017, SSIs have dropped from second to third in rank. The proportion and prevalence of all HAIs in the study population that were SSIs has decreased. In 2017, SSIs represented 18.0% of all HAIs, with a prevalence of 1.2%.

The proportion of SSI categorised as either SSI-D or SSI-O has increased from 67% in 2017 and 56% in 2012.

Figure 12. Classification of surgical site infections by case definition



SSI-D, deep incisional SSI; SSI-O, organ/space SSI; SSI-S, superficial incisional SSI

Bloodstream infection (BSI)

Bloodstream infections (BSI) were the fourth most common HAI overall (n=83), accounting for 8.6% of all HAIs, with a prevalence of 0.7% in the study population.

BSI may be categorised as either: - Primary BSI, which can be due to an infected vascular catheter (including CRI3-CVC and CRI3-PVC), or of unknown origin, or - Secondary BSI, i.e. secondary to an infection elsewhere in the body

Figure 13 shows the classification of BSI cases based on the case definition (see protocol for further details).

Of the 83 BSI cases, 38 (45.8%) were classified as primary, with 38 (45.8%) secondary to infection elsewhere in the body (Figure 14). No information on BSI source was provided for 7 cases.

Of all 83 BSIs reported, 26 (or 31.3%) had an invasive device present, ie. had a vascular catheter inserted.

Of the 38 primary BSI cases, 17 (44.7%) had an indwelling CVC, with the CVC implicated as the BSI source in 11 cases, including 9 that were microbiologically-confirmed (CRI3-CVC) and two that were not microbiologically-confirmed (BSI, with source C-CVC). Overall, 39.5% (n=15) of primary BSIs were vascular catheter-associated, including an additional four cases were the source was C-PVC.

Note: Data on PVC as a risk factor was not collected in PPS 2023, thus it is not possible to compare with PPS 2017 data.

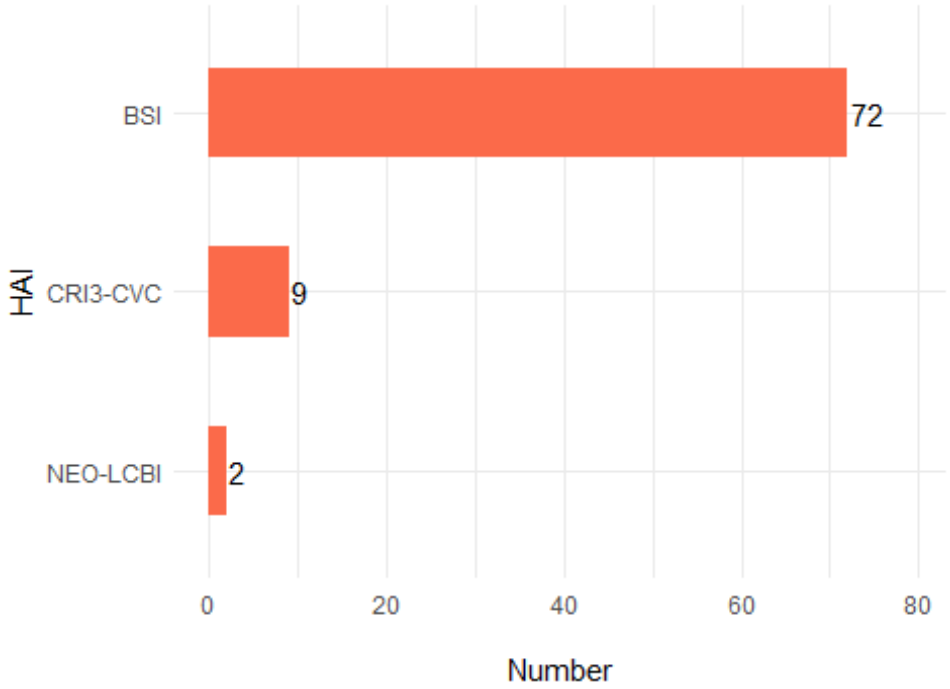
Of the 38 secondary BSI cases, seven (18.4%) had an indwelling CVC; however, there was no evidence to implicate the vascular catheter to the BSI.

Among the 38 secondary BSI cases, the commonest sources reported were the urinary and digestive tracts accounting for 48.1% and 28.9% of cases, respectively (Figure 14). The ranking is the same as in PPS 2017; however, the proportions are higher (PPS 2017: 33% and 24% respectively).

Of the seven BSI cases that could not be categorised as either primary or secondary, two cases had an indwelling CVC. There was no evidence to implicate the vascular catheter to the BSI in these cases.

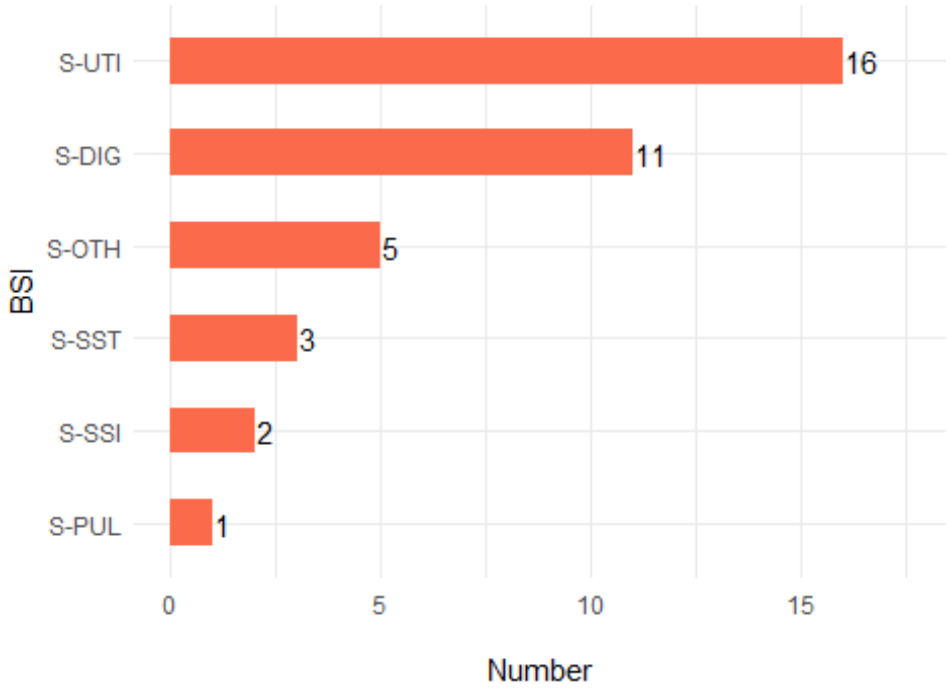
Compared with PPS 2017, the proportion of all HAIs that were BSIs has decreased, while the prevalence of BSI in the study population has remained relatively stable. In 2017, BSIs represented 9.9% of all HAIs, with a prevalence of 0.6%.

Figure 13. Classification of bloodstream infections by case definition



BSI, Bloodstream infection; CRI3-CVC, Catheter-related BSI due to CVC; NEO-LCBI, Neonatal BSI

Figure 14. Sources of secondary bloodstream infections



S-, secondary; UTI, urinary tract; DIG, digestive tract; OTH, other; SST, skind and soft tissue; SSI, surgical site; PUL, pulmonary

Table 24. BSI by source: Public vs Private

	Public	Private	National
N with BSI*	78	5	83
N with BSI	67	5	72
N with CRI3	9	0	9
N with NEO-LCBI	2	0	2
N device-assoc. BSI	26	0	26
% device-assoc. BSI*	33.3%	0.0%	31.3%
N with primary BSI	37	1	38
N with source C-CVC, incl. CRI3	11	0	11
N with source C-PVC	4	0	4
N with source UO	19	1	20
N with source Unknown	3	0	3
N with secondary BSI	34	4	38
N with source S-UTI	15	1	16
N with source S-DIG	9	2	11
N with source S-SST	2	1	3
N with source S-SSI	2	0	2
N with source S-PUL	1	0	1
N with source S-OTH	5	0	5

No information on BSI source was provided for 7 cases from tertiary hospitals

* The broader category of BSI includes BSI, catheter-related BSI (CRI3), and neonatal BSI (NEO-LCBI)

C-CVC, Central venous catheter; C-PVC, Peripheral venous catheter; UO, Unknown origin (confirmed); UNK, Unknown; S-UTI, Secondary to urinary tract infection; S-DIG, Secondary to gastrointestinal infection; S-SST, Secondary to skin and soft tissue infection; S-SSI, Secondary to surgical site infection; S-PUL, Secondary to pulmonary infection; S-OTH, Secondary to other infection (e.g. meningitis, osteomyelitis, etc.)

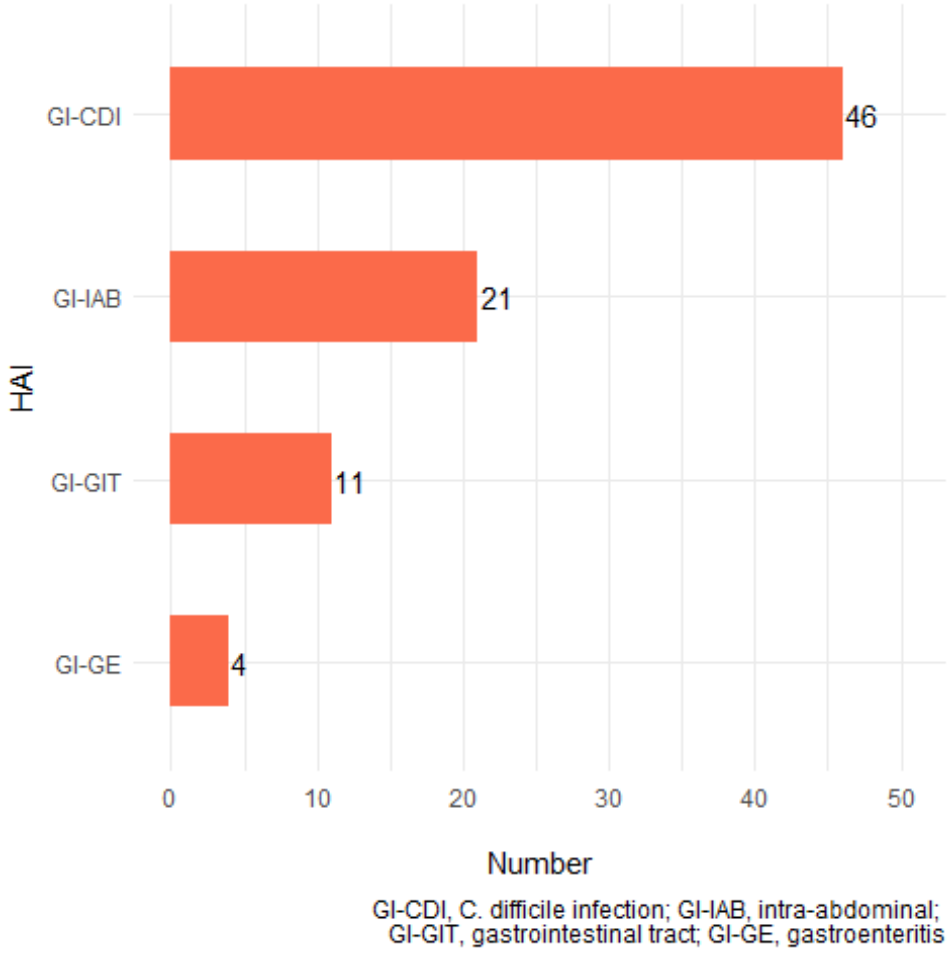
Gastrointestinal infections (GI)

Gastrointestinal infections (GI) were the joint fifth most common HAI overall (along with systemic infections; n=82), accounting for 8.5% of all HAIs, with a prevalence of 0.6% in the study population.

Figure 15 shows the classification of GI cases based on the case definition (see protocol for further details). The majority of GI cases (n=46, 56.1%) were due to *C. difficile* infection (GI-CDI). GI-CDI made up 4.8% of all HAIs, with a prevalence of 0.4%.

Compared with PPS 2017, the proportion of all HAIs that were GI-CDI has remained stable, while the prevalence of GI-CDI in the study population has increased. In 2017, GI-CDI represented 4.4% of all HAIs, with a prevalence of 0.3%.

Figure 15. Classification of gastrointestinal infections by case definition



Microbiology results

Results from microbiology testing at the time of the survey were provided for 616 (63.8%) of the 966 HAIs reported. No microbiology result was required for the remaining HAIs as the diagnosis of these was on a clinical basis only in accordance with the case definitions.

Table 26 shows the distribution of the 484 microorganisms reported (for microorganisms with 10 or more isolates; microorganisms with fewer than 10 isolates are grouped together as "others") from 389 patients. See Appendix D for the full list of microorganisms detected.

E. coli (n=73; 15.1%) and *S. aureus* (n=71; 14.7%) were the two most commonly reported microorganisms, followed by SARS-CoV-2 (n=45; 9.3%), *C. difficile* (n=43; 8.9%), and *E. faecium* (n=29; 6.0%).

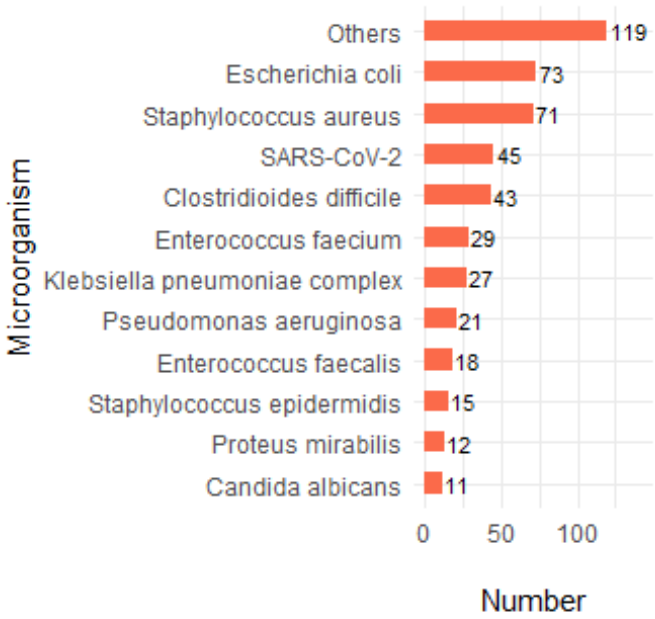
Table 25. Microbiology results (for 616 HAIs)

Microbiology result	Public	Private	National
Pathogen detected	357 (62.7%)	32 (68.1%)	389 (63.1%)
No microbiology data provided	71 (12.5%)	5 (10.6%)	76 (12.3%)
Specimen not sent	69 (12.1%)	5 (10.6%)	74 (12.0%)
Results not available or missing	38 (6.7%)	3 (6.4%)	41 (6.7%)
Pathogen not isolated	34 (6.0%)	2 (4.3%)	36 (5.8%)
Total	569 (100.0%)	47 (100.0%)	616 (100.0%)

Table 26/ Figure 16. Distribution of microorganisms reported from patients with HAI

Antimicrobial	n (%)
Escherichia coli	73 (15.1%)
Staphylococcus aureus	71 (14.7%)
SARS-CoV-2	45 (9.3%)
Clostridioides difficile	43 (8.9%)
Enterococcus faecium	29 (6.0%)
Klebsiella pneumoniae complex	27 (5.6%)
Pseudomonas aeruginosa	21 (4.3%)
Enterococcus faecalis	18 (3.7%)
Staphylococcus epidermidis	15 (3.1%)
Proteus mirabilis	12 (2.5%)
Candida albicans	11 (2.3%)
Others	119 (24.6%)
Total	484 (100.0%)

See Appendix D for the complete list of microorganisms reported



Antimicrobial resistance

Antimicrobial resistance data was collected for the following microorganisms and resistance markers:

- All Enterobacterales spp. / 3rd-generation cephalosporins (3CG) and carbapenems (the latter to determine if CRE)
- *S. aureus* / oxacillin (to determine if MRSA or MSSA)
- All *Enterococcus* spp. / vancomycin (to determine if VRE or VSE)
- *P. aeruginosa* / carbapenems

Table 27. Resistance

	Public	Private	National
N Enterobacterales spp.	115	11	126
% 3GC-R Enterobacterales spp.	7.2%	0.0%	6.7%
% CAR-R Enterobacterales spp.	1.0%	0.0%	1.0%
N Staphylococcus aureus	65	4	69
% OXA-R S. aureus	23.0%	33.3%	23.4%
% GLY-R S. aureus	0.0%	0.0%	0.0%
N Enterococcus spp.	48	4	52
% GLY-R Enterococcus spp.	17.8%	25.0%	18.4%
N Pseudomonas aeruginosa	21	0	21
% CAR-R P. aeruginosa	5.0%		5.0%
N PDR (all)	0	0	0

3GC, 3rd-Generation Cephalosporin; CAR, Carbapenem; OXA, Oxacillin; GLY, Glycopeptide; R, Resistant; PDR, Pan-Drug Resistant

Note: not all isolates were reported with results of susceptibility testing

Among 126 Enterobacterales spp. reported, 105 were tested for susceptibility to 3CG, of which seven (6.7%) were determined to be 3GC-resistant. Of 108 isolates tested for susceptibility to carbapenems, one (1.0%) was determined to be CRE (but susceptible to 3GC).

Of the 69 *S. aureus* isolates reported, 64 were tested for susceptibility to oxacillin, of which 15 (23.4%) were determined to be MRSA.

Of the 52 *Enterococcus* spp. reported, 49 were tested for susceptibility to vancomycin, of which nine (18.4%) were determined to be VRE.

Of the 21 *P. aeruginosa* isolates reported, 20 were tested for susceptibility to carbapenems, of which one (5.0%) was determined to be carbapenem-resistant.

No organisms were found to be pan-drug resistant in accordance with the protocol.

Antimicrobial use (AMU)

The PPS antimicrobial use (AMU) results should be reviewed in conjunction with the methodology and definitions used in this survey, which are available in the PPS Irish protocol 2023 version 2.0 at: https://www.hpsc.ie/a-z/microbiologyantimicrobialresistance/infectioncontrolandhai/surveillance/hospitalpointprevalencesurveys/2023/PPS_2023_Ireland_Protocol_Final_GDPRCompliant_v2.0.pdf

The characteristics of patients with AMU (i.e. receiving antimicrobials), including age and sex profile and presence of risk factors, are shown by hospital ownership in Table 28 and Figures 17 and 18 below. This data is also available by hospital type for HSE/public hospitals (see separate report).

Of the 12,650 eligible patients, 5,087 were found to be receiving systemic antimicrobials resulting in a national AMU prevalence of 40.2%.

This represents a small increase on the national antimicrobial use (AMU) prevalence in 2017 (39.7%).

At the time of the survey, 1,307 patients (25.7%) were prescribed two or more antimicrobials (see Table 20). Overall, 6,715 antimicrobials were reported, which comprised 6,530 antibacterials and 185 antifungals. The majority of patients (n=3780; 74.3%) on antimicrobials were receiving only one antimicrobial.

Of 5,087 patients receiving antimicrobials, 878 (17.3%) had an active HAI.

Table 28. Demographics of patients receiving antimicrobials, by hospital ownership

	Public	Private	National
N patients	11307	1343	12650
N receiving AMs	4441	646	5087
Of whom receives			
1 AM	3302	478	3780
2 AMs	893	152	1045
3 AMs	199	14	213
4 AMs	37	2	39
5 AMs	10	0	10
Total AMs	5883	832	6715
% receiving AMs (or AMU prev)	39.3%	48.1%	40.2%
Of which N has HAI	824	54	878
% Male	52.4%	52.2%	52.4%
% Aged >=65 years	58.7%	63.0%	59.2%
% Aged <10 years	5.4%	0.6%	4.8%
% had Surgery	19.7%	47.8%	23.3%
% with CVC	13.3%	10.8%	13.0%
% with Urinary catheter	21.3%	13.9%	20.3%
% Intubated	2.6%	0.8%	2.4%
McCabe score			
% McCabe: non-fatal	66.7%	79.9%	68%
% McCabe: life-limiting	28.0%	16.9%	26.6%
% McCabe: end-of-life	4.7%	2.8%	4.4%
Vaccination status against COVID-19			
% Fully vaccinated*	49.1%	84.8%	53.6%
% Partially vaccinated	0.8%	0.8%	0.8%
% Not vaccinated	7.2%	3.6%	6.7%
% Unknown	42.7%	10.8%	38.6%

AM, Antimicrobial; HAI, Healthcare-Associated Infection; CVC, Central Venous Catheter

*Full vaccination also includes those that have received one or two additional doses

Figure 17. Age and sex pyramid for acute hospital inpatients receiving antimicrobials

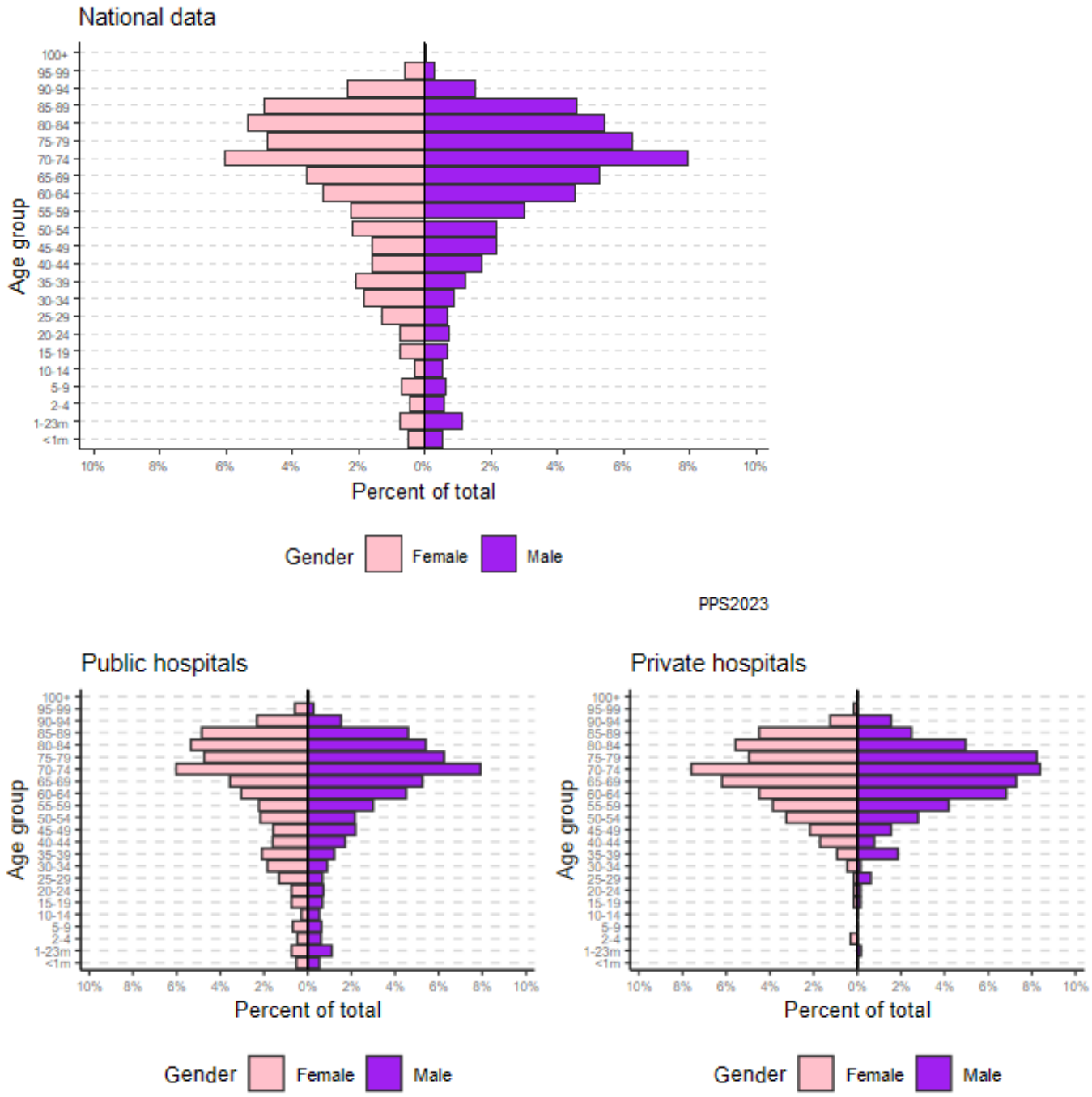
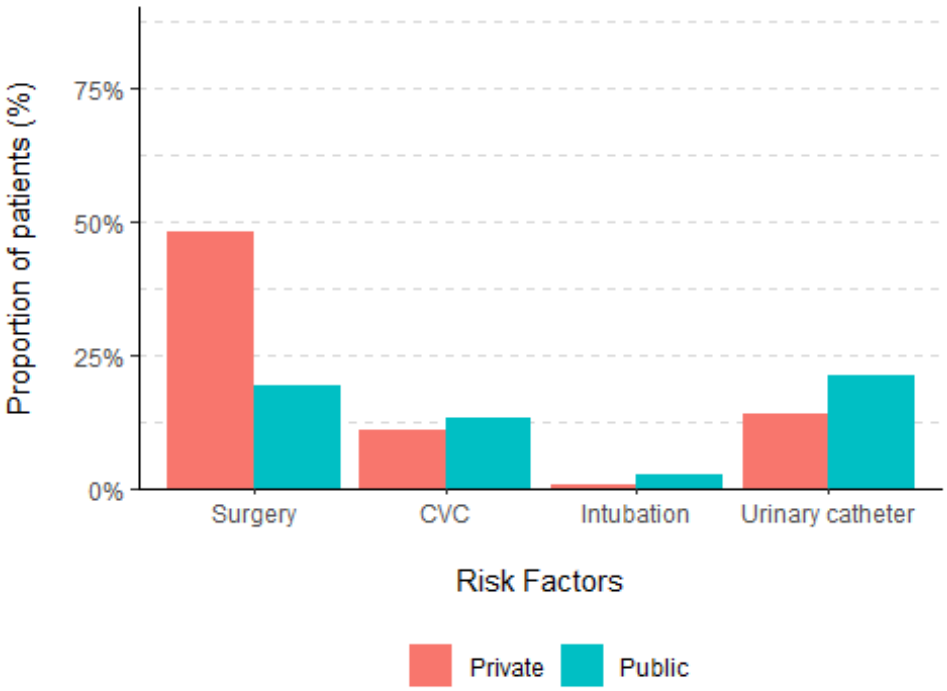


Figure 18. Risk factors for all patients receiving AMs, by hospital ownership



AMU prevalence

AMU prevalence by gender, age, McCabe score and weight

The prevalence of patients receiving antimicrobials, or with antimicrobial use (AMU), by gender, age and McCabe score is presented in Table 29.

Of the 5,087 patients with AMU, 52.4% (n=2,666) were male. The AMU prevalence was significantly higher (p<0.001) in males (42.9%) than in females (37.6%).

The majority of patients (n=4,769; 93.7%) with AMU were in adults aged >=18 years. The highest prevalence was in patients aged 65-74 years (45.6%), which was significantly higher (p=0.008) than in the reference group, patients aged 18-64 years (42.2%).

The underlying disease prognosis, as measured by the McCabe score, was also significantly associated with AMU prevalence (p<0.001). The highest AMU prevalence was reported for patients with rapidly fatal disease/end-of-life prognosis (47.5%).

Table 29. AMU Prevalence and Odds Ratios by gender, age group and McCabe score

Risk factor	Category	N patients	N AMU	AMU Prev (%)	Prev 95% CI	OR	OR 95% CI	P-value
Gender	*Female*	*6,424*	*2,415*	*37.6*	*36.4 , 38.8*			
	Male	6,208	2,666	42.9	41.7 , 44.2	1.24	1.15, 1.33	**<0.001**
Age group	<1m	440	47	10.7	7.8 , 13.6	0.16	0.12, 0.22	**<0.001**
	1-23m	231	83	35.9	29.7 , 42.1	0.77	0.58, 1.01	0.059
	2-17	461	185	40.1	35.7 , 44.6	0.93	0.77, 1.13	0.49
	18-64	*4,155*	*1,755*	*42.2*	*40.7 , 43.7*			
	65-74	2,367	1,080	45.6	43.6 , 47.6	1.15	1.04, 1.27	**0.008**
	75+	4,991	1,934	38.7	37.4 , 40.1	0.87	0.80, 0.94	**<0.001**
McCabe	*Non-fatal disease*	*9,029*	*3,476*	*38.5*	*37.5 , 39.5*			
	Ultimately fatal disease	3,082	1,352	43.9	42.1 , 45.6	1.25	1.15, 1.36	**<0.001**
	Rapidly fatal disease	474	225	47.5	43 , 52	1.44	1.20, 1.74	**<0.001**

N, Number; Prev, Prevalence; OR, Odds Ratio; CI, Confidence Interval

The number of patients (N patients) by gender, age group and McCabe score not always add up to 12,650, as responses that are unknown or not answered are excluded

Reference groups for OR calculation are highlighted in italics; significant p-values are highlighted in bold

AMU prevalence by surgery since admission and invasive device use (CVC, intubation and urinary catheter)

The prevalence of AMU by surgery since admission and use of invasive devices is presented in Table 30.

Of the 5,087 patients with AMU, 23.0% (n=1171) had a surgical procedure since their admission. Of these, 858 had an NHSN surgical procedure, with 313 having a non-NHSN procedure.

An NHSN procedure is one that takes place during a single visit to the operating room, where the surgeon makes at least one incision through the skin or mucous membrane, including by laparoscopic approach, and closes the incision before the patient leaves the operating room.

The AMU prevalence was significantly higher (p<0.001) in patients who had any type of surgery (NHSN, 50.1%; non-NHSN, 56.1%) than in those who had no surgery (37.7%).

The AMU prevalence in patients with any invasive device (CVC, intubation and urinary catheter) *in situ* was significantly higher than in those without such a invasive device (p<0.001).

Table 30. AMU Prevalence and Odds Ratios by surgery since admission and invasive device use (CVC, intubation and urinary catheter)

Risk factor	Category	N patients	N AMU	AMU Prev (%)	Prev 95% CI	OR	OR 95% CI	P-value
Surgery since admission	*No surgery*	*10,354*	*3,901*	*37.7*	*36.7 , 38.6*			
	NHSN surgery	1,714	858	50.1	47.7 , 52.4	1.66	1.50, 1.84	**<0.001**
	Non-NHSN surgery	558	313	56.1	52 , 60.2	2.11	1.78, 2.51	**<0.001**
CVC	*CVC absent*	*11,587*	*4,419*	*38.1*	*37.3 , 39*			
	CVC present	*1,053*	*662*	*62.9*	*59.9 , 65.8*	*2.76*	*2.42, 3.14*	***<0.001***
Intubation	Intubation absent	12,458	4,958	39.8	38.9 , 40.7			
	Intubation present	182	122	67.0	60.2 , 73.9	3.07	2.26, 4.22	**<0.001**
Urinary catheter (UC)	*UC absent*	*10,831*	*4,044*	*37.3*	*36.4 , 38.2*			
	UC present	1,805	1,034	57.3	55 , 59.6	2.25	2.03, 2.49	**<0.001**

N, Number; Prev, Prevalence; OR, Odds Ratio; CI, Confidence Interval

The number of patients (N patients) by risk factor does not always add up to 12,650, as responses that are unknown or not answered are excluded

Reference groups for OR calculation are highlighted in italics; significant p-values are highlighted in bold

AMU Prevalence by length-of-stay and birth weight (neonates aged <1 month)

The length-of-stay (LOS) prior to onset of AMU (or up to the date of the survey for patients with no AMU) was significantly associated with AMU prevalence.

Patients with a LOS of 4-7 days, the AMU prevalence (49.0%) was significantly higher (p=0.002) than those with a LOS of 1-3 days (45.0%), which was used as the reference group. For patients with LOS greater than 7 days, the prevalence of AMU decreased significantly (p<0.001).

Of 385 neonates for whom birth weight was provided, birth weight was normal (2.5-4.0 kg) for 267 (69.3%), low (<2.5 kg) for 85 (23.7%) and high (>4.0 kg) for 33 (8.6%).

The AMU prevalence was significantly higher for low birth weight neonates (20.0%; p=0.002) than for those of normal birth weight (7.5%), which were used as the reference group.

Table 31. AMU Prevalence and Odds Ratios by length-of-stay and birth weight (for neonates aged <1 month)

Risk factor	Category	N patients	N AMU	AMU Prev (%)	Prev 95% CI	OR	OR 95% CI	P-value
Length of stay	*0-3 days*	*5,471*	*2,463*	*45.0*	*43.7 , 46.3*			
	4-7 days	2,190	1,073	49.0	46.9 , 51.1	1.17	1.06, 1.30	**0.002**
	8-14 days	1,763	677	38.4	36.1 , 40.7	0.76	0.68, 0.85	**<0.001**
	15-21 days	905	293	32.4	29.3 , 35.4	0.58	0.50, 0.68	**<0.001**
	22+ days	2,319	581	25.1	23.3 , 26.8	0.41	0.37, 0.46	**<0.001**
Birth weight (neonates only)	*Normal*	*267*	*20*	*7.5*	*4.3 , 10.7*			
	Low	85	17	20.0	11.4 , 28.6	3.09	1.52, 6.22	**0.002**
	High	33	1	3.0	-2.9 , 9	0.39	0.02, 1.95	0.36

N, Number; Prev, Prevalence; OR, Odds Ratio; CI, Confidence Interval

Reference groups for OR calculation are highlighted in italics; significant p-values are highlighted in bold

AMU Prevalence by hospital ownership and hospital type

The prevalence of AMU by hospital ownership and type is presented in Table 32.

Of the 5,087 patients prescribed antimicrobials (i.e. with AMU), 4,441 (87.3%) were in public (or HSE) hospitals, while 646 (12.7%) were in private hospitals. The AMU prevalence was significantly lower (p<0.001) in public hospitals (39.3%) than in private hospitals (48.1%).

Among the different hospital types, the highest AMU prevalence was found in private hospitals (48.1%) followed by tertiary hospitals (42.1%); however, while the former was significantly higher (p<0.001) than in the reference group (secondary hospitals, 40.5%), the latter was not significant (p=0.12). The lowest AMU prevalence was in specialist hospitals (21.6%) followed by primary hospitals (33.5%). Both of these findings were significantly lower (p<0.001) than the reference group.

Table 32. AMU Prevalence and Odds Ratios by hospital ownership and hospital type

Risk factor	Category	N patients	N AMU	AMU Prev (%)	Prev 95% CI	OR	OR 95% CI	p-value
Hospital ownership	*Public*	*11,307*	*4,441*	*39.3*	*38.4 , 40.2*			
	Private	1,343	646	48.1	45.4 , 50.8	1.43	1.28, 1.60	**<0.001**
Hospital type	Tertiary	5,420	2,280	42.1	40.8 , 43.4	1.07	0.98, 1.16	0.12
	Secondary	*3,986*	*1,613*	*40.5*	*38.9 , 42*			
	Primary	648	217	33.5	29.9 , 37.1	0.74	0.62, 0.88	**<0.001**
	Paediatric	307	127	41.4	35.9 , 46.9	1.07	0.84, 1.35	0.59
	Specialist	946	204	21.6	18.9 , 24.2	0.40	0.34, 0.48	**<0.001**
	Private	1,343	646	48.1	45.4 , 50.8	1.36	1.20, 1.54	**<0.001**

N, Number; Prev, Prevalence; OR, Odds Ratio; CI, Confidence Interval

Reference groups for OR calculation are highlighted in italics; significant p-values are highlighted in bold

AMU prevalence by ward specialty

The AMU prevalence by ward specialty is shown in Table 33.

AMU prevalence was highest in intensive care medicine (adult ICUs) and neonatology wards (includes neonatal ICUs) at 70.4% and 51.0%, respectively. These were significantly higher (p<0.001) than in medical wards (40.7%), which were used as the reference group.

The lowest AMU prevalences were in rehabilitation (12.3%), neonatology (includes neonatal ICUs; 19.3%) and gynaecology/obstetric (19.6%) wards.

Table 33. AMU prevalence by ward specialty

Ward specialty	N patients	N AMU	AMU Prev (%)	Prev 95% CI	OR	OR 95% CI	P-value
Intensive care medicine	274	193	70.4	65 , 75.9	3.46	2.67, 4.54	**<0.001**
Surgical specialties	2,662	1,358	51.0	49.1 , 52.9	1.51	1.38, 1.66	**<0.001**
Paediatrics	569	252	44.3	40.2 , 48.4	1.17	0.98, 1.39	0.073
Mixed	1,028	444	43.2	40.2 , 46.2	1.11	0.97, 1.26	0.14
Medical specialties	*5,421*	*2,209*	*40.7*	*39.4 , 42.1*			
Other	625	236	37.8	34 , 41.6	0.88	0.74, 1.05	0.15
Geriatrics	650	140	21.5	18.4 , 24.7	0.40	0.33, 0.48	**<0.001**
Gynaecology/Obstetrics	929	182	19.6	17 , 22.1	0.35	0.30, 0.42	**<0.001**
Neonatology	207	40	19.3	13.9 , 24.7	0.35	0.24, 0.49	**<0.001**
Rehabilitation	252	31	12.3	8.2 , 16.4	0.20	0.14, 0.29	**<0.001**

N, Number; Prev, Prevalence; OR, Odds Ratio; CI, Confidence Interval

Reference group for OR calculation is highlighted in italics; significant p-values are highlighted in bold

Excluding 10 patients in psychiatry and 2 in long-term care

AMU Prevalence by patient specialty

The AMU prevalence for 27 patient specialties, each with over 100 patients, is shown in Table 34. These 27 specialties account for 94.6% of all patients surveyed (n=12,000), and 94.4% of all patients receiving antimicrobials (n=4,801).

Table 34. AMU Prevalence and Odds Ratios by patient specialty

Patient specialty	N patients	N AMU	AMU Prev (%)	Prev 95% CI	OR	OR 95% CI	P-value
Haematology	234	162	69.2	63.3 , 75.2	3.26	2.46, 4.36	**<0.001**
Infectious diseases	106	71	67.0	58 , 76	2.94	1.97, 4.48	**<0.001**
Vascular surgery	209	131	62.7	56.1 , 69.3	2.43	1.83, 3.26	**<0.001**
General surgery	918	552	60.1	57 , 63.3	2.19	1.89, 2.53	**<0.001**
Urology	201	118	58.7	51.9 , 65.5	2.06	1.55, 2.76	**<0.001**
Pneumology	367	208	56.7	51.6 , 61.8	1.90	1.53, 2.36	**<0.001**
ENT	116	59	50.9	41.7 , 60	1.50	1.04, 2.17	**0.031**
Digestive tract surgery	185	91	49.2	42 , 56.4	1.40	1.04, 1.89	**0.024**
Orthopaedics	843	398	47.2	43.8 , 50.6	1.30	1.12, 1.51	**<0.001**
Nephrology	250	114	45.6	39.4 , 51.8	1.22	0.94, 1.57	0.14
Cardio surgery	124	54	43.5	34.8 , 52.3	1.12	0.78, 1.60	0.54
Paediatrics general, not specialised	482	204	42.3	37.9 , 46.7	1.07	0.89, 1.30	0.47
Oncology	521	219	42.0	37.8 , 46.3	1.06	0.88, 1.27	0.54
General medicine	*3,976*	*1,623*	*40.8*	*39.3 , 42.3*			
Neurosurgery	138	52	37.7	29.6 , 45.8	0.88	0.61, 1.24	0.46
Gastroenterology	296	105	35.5	30 , 40.9	0.80	0.62, 1.02	0.071
Rheumatology	120	42	35.0	26.4 , 43.6	0.78	0.53, 1.14	0.20
Endocrinology	156	53	34.0	26.5 , 41.4	0.75	0.53, 1.04	0.089
Other medical	120	36	30.0	21.8 , 38.2	0.62	0.41, 0.91	**0.018**
Obstetrics /maternity	560	141	25.2	21.6 , 28.8	0.49	0.40, 0.59	**<0.001**
Neonatal ICU	101	25	24.8	16.3 , 33.2	0.48	0.30, 0.74	**0.001**
Orthopaedics and surgical traumatology	114	26	22.8	15.1 , 30.5	0.43	0.27, 0.66	**<0.001**
Geriatrics, care for the elderly	793	168	21.2	18.3 , 24	0.39	0.32, 0.47	**<0.001**
Cardiology	472	93	19.7	16.1 , 23.3	0.36	0.28, 0.45	**<0.001**
Neurology	159	29	18.2	12.2 , 24.3	0.32	0.21, 0.48	**<0.001**
Rehabilitation	179	17	9.5	5.2 , 13.8	0.15	0.09, 0.24	**<0.001**
Healthy neonates (maternity)	260	10	3.8	1.5 , 6.2	0.06	0.03, 0.10	**<0.001**

N, Number; Prev, Prevalence; OR, Odds Ratio; CI, Confidence Interval

Reference group for OR calculation is highlighted in italics; significant p-values are highlighted in bold

AMU prevalence across the top 27 patient specialties ranged from 3.8% in healthy neonates to 69.2% in haematology patients.

The patient specialty 'General medicine' accounted for almost one-in three patients (n=3,976; 31.4%) and was used as the reference group. Among this group, 1,623 patients were receiving antimicrobials, accounting for 32.4% of all patients receiving antimicrobials, with an AMU prevalence of 40.8%.

AMU Prevalence among ICU patients vs non-ICU patients

A total of 394 patients were determined to be in ICU at the time of the survey. This combines the total for intensive care medicine (adults) with paediatric and neonatal ICUs that are included in paediatrics and neonatology, respectively.

The AMU prevalence in ICU patients was 58.9% indicating that almost three-in-five ICU patients were receiving antimicrobials at the time of the survey. This was significantly higher (p<0.001) that in non-ICU patients (39.6%).

A separate report on ICU patients is being prepared.

Table 35. AMU Prevalence and Odds Ratios among ICU patients vs non-ICU patients

Patient location	N patients	N AMU	AMU Prev (%)	Prev 95% CI	OR	OR 95% CI	p-value
Non-ICU	*12,256*	*4,855*	*39.6*	*38.7 , 40.5*			
ICU	394	232	58.9	54 , 63.7	2.18	1.78, 2.68	**<0.001**

N, Number; Prev, Prevalence; OR, Odds Ratio; CI, Confidence Interval

Reference group for OR calculation is highlighted in italics; significant p-values are highlighted in bold

Overview of antimicrobial classes prescribed

Table 36 gives an overview of the top 10 antimicrobial classes, which is the overall grouping of antimicrobial agents into their respective classes, prescribed in public and private hospitals, and at the national level. The full list can be seen in Appendix E.

Penicillins are by far the most commonly used antimicrobial class, accounting for over one-in-three (or 37.1%) prescriptions.

Table 36. AMU prevalence by antimicrobial class, top 10, by hospital ownership

Rank	Public				Private				National			
	AM class	n	%	Prev	AM class	n	%	Prev	AM class	n	%	Prev
1	Penicillins	2,213	37.6%	19.6%	Penicillins	275	33.1%	20.5%	Penicillins	2,488	37.1%	19.7%
2	3GCs	319	5.4%	2.8%	2GCs	160	19.2%	11.9%	2GCs	409	6.1%	3.2%
3	Macrolides	319	5.4%	2.8%	Aminoglycosides	42	5.0%	3.1%	Macrolides	359	5.3%	2.8%
4	Beta-lact-R penicillins	296	5.0%	2.6%	Glycopeptides	40	4.8%	3.0%	3GCs	355	5.3%	2.8%
5	2GCs	249	4.2%	2.2%	Macrolides	40	4.8%	3.0%	Beta-lact-R penicillins	335	5.0%	2.6%
6	Sulfonamides and trimethoprim	245	4.2%	2.2%	Beta-lact-R penicillins	39	4.7%	2.9%	Glycopeptides	283	4.2%	2.2%
7	Glycopeptides	243	4.1%	2.1%	3GCs	36	4.3%	2.7%	Sulfonamides and trimethoprim	276	4.1%	2.2%
8	Carbapenems	235	4.0%	2.1%	Imidazoles	33	4.0%	2.5%	Carbapenems	246	3.7%	1.9%
9	Imidazoles	209	3.6%	1.8%	Sulfonamides and trimethoprim	31	3.7%	2.3%	Imidazoles	242	3.6%	1.9%
10	Quinolones	175	3.0%	1.5%	Quinolones	24	2.9%	1.8%	Quinolones	199	3.0%	1.6%

AM, antimicrobial; n, number of patients prescribed this antimicrobial; %, proportion of all antimicrobial prescribed; Prev, prevalence (%) in the overall population; 2GC/3GC, 2nd/3rd generation cephalosporins

See Appendix E for the complete list of antimicrobial classes prescribed

Overview of indiviudal antimicrobials prescribed

Table 37 gives an overview of the top 10 individual antimicrobials prescribed in public and private hospitals, and at the national level. The full list can be seen in Appendix F.

At the time the survey was conducted, 97 different antimicrobials were prescribed, with the top 10 antimicrobials collectively accounting for over two-thirds (68.7%) of all prescriptions.

The most commonly prescribed antimicrobials were amoxicillin/clavulanic acid and piperacillin/tazobactam (both beta-lactam/beta-lactam inhibitor combinations) together accounted for 2,487 (37.1%) of all prescriptions. Each of these had a prevalence in the study population of approximately 10% (10.0% and 9.7%, respectively), indicating that almost 1 in 10 patients were receiving one of these antimicrobials at the time of the study.

Since the previous survey in 2017, the prevalence of piperacillin/tazobactam use has increased (up from 8.0%), while amoxicillin/clavulanic acid decreased (down from 11.3%).

Compared with PPS 2017, ceftriaxone is now among the top 10 antimicrobials used, with its prevalence having increased from 1.2% to 2.1%); while ciprofloxacin has dropped out of the top 10, with its prevalence having decreased from 2.7% to 1.3%.

The prevalence of meropenem use has increased from 1.6% in 2017 to 1.9% in 2023.

Table 37. AMU prevalence by specific antimicrobial, top 10, by hospital ownership

Rank	Public				Private				National			
	Antimicrobial	n	%	Prev	Antimicrobial	n	%	Prev	Antimicrobial	n	%	Prev
1	Piperacillin/ tazobactam	1,127	19.2%	10.0%	Amoxicillin/ clavulanic acid	176	21.2%	13.1%	Amoxicillin/ clavulanic acid	1,261	18.8%	10.0%
2	Amoxicillin/ clavulanic acid	1,085	18.4%	9.6%	Cefuroxime	159	19.1%	11.8%	Piperacillin/ tazobactam	1,226	18.3%	9.7%
3	Flucloxacillin	294	5.0%	2.6%	Piperacillin/ tazobactam	99	11.9%	7.4%	Cefuroxime	403	6.0%	3.2%
4	Cefuroxime	244	4.1%	2.2%	Gentamicin	42	5.0%	3.1%	Flucloxacillin	332	4.9%	2.6%
5	Ceftriaxone	237	4.0%	2.1%	Flucloxacillin	38	4.6%	2.8%	Vancomycin - parenteral	262	3.9%	2.1%
6	Meropenem	227	3.9%	2.0%	Vancomycin - parenteral	38	4.6%	2.8%	Ceftriaxone	260	3.9%	2.1%
7	Vancomycin - parenteral	224	3.8%	2.0%	Metronidazole - parenteral	33	4.0%	2.5%	Metronidazole - parenteral	242	3.6%	1.9%
8	Metronidazole - parenteral	209	3.6%	1.8%	Ceftriaxone	23	2.8%	1.7%	Meropenem	238	3.5%	1.9%
9	Clarithromycin	180	3.1%	1.6%	Ciprofloxacin	23	2.8%	1.7%	Clarithromycin	197	2.9%	1.6%
10	Sulfamethoxazole/ trimethoprim	177	3.0%	1.6%	Azithromycin	22	2.6%	1.6%	Sulfamethoxazole/ trimethoprim	192	2.9%	1.5%

Indication for antimicrobial use

Table 38 shows the prescriber's indication for use of the antimicrobial. The reason for the prescription in the patient's notes was only documented for 90.7% of cases.

Table 38. AMU treatment, by hospital ownership

	Public	Private	Total
Total AMs prescribed	5883	832	6715
Prescriber's indication for AM use			
Reason in notes	5348 (90.9%)	742 (89.2%)	6090 (90.7%)
Treatment of infection:	4909 (83.4%)	454 (54.6%)	5363 (79.9%)
Acute hospital	1213 (20.6%)	78 (9.4%)	1291 (19.2%)
Community	3510 (59.7%)	372 (44.7%)	3882 (57.8%)
LTCF	186 (3.2%)	4 (0.5%)	190 (2.8%)
Surgical prophylaxis (SP):	405 (6.9%)	273 (32.8%)	678 (10.1%)
SP, single dose	148 (2.5%)	93 (11.2%)	241 (3.6%)
SP, one day	122 (2.1%)	115 (13.8%)	237 (3.5%)
SP, > one day	135 (2.3%)	65 (7.8%)	200 (3.0%)
Medical prophylaxis	469 (8.0%)	68 (8.2%)	537 (8.0%)
Unknown indication/reason	51 (0.9%)	18 (2.2%)	69 (1.0%)
Other	44 (0.7%)	17 (2.0%)	61 (0.9%)
Unknown	5 (0.1%)	2 (0.2%)	7 (0.1%)

Treatment of infection

The majority (n=5363; 79.9%) of prescriptions were for the treatment of infection. Community infections accounted for 57.8% of all antimicrobial infections prescribed, followed by infections in hospital (19.2%) and long-term care facilities (2.8%).

Surgical prophylaxis

Surgical prophylaxis (SP) accounted for just over one-in-ten antimicrobial prescriptions (10.1%), which is an increase on PPS 2017 (9.5%).

Although 64.5% of all prescriptions still exceed a single dose, this represents a decrease from 69.4% in 2017. Of note, SP exceeding 24 hours accounted for 29.5% of these prescriptions, which is a reduction compared to PPS 2017 (35.9%) and PPS 2012 (46.7%).

SP accounted for 32.8% of prescriptions in private hospitals compared with 6.9% in public hospitals. This reflects the higher proportion of patients in private hospitals who had undergone a surgical procedure

prior to the date of the survey; and perhaps the type of procedure with more elective surgery carried out in private hospitals.

Medical prophylaxis

Medical prophylaxis (MP) accounted for 8.0% of all prescriptions. This represents a decrease on PPS 2017 (9.2%)

Treatment of infection by prescriber's diagnosis site

A breakdown of prescriptions for treatment of infection by diagnosis site and by hospital ownership is shown in Table 39.

Table 39. Antimicrobial treatment of infection by diagnosis site, by hospital ownership

Rank	Public (n = 4909)		Private (n = 454)		National (n = 5363)	
	Diagnosis code	n (%)	Diagnosis code	n (%)	Diagnosis code	n (%)
1	PNEU	1,392 (28.4%)	PNEU	97 (21.4%)	PNEU	1,489 (27.8%)
2	IA	539 (11.0%)	IA	66 (14.5%)	IA	605 (11.3%)
3	SST-O	528 (10.8%)	SST-O	47 (10.4%)	SST-O	575 (10.7%)
4	BRON	372 (7.6%)	BRON	42 (9.3%)	BRON	414 (7.7%)
5	CYS	314 (6.4%)	CYS	28 (6.2%)	CYS	342 (6.4%)
6	PYE	233 (4.7%)	SST-SSI	27 (5.9%)	PYE	253 (4.7%)
7	BAC	195 (4.0%)	GI	22 (4.8%)	BAC	216 (4.0%)
8	GI	181 (3.7%)	BAC	21 (4.6%)	GI	203 (3.8%)
9	BJ-O	161 (3.3%)	PYE	20 (4.4%)	BJ-O	177 (3.3%)
10	CSEP	161 (3.3%)	BJ-O	16 (3.5%)	CSEP	174 (3.2%)
11	FN	124 (2.5%)	BJ-SSI	13 (2.9%)	FN	136 (2.5%)
12	SST-SSI	109 (2.2%)	CSEP	13 (2.9%)	SST-SSI	136 (2.5%)
13	BJ-SSI	107 (2.2%)	FN	12 (2.6%)	BJ-SSI	120 (2.2%)
14	SIRS	95 (1.9%)	ENT	9 (2.0%)	ENT	103 (1.9%)
15	ENT	94 (1.9%)	UND	9 (2.0%)	SIRS	97 (1.8%)
16	CNS	81 (1.7%)	CVS	5 (1.1%)	CNS	83 (1.5%)
17	OBGY	65 (1.3%)	CNS	2 (0.4%)	OBGY	65 (1.2%)
18	UND	51 (1.0%)	GUM	2 (0.4%)	UND	60 (1.1%)
19	CVS	48 (1.0%)	SIRS	2 (0.4%)	CVS	53 (1.0%)
20	CF	28 (0.6%)	ASB	1 (0.2%)	CF	28 (0.5%)
21	GUM	12 (0.2%)			GUM	14 (0.3%)
22	ASB	8 (0.2%)			ASB	9 (0.2%)
23	UNK	7 (0.1%)			UNK	7 (0.1%)
24	EYE	4 (0.1%)			EYE	4 (0.1%)

ASB, Asymptomatic bacteriuria; BAC, Laboratory-confirmed bacteraemia; BJ-O, Septic arthritis, osteomyelitis, not related to surgery; BJ-SSI, Septic arthritis, osteomyelitis of surgical site; BRON, bronchitis; CF, Cystic fibrosis; CNS, Infections of the central nervous system; CSEP, Clinical sepsis (suspected bloodstream infection without lab confirmation/results are not available, no blood cultures collected or negative blood culture), excluding febrile neutropenia; CVS, Cardiovascular infections: endocarditis, vascular graft; CYS, Symptomatic lower urinary tract infection (e.g. cystitis); ENT, Infections of ear, nose, throat, larynx and mouth; EYE, Endophthalmitis; FN, Febrile neutropenia or other form of manifestation of infection in immunocompromised host (e.g. HIV, chemotherapy, etc) with no clear anatomical site; GI, Gastrointestinal infections (e.g. salmonellosis, antibiotic-associated diarrhoea); GUM,Prostatitis, epididymo- orchitis, STD in men; IA, Intra-abdominal sepsis, including hepatobiliary; OBGY, Obstetric or gynaecological infections, STD in women; PNEU, Pneumonia; PYE, Symptomatic upper urinary tract infection (e.g. pyelonephritis); SIRS, Systemic inflammatory response with no clear anatomical site; SST-O, Cellulitis, wound, deep soft tissue not involving bone, not related to surgery; SST-SSI, Surgical site infection involving skin or soft tissue but not bone; UND, Completely undefined; site with no systemic inflammation

The top 5 diagnosis sites for treatment of infection was the same across both public and private hospitals:

- Pneumonia (PNEU) was by far the commonest type of infection (public, 28.4%; private, 21.4%; and national, 27.8%)
- Intraabdominal (IA) infections
- Skin and soft tissue (SST-O) infections
- Bronchitis (BRON)
- Cystitis (CYS)

At the national level, these five diagnosis sites accounted for 63.9% of all infections in this survey.

Further breakdown of prescriptions for treatment of infection by diagnosis site and origin of infection (i.e. community, hospital and LTCF) is shown in Table 40.

Pneumonia (PNEU) was by far the commonest type of infection across all three (26.1%, 31.1% and 40.0%, respectively).

Among community infections, skin and soft tissue (SST-O) and intra-abdominal (IA) infections were the second and third commonest infection types (12.9% and 12.8%, respectively).

Among hospital infections, cystitis (CYS) and surgical site infections (SST-SSI) were the second and third commonest infection types (8.1% and 7.9%, respectively).

Among LTCF infections, cystitis was the second commonest infection type (11.6%), followed by pyelonephritis (9.5%).

Table 40. Antimicrobial treatment of infection by diagnosis site, for community, hospital and LTCF infections

Rank	Community (n = 3882)		Hospital (n = 1291)		LTCF (n = 190)	
	Diagnosis code	n (%)	Diagnosis code	n (%)	Diagnosis code	n (%)
1	PNEU	1,012 (26.1%)	PNEU	401 (31.1%)	PNEU	76 (40.0%)
2	SST-O	499 (12.9%)	CYS	105 (8.1%)	CYS	22 (11.6%)
3	IA	497 (12.8%)	SST-SSI	102 (7.9%)	PYE	18 (9.5%)
4	BRON	364 (9.4%)	IA	94 (7.3%)	BRON	15 (7.9%)
5	CYS	215 (5.5%)	CSEP	89 (6.9%)	IA	14 (7.4%)
6	PYE	200 (5.2%)	BAC	86 (6.7%)	SST-O	12 (6.3%)
7	BJ-O	163 (4.2%)	SST-O	64 (5.0%)	BAC	10 (5.3%)
8	GI	136 (3.5%)	GI	62 (4.8%)	CSEP	7 (3.7%)
9	BAC	120 (3.1%)	BJ-SSI	54 (4.2%)	GI	5 (2.6%)
10	FN	86 (2.2%)	FN	50 (3.9%)	BJ-O	2 (1.1%)
11	ENT	85 (2.2%)	BRON	35 (2.7%)	CVS	2 (1.1%)
12	CSEP	78 (2.0%)	PYE	35 (2.7%)	SIRS	2 (1.1%)
13	BJ-SSI	65 (1.7%)	SIRS	33 (2.6%)	SST-SSI	2 (1.1%)
14	CNS	65 (1.7%)	CNS	18 (1.4%)	UND	2 (1.1%)
15	SIRS	62 (1.6%)	ENT	18 (1.4%)	BJ-SSI	1 (0.5%)
16	OBGY	55 (1.4%)	BJ-O	12 (0.9%)		
17	UND	48 (1.2%)	OBGY	10 (0.8%)		
18	CVS	47 (1.2%)	UND	10 (0.8%)		
19	SST-SSI	32 (0.8%)	ASB	7 (0.5%)		
20	CF	28 (0.7%)	CVS	4 (0.3%)		
21	GUM	14 (0.4%)	EYE	1 (0.1%)		
22	UNK	6 (0.2%)	UNK	1 (0.1%)		
23	EYE	3 (0.1%)				
24	ASB	2 (0.1%)				

ASB, Asymptomatic bacteriuria; BAC, Laboratory-confirmed bacteraemia; BJ-O, Septic arthritis, osteomyelitis, not related to surgery; BJ-SSI, Septic arthritis, osteomyelitis of surgical site; BRON, bronchitis; CF, Cystic fibrosis; CNS, Infections of the central nervous system; CSEP, Clinical sepsis (suspected bloodstream infection without lab confirmation/results are not available, no blood cultures collected or negative blood culture), excluding febrile neutropenia; CVS, Cardiovascular infections: endocarditis, vascular graft; CYS, Symptomatic lower urinary tract infection (e.g. cystitis); ENT, Infections of ear, nose, throat, larynx and mouth; EYE, Endophthalmitis; FN, Febrile neutropenia or other form of manifestation of infection in immunocompromised host (e.g. HIV, chemotherapy, etc) with no clear anatomical site; GI, Gastrointestinal infections (e.g. salmonellosis, antibiotic-associated diarrhoea); GUM,Prostatitis, epididymo- orchitis, STD in men; IA, Intra-abdominal sepsis, including hepatobiliary; OBGY, Obstetric or gynaecological infections, STD in women; PNEU, Pneumonia; PYE, Symptomatic upper urinary tract infection (e.g. pyelonephritis); SIRS, Systemic inflammatory response with no clear anatomical site; SST-O, Cellulitis, wound, deep soft tissue not involving bone, not related to surgery; SST-SSI, Surgical site infection involving skin or soft tissue but not bone; UND, Completely undefined; site with no systemic inflammation

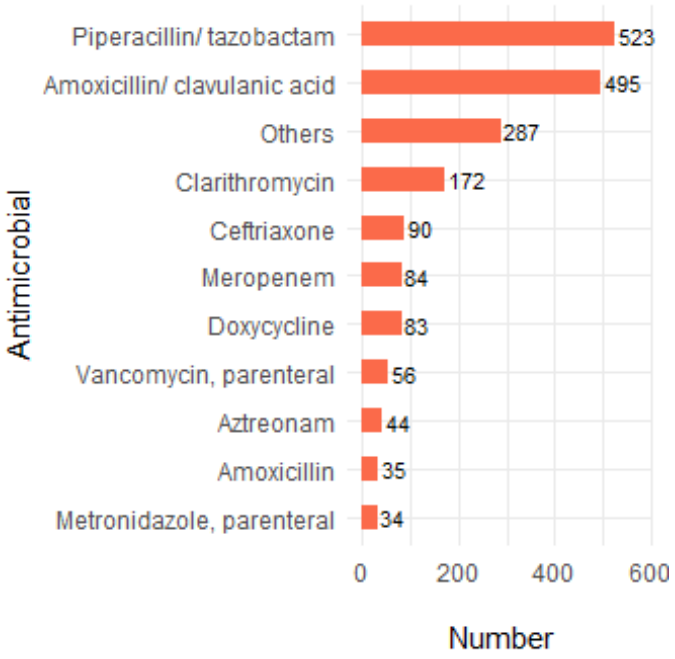
Antimicrobials prescribed to treat specific infection types:

Respiratory tract infections

Piperacillin/tazobactam (n=523) and amoxicillin/clavulanic acid (n=495) were the two most common antimicrobials used to treat respiratory tract infections (bronchitis and pneumonia), together accounting for 52.5% all antimicrobials prescribed.

Table 41/Figure 19. Top 10 antimicrobials prescribed for respiratory tract infections [bronchitis (BRON) and pneumonia (PNEU); n=1,903]

Antimicrobial	n	%
Piperacillin/ tazobactam	523	27.5%
Amoxicillin/ clavulanic acid	495	26.0%
Clarithromycin	172	9.0%
Ceftriaxone	90	4.7%
Meropenem	84	4.4%
Doxycycline	83	4.4%
Vancomycin, parenteral	56	2.9%
Aztreonam	44	2.3%
Amoxicillin	35	1.8%
Metronidazole, parenteral	34	1.8%
Others	287	15.1%
Total	1,903	100.0%

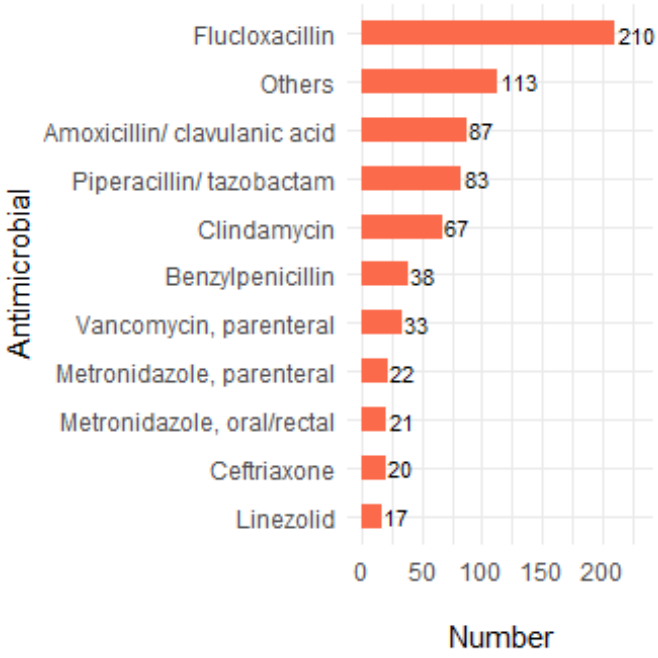


Skin/soft tissue and surgical site infections (SST/SSI)

Flucloxacillin (n=210) was the most common antimicrobial used for the treatment of skin/soft tissue and surgical site infections, accounting for 29.5% of all antimicrobials prescribed.

Table 42/Figure 20. Top 10 antimicrobials prescribed for skin/soft tissue and surgical site infections (SST/SSI; n=711)

Antimicrobial	n	%
Flucloxacillin	210	29.5%
Amoxicillin/ clavulanic acid	87	12.2%
Piperacillin/ tazobactam	83	11.7%
Clindamycin	67	9.4%
Benzylpenicillin	38	5.3%
Vancomycin, parenteral	33	4.6%
Metronidazole, parenteral	22	3.1%
Metronidazole, oral/rectal	21	3.0%
Ceftriaxone	20	2.8%
Linezolid	17	2.4%
Others	113	15.9%
Total	711	100.0%

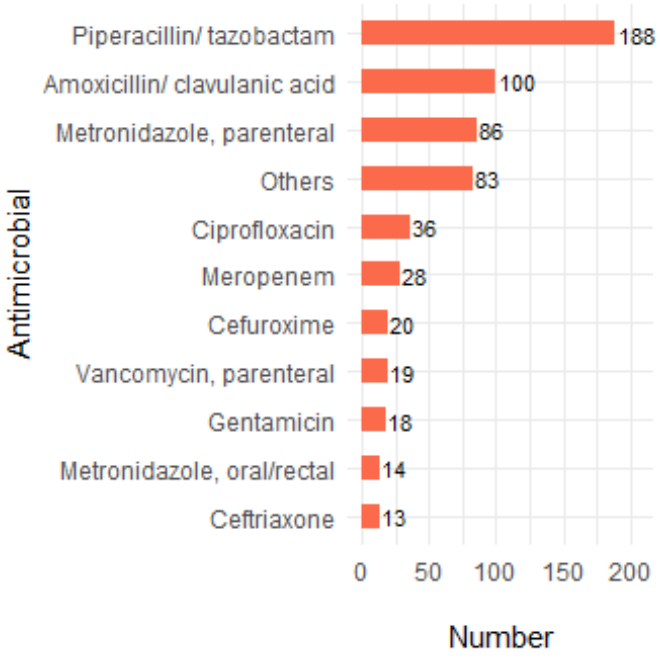


Intraabdominal infections

Piperacillin/tazobactam (n=188), amoxicillin/clavulanic acid (n=100) and metronidazole-parenteral (n=86) were the three most common antimicrobials used for the treatment of intra-abdominal infections, together accounting for 61.8% of all antimicrobials prescribed.

Table 43/Figure 21. Top 10 antimicrobials prescribed for intra-abdominal infections (IAI, n=605)

Antimicrobial	n	%
Piperacillin/ tazobactam	188	31.1%
Amoxicillin/ clavulanic acid	100	16.5%
Metronidazole, parenteral	86	14.2%
Ciprofloxacin	36	6.0%
Meropenem	28	4.6%
Cefuroxime	20	3.3%
Vancomycin, parenteral	19	3.1%
Gentamicin	18	3.0%
Metronidazole, oral/rectal	14	2.3%
Ceftriaxone	13	2.1%
Others	83	13.7%
Total	605	100.0%

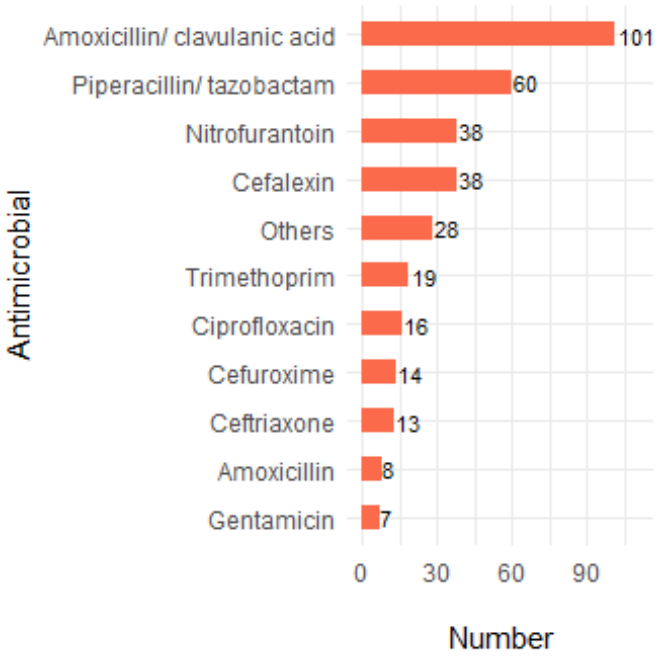


Lower urinary tract infections (symptomatic)

Amoxicillin/clavulanic acid (n=101) and piperacillin/tazobactam (n=60) were the two most common antimicrobials used for the treatment of symptomatic lower urinary tract infections (or cystitis), together accounting for 47.0% of all antimicrobials prescribed.

Table 44/Figure 22. Top 10 antimicrobials prescribed for symptomatic lower urinary tract infections [cystitis (CYS); n=342]

Antimicrobial	n	%
Amoxicillin/ clavulanic acid	101	29.5%
Piperacillin/ tazobactam	60	17.5%
Cefalexin	38	11.1%
Nitrofurantoin	38	11.1%
Trimethoprim	19	5.6%
Ciprofloxacin	16	4.7%
Cefuroxime	14	4.1%
Ceftriaxone	13	3.8%
Amoxicillin	8	2.3%
Gentamicin	7	2.0%
Others	28	8.2%
Total	342	100.0%

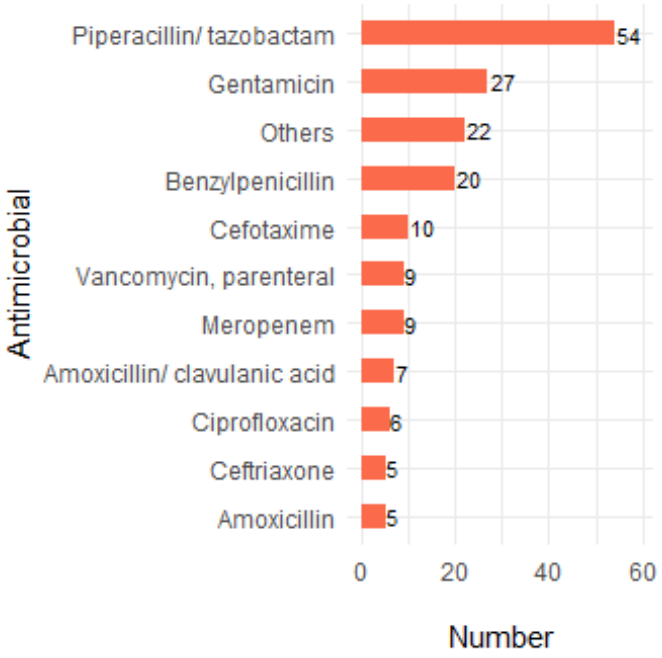


Clinical sepsis

Piperacillin/tazobactam (n=54) followed by gentamicin (n=27) and benzylpenicillin (n=20) were the three most common antimicrobials used for the treatment of clinical sepsis, together accounting for 48.0% of all antimicrobials prescribed.

Table 45/ Figure 23. Top 10 antimicrobials prescribed for clinical sepsis (CSEP; n=174)

Antimicrobial	n	%
Piperacillin/ tazobactam	54	31.0%
Gentamicin	27	15.5%
Benzylpenicillin	20	11.5%
Cefotaxime	10	5.7%
Meropenem	9	5.2%
Vancomycin, parenteral	9	5.2%
Amoxicillin/ clavulanic acid	7	4.0%
Ciprofloxacin	6	3.4%
Amoxicillin	5	2.9%
Ceftriaxone	5	2.9%
Others	22	12.6%
Total	174	100.0%

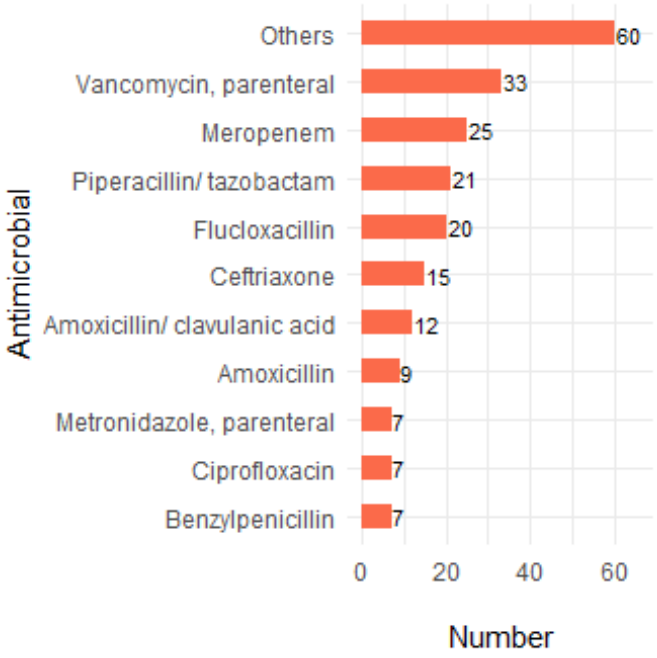


Bacteraemia

Vancomycin-parenteral (n=33) followed by meropenem (n=25) and piperacillin/tazobactam (n=21) were the three most common antimicrobials used for the treatment of bacteraemia, together accounting for 36.6% of all antimicrobials prescribed.

Table 46/Figure 24. Top 10 antimicrobials prescribed for bacteraemia (BAC; n=216)

Antimicrobial	n	%
Vancomycin, parenteral	33	15.3%
Meropenem	25	11.6%
Piperacillin/ tazobactam	21	9.7%
Flucloxacillin	20	9.3%
Ceftriaxone	15	6.9%
Amoxicillin/ clavulanic acid	12	5.6%
Amoxicillin	9	4.2%
Benzylpenicillin	7	3.2%
Ciprofloxacin	7	3.2%
Metronidazole, parenteral	7	3.2%
Others	60	27.8%
Total	216	100.0%

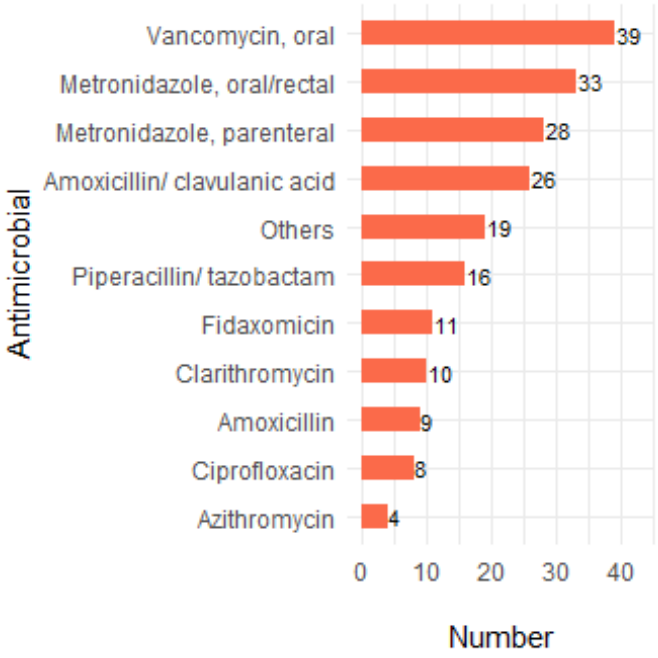


Gastrointestinal infections

Vancomycin-oral (n=39) followed by metronidazole-oral/rectal (n=33), metronidazole-parenteral (n=28) and amoxicillin/clavulanic (n=26) were the four most common antimicrobials used for the treatment of gastrointestinal infections, together accounting for 62.1% of all antimicrobials prescribed.

Table 47/Figure 25. Top 10 antimicrobials prescribed for gastrointestinal infections (GI; n=203)

Antimicrobial	n	%
Vancomycin, oral	39	19.2%
Metronidazole, oral/rectal	33	16.3%
Metronidazole, parenteral	28	13.8%
Amoxicillin/ clavulanic acid	26	12.8%
Piperacillin/ tazobactam	16	7.9%
Fidaxomicin	11	5.4%
Clarithromycin	10	4.9%
Amoxicillin	9	4.4%
Ciprofloxacin	8	3.9%
Azithromycin	4	2.0%
Others	19	9.4%
Total	203	100.0%



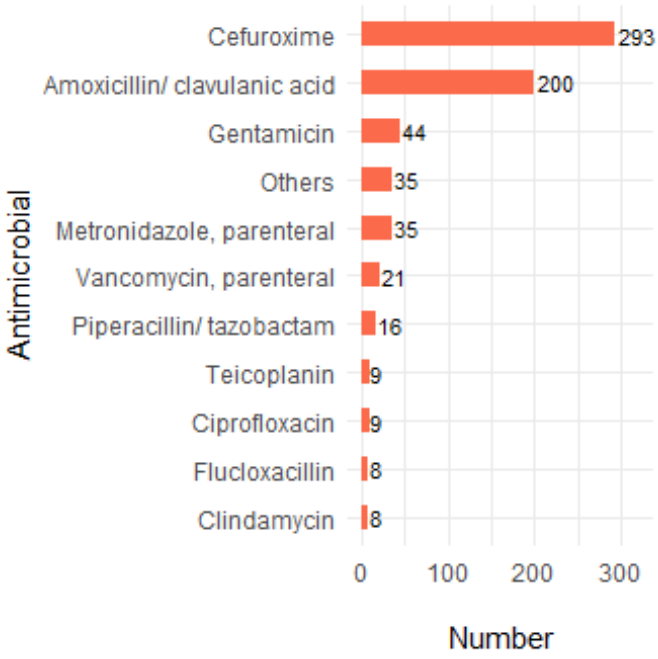
Antimicrobials prescribed for surgical and medical prophylaxis

Surgical prophylaxis

Table 48 and Figure 26 show a breakdown of the top 10 antimicrobials used for surgical prophylaxis. The two most commonly prescribed antimicrobials were cefuroxime (43.2%) and amoxicillin/clavulanic acid (29.5%), which together accounted for almost three-quarters of all prescriptions. This represents an increase for cefuroxime (from 33.9%) and a decrease for amoxicillin/clavulanic acid (from 37.9%) in PPS 2017.

Table 48/Figure 26. Top 10 antimicrobials prescribed for surgical prophylaxis (SP; n=678)

Antimicrobial	n	%
Cefuroxime	293	43.2%
Amoxicillin/ clavulanic acid	200	29.5%
Gentamicin	44	6.5%
Metronidazole, parenteral	35	5.2%
Vancomycin, parenteral	21	3.1%
Piperacillin/ tazobactam	16	2.4%
Ciprofloxacin	9	1.3%
Teicoplanin	9	1.3%
Clindamycin	8	1.2%
Flucloxacillin	8	1.2%
Others	35	5.2%
Total	678	100.0%

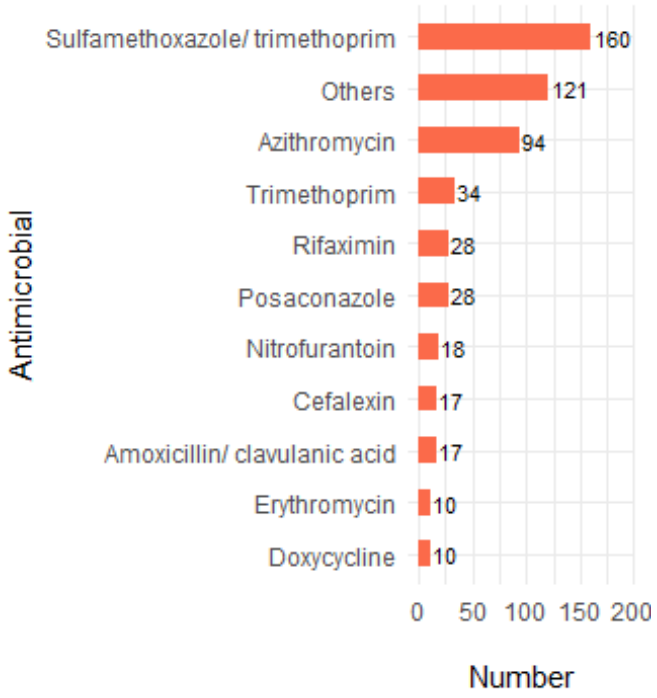


Medical prophylaxis

Table 49 and Figure 27 show a breakdown of the top 10 antimicrobials used for medical prophylaxis. As in PPS 2017, the two most commonly prescribed antimicrobials were sulfamethoxazole/trimethoprim (or co-trimoxazole; 29.8%) and azithromycin (17.5%), which together accounted for just over 45% of all prescriptions, which represents an increase from 38% in the last survey.

Table 49/Figure 27. Top 10 antimicrobials prescribed for medical prophylaxis (MP; n=537)

Antimicrobial	n	%
Sulfamethoxazole/ trimethoprim	160	29.8%
Azithromycin	94	17.5%
Trimethoprim	34	6.3%
Posaconazole	28	5.2%
Rifaximin	28	5.2%
Nitrofurantoin	18	3.4%
Amoxicillin/ clavulanic acid	17	3.2%
Cefalexin	17	3.2%
Doxycycline	10	1.9%
Erythromycin	10	1.9%
Others	121	22.5%
Total	537	100.0%



Route of administration of antimicrobials

Table 50 shows the route of administration for 6,711 antimicrobials prescribed. The majority (n=4,698; 70%) were prescribed parenterally, or intravenously. Compared with PPS 2017, this represents an increase from 63.0%; while antimicrobials taken orally have decreased from 36.7% to 29.4%.

Table 50. AMU treatment route, by hospital ownership

	Public	Private	National
Parenteral	4,070 (69.2%)	628 (75.5%)	4,698 (70.0%)
Oral	1,779 (30.3%)	197 (23.7%)	1,976 (29.4%)
Inhalation	23 (0.4%)	2 (0.2%)	25 (0.4%)
Rectal	7 (0.1%)	5 (0.6%)	12 (0.2%)
Total	5,879 (100.0%)	832 (100.0%)	6,711 (100.0%)

Data not provided for four antimicrobials

Treatment change

Table 51 looks at any change to the original treatment. The majority (72.2%) of antimicrobials were unchanged at the time of the PPS. This represents an increase from 67.5% in PPS 2017.

Of the remainder, 14.9% required escalation to a more broad-spectrum antimicrobial; while 5.7% required a de-escalation to a more narrow-spectrum antimicrobial. A further 4.1% were switched from parenteral to oral treatment. Adverse reactions, resulting in a change of antimicrobial, accounted for 0.5% of all prescriptions.

Table 51. AMU treatment change, by hospital ownership

	Public	Private	National
No change	4,124 (70.8%)	668 (82.4%)	4,792 (72.2%)
Escalation	916 (15.7%)	74 (9.1%)	990 (14.9%)
De-escalation	349 (6.0%)	29 (3.6%)	378 (5.7%)
Switch	245 (4.2%)	30 (3.7%)	275 (4.1%)
Adverse effects	27 (0.5%)	6 (0.7%)	33 (0.5%)
Unknown reason	27 (0.5%)	1 (0.1%)	28 (0.4%)
Unknown	136 (2.3%)	3 (0.4%)	139 (2.1%)
Total	5,824 (100.0%)	811 (100.0%)	6,635 (100.0%)

Data not provided for 80 antimicrobials

Steering group

MEMBER	TITLE	REPRESENTING
Dr Susanna Frost (Chairperson)	Consultant Microbiologist & National Coordinator for PPS 2023	HSE-HPSC
Ms Michelle Bergin	ADON IPC	Midlands Regional Hospital Tullamore/IPCN public hospitals
Dr Eimear Brannigan	National Clinical Lead	AMRIC
Dr Caoimhe Brennan	Clinical Microbiology Specialist Registrar	Clinical Microbiology specialist trainees
Dr Karen Burns	Consultant Microbiologist & National Coordinator for PPS 2012/2017	ISCM
Ms Fiona Cloak	Surveillance Officer	HSE-HPSC
Ms Leah Colclough	Senior Pharmacist (Antimicrobial)	Irish Antimicrobial Pharmacist Group of Hospital Pharmacists
Ms Therese Dalchan	Head of Service	AMRIC/Acute Operations HSE
Ms Michelle Evans	Data analyst	Acute Hospitals Division
Ms Caoimhe Finn	ADON IPC	Beaumont Hospital/ IPCN public hospitals
Prof Fidelma Fitzpatrick	Consultant Microbiologist	RCSI
Ms Rafaela Franca	Clinical Nurse Manager II	HSE-HPSC
Mr Emre Umut Gurpinar	Epidemiologist	HSE-HPSC
Ms Deirdre Halford	Nursing Midwifery Planning and Development Unit (NMPDU) Officer	NMPDU Dublin South, Kildare and Wicklow
Ms Shirley Keane	National Programme Manager	AMRIC
Ms Lenora Leonard	Head of IPC	Beacon Private Hospital/ IPCN private hospitals
Mr David McCabe	HCAI / AMR Project Manager	Acute Operations HSE
Dr Tara Mitchell	Senior Epidemiologist	HSE-HPSC
Mr Stephen Murchan	Senior Epidemiologist	HSE-HPSC
Ms Helen Murphy	Clinical Nurse Manager III	HSE-HPSC
Ms Maureen Nwadike	Administrative Officer	HSE-HPSC
Ms Mairead OHanlon	Epidemiologist	HSE-HPSC
Ms Brid Ann OShea	Project Manager	HSE-HPSC
Mr Richard Sykes	Chief 1 Pharmacist PUH	Hospital Pharmacist Association of Ireland
Dr Robyn Traynor	Clinical Microbiology Specialist Registrar	Clinical Microbiology specialist trainees
Ms Lauren Webster	Epidemiologist	AMRIC

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- PPS Team Leaders and data collectors
- Administrative staff, ward nursing and midwifery staff, clinicians, antimicrobial and hospital pharmacists
- Ward Nursing & Midwifery Staff who completed Ward Lists and assisted with data collection
- Laboratory Surveillance Scientists
- National HSE ICT helpdesk
- Hospital Chief Executive Officers and managers
- Dr Greg Martin, Director, HPSC
- Ms Louise Cullen and Dr Phil Downes, Principal Epidemiologists, HSPC
- Ms Mary Day, HSE National Director of Acute Hospitals
- Ms Mary Wynne, HSE Nursing and Midwifery Services Director (acting)
- Dr Philip Crowley, National Director Quality Improvement
- Dr Colm Henry, Office for the National Chief Clinical Officer
- Dr Carl Suetens, Dr Tommi Karki, Dr Angelo D'Ambrosio, Dr Diamantis Plachouras, European Centre for Disease Prevention and Control, Sweden

Appendix A. Patients by patient specialty and hospital ownership

Patient specialties are arranged by alphabetical order

Patient Speciality	Public	Private	National
Bone marrow transplantation (BMT)	5 (0.0%)	0 (0.0%)	5 (0.0%)
Burns care	6 (0.1%)	0 (0.0%)	6 (0.0%)
Cardio surgery	63 (0.6%)	61 (4.5%)	124 (1.0%)
Cardio surgery and vascular surgery	3 (0.0%)	4 (0.3%)	7 (0.1%)
Cardiology	339 (3.0%)	133 (9.9%)	472 (3.7%)
Combination of specialties	14 (0.1%)	0 (0.0%)	14 (0.1%)
COVID-19 (non-ICU)	5 (0.0%)	0 (0.0%)	5 (0.0%)
COVID-19 ICU	0 (0.0%)	1 (0.1%)	1 (0.0%)
Dermatology	3 (0.0%)	2 (0.1%)	5 (0.0%)
Digestive tract surgery	128 (1.1%)	57 (4.2%)	185 (1.5%)
Endocrinology	148 (1.3%)	8 (0.6%)	156 (1.2%)
ENT	98 (0.9%)	18 (1.3%)	116 (0.9%)
Gastroenterology	255 (2.3%)	41 (3.1%)	296 (2.3%)
General medicine	3,707 (32.9%)	269 (20.0%)	3,976 (31.5%)
General surgery	824 (7.3%)	94 (7.0%)	918 (7.3%)
Geriatrics, care for the elderly	786 (7.0%)	7 (0.5%)	793 (6.3%)
Gynaecology	71 (0.6%)	19 (1.4%)	90 (0.7%)
Haematology	218 (1.9%)	16 (1.2%)	234 (1.9%)
Haematology/BMT	4 (0.0%)	0 (0.0%)	4 (0.0%)
Healthy neonates (maternity)	260 (2.3%)	0 (0.0%)	260 (2.1%)
Healthy neonates (paediatrics)	73 (0.6%)	0 (0.0%)	73 (0.6%)
Hepatology	23 (0.2%)	1 (0.1%)	24 (0.2%)
Infectious diseases	106 (0.9%)	0 (0.0%)	106 (0.8%)
Long-term care	21 (0.2%)	0 (0.0%)	21 (0.2%)
Maxillo-facial surgery	19 (0.2%)	0 (0.0%)	19 (0.2%)
Medical ICU	25 (0.2%)	1 (0.1%)	26 (0.2%)
Mixed (polyvalent) ICU, general intensive or critical care	40 (0.4%)	0 (0.0%)	40 (0.3%)
Neonatal ICU	101 (0.9%)	0 (0.0%)	101 (0.8%)
Neonatology (excl. healthy neonates)	62 (0.5%)	0 (0.0%)	62 (0.5%)
Nephrology	242 (2.1%)	8 (0.6%)	250 (2.0%)
Neurology	148 (1.3%)	11 (0.8%)	159 (1.3%)
Neurosurgery	119 (1.1%)	19 (1.4%)	138 (1.1%)
Obstetrics /maternity	560 (5.0%)	0 (0.0%)	560 (4.4%)
Oncology	383 (3.4%)	138 (10.3%)	521 (4.1%)

Patient Speciality	Public	Private	National
Ophthalmology	18 (0.2%)	1 (0.1%)	19 (0.2%)
Orthopaedics	610 (5.4%)	233 (17.3%)	843 (6.7%)
Orthopaedics and surgical traumatology	112 (1.0%)	2 (0.1%)	114 (0.9%)
Other medical	113 (1.0%)	7 (0.5%)	120 (1.0%)
Other surgery	21 (0.2%)	3 (0.2%)	24 (0.2%)
Paediatric general surgery	41 (0.4%)	0 (0.0%)	41 (0.3%)
Paediatric ICU	12 (0.1%)	0 (0.0%)	12 (0.1%)
Paediatrics general, not specialised	477 (4.2%)	5 (0.4%)	482 (3.8%)
Plastic and reconstructive surgery	43 (0.4%)	5 (0.4%)	48 (0.4%)
Pneumology	283 (2.5%)	84 (6.3%)	367 (2.9%)
Psychiatry	11 (0.1%)	0 (0.0%)	11 (0.1%)
Rehabilitation	179 (1.6%)	0 (0.0%)	179 (1.4%)
Rheumatology	99 (0.9%)	21 (1.6%)	120 (1.0%)
Surgery for cancer	17 (0.2%)	1 (0.1%)	18 (0.1%)
Surgical ICU	19 (0.2%)	0 (0.0%)	19 (0.2%)
Thoracic surgery	22 (0.2%)	6 (0.4%)	28 (0.2%)
Transplantation surgery	1 (0.0%)	0 (0.0%)	1 (0.0%)
Traumatology	3 (0.0%)	0 (0.0%)	3 (0.0%)
Urology	142 (1.3%)	59 (4.4%)	201 (1.6%)
Vascular surgery	201 (1.8%)	8 (0.6%)	209 (1.7%)
Total	11,283 (100.0%)	1,343 (100.0%)	12,626 (100.0%)

ENT, Ear, nose and throat

Appendix B. NHSN surgery type by hospital ownership

NHSN surgery types are arranged by number (in descending order) for the overall national data (column on right of table)

NHSN surgery code	Public	Private	National
NHSN-HPRO	193 (14.2%)	78 (22.0%)	271 (15.8%)
NHSN-FX	174 (12.8%)	2 (0.6%)	176 (10.3%)
NHSN-CSEC	165 (12.1%)	0 (0.0%)	165 (9.6%)
NHSN-COLO	117 (8.6%)	10 (2.8%)	127 (7.4%)
NHSN-KPRO	45 (3.3%)	56 (15.8%)	101 (5.9%)
NHSN-AMP	72 (5.3%)	3 (0.8%)	75 (4.4%)
NHSN	25 (1.8%)	45 (12.7%)	70 (4.1%)
NHSN-CRAN	61 (4.5%)	2 (0.6%)	63 (3.7%)
NHSN-CBGB	17 (1.2%)	33 (9.3%)	50 (2.9%)
NHSN-CARD	32 (2.4%)	16 (4.5%)	48 (2.8%)
NHSN-NECK	47 (3.5%)	0 (0.0%)	47 (2.7%)
NHSN-SB	43 (3.2%)	2 (0.6%)	45 (2.6%)
NHSN-FUSN	32 (2.4%)	12 (3.4%)	44 (2.6%)
NHSN-GAST	34 (2.5%)	7 (2.0%)	41 (2.4%)
NHSN-THOR	29 (2.1%)	9 (2.5%)	38 (2.2%)
NHSN-LAM	21 (1.5%)	14 (4.0%)	35 (2.0%)
NHSN-HER	18 (1.3%)	9 (2.5%)	27 (1.6%)
NHSN-APPY	25 (1.8%)	1 (0.3%)	26 (1.5%)
NHSN-BRST	16 (1.2%)	10 (2.8%)	26 (1.5%)
NHSN-HYST	16 (1.2%)	8 (2.3%)	24 (1.4%)
NHSN-BILI	15 (1.1%)	8 (2.3%)	23 (1.3%)
NHSN-NEPH	18 (1.3%)	3 (0.8%)	21 (1.2%)
NHSN-PVBY	19 (1.4%)	1 (0.3%)	20 (1.2%)
NHSN-XLAP	19 (1.4%)	1 (0.3%)	20 (1.2%)
NHSN-VSHN	18 (1.3%)	0 (0.0%)	18 (1.1%)
NHSN-CHOL	8 (0.6%)	9 (2.5%)	17 (1.0%)
NHSN-REC	14 (1.0%)	0 (0.0%)	14 (0.8%)
NHSN-PACE	8 (0.6%)	4 (1.1%)	12 (0.7%)
NHSN-PRST	10 (0.7%)	2 (0.6%)	12 (0.7%)
NHSN-OVRY	6 (0.4%)	4 (1.1%)	10 (0.6%)
NHSN-AAA	9 (0.7%)	0 (0.0%)	9 (0.5%)
NHSN-THYR	8 (0.6%)	0 (0.0%)	8 (0.5%)
NHSN-VHYS	4 (0.3%)	4 (1.1%)	8 (0.5%)
NHSN-CBGC	7 (0.5%)	0 (0.0%)	7 (0.4%)

NHSN surgery code	Public	Private	National
NHSN-CEA	6 (0.4%)	1 (0.3%)	7 (0.4%)
NHSN-RFUSN	3 (0.2%)	0 (0.0%)	3 (0.2%)
NHSN-KTP	2 (0.1%)	0 (0.0%)	2 (0.1%)
NHSN-SPLE	2 (0.1%)	0 (0.0%)	2 (0.1%)
NHSN-AVSD	1 (0.1%)	0 (0.0%)	1 (0.1%)
NHSN-HTP	1 (0.1%)	0 (0.0%)	1 (0.1%)
Total	1,360 (100.0%)	354 (100.0%)	1,714 (100.0%)

NHSN-AAA, Abdominal aortic aneurysm repair; NHSN-AMP, Limb amputation; NHSN-APPY, Appendix surgery; NHSN-AVSD, Shunt for dialysis; NHSN-BILI, Bile duct, liver or pancreatic surgery; NHSN-BRST, Breast surgery; NHSN-CARD, Cardiac surgery; NHSN-CBGB, Coronary artery bypass graft with both chest and donor site incisions; NHSN-CBGC, Coronary artery bypass graft with chest incision only; NHSN-CEA, Carotid endarterectomy;NHSN-CHOL, Gallbladder surgery; NHSN-COLO, Colon surgery; NHSN-CRAN, Craniotomy; NHSN-CSEC, Caesarean section; NHSN-FUSN, Spinal fusion; NHSN-FX, Open reduction of fracture; NHSN-GAST Gastric surgery; NHSN-HER, Herniorrhaphy; NHSN-HPRO, Hip prosthesis,; NHSN-HTP, Heart transplant; NHSN-HYST, Abdominal hysterectomy; NHSN-KTP, Kidney transplant; NHSN-KPRO, Knee prosthesis; NHSN-LAM, Laminectomy; NHSN-LTP, Liver transplant; NHSN-NECK, Neck surgery; NHSN-NEPH, Kidney surgery;NHSN-OVRY, Ovarian surgery;NHSN-PACE, Pacemaker surgery; NHSN-PRST, Prostate surgery; NHSN-PVBY, Peripheral vascular bypass surgery; NHSN-REC, Rectal surgery; NHSN-RFUSN, Refusion of spine; NHSN-SB, Small bowel surgery;NHSN-SPLE, Spleen surgery; NHSN-THOR, Thoracic surgery; NHSN-THYR, Thyroid and/or parathyroid surgery; NHSN-VHYS, Vaginal hysterectomy; NHSN-VSHN, Ventricular shunt; NHSN-XLAP, Exploratory laparotomy

See protocol for full descritption of surgery types

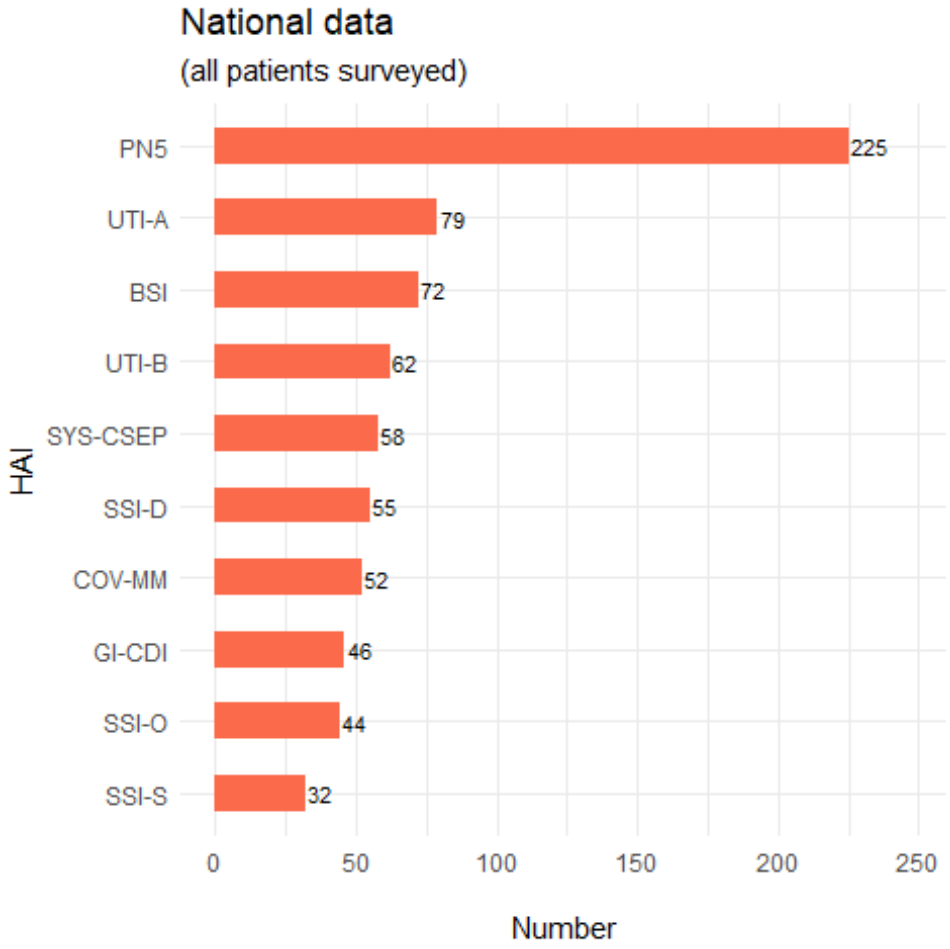
Appendix C. HAI prevalence by HAI type and hospital ownership

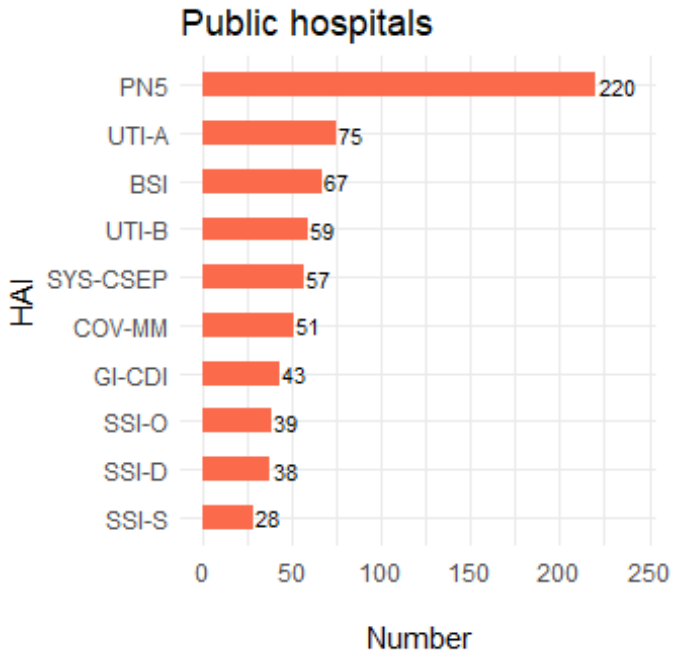
Rank	Public				Private				National			
	HAI type	n	%	Prev	HAI type	n	%	Prev	HAI type	n	%	Prev
1	PN5	220	24.2%	1.9%	SSI-D	17	29.3%	1.3%	PN5	225	23.3%	1.8%
2	UTI-A	75	8.3%	0.7%	BSI	5	8.6%	0.4%	UTI-A	79	8.2%	0.6%
3	BSI	67	7.4%	0.6%	PN5	5	8.6%	0.4%	BSI	72	7.5%	0.6%
4	UTI-B	59	6.5%	0.5%	SSI-O	5	8.6%	0.4%	UTI-B	62	6.4%	0.5%
5	SYS-CSEP	57	6.3%	0.5%	SSI-S	4	6.9%	0.3%	SYS-CSEP	58	6.0%	0.5%
6	COV-MM	51	5.6%	0.5%	UTI-A	4	6.9%	0.3%	SSI-D	55	5.7%	0.4%
7	GI-CDI	43	4.7%	0.4%	GI-CDI	3	5.2%	0.2%	COV-MM	52	5.4%	0.4%
8	SSI-O	39	4.3%	0.3%	UTI-B	3	5.2%	0.2%	GI-CDI	46	4.8%	0.4%
9	SSI-D	38	4.2%	0.3%	LRI-LUNG	2	3.4%	0.1%	SSI-O	44	4.6%	0.3%
10	SSI-S	28	3.1%	0.2%	SST-SKIN	2	3.4%	0.1%	SSI-S	32	3.3%	0.3%
11	SST-SKIN	25	2.8%	0.2%	BJ-Nos	1	1.7%	0.1%	SST-SKIN	27	2.8%	0.2%
12	LRI-BRON	21	2.3%	0.2%	COV-MM	1	1.7%	0.1%	GI-IAB	21	2.2%	0.2%
13	GI-IAB	20	2.2%	0.2%	GI-IAB	1	1.7%	0.1%	LRI-BRON	21	2.2%	0.2%
14	PN4	20	2.2%	0.2%	PN-Nos	1	1.7%	0.1%	PN4	21	2.2%	0.2%
15	NEO-CSEP	19	2.1%	0.2%	PN1	1	1.7%	0.1%	NEO-CSEP	19	2.0%	0.2%
16	COV-ASY	14	1.5%	0.1%	PN4	1	1.7%	0.1%	COV-ASY	14	1.4%	0.1%
17	GI-GIT	11	1.2%	0.1%	SYS-CSEP	1	1.7%	0.1%	GI-GIT	11	1.1%	0.1%
18	BJ-JNT	10	1.1%	0.1%	SYS-DI	1	1.7%	0.1%	PN1	11	1.1%	0.1%
19	EENT-ORAL	10	1.1%	0.1%					BJ-JNT	10	1.0%	0.1%
20	PN1	10	1.1%	0.1%					EENT-ORAL	10	1.0%	0.1%
21	CRI3-CVC	9	1.0%	0.1%					CRI3-CVC	9	0.9%	0.1%
22	BJ-BONE	8	0.9%	0.1%					BJ-BONE	8	0.8%	0.1%
23	SST-ST	8	0.9%	0.1%					SST-ST	8	0.8%	0.1%
24	COV-SEV	7	0.8%	0.1%					COV-SEV	7	0.7%	0.1%
25	LRI-LUNG	5	0.6%	0.0%					LRI-LUNG	7	0.7%	0.1%
26	GI-GE	4	0.4%	0.0%					GI-GE	4	0.4%	0.0%
27	CNS-MEN	3	0.3%	0.0%					CNS-MEN	3	0.3%	0.0%
28	PN2	3	0.3%	0.0%					PN2	3	0.3%	0.0%
29	REPR-OREP	3	0.3%	0.0%					REPR-OREP	3	0.3%	0.0%
30	SYS-Nos	3	0.3%	0.0%					SYS-Nos	3	0.3%	0.0%
31	BJ-DISC	2	0.2%	0.0%					BJ-DISC	2	0.2%	0.0%
32	NEO-LCBI	2	0.2%	0.0%					NEO-LCBI	2	0.2%	0.0%

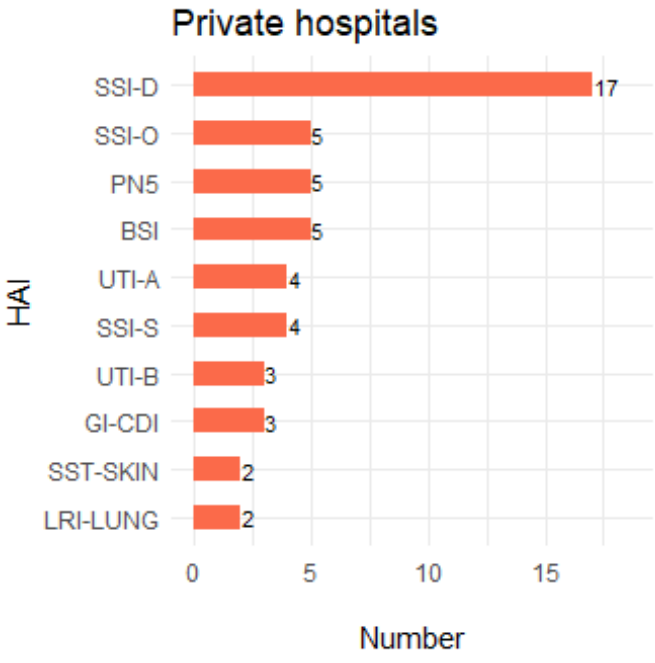
Rank	Public				Private				National			
	HAI type	n	%	Prev	HAI type	n	%	Prev	HAI type	n	%	Prev
33	NEO-PNEU	2	0.2%	0.0%					NEO-PNEU	2	0.2%	0.0%
34	PN3	2	0.2%	0.0%					PN3	2	0.2%	0.0%
35	CNS-IC	1	0.1%	0.0%					SYS-DI	2	0.2%	0.0%
36	CNS-Nos	1	0.1%	0.0%					BJ-Nos	1	0.1%	0.0%
37	CRI1-PVC	1	0.1%	0.0%					CNS-IC	1	0.1%	0.0%
38	CVS-MED	1	0.1%	0.0%					CNS-Nos	1	0.1%	0.0%
39	EENT-CONJ	1	0.1%	0.0%					CRI1-PVC	1	0.1%	0.0%
40	EENT-Nos	1	0.1%	0.0%					CVS-MED	1	0.1%	0.0%
41	LRI-Nos	1	0.1%	0.0%					EENT-CONJ	1	0.1%	0.0%
42	REPR-EMET	1	0.1%	0.0%					EENT-Nos	1	0.1%	0.0%
43	SST-DECU	1	0.1%	0.0%					LRI-Nos	1	0.1%	0.0%
44	SYS-DI	1	0.1%	0.0%					PN-Nos	1	0.1%	0.0%
45									REPR-EMET	1	0.1%	0.0%
46									SST-DECU	1	0.1%	0.0%

BJ-BONE, Osteomyelitis; BJ-DISC, Disc space infection; BJ-JNT, Joint or bursa; BJ-Nos, Not specified; BSI, Bloodstream infection (laboratory-confirmed); CRI1-PVC, Local PVC-related infection (no positive blood culture); CRI3-CVC, Microbiologically confirmed CVC-related BSI; CVS-MED, Mediastinitis ,CNS-MEN, Meningitis or ventriculitis; CNS-Nos, Not specified; COV-ASY, asymptomatic COVID-19; COV-MM, mild/moderate COVID-19; COV-SEV, severe COVID-19, EENT-CONJ, Conjunctivitis; EENT-ORAL, Oral cavity (mouth, tongue, or gums); EENT-Nos, Not specified; GI-CDI, Clostridium difficile infection; GI-GE, Gastroenteritis (excluding CDI); GI-GIT, Gastrointestinal tract (oesophagus, stomach, small and large bowel, and rectum), excluding GE, CDI; GI-IAB, Intra-abdominal, not specified elsewhere; LRI-BRON, Bronchitis, tracheobronchitis, bronchiolitis, tracheitis, without evidence of pneumonia; LRI-LUNG, Other infections of the lower respiratory tract; LRI-Nos, Not specified; NEO-CSEP, Clinical sepsis in neonates; NEO-LCBI, Laboratory-confirmed bloodstream infection in neonates, non-coagulase-negative staphylococci; NEO-PNEU, Pneumonia in neonates; PN1, Positive quantitative culture from minimally contaminated lower respiratory tract specimen; PN2, Positive quantitative culture from possibly contaminated lower respiratory tract specimen; PN3, Microbiological diagnosis by alternative microbiology methods; PN4, Positive sputum culture or non-quantitative culture from lower respiratory tract specimen; PN5, Clinical signs of pneumonia without positive microbiology; PN-Nos, Not specified; REPR-EMET, Endometritis; REPR-OREP, Other infections of the male or female reproductive tract; SSI-D, Deep incisional; SSI-O, Organ/space; SSI-S, Superficial incisional; SST-DECU, Decubitus ulcer or pressure sore, including both superficial and deep infections; SST-SKIN, Skin; SST-ST, Soft tissue (necrotising fasciitis, infectious gangrene, necrotizing cellulitis, infectious myositis, lymphadenitis, or lymphangitis); SYS-CSEP, Treated unidentified severe infection in adults; SYS-DI, Disseminated infection; SYS-Nos, Not specified; UTI-A, Microbiologically confirmed symptomatic UTI; UTI-B, Not microbiologically confirmed symptomatic UTI

Appendix C2. Top 10 specific HAIs nationally and by hospital ownership







Appendix D. Microorganisms (all) by hospital ownership

Microorganism are arranged by number (in descending order) for the overall national data (column on right of table)

Microorganism	Public	Private	National
Escherichia coli	69 (15.5%)	4 (10.0%)	73 (15.1%)
Staphylococcus aureus	65 (14.6%)	6 (15.0%)	71 (14.7%)
SARS-CoV-2	44 (9.9%)	1 (2.5%)	45 (9.3%)
Clostridioides difficile	40 (9.0%)	3 (7.5%)	43 (8.9%)
Enterococcus faecium	27 (6.1%)	2 (5.0%)	29 (6.0%)
Klebsiella pneumoniae complex	26 (5.9%)	1 (2.5%)	27 (5.6%)
Pseudomonas aeruginosa	21 (4.7%)	0 (0.0%)	21 (4.3%)
Enterococcus faecalis	16 (3.6%)	2 (5.0%)	18 (3.7%)
Staphylococcus epidermidis	9 (2.0%)	6 (15.0%)	15 (3.1%)
Proteus mirabilis	10 (2.3%)	2 (5.0%)	12 (2.5%)
Candida albicans	9 (2.0%)	2 (5.0%)	11 (2.3%)
Klebsiella oxytoca	5 (1.1%)	4 (10.0%)	9 (1.9%)
Anaerobes, not specified	7 (1.6%)	0 (0.0%)	7 (1.4%)
Candida glabrata	5 (1.1%)	1 (2.5%)	6 (1.2%)
Enterobacter cloacae	5 (1.1%)	1 (2.5%)	6 (1.2%)
Other coagulase-negative staphylococci (CNS)	6 (1.4%)	0 (0.0%)	6 (1.2%)
Staphylococcus haemolyticus	4 (0.9%)	2 (5.0%)	6 (1.2%)
Serratia marcescens	5 (1.1%)	0 (0.0%)	5 (1.0%)
Coagulase-negative staphylococci, not specified	4 (0.9%)	0 (0.0%)	4 (0.8%)
Corynebacterium spp.	4 (0.9%)	0 (0.0%)	4 (0.8%)
Stenotrophomonas maltophilia	4 (0.9%)	0 (0.0%)	4 (0.8%)
Candida parapsilosis	3 (0.7%)	0 (0.0%)	3 (0.6%)
Candida spp., not specified	3 (0.7%)	0 (0.0%)	3 (0.6%)
Enterobacterales, not specified	3 (0.7%)	0 (0.0%)	3 (0.6%)
Enterococcus spp., other	3 (0.7%)	0 (0.0%)	3 (0.6%)
Gram-negative bacilli, not specified	3 (0.7%)	0 (0.0%)	3 (0.6%)
Haemophilus influenza	3 (0.7%)	0 (0.0%)	3 (0.6%)
Streptococcus agalactiae (B)	3 (0.7%)	0 (0.0%)	3 (0.6%)
Streptococcus pyogenes (A)	3 (0.7%)	0 (0.0%)	3 (0.6%)
Aspergillus fumigatus	2 (0.5%)	0 (0.0%)	2 (0.4%)
Candida spp., other	2 (0.5%)	0 (0.0%)	2 (0.4%)
Enterococcus spp., not specified	2 (0.5%)	0 (0.0%)	2 (0.4%)
Enterovirus (polio, coxsackie, echo)	2 (0.5%)	0 (0.0%)	2 (0.4%)
Moraxella catharralis	2 (0.5%)	0 (0.0%)	2 (0.4%)

Microorganism	Public	Private	National
Other Gram-positive cocci	1 (0.2%)	1 (2.5%)	2 (0.4%)
Parainfluenzavirus	2 (0.5%)	0 (0.0%)	2 (0.4%)
Rhinovirus	2 (0.5%)	0 (0.0%)	2 (0.4%)
Staphylococcus spp., not specified	1 (0.2%)	1 (2.5%)	2 (0.4%)
Adenovirus	1 (0.2%)	0 (0.0%)	1 (0.2%)
Bacteroides other	1 (0.2%)	0 (0.0%)	1 (0.2%)
Burkholderia cepacia	1 (0.2%)	0 (0.0%)	1 (0.2%)
Citrobacter freundii	1 (0.2%)	0 (0.0%)	1 (0.2%)
Citrobacter koseri (e.g., diversus)	1 (0.2%)	0 (0.0%)	1 (0.2%)
Citrobacter spp., other	1 (0.2%)	0 (0.0%)	1 (0.2%)
Clostridioides other	0 (0.0%)	1 (2.5%)	1 (0.2%)
Enterobacter agglomerans	1 (0.2%)	0 (0.0%)	1 (0.2%)
Enterobacter spp., other	1 (0.2%)	0 (0.0%)	1 (0.2%)
Gram-positive cocci, not specified	1 (0.2%)	0 (0.0%)	1 (0.2%)
Haemophilus parainfluenzae	1 (0.2%)	0 (0.0%)	1 (0.2%)
Hafnia spp.	1 (0.2%)	0 (0.0%)	1 (0.2%)
Moraxella spp., other	1 (0.2%)	0 (0.0%)	1 (0.2%)
Morganella spp.	1 (0.2%)	0 (0.0%)	1 (0.2%)
Other enterobacterales	1 (0.2%)	0 (0.0%)	1 (0.2%)
Other Gram-negative bacilli, non enterobacterales	1 (0.2%)	0 (0.0%)	1 (0.2%)
Other yeasts	1 (0.2%)	0 (0.0%)	1 (0.2%)
Serratia spp., other	1 (0.2%)	0 (0.0%)	1 (0.2%)
Streptococcus spp., other	1 (0.2%)	0 (0.0%)	1 (0.2%)
Yersinia spp.	1 (0.2%)	0 (0.0%)	1 (0.2%)
Total	444 (100.0%)	40 (100.0%)	484 (100.0%)

Appendix E. AMU prevalence by AM class and hospital ownership

Rank	Public				Private				National			
	AM class	n	%	Prev	AM class	n	%	Prev	AM class	n	%	Prev
1	Penicillins	2,213	37.6%	19.6%	Penicillins	275	33.1%	20.5%	Penicillins	2,488	37.1%	19.7%
2	3GCs	319	5.4%	2.8%	2GCs	160	19.2%	11.9%	2GCs	409	6.1%	3.2%
3	Macrolides	319	5.4%	2.8%	Aminoglycosides	42	5.0%	3.1%	Macrolides	359	5.3%	2.8%
4	Beta-lact-R penicillins	296	5.0%	2.6%	Glycopeptides	40	4.8%	3.0%	3GCs	355	5.3%	2.8%
5	2GCs	249	4.2%	2.2%	Macrolides	40	4.8%	3.0%	Beta-lact-R penicillins	335	5.0%	2.6%
6	Sulfonamides and trimethoprim	245	4.2%	2.2%	Beta-lact-R penicillins	39	4.7%	2.9%	Glycopeptides	283	4.2%	2.2%
7	Glycopeptides	243	4.1%	2.1%	3GCs	36	4.3%	2.7%	Sulfonamides and trimethoprim	276	4.1%	2.2%
8	Carbapenems	235	4.0%	2.1%	Imidazoles	33	4.0%	2.5%	Carbapenems	246	3.7%	1.9%
9	Imidazoles	209	3.6%	1.8%	Sulfonamides and trimethoprim	31	3.7%	2.3%	Imidazoles	242	3.6%	1.9%
10	Quinolones	175	3.0%	1.5%	Quinolones	24	2.9%	1.8%	Quinolones	199	3.0%	1.6%
11	Antifungals	172	2.9%	1.5%	Other	14	1.7%	1.0%	Aminoglycosides	185	2.8%	1.5%
12	Other	167	2.8%	1.5%	Antifungals	13	1.6%	1.0%	Antifungals	185	2.8%	1.5%
13	Aminoglycosides	143	2.4%	1.3%	Tetracyclines	13	1.6%	1.0%	Other	181	2.7%	1.4%
14	Tetracyclines	139	2.4%	1.2%	Carbapenems	11	1.3%	0.8%	Tetracyclines	152	2.3%	1.2%
15	Imidazoles - oral, rectal	116	2.0%	1.0%	Imidazoles - oral, rectal	11	1.3%	0.8%	Imidazoles - oral, rectal	127	1.9%	1.0%
16	Beta-lact-S penicillins	112	1.9%	1.0%	Antidiarrhoeals	10	1.2%	0.7%	Beta-lact-S penicillins	120	1.8%	0.9%
17	Ext spec penicillins	107	1.8%	0.9%	Lincosamides	10	1.2%	0.7%	Ext spec penicillins	114	1.7%	0.9%
18	1GCs	95	1.6%	0.8%	1GCs	9	1.1%	0.7%	1GCs	104	1.5%	0.8%
19	Lincosamides	90	1.5%	0.8%	Beta-lact-S penicillins	8	1.0%	0.6%	Lincosamides	100	1.5%	0.8%
20	Monobactams	82	1.4%	0.7%	Ext spec penicillins	7	0.8%	0.5%	Monobactams	83	1.2%	0.7%
21	Antidiarrhoeals	64	1.1%	0.6%	Antimycobacterials	2	0.2%	0.1%	Antidiarrhoeals	74	1.1%	0.6%
22	Glycopeptides - oral	42	0.7%	0.4%	Beta-lactamase inhibitors	2	0.2%	0.1%	Glycopeptides - oral	43	0.6%	0.3%
23	Beta-lactamase inhibitors	18	0.3%	0.2%	Glycopeptides - oral	1	0.1%	0.1%	Beta-lactamase inhibitors	20	0.3%	0.2%
24	Antimycobacterials	14	0.2%	0.1%	Monobactams	1	0.1%	0.1%	Antimycobacterials	16	0.2%	0.1%
25	Polymyxins	10	0.2%	0.1%					Polymyxins	10	0.1%	0.1%
26	Combinations	6	0.1%	0.1%					Combinations	6	0.1%	0.0%
27	Other cephalosporins	3	0.1%	0.0%					Other cephalosporins	3	0.0%	0.0%

AM, antimicrobial; n, number of patients prescribed this antimicrobial; %, proportion of all antimicrobial prescribed; Prev, prevalence (%) in the overall population; 1GC/2GC/3GC, 1st/2nd/3rd generation cephalosporins

Appendix F. AMU prevalence by specific antimicrobial and hospital ownership

See protocol for list of antimicrobials along with their respective ATC code.

Rank	Public				Private				National			
	Antimicrobial	n	%	Prev	Antimicrobial	n	%	Prev	Antimicrobial	n	%	Prev
1	Piperacillin/ tazobactam	1,127	19.2%	10.0%	Amoxicillin/ clavulanic acid	175	21.0%	13.0%	Amoxicillin/ clavulanic acid	1,246	18.6%	9.8%
2	Amoxicillin/ clavulanic acid	1,071	18.2%	9.5%	Cefuroxime	159	19.1%	11.8%	Piperacillin/ tazobactam	1,226	18.3%	9.7%
3	Flucloxacillin	294	5.0%	2.6%	Piperacillin/ tazobactam	99	11.9%	7.4%	Cefuroxime	403	6.0%	3.2%
4	Cefuroxime	244	4.1%	2.2%	Gentamicin	42	5.0%	3.1%	Flucloxacillin	332	4.9%	2.6%
5	Ceftriaxone	237	4.0%	2.1%	Flucloxacillin	38	4.6%	2.8%	Vancomycin, parenteral	262	3.9%	2.1%
6	Meropenem	227	3.9%	2.0%	Vancomycin, parenteral	38	4.6%	2.8%	Ceftriaxone	260	3.9%	2.1%
7	Vancomycin, parenteral	224	3.8%	2.0%	Metronidazole, parenteral	33	4.0%	2.5%	Metronidazole, parenteral	242	3.6%	1.9%
8	Metronidazole, parenteral	209	3.6%	1.8%	Ceftriaxone	23	2.8%	1.7%	Meropenem	238	3.5%	1.9%
9	Clarithromycin	180	3.1%	1.6%	Ciprofloxacin	23	2.8%	1.7%	Clarithromycin	197	2.9%	1.6%
10	Sulfamethoxazole/ trimethoprim	177	3.0%	1.6%	Azithromycin	22	2.6%	1.6%	Sulfamethoxazole/ trimethoprim	192	2.9%	1.5%
11	Ciprofloxacin	136	2.3%	1.2%	Clarithromycin	17	2.0%	1.3%	Gentamicin	160	2.4%	1.3%
12	Doxycycline	123	2.1%	1.1%	Sulfamethoxazole/ trimethoprim	15	1.8%	1.1%	Ciprofloxacin	159	2.4%	1.3%
13	Gentamicin	118	2.0%	1.0%	Trimethoprim	13	1.6%	1.0%	Doxycycline	134	2.0%	1.1%
14	Metronidazole, oral/rectal	116	2.0%	1.0%	Doxycycline	11	1.3%	0.8%	Azithromycin	131	2.0%	1.0%
15	Azithromycin	109	1.9%	1.0%	Meropenem	11	1.3%	0.8%	Metronidazole, oral/rectal	127	1.9%	1.0%
16	Amoxicillin	99	1.7%	0.9%	Metronidazole, oral/rectal	11	1.3%	0.8%	Amoxicillin	105	1.6%	0.8%
17	Benzylpenicillin	92	1.6%	0.8%	Clindamycin	10	1.2%	0.7%	Clindamycin	99	1.5%	0.8%
18	Clindamycin	89	1.5%	0.8%	Cefotaxime	9	1.1%	0.7%	Benzylpenicillin	98	1.5%	0.8%
19	Aztreonam	82	1.4%	0.7%	Fluconazole	8	1.0%	0.6%	Aztreonam	83	1.2%	0.7%
20	Cefalexin	74	1.3%	0.7%	Amoxicillin	6	0.7%	0.4%	Cefalexin	80	1.2%	0.6%
21	Linezolid	66	1.1%	0.6%	Benzylpenicillin	6	0.7%	0.4%	Linezolid	69	1.0%	0.5%
22	Fluconazole	56	1.0%	0.5%	Cefalexin	6	0.7%	0.4%	Trimethoprim	67	1.0%	0.5%
23	Nitrofurantoin	56	1.0%	0.5%	Nitrofurantoin	6	0.7%	0.4%	Fluconazole	64	1.0%	0.5%
24	Trimethoprim	54	0.9%	0.5%	Rifaximin	6	0.7%	0.4%	Nitrofurantoin	62	0.9%	0.5%
25	Cefotaxime	52	0.9%	0.5%	Cefazolin	3	0.4%	0.2%	Cefotaxime	61	0.9%	0.5%
26	Vancomycin, oral	42	0.7%	0.4%	Linezolid	3	0.4%	0.2%	Daptomycin	43	0.6%	0.3%
27	Daptomycin	41	0.7%	0.4%	Nystatin	3	0.4%	0.2%	Vancomycin, oral	43	0.6%	0.3%
28	Levofloxacin	39	0.7%	0.3%	Anidulafungin	2	0.2%	0.1%	Levofloxacin	40	0.6%	0.3%

Rank	Public				Private				National			
	Antimicrobial	n	%	Prev	Antimicrobial	n	%	Prev	Antimicrobial	n	%	Prev
29	Caspofungin	34	0.6%	0.3%	Ceftazidime	2	0.2%	0.1%	Rifaximin	37	0.6%	0.3%
30	Rifaximin	31	0.5%	0.3%	Daptomycin	2	0.2%	0.1%	Caspofungin	35	0.5%	0.3%
31	Posaconazole	30	0.5%	0.3%	Rifampicin	2	0.2%	0.1%	Erythromycin	30	0.4%	0.2%
32	Erythromycin	29	0.5%	0.3%	Sulfamoxole/ trimethoprim	2	0.2%	0.1%	Posaconazole	30	0.4%	0.2%
33	Cefazolin	21	0.4%	0.2%	Tazobactam	2	0.2%	0.1%	Cefazolin	24	0.4%	0.2%
34	Amphotericin B (P)	19	0.3%	0.2%	Teicoplanin	2	0.2%	0.1%	Nystatin	21	0.3%	0.2%
35	Nystatin	18	0.3%	0.2%	Ampicillin/ clavulanic acid	1	0.1%	0.1%	Tazobactam	20	0.3%	0.2%
36	Tazobactam	18	0.3%	0.2%	Aztreonam	1	0.1%	0.1%	Teicoplanin	20	0.3%	0.2%
37	Teicoplanin	18	0.3%	0.2%	Beta-lactamase-S penicillin comb	1	0.1%	0.1%	Amphotericin B (P)	19	0.3%	0.2%
38	Ceftazidime	16	0.3%	0.1%	Caspofungin	1	0.1%	0.1%	Ceftazidime	18	0.3%	0.1%
39	Anidulafungin	15	0.3%	0.1%	Cefaclor	1	0.1%	0.1%	Anidulafungin	17	0.3%	0.1%
40	Ampicillin/ clavulanic acid	14	0.2%	0.1%	Cefixime	1	0.1%	0.1%	Ampicillin/ clavulanic acid	15	0.2%	0.1%
41	Tigecycline	13	0.2%	0.1%	Ceftizoxime	1	0.1%	0.1%	Tigecycline	14	0.2%	0.1%
42	Amikacin	12	0.2%	0.1%	Clofoctol	1	0.1%	0.1%	Amikacin	12	0.2%	0.1%
43	Tobramycin	12	0.2%	0.1%	Cloxacillin	1	0.1%	0.1%	Fidaxomicin	12	0.2%	0.1%
44	Fidaxomicin	11	0.2%	0.1%	Erythromycin	1	0.1%	0.1%	Phenoxymethyl-penicillin	12	0.2%	0.1%
45	Phenoxymethyl-penicillin	11	0.2%	0.1%	Fidaxomicin	1	0.1%	0.1%	Tobramycin	12	0.2%	0.1%
46	Colistin, injection/ infusion	10	0.2%	0.1%	Fusidic acid	1	0.1%	0.1%	Voriconazole	11	0.2%	0.1%
47	Voriconazole	10	0.2%	0.1%	Levofloxacin	1	0.1%	0.1%	Colistin, injection/ infusion	10	0.1%	0.1%
48	Ceftazidime/ beta-lactamase inh	9	0.2%	0.1%	Mecillinam	1	0.1%	0.1%	Rifampicin	10	0.1%	0.1%
49	Rifampicin	8	0.1%	0.1%	Methenamine	1	0.1%	0.1%	Ceftazidime/ beta-lactamase inh	9	0.1%	0.1%
50	Beta-lactamase-S penicillin comb	7	0.1%	0.1%	Minocycline	1	0.1%	0.1%	Beta-lactamase-S penicillin comb	8	0.1%	0.1%
51	Ertapenem	6	0.1%	0.1%	Phenoxymethyl-penicillin	1	0.1%	0.1%	Sulfamoxole/ trimethoprim	7	0.1%	0.1%
52	Cefaclor	5	0.1%	0.0%	Sulfadiazine/ trimethoprim	1	0.1%	0.1%	Cefaclor	6	0.1%	0.0%
53	Sulfamoxole/ trimethoprim	5	0.1%	0.0%	Terbinafine	1	0.1%	0.1%	Ertapenem	6	0.1%	0.0%
54	Cefixime	4	0.1%	0.0%	Tigecycline	1	0.1%	0.1%	Cefixime	5	0.1%	0.0%
55	Ethambutol	4	0.1%	0.0%	Vancomycin, oral	1	0.1%	0.1%	Ethambutol	4	0.1%	0.0%
56	Isavuconazole	4	0.1%	0.0%	Voriconazole	1	0.1%	0.1%	Isavuconazole	4	0.1%	0.0%
57	Temocillin	4	0.1%	0.0%					Sulfadiazine/ trimethoprim	4	0.1%	0.0%

Rank	Public				Private				National			
	Antimicrobial	n	%	Prev	Antimicrobial	n	%	Prev	Antimicrobial	n	%	Prev
58	Colistin (O)	3	0.1%	0.0%					Temocillin	4	0.1%	0.0%
59	Sulfadiazine/ trimethoprim	3	0.1%	0.0%					Terbinafine	4	0.1%	0.0%
60	Terbinafine	3	0.1%	0.0%					Cloxacillin	3	0.0%	0.0%
61	Ceftolozane/beta-lactamase inh	2	0.0%	0.0%					Colistin (O)	3	0.0%	0.0%
62	Cloxacillin	2	0.0%	0.0%					Methenamine	3	0.0%	0.0%
63	Levofloxacin, comb other antibact	2	0.0%	0.0%					Ceftizoxime	2	0.0%	0.0%
64	Methenamine	2	0.0%	0.0%					Ceftolozane/beta-lactamase inh	2	0.0%	0.0%
65	Rifabutin	2	0.0%	0.0%					Levofloxacin, comb other antibact	2	0.0%	0.0%
66	Sulfadimidine/ trimethoprim	2	0.0%	0.0%					Mecillinam	2	0.0%	0.0%
67	Sulfonamides, comb other antibact (excl. trim)	2	0.0%	0.0%					Minocycline	2	0.0%	0.0%
68	Ampicillin	1	0.0%	0.0%					Rifabutin	2	0.0%	0.0%
69	Azithro, fluconazole/ secnidazole	1	0.0%	0.0%					Sulfadimidine/ trimethoprim	2	0.0%	0.0%
70	Benzathine benzylpenicillin	1	0.0%	0.0%					Sulfonamides, comb other antibact (excl. trim)	2	0.0%	0.0%
71	Benzathine phenoxymethylpenicillin	1	0.0%	0.0%					Ampicillin	1	0.0%	0.0%
72	Ceftaroline fosamil	1	0.0%	0.0%					Azithro, fluconazole/ secnidazole	1	0.0%	0.0%
73	Ceftizoxime	1	0.0%	0.0%					Benzathine benzylpenicillin	1	0.0%	0.0%
74	Ciprofloxacin/metronidazole	1	0.0%	0.0%					Benzathine phenoxymethylpenicillin	1	0.0%	0.0%
75	Combinations of penicillins	1	0.0%	0.0%					Ceftaroline fosamil	1	0.0%	0.0%
76	Dalbavancin	1	0.0%	0.0%					Ciprofloxacin/metronidazole	1	0.0%	0.0%
77	Flucytosine	1	0.0%	0.0%					Clofoctol	1	0.0%	0.0%
78	Fosfomycin	1	0.0%	0.0%					Combinations of penicillins	1	0.0%	0.0%
79	Intermed-acting sulphonamide comb	1	0.0%	0.0%					Dalbavancin	1	0.0%	0.0%
80	Lincomycin	1	0.0%	0.0%					Flucytosine	1	0.0%	0.0%

Rank	Public				Private				National			
	Antimicrobial	n	%	Prev	Antimicrobial	n	%	Prev	Antimicrobial	n	%	Prev
81	Mecillinam	1	0.0%	0.0%					Fosfomycin	1	0.0%	0.0%
82	Meropenem/vabor bactam	1	0.0%	0.0%					Fusidic acid	1	0.0%	0.0%
83	Minocycline	1	0.0%	0.0%					Intermed-acting sulphonamide comb	1	0.0%	0.0%
84	Natamycin	1	0.0%	0.0%					Lincomycin	1	0.0%	0.0%
85	Nifurtoinol	1	0.0%	0.0%					Meropenem/vabor bactam	1	0.0%	0.0%
86	Pivampicillin	1	0.0%	0.0%					Natamycin	1	0.0%	0.0%
87	Spiramycin	1	0.0%	0.0%					Nifurtoinol	1	0.0%	0.0%
88	Streptomycin (P)	1	0.0%	0.0%					Pivampicillin	1	0.0%	0.0%
89	Sulfamerazine/ trimethoprim	1	0.0%	0.0%					Spiramycin	1	0.0%	0.0%
90	Sulfamethoxazole	1	0.0%	0.0%					Streptomycin (P)	1	0.0%	0.0%
91	Sulfamethoxypyrid azine	1	0.0%	0.0%					Sulfamerazine/ trimethoprim	1	0.0%	0.0%
92	Talampicillin	1	0.0%	0.0%					Sulfamethoxazole	1	0.0%	0.0%
93	Tebipenem pivoxil	1	0.0%	0.0%					Sulfamethoxypyrid azine	1	0.0%	0.0%
94	Tetracycline	1	0.0%	0.0%					Talampicillin	1	0.0%	0.0%
95	Tetracycline comb	1	0.0%	0.0%					Tebipenem pivoxil	1	0.0%	0.0%
96									Tetracycline	1	0.0%	0.0%
97									Tetracycline comb	1	0.0%	0.0%

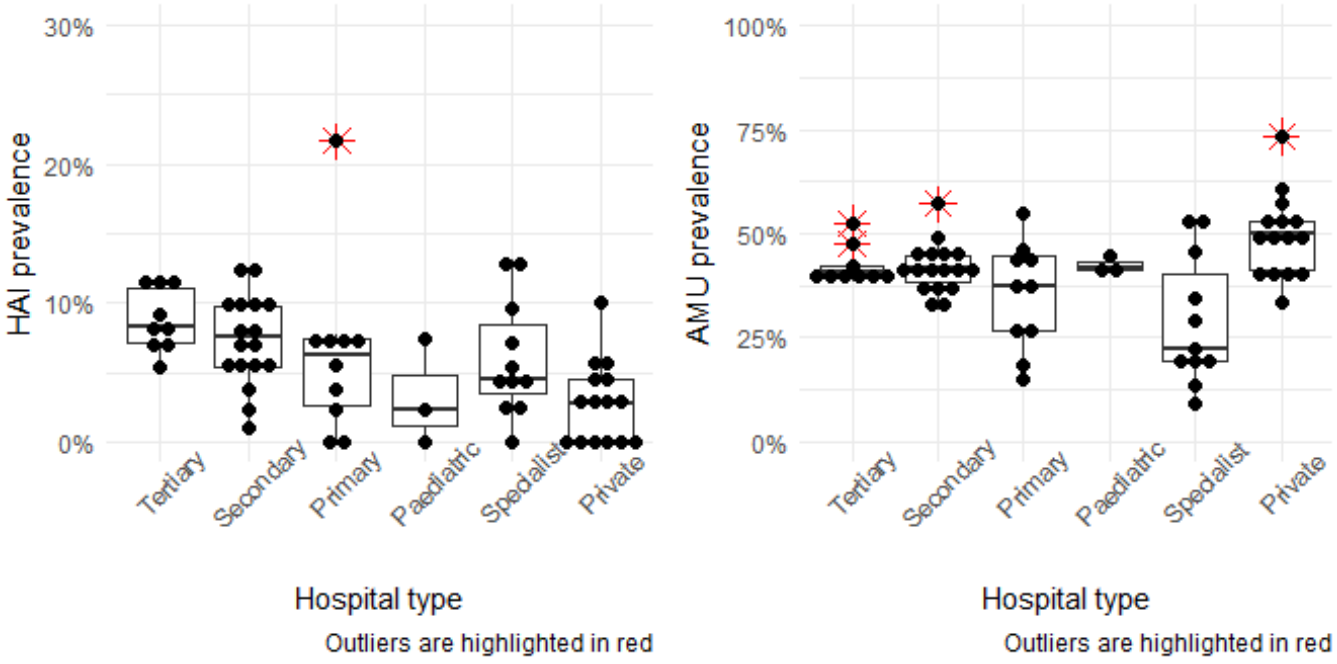
n, number of patients prescribed this antibiotic; %, proportion of all antibiotics prescribed; Prev, prevalence (%) in the overall population; 2GC/3GC, 2nd/3rd generation cephalosporins

Appendix G. Summary of HAI and AMU prevalence by hospital type, with boxplots

Appendix G1. HAI and AMU prevalence by hospital type

Hospital type	N patients	N with HAI	HAI prevalence	N with AMU	AMU prevalence
Tertiary	5,420	486	9.0%	2,280	42.1%
Secondary	3,986	287	7.2%	1,613	40.5%
Private	1,343	55	4.1%	646	48.1%
Specialist	946	49	5.2%	204	21.6%
Primary	648	39	6.0%	217	33.5%
Paediatric	307	16	5.2%	127	41.4%

Appendix G2. Boxplot of HAI and AMU prevalence by hospital type



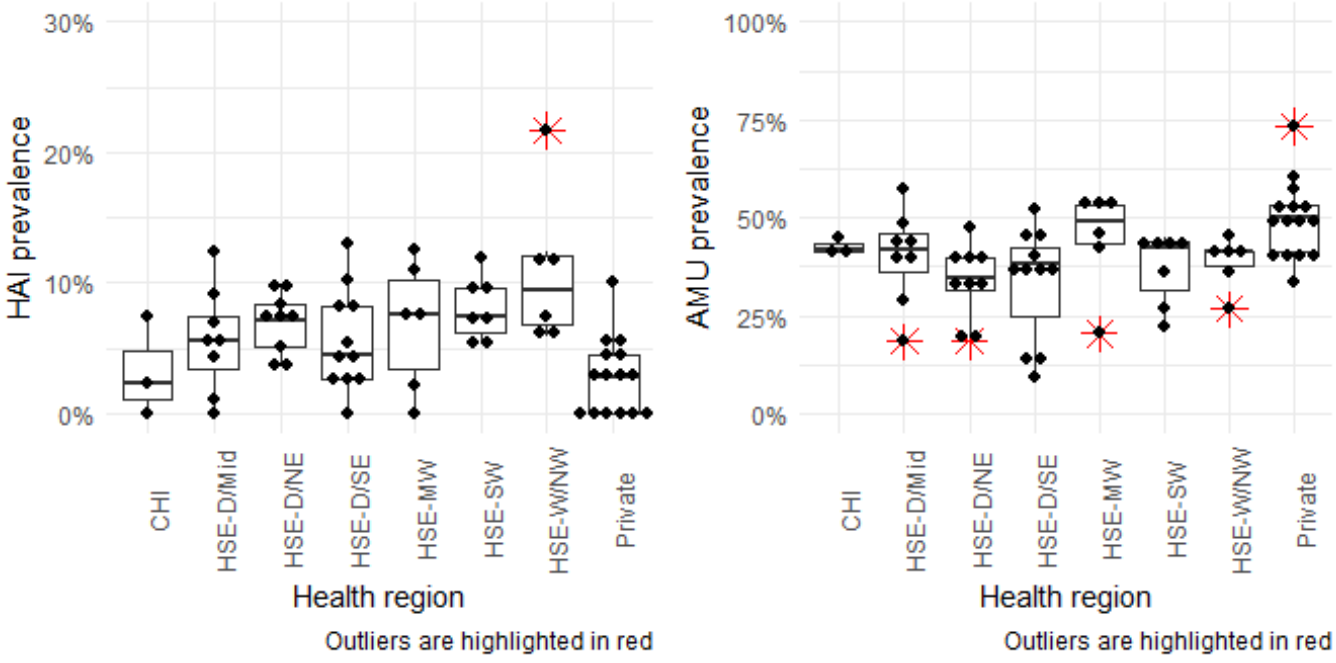
Appendix H. Summary of HAI and AMU prevalence by HSE Regional Health Area, with boxplots

Appendix H1. HAI and AMU prevalence by health region

HSE region	N patients	N with HAI	HAI prevalence	N with AMU	AMU prevalence
CHI	307	16	5.2%	127	41.4%
HSE-D/Mid	2,163	161	7.4%	873	40.4%
HSE-D/NE	2,607	179	6.9%	981	37.6%
HSE-D/SE	2,048	128	6.2%	720	35.2%
HSE-MW	814	72	8.8%	389	47.8%
HSE-SW	1,474	146	9.9%	586	39.8%
HSE-W/NW	1,894	175	9.2%	765	40.4%
Private	1,343	55	4.1%	646	48.1%

CHI, Children's Health Ireland; HSE-D/Mid, HSE-Dublin/Midlands; HSE-D/NE, HSE-Dublin/North-East; HSE-D/SE, HSE-Dublin/South-East; HSE-MW, HSE-Mid-West, HSE-SW, HSE-South-West, HSE-W/NE, HSE-West/North-West

Appendix H2. Boxplot of HAI and AMU prevalence by health region



Appendix I. Summary of HAI and AMU prevalence by individual hospital

Appendix I shows the HAI and AMU prevalence for the 65 participating hospitals in PPS 2023.

Direct comparison of HAI and AMU prevalence in acute care hospitals is not recommended due to differences in the hospital types and case mix.

Inter-hospital comparisons between similar hospital types should be undertaken with caution as indiviudual hospitals have differing patient case mixes and acuity. For example, elective admissions only versus elective and emergency admissions; predominance of day surgery versus major surgery following trauma; admission to an on-site emergency department (ED) or critical care unit (CCU) versus no on-site ED and CCU. Such factors will have significant impact on the prevalence of HAI and AMU within and between hospitals and limit the validity of inter-hospital comparisons.

Appendix I. HAI and AMU prevalence in participating hospitals

Hospital name	Hosp type	RHA	N eligible patients	HAI (All)		HAI (Curr)		AMU	
				N w/ HAI	HAI prev	N w/ HAI	HAI prev	N w/ AMU	AMU prev
Bantry General Hospital	Primary	HSE-SW	86	6	7.0%	6	7.0%	23	26.7%
Beacon Hospital, Sandyford	Private	Private	152	5	3.3%	5	3.3%	79	52.0%
Beaumont Hospital	Tertiary	HSE-D/NE	648	46	7.1%	40	6.2%	257	39.7%
Blackrock Health Blackrock Clinic	Private	Private	139	14	10.1%	11	7.9%	73	52.5%
Blackrock Health Galway Clinic	Private	Private	117	7	6.0%	6	5.1%	48	41.0%
Blackrock Health Hermitage Clinic	Private	Private	104	5	4.8%	5	4.8%	63	60.6%
Bon Secours Hospital, Cork	Private	Private	189	10	5.3%	8	4.2%	78	41.3%
Bon Secours Hospital, Galway	Private	Private	74	2	2.7%	1	1.4%	36	48.6%
Bon Secours Hospital, Glasnevin	Private	Private	62	2	3.2%	2	3.2%	25	40.3%
Bon Secours Hospital, Limerick at Barringtons	Private	Private	15	0	0.0%	0	0.0%	11	73.3%
Bon Secours Hospital, Tralee	Private	Private	62	0	0.0%	0	0.0%	30	48.4%
Cappagh National Orthopaedic Hospital	Specialist	HSE-D/NE	52	5	9.6%	3	5.8%	18	34.6%
Cavan General Hospital	Secondary	HSE-D/NE	261	10	3.8%	7	2.7%	89	34.1%
Children's Health Ireland at Crumlin	Paediatric	CHI	189	14	7.4%	13	6.9%	77	40.7%
Children's Health Ireland at Tallaght	Paediatric	CHI	29	0	0.0%	0	0.0%	13	44.8%
Children's Health Ireland at Temple Street	Paediatric	CHI	89	2	2.2%	2	2.2%	37	41.6%
Connolly Hospital, Blanchardstown	Secondary	HSE-D/NE	312	24	7.7%	14	4.5%	124	39.7%
Coombe Women and Infant's University Hospital	Specialist	HSE-D/Mid	141	6	4.3%	6	4.3%	26	18.4%
Cork University Hospital	Tertiary	HSE-SW	677	81	12.0%	71	10.5%	285	42.1%
Cork University Maternity Hospital	Specialist	HSE-SW	130	7	5.4%	6	4.6%	29	22.3%
Croom Orthopaedic Hospital	Specialist	HSE-MW	32	4	12.5%	1	3.1%	17	53.1%
Galway University Hospital	Tertiary	HSE-W/NW	695	79	11.4%	62	8.9%	287	41.3%
Kilcreene Regional Orthopaedic Hospital, Kilkenny	Specialist	HSE-D/SE	23	3	13.0%	3	13.0%	12	52.2%
Letterkenny University Hospital	Secondary	HSE-W/NW	391	23	5.9%	12	3.1%	162	41.4%
Louth County Hospital, Dundalk	Primary	HSE-D/NE	54	2	3.7%	2	3.7%	10	18.5%
Mallow General Hospital	Primary	HSE-SW	40	3	7.5%	0	0.0%	18	45.0%

Hospital name	Hosp type	RHA	N eligible patients	HAI (All)		HAI (Curr)		AMU	
				N w/ HAI	HAI prev	N w/ HAI	HAI prev	N w/ AMU	AMU prev
Mater Misericordiae University Hospital	Tertiary	HSE-D/NE	565	47	8.3%	38	6.7%	269	47.6%
Mater Private Hospital, Cork	Private	Private	49	0	0.0%	0	0.0%	28	57.1%
Mater Private Hospital, Dublin	Private	Private	160	4	2.5%	4	2.5%	63	39.4%
Mayo University Hospital, Castlebar	Secondary	HSE-W/NW	294	22	7.5%	17	5.8%	122	41.5%
Mercy University Hospital	Secondary	HSE-SW	227	22	9.7%	18	7.9%	97	42.7%
Midland Regional Hospital, Mullingar	Secondary	HSE-D/Mid	185	10	5.4%	4	2.2%	79	42.7%
Midland Regional Hospital, Portlaoise	Secondary	HSE-D/Mid	98	1	1.0%	0	0.0%	56	57.1%
Midland Regional Hospital, Tullamore	Secondary	HSE-D/Mid	207	12	5.8%	12	5.8%	101	48.8%
Naas General Hospital	Secondary	HSE-D/Mid	201	25	12.4%	13	6.5%	90	44.8%
National Maternity Hospital, Holles Street	Specialist	HSE-D/SE	141	4	2.8%	4	2.8%	19	13.5%
National Rehabilitation Hospital, Dun Laoghaire	Specialist	HSE-D/SE	111	5	4.5%	5	4.5%	10	9.0%
Our Lady of Lourdes Hospital, Drogheda	Secondary	HSE-D/NE	446	23	5.2%	21	4.7%	140	31.4%
Our Lady's Hospital, Navan	Secondary	HSE-D/NE	101	10	9.9%	7	6.9%	40	39.6%
Portiuncula University Hospital, Ballinasloe	Secondary	HSE-W/NW	146	18	12.3%	8	5.5%	66	45.2%
Roscommon University Hospital	Primary	HSE-W/NW	60	13	21.7%	10	16.7%	16	26.7%
Rotunda Hospital	Specialist	HSE-D/NE	168	12	7.1%	6	3.6%	34	20.2%
Royal Victoria Eye and Ear Hospital	Specialist	HSE-D/SE	24	1	4.2%	1	4.2%	11	45.8%
Sligo University Hospital	Secondary	HSE-W/NW	308	20	6.5%	15	4.9%	112	36.4%
South Infirmary-Victoria University Hospital	Primary	HSE-SW	72	4	5.6%	2	2.8%	26	36.1%
St Columcille's Hospital, Loughlinstown	Primary	HSE-D/SE	88	2	2.3%	2	2.3%	13	14.8%
St James's Hospital	Tertiary	HSE-D/Mid	768	70	9.1%	61	7.9%	294	38.3%
St John's Hospital, Limerick	Primary	HSE-MW	65	5	7.7%	3	4.6%	30	46.2%
St Luke's General Hospital, Kilkenny	Secondary	HSE-D/SE	234	24	10.3%	18	7.7%	90	38.5%
St Luke's Hospital, Rathgar	Specialist	HSE-D/Mid	31	0	0.0%	0	0.0%	9	29.0%
St Michael's Hospital, Dun Laoghaire	Primary	HSE-D/SE	78	0	0.0%	0	0.0%	30	38.5%
St Vincent's Private Hospital	Private	Private	146	6	4.1%	6	4.1%	78	53.4%
St Vincent's University Hospital	Tertiary	HSE-D/SE	552	44	8.0%	28	5.1%	221	40.0%
Tallaght University Hospital	Tertiary	HSE-D/Mid	532	37	7.0%	27	5.1%	218	41.0%

Hospital name	Hosp type	RHA	N eligible patients	HAI (All)		HAI (Curr)		AMU	
				N w/ HAI	HAI prev	N w/ HAI	HAI prev	N w/ AMU	AMU prev
Tipperary University Hospital, Clonmel	Secondary	HSE-D/SE	205	17	8.3%	7	3.4%	92	44.9%
UPMC Aut Even Hospital, Kilkenny	Private	Private	20	0	0.0%	0	0.0%	10	50.0%
UPMC Sports Surgery Clinic, Santry	Private	Private	36	0	0.0%	0	0.0%	18	50.0%
UPMC Whitfield Hospital, Waterford	Private	Private	18	0	0.0%	0	0.0%	6	33.3%
University Hospital Ennis	Primary	HSE-MW	51	0	0.0%	0	0.0%	28	54.9%
University Hospital Kerry, Tralee	Secondary	HSE-SW	242	23	9.5%	21	8.7%	108	44.6%
University Hospital Limerick	Tertiary	HSE-MW	519	57	11.0%	50	9.6%	272	52.4%
University Hospital Nenagh	Primary	HSE-MW	54	4	7.4%	4	7.4%	23	42.6%
University Hospital Waterford	Tertiary	HSE-D/SE	464	25	5.4%	20	4.3%	177	38.1%
University Maternity Hospital, Limerick	Specialist	HSE-MW	93	2	2.2%	2	2.2%	19	20.4%
Wexford General Hospital	Secondary	HSE-D/SE	128	3	2.3%	2	1.6%	45	35.2%

RHA, Regional Health Area

Appendix J. Comparison of data for PPS 2012, PPS 2017 and PPS 2023 by participating hospital

Hospital name	N eligible patients			HAI prevalence			AMU prevalence		
	2012	2017	2023	2012	2017	2023	2012	2017	2023
Bantry General Hospital	*	63	86	*	7.9%	7.0%	*	31.7%	26.7%
Beacon Hospital, Sandyford	129	130	152	1.6%	5.4%	3.3%	58.1%	45.4%	52.0%
Beaumont Hospital	558	634	648	10.9%	8.8%	7.1%	37.3%	43.8%	39.7%
Blackrock Health Blackrock Clinic	*	120	139	*	5.8%	10.1%	*	53.3%	52.5%
Blackrock Health Galway Clinic	141	109	117	4.3%	7.3%	6.0%	34.0%	38.5%	41.0%
Blackrock Health Hermitage Clinic	*	95	104	*	3.2%	4.8%	*	41.1%	60.6%
Bon Secours Hospital, Cork	199	183	189	3.0%	3.3%	5.3%	24.1%	41.0%	41.3%
Bon Secours Hospital, Galway	48	59	74	2.1%	1.7%	2.7%	41.7%	47.5%	48.6%
Bon Secours Hospital, Glasnevin	101	80	62	2.0%	5.0%	3.2%	36.6%	47.5%	40.3%
Bon Secours Hospital, Limerick	*	10	15	*	0.0%	0.0%	*	90.0%	73.3%
Bon Secours Hospital, Tralee	89	79	62	1.1%	5.1%	0.0%	39.3%	43.0%	48.4%
Cappagh National Orthopaedic Hospital	26	78	52	7.7%	6.4%	9.6%	34.6%	17.9%	34.6%
Cavan General Hospital	206	233	261	3.4%	5.6%	3.8%	36.9%	42.9%	34.1%
Children's Health Ireland at Crumlin	151	172	189	5.3%	4.7%	7.4%	46.4%	47.7%	40.7%
Children's Health Ireland at Tallaght	**	28	29	**	0.0%	0.0%	**	28.6%	44.8%
Children's Health Ireland at Temple Street	72	78	89	5.6%	6.4%	2.2%	37.5%	53.8%	41.6%
Connolly Hospital, Blanchardstown	189	255	312	3.2%	3.5%	7.7%	36.5%	39.2%	39.7%
Coombe Women and Infant's University Hospital	197	178	141	4.1%	4.5%	4.3%	21.8%	18.0%	18.4%
Cork University Hospital	*	*	677	*	*	12.0%	*	*	42.1%
Cork University Maternity Hospital	*	*	130	*	*	5.4%	*	*	22.3%
Croom Orthopaedic Hospital	32	27	32	3.1%	7.4%	12.5%	6.3%	48.1%	53.1%
Galway University Hospital	600	586	695	6.8%	6.8%	11.4%	41.5%	36.9%	41.3%
Kilcreene Regional Orthopaedic Hospital, Kilkenny	14	12	23	0.0%	0.0%	13.0%	71.4%	58.3%	52.2%
Letterkenny University Hospital	293	279	391	2.4%	5.0%	5.9%	35.8%	42.7%	41.4%
Louth County Hospital, Dundalk	33	55	54	3.0%	14.5%	3.7%	6.1%	16.4%	18.5%
Mallow General Hospital	*	*	40	*	*	7.5%	*	*	45.0%
Mater Misericordiae University Hospital	*	570	565	*	13.2%	8.3%	*	44.7%	47.6%
Mater Private Hospital, Cork	***	*	49	***	*	0.0%	***	*	57.1%
Mater Private Hospital, Dublin	140	180	160	2.1%	13.3%	2.5%	37.9%	45.0%	39.4%
Mayo University Hospital, Castlebar	*	249	294	*	3.6%	7.5%	*	40.6%	41.5%
Mercy University Hospital	158	210	227	5.1%	5.7%	9.7%	36.7%	45.2%	42.7%
Midland Regional Hospital, Mullingar	186	174	185	3.2%	1.7%	5.4%	39.2%	32.8%	42.7%

Hospital name	N eligible patients			HAI prevalence			AMU prevalence		
	2012	2017	2023	2012	2017	2023	2012	2017	2023
Midland Regional Hospital, Portlaoise	108	116	98	0.0%	0.9%	1.0%	36.1%	37.1%	57.1%
Midland Regional Hospital, Tullamore	152	189	207	3.9%	3.7%	5.8%	48.0%	48.1%	48.8%
Naas General Hospital	169	184	201	5.9%	6.5%	12.4%	49.1%	45.1%	44.8%
National Maternity Hospital, Holles Street	171	198	141	2.3%	2.5%	2.8%	18.1%	20.7%	13.5%
National Rehabilitation Hospital, Dun Laoghaire	*	89	111	*	4.5%	4.5%	*	9.0%	9.0%
Our Lady of Lourdes Hospital, Drogheda	340	337	446	4.1%	4.7%	5.2%	37.1%	29.1%	31.4%
Our Lady's Hospital, Navan	105	76	101	1.9%	10.5%	9.9%	30.5%	42.1%	39.6%
Portiuncula University Hospital, Ballinasloe	136	133	146	2.2%	6.0%	12.3%	38.2%	43.6%	45.2%
Roscommon University Hospital	48	52	60	22.9%	15.4%	21.7%	41.7%	44.2%	26.7%
Rotunda Hospital	196	145	168	4.6%	1.4%	7.1%	18.9%	17.9%	20.2%
Royal Victoria Eye and Ear Hospital	20	15	24	5.0%	0.0%	4.2%	35.0%	53.3%	45.8%
Sligo University Hospital	191	284	308	4.7%	2.8%	6.5%	33.5%	34.2%	36.4%
South Infirmary-Victoria University Hospital	91	70	72	5.5%	8.6%	5.6%	37.4%	35.7%	36.1%
St Columcille's Hospital, Loughlinstown	104	96	88	5.8%	8.3%	2.3%	36.5%	29.2%	14.8%
St James's Hospital	727	607	768	6.3%	11.5%	9.1%	30.0%	42.5%	38.3%
St John's Hospital, Limerick	37	67	65	2.7%	3.0%	7.7%	56.8%	56.7%	46.2%
St Luke's General Hospital, Kilkenny	148	205	234	2.0%	1.5%	10.3%	33.1%	40.5%	38.5%
St Luke's Hospital, Rathgar	66	42	31	12.1%	4.8%	0.0%	21.2%	28.6%	29.0%
St Michael's Hospital, Dun Laoghaire	67	72	78	4.5%	1.4%	0.0%	38.8%	38.9%	38.5%
St Vincent's Private Hospital	*	180	146	*	6.7%	4.1%	*	49.4%	53.4%
St Vincent's University Hospital	354	455	552	7.3%	5.9%	8.0%	36.4%	44.8%	40.0%
Tallaght University Hospital	496	418	532	6.0%	7.7%	7.0%	38.7%	41.1%	41.0%
Tipperary University Hospital, Clonmel	139	169	205	10.1%	1.8%	8.3%	46.8%	46.7%	44.9%
University Hospital Ennis	51	54	51	5.9%	1.9%	0.0%	47.1%	55.6%	54.9%
University Hospital Kerry, Tralee	221	247	242	4.1%	3.2%	9.5%	26.2%	32.0%	44.6%
University Hospital Limerick	345	430	519	7.8%	5.1%	11.0%	45.5%	47.7%	52.4%
University Hospital Nenagh	49	42	54	4.1%	7.1%	7.4%	34.7%	38.1%	42.6%
University Hospital Waterford	*	*	464	*	*	5.4%	*	*	38.1%
University Maternity Hospital, Limerick	149	136	93	1.3%	0.7%	2.2%	10.1%	11.8%	20.4%
UPMC Aut Even Hospital, Kilkenny	*	31	20	*	0.0%	0.0%	*	54.2%	50.0%
UPMC Sports Surgery Clinic, Santry	*	30	36	*	0.0%	0.0%	*	54.8%	50.0%
UPMC Whitfield Hospital, Waterford	*	*	18	*	*	0.0%	*	*	33.3%
Wexford General Hospital	156	180	128	3.8%	8.3%	2.3%	34.6%	35.0%	35.2%
TOTAL	8398	10333	12,650	5.2%	6.1%	7.4%	35.6%	39.7%	40.2%

*Did not participate in this year's PPS; **Tallaght Children's Health Ireland at Tallaght participated as part of Tallaght University Hospital; ***Mater Private Cork opened in 2012