SURVEILLANCE

Point prevalence survey of healthcare-associated infections and antimicrobial use in European long-term care facilities

2023–2024

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Abbreviations

AMR	Antimicrobial resistance
AST	Antimicrobial susceptibility testing
ATC	Anatomical Therapeutic Chemical
AU	Antimicrobial use
CI	Confidence interval
EEA	European Economic Area
ECDC	European Centre for Disease Prevention and Control
EFSA	European Food Safety Authority
EMA	European Medicines Agency
EU	European Union
EUCAST	European Committee on Antimicrobial Susceptibility Testing
GP	General practitioner
GI	Gastrointestinal infection
HAI	Healthcare-associated infection
HAI-Net	Healthcare-Associated Infections Surveillance Network
HALT	ECDC surveillance of healthcare-associated infections and antimicrobial use in European long-term care facilities
I	Susceptible, increased exposure
IPC	Infection prevention and control
LTC	Long-term care
LTCF	Long-term care facility
MDB	Microsoft Access database
MDRO	Multidrug-resistant organism
MRSA	Meticillin-resistant *Staphylococcus aureus*
NC	National centre
NSC	National survey coordinator
PPS	Point prevalence survey
R	Resistant
RER	Regione Emilia-Romagna
RTI	Respiratory tract infection
S	Susceptible, standard dosing regimen
SSI	Surgical site infection
UTI	Urinary tract infection

Executive summary

In 2023–2024, the European Centre for Disease Prevention and Control (ECDC) organised the fourth point prevalence survey (PPS) of healthcare-associated infections (HAIs) and antimicrobial use in European long-term care facilities (LTCFs) (HALT-4). The design of the PPS was based on the experiences and recommendations of the three previous PPSs in LTCFs organised by ECDC, i.e. the first HALT study in 2010, HALT-2 in 2013 2013 and HALT-3 in 2016-2017 [1–3]. Specifically, HALT-4 used a standardised PPS methodology which aimed:

- to estimate the prevalence of HAIs and antimicrobial use in LTCFs in the EU/EEA;
- to measure structure and process indicators of infection prevention and control (IPC) in these LTCFs.

The data obtained through these PPSs are considered useful:

- to quantify the prevalence of HAIs and antimicrobial use in LTCFs, in EU/EEA countries and in the EU/EEA overall;
- to identify needs for intervention, training and/or additional IPC resources;
- to identify priorities for intervention and raising awareness at the national and local levels;
- to ensure the availability of healthcare and the safety of residents in LTCFs, and more generally the ageing population in the EU/EEA.

ECDC invited EU/EEA countries to participate in one or more out of three surveillance periods: April–June 2023, September–November 2023 and/or April–June 2024.

Long-term care facilities were defined as facilities in which residents need constant supervision (24 hours), need 'high-skilled nursing care' (i.e. more than 'basic' nursing care and assistance for daily living) and are medically stable and do not need constant 'specialised medical care' (i.e. administered by specialised physicians) or invasive medical procedures (e.g. ventilation). The following facilities were excluded: hospital long-term care wards, hostel care (hotel without any kind of nursing care), sheltered care houses, day centres, home-based centres, and protected living.

The protocol requested that national survey coordinators (NSCs) classify LTCFs, by applying definitions provided in the protocol. This included 10 types of LTCF: general nursing home, residential home, psychiatric LTCF, LTCF for people with intellectual disabilities, LTCF for people with physical disabilities[i], rehabilitation centre, palliative care facility, sanatorium, mixed LTCF (all or some of the above) and 'other' type of LTCF.

Methods

Residents were eligible and could therefore be included in the survey if they were living full-time (24 hours a day) in the LTCF and were present at 8:00 AM on the day of the PPS and not discharged from the LTCF at the time of the survey. Residents who regularly received chronic ambulatory care in an acute care hospital (e.g. haemodialysis or chemotherapy) were eligible for inclusion unless they were hospitalised on the day of the PPS, i.e. a hospital stay of at least one night.

Depending on the available resources, data were collected either by a local data collector (e.g. designated physician, IPC doctor/nurse, head nurse, etc.) or an external data collector recruited by the NSC (e.g. IPC doctor/nurse), or by the national team themselves. Data were collected using two questionnaires, an institutional questionnaire and a resident questionnaire.

The institutional questionnaire was used to collect data from every participating LTCF regarding their denominators (demographic data, risk factors and care load indicators for the entire LTCF population), structural and functional characteristics (e.g. presence of qualified nurses, medical coordination) and information about their antimicrobial policies and IPC resources.

Resident-level questionnaires were completed for each resident that received at least one antimicrobial agent and/or presented with at least one 'active HAI' on the day of the PPS. The protocol contained materials to support completion of this form, such as a list of codes for microorganisms and their antimicrobial resistance profiles.

The Anatomical Therapeutic Chemical (ATC) classification system of the World Health Organization Collaborating Centre for Drug Statistics Methodology was used to classify antimicrobials [4]. The following antimicrobial agents had to be included: antibacterials (ATC level J01), antimycotics (J02) and antifungals (D01BA) for systemic use, antibiotics used as intestinal anti-infectives (A07AA), antiprotozoals (P01AB), antimycobacterials (J04) when used for treatment of mycobacteria including tuberculosis or as reserve treatment for multidrug-resistant bacteria and

[i] The terms 'mentally disabled persons' and 'physically disabled persons' were used as categories in the collection of results. However, throughout this report these groups will be referred to as 'people with intellectual disabilities' and 'people with physical disabilities' respectively. Future data collection protocols will be updated accordingly.

COVID-19 antivirals PF-07321332/ritonavir/nirmatrelvir (Paxlovid™), regdanvimab, (Regkirona™), casirivimab/imdevimab (Ronapreve™), remdesivir (Veklury™), sotrovimab (Xevudy™), molnupiravir (Lagevrio™), and tixagevimab/cilgavimab (Evusheld™). Their route of administration had to be oral, parenteral (intravenous), intramuscular, subcutaneous, inhalation or rectal. Antiviral agents for systemic use (J05; other than for COVID-19), preparations of antimicrobial agents for topical use, and antiseptic agents were excluded.

Results

A total of 18 EU/EEA countries recruited 1 662 LTCFs. General nursing homes, residential homes and mixed LTCFs represent 89.1% of all participating LTCFs. To avoid overrepresentation, a subset of these three types of LTCFs was drawn from the submitted data from three countries: Denmark, Norway and Sweden. The final EU/EEA database included a total sample of 66 112 residents from 1 097 LTCFs. These were mainly general nursing homes (43.1%), residential homes (9.2%) and mixed LTCFs (31.2%). These three types of LTCF accounted for 61 045 eligible residents, which were included in the main analysis presented in this report.

The median size of the participating LTCFs was 60 beds. Beds in single rooms accounted for a median of 86.0% among all LTCF beds. Most residents in the three selected types of LTCFs (general nursing homes, residential homes, and mixed LTCFs) were female (median: 69.7%) and aged over 85 years (median: 53.8%). The LTCFs had a high median care load, with 69.9% of residents experiencing urinary and/or faecal incontinence, 56.5% presenting disorientation in time and/or space, and 45.5% having impaired mobility (e.g. being wheelchair-bound or bedridden).

At least one staff member with IPC training was available in 77.5% of LTCFs, and 40.5% reported having an IPC committee. Additionally, 85.6% of LTCFs could access external IPC teams for support and advice. Nearly all LTCFs (94.2%) had a written hand hygiene protocol, with alcohol-based hand disinfection being the most commonly reported method (81.6%). The median consumption of alcohol-based hand rub was 4.9 litres per 1 000 resident-days.

Of the surveyed LTCFs, 38.8% did not have any of the ten specified antimicrobial stewardship elements. The most commonly implemented elements were a 'therapeutic formulary listing antibiotics' (38.2%) and 'written guidelines for appropriate antimicrobial use' (36.6%). However, only 9.0% of LTCFs offered training on appropriate prescribing practices. Surveillance of healthcare-associated infections (HAIs) (32.9%) was more commonly reported than surveillance of antimicrobial-resistant microorganisms (31.3%) or antimicrobial consumption (24.2%).

The crude prevalence of residents with at least one HAI was 3.1% (1 925/61 045). The most frequently reported HAIs (n=1 690) were urinary tract infections (UTIs, 34.3%), respiratory tract infections (RTIs, 27.3%, with 55.2% being lower RTIs other than pneumonia), and skin infections (23.9%, of which 68.4% were cellulitis, soft tissue, or wound infections). Over half (65.2%) of the UTIs were classified as probable, indicating sufficient symptoms to suspect infection without microbiological confirmation. Only a few cases of COVID-19 (n=54; 2.7%) were documented.

Overall, only 20.0% of HAIs had positive microbiological confirmation at the time of the PPS. For 68.3% of HAIs, no microbiological samples were taken, while results were unavailable or unknown for 8.7%. Microbiological samples did not allow for the identification of a microorganism in 2.0% of HAIs and cultures were reported as negative in 1.1% of HAIs. The proportion of HAIs with microbiological data varied significantly by country, warranting cautious interpretation of the HALT-4 data on isolated microorganisms. The most frequently reported microorganisms were *Escherichia coli* (32.6%), SARS-CoV-2 (14.1%), *Klebsiella pneumoniae* (9.8%), *Staphylococcus aureus* (7.9%), *Proteus mirabilis* (6.8%), *Pseudomonas aeruginosa* (5.2%), *Enterococcus faecalis* (3.3%), *Enterobacter cloacae* (1.6%), *Providencia species* (1.6%), *Clostridioides difficile* (1.4%), and *Klebsiella species*, not specified (1.4%).

The crude prevalence of residents receiving at least one antimicrobial was 4.1%. In total, 2 502 residents received at least one antimicrobial agent. Most antimicrobial agents were administered orally (90.2%) and were prescribed within the LTCF (75.6%). Documentation of an end or review date was found for 79.1% of therapeutic prescriptions, but for only 21.3% of prophylactic prescriptions.

Treatment was the leading indication for antimicrobial prescription (68.8%), followed by prophylaxis (29.1%), while the reason was not documented for 2.1% of prescriptions. Prophylaxis was primarily for UTIs (68.5%), while treatment was most often for UTIs (41.8%), RTIs (30.5%), and skin or wound infections (15.4%).

Antibacterials for systemic use (ATC J01) accounted for 94.9% of all prescribed antimicrobials. The most commonly used groups were penicillins (J01C; 34.7%), 'other antibacterials' (J01X; 21.6%), sulfonamides and trimethoprim (J01E; 11.2%), other beta-lactam antibacterials (J01D; 11.2%), and quinolones (J01M; 9.7%). Fifteen antimicrobial agents constituted over 75% of total use, with amoxicillin combined with beta-lactamase inhibitors (J01CR02; 13.7%) being the most frequently prescribed, followed by nitrofurantoin (J01XE01; 8.0%) and fosfomycin (J01EX01; 6.7%).

Conclusions

The fourth PPS (HALT-4) had in part limited participation of LTCFs at national and local levels, often due to lack of resources of national teams to focus on HAIs and antimicrobial use in LTCFs. However, participation in the PPS was good (18 EU/EEA countries participated) with most participating countries achieving at least good representativeness. Most of the countries performed the PPS using the ECDC standardised methodology, including the most recent protocol updates, contributing to the robustness of the results.

The results of the PPS indicate that it is essential to strengthen IPC in LTCFs by ensuring core competencies for IPC professionals, allocating adequate resources for IPC programmes, implementing robust quality control and surveillance systems, developing comprehensive guidelines, and promoting awareness and training activities. Future actions should include further training for LTCF staff, prioritising hand disinfection with alcohol-based hand rub and standardised monitoring of HAIs and antimicrobial use, especially with PPSs. Additionally, collaboration of national authorities to collect and maintain comprehensive registries of LTCFs and their population is essential to improve understanding and comparability of long-term care systems across Europe.

Background and objectives

In December 2008, the European Centre for Disease Prevention and Control (ECDC) initiated the surveillance of healthcare-associated infections (HAIs) and antimicrobial use in European long-term care facilities (LTCFs) under the Healthcare-Associated Infections in Long-Term Care Facilities (HALT) project. A protocol for point prevalence surveys (PPSs) in LTCFs was developed, providing an integrated methodology for continued assessment of the prevalence of HAIs, antimicrobial use, and infection prevention and control (IPC) resources in chronic care settings.

Between 2010 and 2017, three PPSs in LTCFs were successfully organised. The first PPS (HALT, 2010) collected data from 722 LTCFs in 25 European countries, the second PPS (HALT-2, 2013) was performed in 1 181 LTCFs across 17 European countries, and the third PPS (HALT-3, 2016–2017) was performed in 3 052 LTCFs in 24 EU/EEA countries [1–3]. The prevalence of residents with at least one HAI (associated to the LTCF performing the PPS) was 2.4% in 2010, 3.4% in 2013 and 3.1% in 2016–2017, but HAI case definitions and the methods of HAI data collection differed between the three PPSs. The prevalence of residents with at least one antimicrobial agent was 4.3% in 2010, 4.4% in 2013 and 4.9% in 2016–2017.

The protocols and tools from the HALT, HALT-2 and HALT-3 PPSs were adapted and discussed by the HALT-4 management team and advisory committee members. At an ECDC train-the-trainers workshop on 12 December 2022, nominated national survey coordinators (NSCs) from EU/EEA countries discussed the draft surveillance protocol, data collection questionnaires and the data collection software (HelicsWin.Net). Subsequently, ECDC published the protocol for HALT-4 PPS on its website to be used in LTCFs in the EU/EEA in 2023–2024 [5].

The aim of the HALT-4 PPS protocol [5] was to provide a standardised tool to enable the specific objectives of HALT-4:

- to estimate the prevalence of HAIs and antimicrobial use in LTCFs in the EU/EEA;
- to measure structure and process indicators of infection prevention and control (IPC) in these LTCFs.

The data obtained through these PPSs are considered useful:

- to quantify the prevalence of HAIs and antimicrobial use in LTCFs, in EU/EEA countries and in the EU/EEA overall;
- to identify needs for intervention, training and/or additional IPC resources;
- to identify priorities for intervention and raising awareness at the national and local levels;
- to ensure the availability of healthcare and the safety of residents in LTCFs, and more generally the ageing population in the EU/EEA.

This report is intended both for policy makers and technical experts in the field of healthcare-associated infections, infection prevention and control, antimicrobial consumption and antimicrobial resistance.

Methodology

Participation

National participation

All EU/EEA countries were invited to participate in the fourth PPS of HAIs and antimicrobial use in European LTCFs through ECDC's healthcare-associated infections surveillance network (HAI-Net). Participation in the PPS was voluntary but recommended by ECDC. In some countries, all regions were invited, but only some participated.

LTCF participation

All types of LTCFs were eligible to participate in the PPS, according to the HALT-2 definition of an LTCF, i.e. a facility in which residents:

- need constant supervision (24 hours);
- need 'high-skilled nursing care' (i.e. more than 'basic' nursing care and assistance for daily living);
- are medically stable and do not need constant 'specialised medical care' (i.e. administered by specialised physicians) or invasive medical procedures (e.g. ventilation).

The following facilities were excluded: hospital long-term care wards, hostel care (hotel without any kind of nursing care), sheltered care houses, day centres, home-based centres, and protected living.

The protocol requested that NSCs classify LTCFs, by applying definitions provided in the protocol. This included 10 types of LTCF: general nursing home, residential home, psychiatric LTCF, LTCF for people with intellectual disabilities ('LTCFs for mentally disabled persons' in the HALT-4 protocol), LTCF for people with physical disabilities ('LTCFs for physically disable persons' in the HALT-4 protocol), rehabilitation centre, palliative care facility, sanatorium, mixed LTCF (all or some of the above) and 'other' type of LTCF.

As in the previous HALT PPSs, data from the most similar, and most frequently recruited types of LTCF, i.e. general nursing homes, residential homes and mixed facilities, are aggregated in the main result section of this report, to minimise differences that are likely to have arisen from national interpretations of the LTCF type definitions. The results of the other, more specialised LTCFs are presented in a separate chapter.

HALT-4 surveillance protocol and training

Following a two-day train-the-trainers workshop in December 2022, ECDC distributed the HALT-4 PPS protocol [4] together with English-language training materials on ECDC's secure platform. An updatable list of frequently asked questions was made available in October 2023.

Unlike the PPS of HAIs and antimicrobial use in European acute care hospitals 2022–2023 [3,6] which proposes both standard and 'light' protocols for data collection, the HALT-4 PPS protocol only described one format for data collection. This includes a form used to collect aggregate LTCF-level denominator data from each participating LTCF, i.e. demographic data, risk factors and care load indicators for the entire LTCF population. A separate form was used to collect data from residents that received at least one antimicrobial and/or had at least one active HAI on the day of the PPS.

Further methodological details are available in the published HALT-4 PPS protocol [5].

Supporting training activities by the HALT-4 management team were provided to 10 out of 18 countries (Belgium, Finland, France, Iceland, Italy, Luxembourg, the Netherlands, Norway, Portugal, and Spain). This support was mainly given online through webinar sessions with the national team(s). On-site training was conducted by the HALT-4 management team for LTCFs in Luxembourg, while Iceland received a one-day online training (split into two-half days), delivered directly to the interested LTCFs.

Representativeness of national samples of LTCFs

Countries were encouraged to draw a nationally representative sample of LTCFs through systematic random sampling of a national/regional register of LTCFs. As participation was voluntary, other methods of recruitment were permitted, including convenience samples.

The calculation of the recommended national sample size and the criteria for categorisation of the representativeness of the national LTCF sample were presented for discussion at the train-the-trainer meeting in December 2022 and in the draft protocol distributed to countries, prior to publication of the final protocol [5]. The recommended national-level sample size was calculated using data from the HALT (2010), HALT-2 (2013) and/or HALT-3 (2016–2017) PPSs, such as the total reported number of LTCF beds in the country and the number of beds

in each participating LTCF. As the calculation incorporated an anticipated crude prevalence of 4.0%, with 1% precision for the 95% confidence interval, the sample size was most appropriate for a prevalence of that magnitude, both for HAIs and antimicrobial use [5].

Three countries (Denmark, Norway and Sweden) enrolled a much larger number of LTCFs than the recommended sample size, thus a random sample of these LTCFs was selected to avoid overrepresentation and to align with the other countries. This random sample was drawn by ordering LTCFs by size and selecting them to obtain up to twice the number required. In these countries, the random sampling may have resulted in differences in the reported prevalence comparing to their national report.

PPS surveillance period

EU/EEA countries could organise the PPS in LTCFs during one or more of three possible surveillance periods: April–June 2023, September–November 2023 and/or April–June 2024.

Preferably, data were collected from each LTCF on one single day. In LTCFs with many beds, data collection could be spread over two or more consecutive days, but all beds in one ward had to be surveyed on the same day.

Eligibility of residents

Residents were eligible, and could therefore be included in the PPS, if they were living full-time (24 hours a day) in the LTCF and were present at 8:00 AM on the day of the PPS and not discharged from the LTCF at the time of the PPS. Residents who regularly received chronic ambulatory care in an acute care hospital (e.g. haemodialysis or chemotherapy) were eligible for inclusion unless they were hospitalised on the day of the PPS, i.e. a hospital stay of at least one night.

National survey coordinators (NSCs) were responsible for ensuring compliance with national guidelines regarding the residents' consent to participate.

Data collectors and tools

Depending on the available resources, data were collected either by a local data collector (e.g. designated physician, IPC doctor/nurse, head nurse, etc.) or an external data collector recruited by the NSC (e.g. IPC doctor/nurse), or by the national team themselves.

Data were collected using two questionnaires, an institutional questionnaire and a resident questionnaire.

The institutional questionnaire was used to collect data from every participating LTCF including denominators (demographic data, risk factors and care load indicators for the entire LTCF population), structural and functional characteristics (e.g. presence of qualified nurses, medical coordination) and information about their antimicrobial policies and IPC resources.

Resident-level questionnaires were completed for each resident that received at least one antimicrobial agent and/or presented with at least one 'active HAI' on the day of the PPS. The protocol contained materials to support completion of this form, such as a list of codes for microorganisms and their antimicrobial resistance profiles.

Data were entered using a stand-alone Windows software package HelicsWin.Net available from ECDC. NSCs were encouraged to offer this software package to LTCFs to enter the data. In HelicsWin.Net, all data are stored on the local computer rather than a central database. Therefore, the data needed to be exported as an MDB (Microsoft Access database) file. NSCs either merged all MDB files received from their participating LTCFs into a single database using HelicsWin.Net or entered the data into the application themselves. Once all the data were included and data quality checks were performed, NSCs exported a national database from the software – preferably a set of CSV (comma-separated values) files compatible with ECDC's European Surveillance System/the European surveillance portal for infectious diseases

Care load indicators and risk factors

The PPS explored three care load indicators and five risk factors in the total resident population. The care load indicators were incontinence for urine and/or faeces, disorientation in time and/or space and impaired mobility (i.e. wheelchair user or bedridden). The risk factors were the presence of a urinary catheter, presence of a vascular catheter, pressure sores, other wounds (e.g. leg ulcers, traumatic or surgical wounds, insertion sites for gastrostomy, tracheostomy), and recent surgery, i.e. in the 30 days prior to the PPS.

Antimicrobial consumption data

The Anatomical Therapeutic Chemical (ATC) classification system of the World Health Organization Collaborating Centre for Drug Statistics Methodology was used to classify antimicrobials [4]. The following antimicrobial agents had to be included: antibacterials (ATC level J01), antimycotics (J02) and antifungals (D01BA) for systemic use, antibiotics used as intestinal anti-infectives (A07AA), antiprotozoals (P01AB), antimycobacterials (J04) when used

for treatment of mycobacteria including tuberculosis or as reserve treatment for multidrug-resistant bacteria. Also, the following COVID-19 antivirals were included: PF-07321332/ritonavir/nirmatrelvir (Paxlovid™), regdanvimab, (Regkirona™), casirivimab/imdevimab (Ronapreve™), remdesivir (Veklury™), sotrovimab (Xevudy™), molnupiravir (Lagevrio™), and tixagevimab/cilgavimab (Evusheld™).

Only antimicrobial agents with oral, parenteral (intravenous), intramuscular, subcutaneous, inhalation or rectal administration were recorded. Antiviral agents for systemic use (J05; other than for COVID-19), preparations of antimicrobial agents for topical use, and antiseptic agents were excluded.

Healthcare-associated infections

In contrast to HALT-3 PPS, data were collected solely for HAIs associated with the current LTCF. For this purpose, the term 'active HAI' was defined as follows:

are present on the date of the PPS AND are new or acutely worse[a].

OR
were present in the two weeks (14 days) prior to the PPS AND were new or acutely worse[a], AND the resident is (still) receiving treatment for that infection on the PPS date[b].

AND
The onset of symptoms occurred more than 48 hours (i.e. day three onwards) after the resident was (re-)admitted to the current LTCF.

OR
The resident was diagnosed with COVID-19[c] and the onset of symptoms – or in the case of asymptomatic COVID-19, the first positive test was recorded within two weeks (14 days) prior to the PPS – occurred more than 48 hours (i.e. day three onwards) after the resident was (re-)admitted to the current LTCF.

Exceptions:

- When a resident presents signs/symptoms of a skin or wound infection on the day of the PPS, it should be verified that these signs/symptoms of an infection are not the result of a prior surgery. Skin or wound infections occurring within 30 days after surgery without an implant or within 90 days after surgery with an implant, are considered to be surgical site infections. Surgical site infections should be excluded from this PPS as they are acquired in other healthcare facilities.
- *Clostridioides (Clostridium) difficile* infections should be excluded from this PPS if the onset of signs/symptoms happened within 28 days after a stay in another healthcare facility (e.g. hospital or other LTCF). In this situation, *C. difficile* infections are considered as acquired in another healthcare facility.

Notes:
a. Chronic symptoms, such as cough or urinary urgency, are commonly not associated with infection. Non-infectious causes should always be considered before a diagnosis of infection is made. A change in the resident's status is an important indication that an infection is in development.
b. If these signs/symptoms meet a case definition for an HAI, that HAI should be recorded on the resident form. Data collectors should investigate the signs/symptoms in the preceding two weeks, e.g. from patient records or by consulting the resident's physician, if practicable.
c. Diagnosis for COVID-19 is made on the sole confirmation of a documented laboratory test (viral RNA target or antigenic detection from an oropharyngeal or nasal swab, or any other appropriate clinical specimen), even in the absence of any clinical signs and symptoms.

The case definition decision algorithms used in the current PPS were largely identical to the definitions used in the HALT-2 and HALT-3 PPSs, and were based on case definitions of the US Centers for Disease Control and Prevention and the Society for Healthcare Epidemiology of America Long-Term Care Special Interest Group [7].

The following changes were made to the definitions compared to the HALT-3 PPS:

- Case definitions of surgical site infections and the infection codes for imported infections were removed since HAIs acquired in other healthcare facilities were not included in the HALT-4 PPS.
- The case definition of confirmed COVID-19 by severity (COV-ASY, COV-MM, COV-SEV) was added.
- The definition of lower respiratory tract infections (LRTI) was adapted: positive chest X-ray replaced by positive thoracic imaging (including chest X-ray, CT-scan and ultrasound).
- *Clostridium difficile* infection was renamed *Clostridioides difficile* infection; the name of the order Enterobacterales was used in place of the name of the family Enterobacteriaceae; and the taxonomy change of *Enterobacter aerogenes* to *Klebsiella aerogenes* was adopted in the code list for microorganisms with the introduction of the code 'KLEAER', although both the new and the old code ('ENBAER') were accepted in 2023–2024.

Antimicrobial resistance data

The resident form recorded up to three isolated microorganisms for patients identified as having an active HAI on the day of the PPS and who had a relevant microbiological sample taken. The protocol also provided codes to report antimicrobial susceptibility testing (AST) results for selected pathogen-antimicrobial combinations (Table 1). The data collector then entered the specified AST result code onto the resident form [5].

Table 1. Antimicrobial resistance phenotype to be reported for selected microorganisms in the fourth PPS of HAI and antimicrobial use in European LTCFs, HALT-4, 2023–2024

Microorganism	Tested antibiotic[1]	Antimicrobial resistance			
Staphylococcus aureus (STAAUR)	Oxacillin (OXA)	Susceptible, standard dosing regimen (S)	–	Resistant (R)	Unknown (U)
	Glycopeptides (GLY)	Susceptible, standard dosing regimen (S)	Susceptible, increased exposure (I)	Resistant (R)	Unknown (U)
Enterococcus* species** (ENC)	Glycopeptides (GLY)	Susceptible, standard dosing regimen (S)	Susceptible, increased exposure (I)	Resistant (R)	Unknown (U)
Enterobacterales[2], including: *Escherichia coli (ESCCOL)* *Klebsiella* species (KLE***) *Enterobacter* species (ENB***) *Proteus* species (PRT***) *Citrobacter* species (CIT***) *Serratia* species (SER***) *Morganella* species (MOGSPP)	Third-generation cephalosporins (C3G)	Susceptible, standard dosing regimen (S)	Susceptible, increased exposure (I)	Resistant (R)	Unknown (U)
	Carbapenems (CAR)	Susceptible, standard dosing regimen (S)	Susceptible, increased exposure (I)	Resistant (R)	Unknown (U)
Pseudomonas aeruginosa (PSEAER)	Carbapenems (CAR)	Susceptible, standard dosing regimen (S)	Susceptible, increased exposure (I)	Resistant (R)	Unknown (U)
Acinetobacter baumannii (ACIBAU)	Carbapenems (CAR)	Susceptible, standard dosing regimen (S)	Susceptible, increased exposure (I)	Resistant (R)	Unknown (U)

1 OXA: susceptibility to oxacillin, or other marker of MRSA, such as cefoxitin, cloxacillin, dicloxacillin, flucloxacillin, meticillin;
GLY: susceptibility to glycopeptides: vancomycin or teicoplanin;
C3G: susceptibility to third-generation cephalosporins: cefotaxime, ceftriaxone, ceftazidime;
CAR: susceptibility to carbapenems: imipenem, meropenem, doripenem.
2 Antimicrobial resistance markers are not collected for other Enterobacterales (e.g. Hafnia spp., Salmonella spp., Shigella spp., Yersinia spp.).

National PPS protocols

Three countries (the Netherlands, Norway and Sweden) used national protocols for PPSs in LTCFs. The Netherlands applied its national protocol specifically to collect data on antimicrobial use, not collecting data for all antimicrobial ATC codes. Norway provided data from its PPS of HAIs and antimicrobial use in healthcare institutions focusing on antimicrobial use and only selected HAIs: UTIs, lower RTIs and cellulitis/soft tissue/wound infections. Norwegian LTCFs for the elderly, such as nursing homes and residential care homes, must participate in these PPSs twice a year. Norway submitted data that originated from the PPS that was conducted in May 2023. Sweden performed its national data collection employing the HALT-2 PPS protocol, which linked data on microorganisms to the antimicrobial use rather than to the HAIs and did not include COVID-19 infections. Sweden performed its PPS in November 2023 and collected additional information for microorganisms and institutional indicators from the HALT-4 PPS protocol.

Additionally, a few other countries did not fully adhere to the HALT-4 PPS protocol. For example, Denmark did not collect data on microorganisms. France omitted certain questions and did not include data on the diagnosis sites for antimicrobial prophylaxis. Luxembourg only included HAIs for which the signs/symptoms were still present on the day of the PPS.

National denominators

NSCs were asked to review the national denominators included in the HALT-4 PPS protocol.

The national denominators include the number of LTCFs and the respective number of LTCF beds in the following types of LTCFs:

General nursing homes	In these facilities, residents need medical and/or skilled nursing care and supervision 24 hours a day. These facilities principally provide care to older adults with severe illnesses or injuries.
Residential homes	In these facilities, residents are unable to live independently. They require supervision and assistance for the activities of daily living (ADL). These facilities usually include personal care, housekeeping and three meals a day.
Specialised LTCFs	These facilities specialise in one specific type of care, e.g. physical impairment, chronic diseases such as multiple sclerosis, dementia, psychiatric illnesses, rehabilitation care, palliative care, intensive care, etc.
Mixed LTCFs	These LTCFs provide different types of care at the same facility (a mix of the above-mentioned types of LTCF).
Other LTCFs	Other facilities, which are not classifiable under the above-mentioned types of LTCF.

Validation study

No validation study was performed for the HALT-4 PPS.

Data analysis

HALT-4 PPS data were processed and analysed with Stata/SE 17.0 (StataCorp. 2021. Stata Statistical Software: Release 1. College Station, TX: StataCorp LLC.) and the maps were made with R 4.2.2 (R Foundation for Statistical Computing, Vienna, Austria). Boxes in horizontal box plots represent the median and interquartile range.

Definitions

The criteria defining 'eligible residents' are listed above (see 'Eligibility of residents'). 'Selected LTCFs' included all LTCFs classified as general nursing homes, residential homes or mixed LTCFs (see 'LTCF participation'). In this report, a 'country' is defined as an EU Member State or an EEA country.

In the LTCF-level demographic data only the number of residents over 85 years and the number of male residents were collected. The choice to collect only the number of male residents was due to data collection simplicity, and we chose it to be number of males as a 'risk factor' for HAIs and/or antimicrobial use [3].

The crude HAI prevalence was presented as the percentage of residents with at least one active HAI detected on the day of the PPS over the total number of eligible residents on the day of the PPS. Similarly, the crude antimicrobial use prevalence was defined as the percentage of residents receiving at least one systemic antimicrobial agent over the total number of eligible residents on the day of the PPS. The number of residents with at least one active HAI and with at least one systemic antimicrobial agent were assessed from the resident level records whilst the number of eligible residents was taken from the aggregated LTCF-level reporting. The 'median' of an indicator is the 50th percentile for that indicator in all participating LTCFs calculated for the entire dataset and by country, e.g. the median HAI prevalence is the median of the HAI prevalence detected in all participating LTCFs in the EU/EEA or the respective country.

Antimicrobial resistance data presented in this report should be interpreted with caution. Access to microbiological tests and their results is limited in European LTCFs and can vary greatly between countries and even within one country. Therefore, antimicrobial resistance data collected for selected pathogen-antimicrobial combinations were combined in one composite index. The composite index of AMR was calculated as the percentage of resistant isolates for the 'first level' AMR markers divided by the sum of the isolates for which AST results were reported. These first-level markers were *Staphylococcus aureus* resistant to oxacillin, i.e. MRSA, enterococci resistant to glycopeptides, Enterobacterales resistant to third-generation cephalosporins, and *Pseudomonas aeruginosa* and *Acinetobacter baumannii* resistant to carbapenems.

Recoding of variables

If a resident was reporting as having a COVID-19 infection but no microorganism was reported, the microorganism 'VIRCOV' was added for this resident. Missing values for AST results were recoded as 'Unknown'.

HAI data imputation

Norway submitted data from its national PPSs, and according to its national PPS protocol, only a limited set of HAIs had to be collected. Using these data without any modification would have led to an underestimation of the prevalence of residents with at least one HAI, and thereby also underestimate HAI prevalence at the EU/EEA level. Therefore, for Norway, we imputed the prevalence of the HAIs that were not recorded. To achieve this, the total number of HAIs was calculated by type of HAI and by country. These totals were then divided by the total number of eligible residents of each country. The obtained median prevalence of each HAI was multiplied by the number of eligible residents of each Norwegian LTCF for the types of HAI that were missing. The imputed values were then rounded to the nearest integer.

Outputs

Post-PPS LTCF-level feedback reports

After each surveillance period, NSCs received LTCF-level feedback reports for all participating LTCFs in their country. These compared an individual LTCF to LTCFs of the same type, and to all LTCFs in the national dataset.

HALT-4 report

This report summarises the methodology and main results from the HALT-4 PPS.

Results

Participation and representativeness

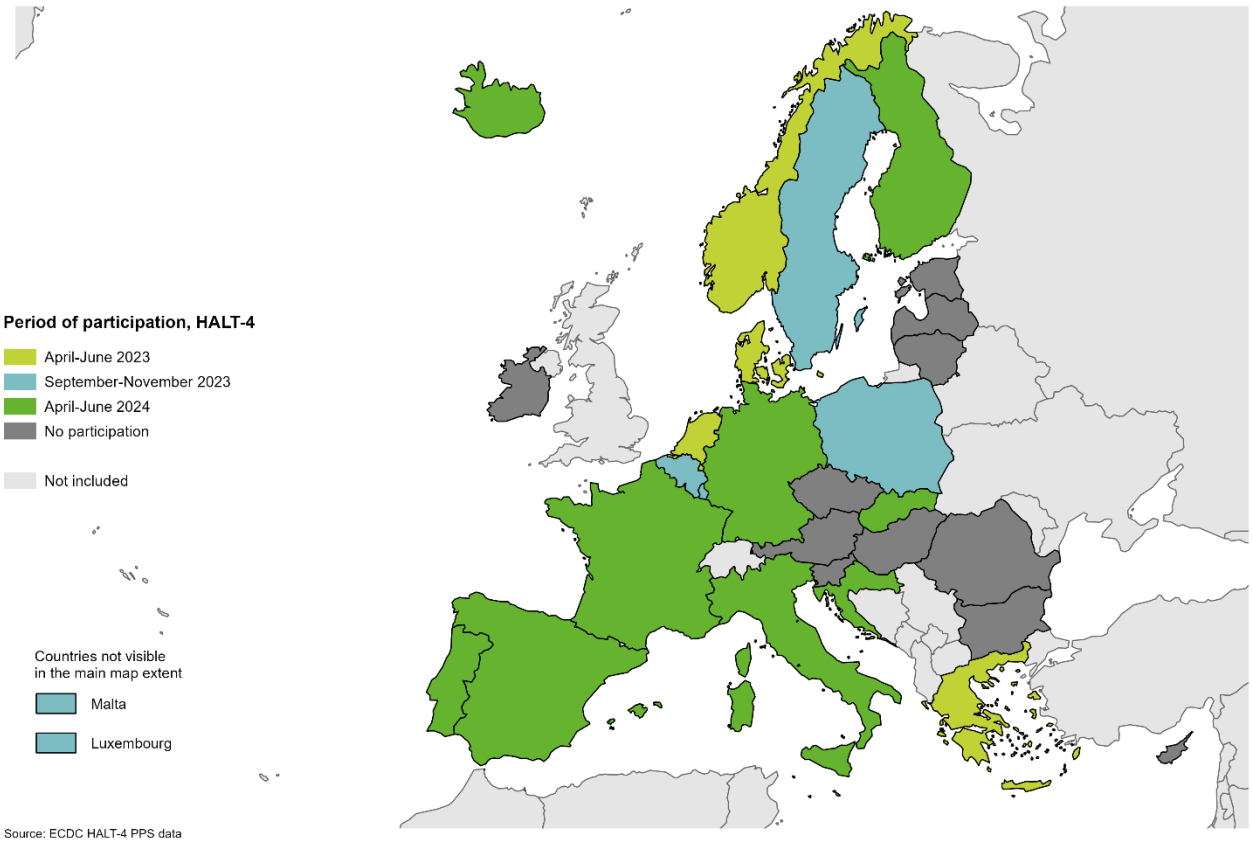
A total of 18 EU/EEA countries participated in the fourth PPS of HAIs and antimicrobial use in European LTCFs. This includes 16 EU Member States and two EEA countries (Norway and Iceland).

Half of the countries (n=9/18, 50.0%) performed the PPS during the third and last surveillance period, i.e. April–June 2024. Denmark submitted the data collected during the first two surveillance periods. Belgium and Poland submitted the data collected during the two last surveillance periods. Fourteen countries participated in only one surveillance period, while the Netherlands had LTCFs participating in all three surveillance periods (Figure 1). Portugal performed the HALT-4 PPS in July 2024 following an agreement with the HALT-4 management team.

Most countries reached optimal or good representativeness for their national samples (Table 3). However, only France selected randomly LTCFs for participation; other countries recruited LTCFs on voluntary basis.

Therefore, in some countries with good representativeness, the geographical representativeness of the data may be limited due to voluntary convenience sampling. Greece, Malta and Poland also included a large sample of LTCFs, n=22, n=12 and n=19, respectively, but did not reach the recommended representativeness which may further limit conclusions drawn from their data. Croatia (n=4 LTCFs) and Iceland (n=3 LTCFs) only included small number of LTCFs and therefore the representativeness of their data remains limited. It should nevertheless be emphasised that the three Icelandic LTCFs that participated in the PPS are the largest in the country. Together, they account for approximately 80% of LTCF residents in the extended Reykjavik area and nearly half of all LTCF residents nationwide.

Figure 1. First period of participation in the fourth PPS of HAI and antimicrobial use in European LTCFs, HALT-4, 2023–2024



Source: ECDC HALT-4 PPS data

The boundaries and names shown on this map do not imply official endorsement or acceptance by the European Union. ECDC. Map produced on 19 December 2024

ECDC received data from 1 662 LTCFs (90 001 eligible residents) from 18 EU/EEA countries. General nursing homes, residential homes and mixed LTCFs represented 89.1% of all LTCFs. To avoid overrepresentation, a subset of these three types of LTCF was randomly selected from the submitted data from three countries who provided large samples of data: Denmark (294 LTCFs; 11 566 residents), Norway (446 LTCFs; 21 057 residents) and Sweden

(135 LTCFs; 1 649 residents). After sampling them, 98 LTCFs (3 890 residents) were selected for Denmark, 111 LTCFs (5 231 residents) for Norway and 101 LTCFs (1 262 residents) for Sweden.

The final EU/EEA database included a total of 66 112 residents from 1 097 LTCFs, mainly general nursing homes (43.1%), residential homes (9.2%) and mixed LTCFs (31.2%) (Table 2).

Table 2. Total number of LTCFs participating in the PPS by country and by type of LTCF, HALT-4, 2023–2024

Country	No. of LTCFs										
	General nursing home	Residential home	Mixed LTCF	Psychiatric LTCF	LTCF for people with intellectual disabilities	LTCF for people with physical disabilities	Rehabilitation centre	Palliative care centre	Sanatorium	Other LTCF	Total
Belgium	69	0	0	3	2	0	5	0	0	0	79
Croatia	2	1	1	0	0	0	0	0	0	0	4
Denmark	66	6	26	0	0	0	0	0	0	0	98
Finland	51	3	12	0	0	0	0	0	0	0	66
France	44	0	0	0	0	0	0	0	0	0	44
Germany	11	11	33	1	0	0	0	0	0	0	56
Greece	18	2	2	1	0	1	2	0	0	0	26
Iceland	3	0	0	0	0	0	0	0	0	0	3
Italy	2	30	15	0	0	1	0	0	1	1	50
Luxembourg	50	0	0	0	0	0	0	0	0	0	50
Malta	5	6	1	0	0	0	0	0	0	0	12
Netherlands	0	0	26	5	0	2	2	0	0	0	35
Norway	111	0	0	0	0	0	0	0	0	0	111
Poland	11	7	1	0	0	0	0	0	0	0	19
Portugal	0	0	52	0	0	8	20*	0	0	1	81
Slovakia	12	16	33	0	3	0	0	2	2	3	71
Spain	17	19	40	0	0	0	0	0	0	0	76
Sweden	0	0	101	0	115	0	0	0	0	0	216
Total	**473**	**101**	**342**	**10**	**120**	**12**	**29**	**2**	**3**	**5**	**1 097**

LTCF categories that are highlighted in green were amalgamated in this report for further analyses; those in grey are presented individually in a separate chapter. LTCFs were classified using ECDC definitions, which may differ from those used by individual countries.
**Medium Term and Rehabilitation Units*

Table 3. Number of LTCFs and beds nationally by country, HALT-4, 2023–2024

Country	LTCFs in the country	LTCF beds in the country	Beds in LTCFs selected for inclusion in HALT-4		National representativeness of LTCF sample*
	N	N	N	%	
Belgium	1 545	146 462	7 745	5.3	Good
Croatia	325	37 249	1 274	3.4	Limited
Denmark	950	42 668	4 355	10.2	Good
Finland	1 928	50 373	2 816	5.6	Good
France	9 744	687 936	3 765	0.5	Optimal
Germany	11 250	874 562	4 455	0.5	Good
Greece	263	10 849	1 542	14.2	Medium
Iceland	64	3 021	1 438	47.6	Limited
Italy	3 219	186 872	3 841	2.0	Good
Luxembourg	62	6 966	5 923	85.0	Optimal
Malta	41	5 035	2 920	58.0	Medium
Netherlands	700	80 500	3 068	3.8	Good
Norway	852	39 583	-	-	Good
Poland	373	17 291	2 330	13.5	Medium
Portugal	360	8 400	1 576	18.8	Good
Slovakia	677	27 497	4 656	16.9	Good
Spain	5 442	389 050	8 578	2.2	Good
Sweden	1 700	85 000	1 568	1.8	Good

** National representativeness based on the criteria outlined in the HALT-4 protocol*

Results from general nursing homes, residential homes and mixed LTCFs

Characteristics of the selected LTCFs

General nursing homes (n=473), residential homes (n=101) and mixed LTCFs (n=342) were selected from the final dataset to increase homogeneity and consequently, comparability between countries. Combined, they represented 83.5% of all participating LTCFs.

The median size of the LTCFs (total number of beds) included in the HALT-4 PPS was 60 beds. Sweden (11 beds) and Portugal (21 beds) reported the lowest median number of beds as they recruited LTCF units instead of entire LTCFs. Iceland – which enrolled the largest LTCFs, reported the highest median number of beds (381 beds) well ahead of Luxembourg (119 beds) (Table 4).

The median percentage of single-bed rooms among the total number of rooms was 86.0%. Four countries (Denmark, Finland, the Netherlands and Sweden) reported LTCFs with only single-bed rooms. Conversely, the median percentage of single rooms was less than 10% in Greece, Italy, Malta, Poland and Portugal.

Table 4. Size and percentage of single bedrooms in participating LTCFs, by country, HALT-4, 2023–2024

Country	Participating LTCFs	Size of participating LTCFs (n of beds)				Median % of single-bed rooms among the total N of LTCF beds
	N	Mean	P25	Median	P75	%
Belgium	69	112.2	88	118	140	95.0
Croatia	4	318.5	146	261	491	25.0
Denmark	98	44.4	27	39	56	100
Finland	66	42.7	24	40.5	58	100
France	44	85.6	57	78.5	90.5	-
Germany	55	81.0	51	78	96	73.6
Greece	22	70.1	38	59	80	7.2
Iceland	3	479.3	292	381	765	88.7
Italy	47	81.7	40	64	106	5.9
Luxembourg	50	118.5	100	119.5	140	97.6
Malta	12	243.3	92.5	149.5	214	6.2
Netherlands	26	118.0	59	81.5	172	100
Norway	111	-	-	-	-	-
Poland	19	122.6	75	105	144	6.2
Portugal	52	30.3	15	21.5	34.5	9.1
Slovakia	61	76.3	40	56	107	13.6
Spain	76	113.0	72	95	143.5	15.0
Sweden	101	15.5	9	11	17	100
Total	**916**	**76.8**	**30**	**60**	**103**	**86.0**

-: Not available.

Characteristics of the eligible LTCF population

Of the 66 112 eligible residents in the final dataset, 61 045 (92.3%) were from general nursing homes, residential homes and mixed LTCFs.

Age and gender

The median percentage of male LTCF residents was 31.3%. Greece reported the lowest median percentage of male residents (24.2%) and Portugal the highest (44.5%). In contrast, Portugal reported the lowest median percentage of residents older than 85 years (19.2%) and Greece the highest (77.9%). The median percentage of residents older than 85 years was 53.8% (Table 5).

Table 5. Total number of eligible LTCF residents and resident demographics (age and gender), by country, HALT-4, 2023–2024

Country	N of eligible LTCF residents	% male residents				% residents older than 85 years			
		Mean	P25	Median	P75	Mean	P25	Median	P75
Belgium	7 345	28.0	22.4	28.2	33.8	59.5	52.7	59.4	69.0
Croatia	974	33.9	23.3	26.0	44.5	43.7	19.0	42.6	68.4
Denmark	3 890	36.4	31.0	37.6	42.1	49.2	40.4	48.5	56.7
Finland	2 611	34.9	27.8	33.1	39.0	53.4	46.3	55.0	62.0
France	3 140	28.3	21.9	27.3	34.5	64.1	57.9	67.8	72.6
Germany	3 988	29.2	22.7	29.0	34.6	55.4	46.3	55.6	62.8
Greece	1 366	22.3	19.2	24.2	28.3	70.7	58.3	77.9	89.7
Iceland	1 390	32.3	24.0	32.1	40.9	50.3	44.5	50.3	56.0
Italy	3 587	29.5	23.3	28.9	35.5	52.8	43.5	55.8	65.0
Luxembourg	5 420	27.2	21.5	25.8	31.6	60.6	54.7	62.9	68.7
Malta	2 800	29.1	25.4	29.1	32.3	57.0	51.2	56.6	60.9
Netherlands	3 005	30.9	25.5	31.8	37.2	48.5	39.2	50.3	58.2
Norway	5 231	-	-	-	-	-	-	-	-
Poland	2 109	30.6	22.9	26.7	40.0	46.1	32.9	50.0	56.3
Portugal	1 310	46.3	38.1	44.5	53.6	22.0	14.5	19.2	29.3
Slovakia	4 301	31.4	24.5	30.2	38.1	32.5	23.7	33.3	42.5
Spain	7 316	32.7	25.6	30.3	40.5	55.6	46.5	56.4	63.3
Sweden	1 262	34.9	25.0	35.3	45.0	54.2	42.9	57.1	66.7
Total	**61 045**	**32.5**	**25.0**	**31.3**	**39.5**	**51.4**	**40.0**	**53.8**	**63.3**

Care load indicators and risk factors

The distribution of care load indicators and risk factors in the total eligible population is presented in Table 6 and Table 7. The overall median prevalence of residents with incontinence (urine and/or faeces) was 69.9%. Incontinence was most commonly reported by participating LTCFs in Finland (90.0%) and less frequently in the Netherlands (57.8%). The median percentage of residents with impaired mobility (wheelchair-user or bedridden) was 45.5%, varying from 31.2% in Iceland to 81.3% in Portugal.

There is a large inter-country variability concerning the percentage of disoriented residents. Croatia reported the lowest percentage of disoriented residents (17.4%), while Finland reported the highest (87.7%). The overall median prevalence was 56.5%.

Urinary catheters (EU/EEA median=5.6%) were most frequently reported in Sweden (11.1%) and in the Netherlands (10.9%), while they were least commonly reported in France (0.3%). The overall median percentages of both vascular catheters and recent surgery were 0.0%. Italy reported the most residents with a vascular catheter (3.1%), while Poland had most residents with recent surgery (1.1%).

The overall median prevalence of pressure sores and wounds (other than pressure sores) was 3.8% and 7.2%, respectively. Pressure sores were more commonly reported in Portugal (11.1%) and Italy (7.4%), and other wounds were more commonly reported in Iceland (11.2%) and Portugal (10.6%). Sweden and Greece both reported a median prevalence of pressure sores and other wounds of 0.0%.

Table 6. Distribution of care load indicators in the total LTCF resident population, by country, HALT-4, 2023–2024

Country	Care load indicators											
	% residents with incontinence (urine and/or faeces)				% disoriented residents (in time and/or space)				% residents with impaired mobility (wheelchair user or bedridden)			
	Mean	P25	Median	P75	Mean	P25	Median	P75	Mean	P25	Median	P75
Belgium	64.3	47.7	67.5	83.5	56.9	47.0	55.4	64.5	38.1	31.6	37.8	45.7
Croatia	53.6	22.9	58.1	84.2	20.9	12.1	17.4	29.6	40.5	28.7	38.0	52.3
Denmark	68.1	58.1	69.7	79.5	60.1	47.9	60.9	78.6	38.3	30.9	38.4	45.9
Finland	86.8	80.0	90.0	95.0	83.2	72.0	87.7	96.5	50.0	37.9	52.1	59.4
France	66.1	60.0	69.2	76.6	68.1	61.2	69.8	75.6	45.4	38.9	44.9	53.1
Germany	72.8	63.8	72.2	86.6	55.7	40.0	56.6	66.7	52.3	41.2	53.3	61.5
Greece	65.0	47.6	70.3	79.7	55.9	43.5	59.4	69.0	48.9	30.8	54.2	65.8
Iceland	44.7	23.6	54.8	55.7	50.7	46.9	49.0	56.2	31.9	25.8	31.2	38.7
Italy	70.0	64.7	75.6	87.0	58.2	43.5	556.9	75.0	70.6	60.0	69.4	83.3
Luxembourg	56.1	47.1	58.3	70.8	50.9	34.5	53.0	66.5	39.4	28.9	41.0	48.3
Malta	66.5	55.7	65.8	75.2	31.6	18.4	35.9	43.0	42.7	36.0	43.9	49.1
Netherlands	51.2	43.7	50.9	57.8	53.9	44.1	51.5	60.7	36.6	23.9	37.6	46.3
Norway	-	-	-	-	-	-	-	-	-	-	-	-
Poland	70.6	52.0	81.8	87.0	51.5	37.9	53.2	68.6	55.6	33.3	51.2	77.1
Portugal	66.5	51.5	69.6	81.5	54.0	35.5	55.5	71.1	75.3	67.2	81.3	90.0
Slovakia	73.9	56.8	76.3	86.5	45.8	33.3	44.9	55.6	40.8	32.1	42.5	50.0
Spain	67.2	57.5	69.5	79.7	53.0	41.5	55.4	65.2	46.7	38.3	50.0	57.7
Sweden	59.2	47.1	60.0	75.0	47.0	30.0	44.4	65.0	42.7	33.3	44.4	52.9
Total	**67.4**	**54.0**	**69.9**	**82.7**	**56.1**	**40.3**	**56.5**	**71.2**	**47.2**	**35.0**	**45.5**	**58.2**

Table 7. Distribution of risk factors in the total LTCF resident population, by country, HALT-4, 2023–2024

Country	% residents with a urinary catheter				% residents with a vascular catheter				% residents with pressure sore(s)				% residents with other wound(s)				% residents with recent surgery (past 30 days)			
	Mean	P25	Median	P75	Mean	P25	Median	P75	Mean	P25	Median	P75	Mean	P25	Median	P75	Mean	P25	Median	P75
Belgium	3.4	1.4	3.2	5.0	0.3	0.0	0.0	0.0	2.9	0.9	2.1	4.2	9.1	5.0	8.4	13.9	1.2	0.0	1.0	1.8
Croatia	3.4	2.3	3.4	4.4	0.2	0.0	0.0	0.3	3.1	1.4	1.9	4.8	1.4	0.8	1.8	2.0	0.9	0.3	0.9	1.6
Denmark	10.2	5.3	9.7	13.8	0.4	0.0	0.0	0.0	5.4	0.0	4.4	8.0	10.3	5.3	9.7	14.3	1.9	0.0	0.0	3.1
Finland	4.4	0.0	4.2	6.8	0.1	0.0	0.0	0.0	5.1	0.0	3.7	7.0	4.4	0.0	3.6	7.0	0.3	0.0	0.0	0.0
France	1.2	0.0	0.3	1.6	2.3	0.0	0.6	2.3	4.5	1.3	3.7	7.3	-	-	-	-	1.2	0.0	0.3	1.8
Germany	9.8	5.7	8.9	11.9	0.3	0.0	0.0	0.0	4.3	2.2	3.7	6.1	9.8	4.0	8.3	14.3	1.1	0.0	0.0	1.6
Greece	15.8	4.3	7.4	26.6	0.5	0.0	0.0	0.0	4.2	0.0	3.6	7.4	1.0	0.0	0.0	1.6	0.8	0.0	0.0	0.0
Iceland	9.0	8.4	8.5	10.1	0.6	0.3	0.3	1.1	4.9	2.8	5.6	6.4	8.8	2.8	11.2	12.3	0.5	0.0	0.6	0.8
Italy	15.5	4.9	7.3	20.0	9.2	0.0	3.1	6.7	11.2	4.3	7.4	15.6	9.1	3.4	8.3	13.3	3.7	0.0	0.9	3.4
Luxembourg	4.4	2.0	4.1	5.9	0.3	0.0	0.0	0.0	3.7	2.1	3.4	4.3	11.3	4.8	10.5	15.0	1.4	0.0	1.0	2.1
Malta	5.6	3.7	4.4	7.2	0.2	0.0	0.0	0.0	2.8	0.9	2.1	3.7	5.4	2.7	3.9	6.5	0.5	0.0	0.3	1.0
Netherlands	11.0	6.3	10.9	14.7	0.2	0.0	0.0	0.3	5.8	1.9	4.9	8.3	10.8	6.3	9.9	14.8	2.1	0.0	0.9	4.1
Norway	12.8	6.3	10.7	17.2	-	-	-	-	-	-	-	-	-	-	-	-	2.3	0.0	0.0	3.1
Poland	10.2	2.5	5.3	9.1	2.6	0.0	0.4	4.5	6.2	2.1	6.5	10.6	3.7	0.0	2.9	5.3	1.4	0.0	1.1	1.9
Portugal	11.1	5.0	9.5	17.3	2.0	0.0	0.0	2.6	13.6	6.4	11.1	20.0	13.0	6.9	10.6	17.7	2.7	0.0	0.0	0.9
Slovakia	5.1	0.0	2.6	5.6	0.2	0.0	0.0	0.0	4.4	1.2	2.6	5.0	5.7	2.2	3.9	7.5	2.6	0.0	0.9	2.3
Spain	2.3	0.0	1.6	3.0	0.3	0.0	0.0	0.0	6.4	3.3	5.7	8.6	9.7	5.0	9.3	12.8	1.1	0.0	0.9	1.5
Sweden	12.3	0.0	11.1	20.0	0.1	0.0	0.0	0.0	4.6	0.0	0.0	10.0	8.9	0.0	6.1	12.5	2.7	0.0	0.0	0.0
Total	**8.4**	**1.8**	**5.6**	**11.3**	**1.1**	**0.0**	**0.0**	**0.0**	**5.7**	**1.1**	**3.8**	**7.9**	**8.7**	**2.8**	**7.2**	**12.5**	**1.8**	**0.0**	**0.0**	**1.9**

Medical care and coordination in the LTCFs

Medical care for residents was provided by general practitioners (GPs) in 48.7% of the LTCFs, and by employed medical staff in 23.4% of the LTCFs. Both types of medical care were provided in 27.9% of participating LTCFs. In Sweden, medical care was only provided by GPs, while in Iceland and in the Netherlands this care was only provided by employed medical staff (Table 8).

Table 8. Medical care providers and coordination in participating LTCFs, by country, HALT-4, 2023–2024

Country	Medical care providers			Coordinating physician			
	GPs only	Employed medical staff	Both GPs and employed medical staff	None	Internal	External	Internal and external
	% LTCFs			% LTCFs			
Belgium	63.8	1.4	34.8	2.9	0.0	97.1	0.0
Croatia	50.0	0.0	50.0	50.0	0.0	50.0	0.0
Denmark	26.5	8.2	65.3	31.6	12.2	5.1	51.0
Finland	3.0	77.3	19.7	4.5	27.3	62.1	6.1
France	-	-	-	0.0	74.4	25.6	0.0
Germany	98.1	0.0	1.9	77.8	1.9	20.4	0.0
Greece	9.1	59.1	31.8	0.0	40.9	31.8	27.3
Iceland	0.0	100.0	0.0	0.0	66.7	0.0	33.3
Italy	14.9	46.8	38.3	66.7	33.3	0.0	0.0
Luxembourg	98.0	0.0	2.0	96.0	2.0	2.0	0.0
Malta	16.7	8.3	75.0	11.1	77.8	0.0	11.1
Netherlands	0.0	100	0.0	3.8	92.3	0.0	3.8
Norway	-	-	-	-	-	-	-
Poland	26.3	52.6	21.1	11.1	66.7	16.7	5.6
Portugal	21.6	29.4	49.0	7.7	50.0	23.1	19.2
Slovakia	57.4	19.7	23.0	6.6	6.6	82.0	4.9
Spain	39.5	22.4	38.2	31.6	27.6	34.2	6.6
Sweden	100.0	0.0	0.0	0.0	0.0	100.0	0.0
Total	**48.7**	**23.4**	**27.9**	**22.0**	**22.5**	**44.6**	**10.9**

GP: general practitioner; -: not available.

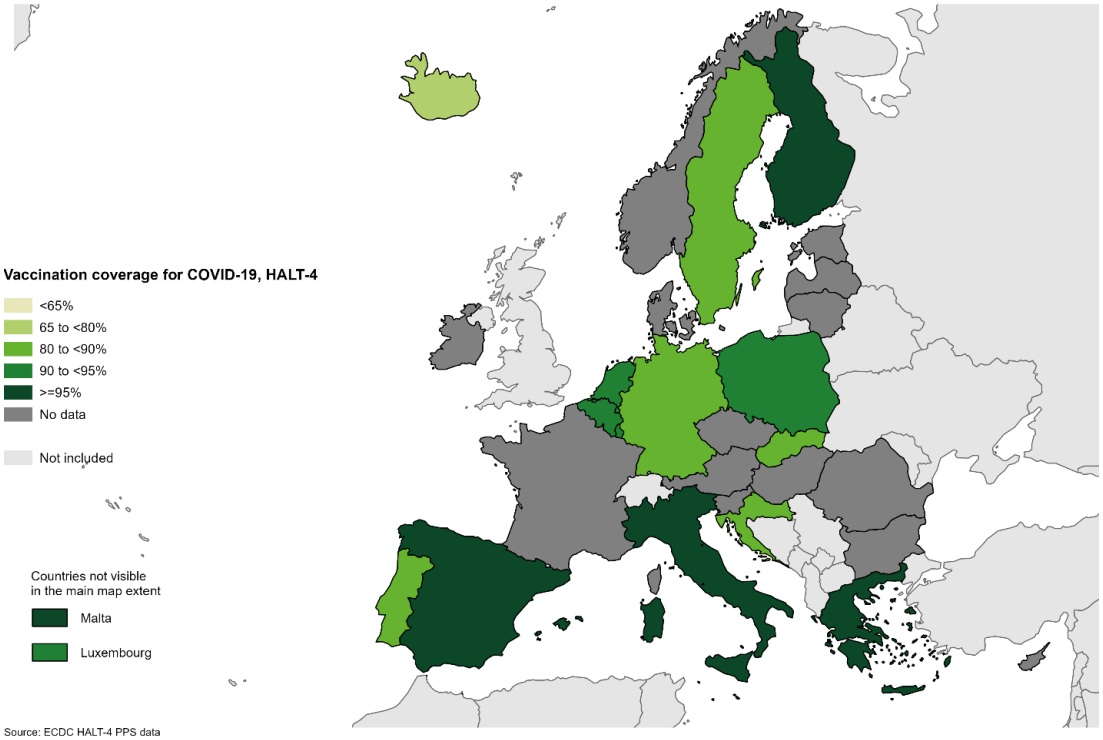
In Sweden, medical activities were coordinated by external physicians. Conversely, the Netherlands predominately reported internal medical coordinators (92.3%). In Belgium, medical coordination was present in 97.1% of LTCFs and was consistently handled by an external physician. LTCFs in France, Greece, Iceland and Sweden reported having either internal coordinators or external coordinators, or a combination of both (Table 8).

Vaccination coverage for COVID-19 and seasonal influenza

COVID-19 vaccination coverage was defined as the percentage of healthcare workers who were fully vaccinated against COVID-19, based on the national definition of full vaccination at the time of the PPS (see Annex 1 for available details). Influenza vaccination coverage referred to the percentage of healthcare workers vaccinated against influenza during the most recent influenza vaccination campaign at the time of the PPS. Vaccination coverage of residents and healthcare workers against COVID-19 and influenza were collected as a percentage. Fourteen countries provided data on COVID-19 vaccination status of residents, while 15 countries provided data on vaccination status of healthcare workers. Twelve countries provided data on seasonal influenza vaccination status of residents and 13 on seasonal influenza vaccination status of healthcare workers (Table 9).

The median reported vaccination coverage of residents and healthcare workers against COVID-19 were similar, 92.0% and 82.0% respectively. Greece reported the highest vaccination coverage for residents (100%), and Iceland reported the lowest (70%) (Figure 2). Similarly, for healthcare workers, Greece reported the highest (100%) and Iceland the lowest vaccination coverage (8.0%).

Figure 2. Median vaccination coverage of residents against COVID-19, HALT-4, 2023–2024



Source: ECDC HALT-4 PPS data
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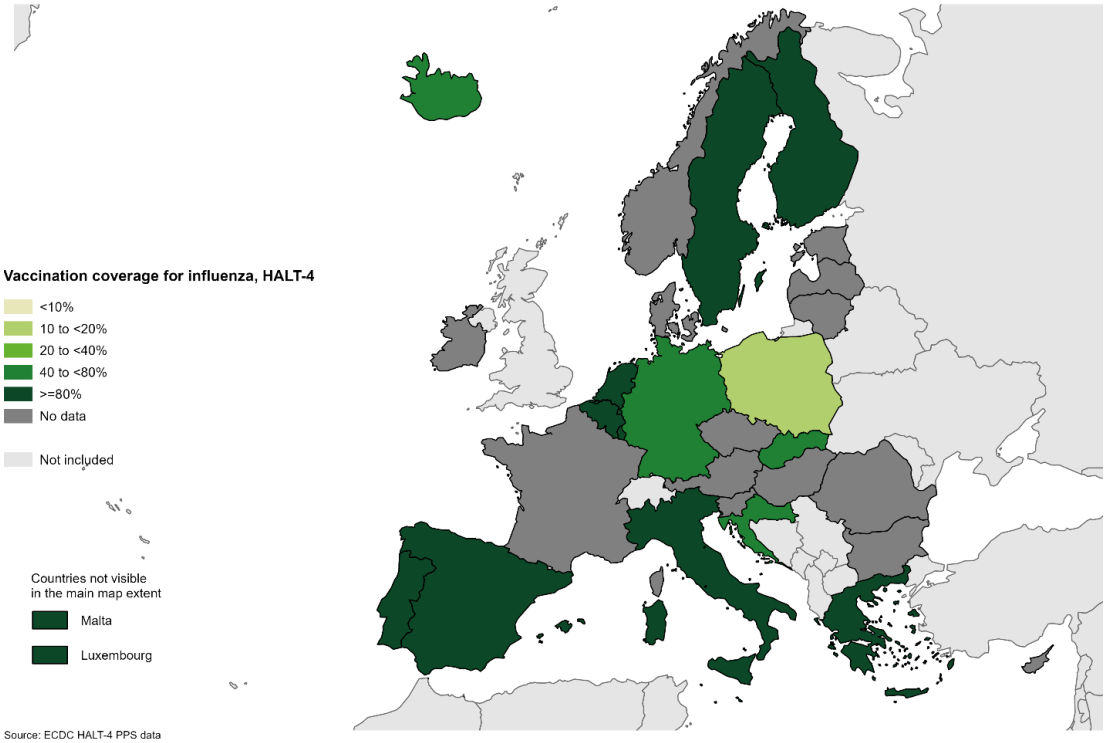
The median vaccination coverage of residents against seasonal influenza was 90.0%, with a large variation between countries, for example, 15.0% in Poland and 100% in Greece (Figure 3). The median vaccination coverage of healthcare workers against seasonal influenza was much lower with a median of 30%, ranging from 4.0% in Slovakia to 90.0% in Finland.

Figure 3. Median vaccination coverage of residents against influenza, HALT-4, 2023–2024



Source: ECDC HALT-4 PPS data
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Vaccination status for COVID-19 and seasonal influenza were not available in Denmark, France and Norway. The Netherlands and Sweden only collected data on the vaccination status of residents. In Germany, only data on influenza vaccination status were available. Their median COVID-19 vaccination percentage in residents and healthcare workers was extracted from their monthly federal report [8].

Table 9. Vaccination status for COVID-19 and seasonal influenza among residents and healthcare workers, HALT-4, 2023–2024

Country	COVID-19*								Seasonal influenza*							
	% Residents				% Healthcare workers				% Residents				% Healthcare workers			
	Mean	P25	Median	P75	Mean	P25	Median	P75	Mean	P25	Median	P75	Mean	P25	Median	P75
Belgium	85.6	82.5	94.5	96.0	42.4	20.0	30.0	60.0	88.1	90.0	93.3	95.0	38.9	15.0	39.5	55.0
Croatia	82.6	79.6	82.5	85.5	81.0	66.0	82.0	96.0	74.3	63.5	74.0	85.0	29.9	11.8	30.8	48.0
Denmark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Finland	91.8	90.0	95.0	99.0	89.1	90.0	99.0	100	91.1	89.0	95.0	99.0	81.8	70.0	90.0	100
France	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Germany	-	-	87.0**	-	-	-	76.0**	-	64.4	50.0	66.3	82.1	33.0	20.8	32.1	43.8
Greece	98.1	98.0	100	100	97.1	99.0	100	100	98.5	100	100	100	68.9	60.0	70.0	96.0
Iceland	70.3	67.0	70.0	74.0	7.0	2.0	8.0	11.0	78.3	76.0	78.0	81.0	17.0	12.0	19.0	20.0
Italy	94.8	90.0	99.0	100	93.4	95.0	100	100	82.6	80.0	90.0	100	22.2	10.0	15.0	26.0
Luxembourg	90.6	85.0	94.5	96.0	74.5	60.0	80.0	90.0	83.8	80.0	86.5	95.0	11.5	5.0	10.0	15.0
Malta	90.0	83.5	95.0	99.0	86.2	73.0	85.0	100	84.2	75.0	89.0	97.0	58.9	40.0	57.0	89.0
Netherlands	86.2	85.0	90.0	95.0	-	-	-	-	86.2	79.0	90.0	95.0	-	-	-	-
Norway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poland	84.3	82.5	90.0	93.0	73.5	50.0	80.0	82.0	22.3	1.0	15.0	40.0	12.6	0.0	7.0	20.0
Portugal	78.9	69.5	85.0	95.0	51.4	19.0	30.0	91.5	75.7	69.5	80.0	90.0	47.7	26.0	43.0	66.5
Slovakia	75.4	60.0	80.0	92.0	70.4	53.0	72.0	90.0	63.1	49.0	70.0	83.0	5.3	0.0	4.0	10.0
Spain	90.7	90.0	96.0	99.0	58.9	24.5	72.5	90.0	91.5	88.0	95.0	99.0	39.0	16.0	40.0	57.5
Sweden	63.3	12.0	88.5	98.0	-	-	-	-	64.2	13.0	89.0	99.0	-	-	-	-
Total	**83.2**	**80.0**	**92.0**	**98.0**	**70.0**	**50.0**	**82.0**	**97.0**	**77.6**	**70.0**	**90.0**	**96.0**	**37.3**	**10.0**	**30.0**	**60.0**

** COVID-19 vaccination coverage was defined as the percentage of healthcare workers who were fully vaccinated against COVID-19, based on the national definition of full vaccination at the time of the PPS (see Annex 1 for available details). Influenza vaccination coverage referred to the percentage of healthcare workers vaccinated against influenza during the most recent influenza vaccination campaign at the time of the PPS.*
***Extracted for the German monthly report; -: not available.*

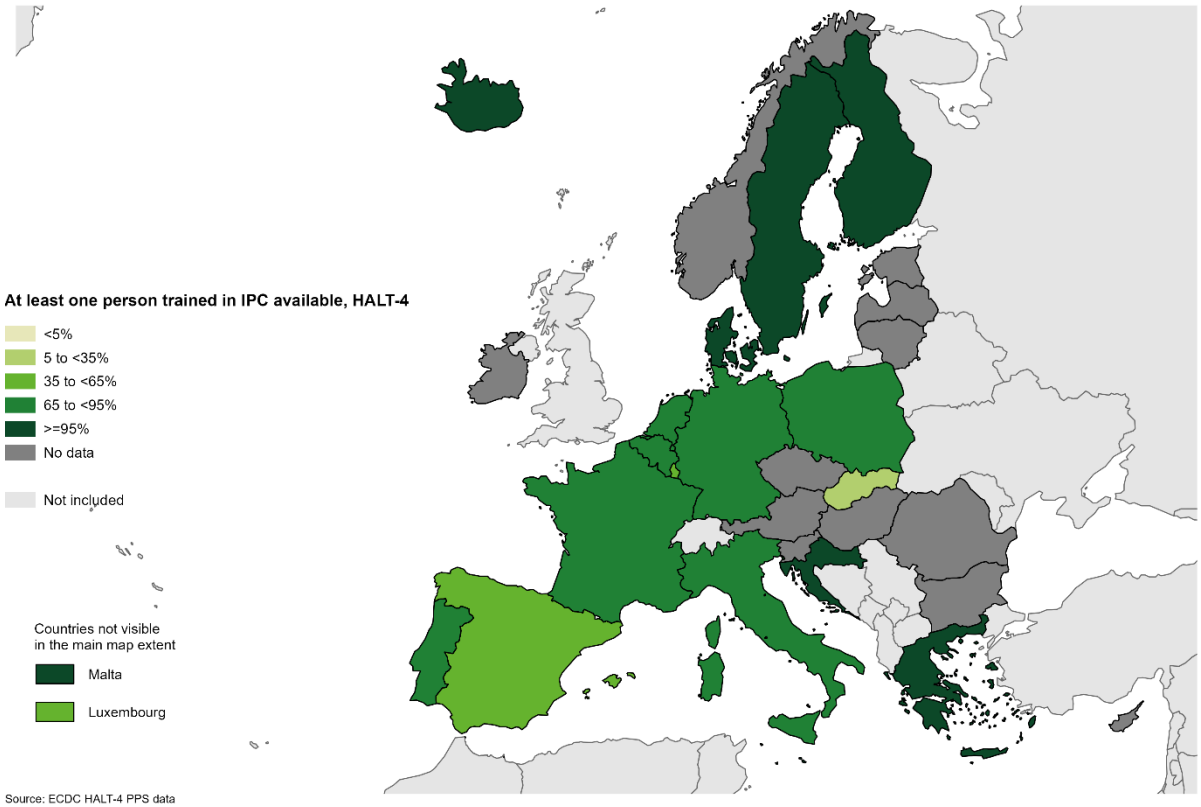
Infection prevention and control practices and resources in LTCFs

Each participating LTCF was asked about the availability of an individual trained in IPC practices, an IPC committee, and formal access to support and guidance from an external IPC team. LTCFs that answered all three questions were included in the analyses presented in Table 10. Consequently, LTCFs from France and Norway were excluded. France collected data solely on the availability of trained IPC personnel (90.2%).

The majority of LTCFs (n=623/792; 78.7%) had at least one professional with IPC training at their disposal (Figure 1 (all data for trained IPC personnel considered)). These IPC professionals were reported to be a nurse in 40.8% of LTCFs (n=254/623), a medical doctor in 5.1% (n=32; 5.1%), or a team of both in 46.1% of the LTCFS (n=287). In 50 LTCFs, the profession of the IPC professional was unknown (8.0%). Formal access to support and guidance from an external IPC team was available in most LTCFs (683/787; 86.8%).

An IPC committee was in place in 40.4% (n=295/731) of the LTCFs (Figure 5). These committees had on average 4.2 meetings per year ranging between 0 to 52 meetings annually. In total, 25 LTCFs from eight countries reported having an IPC committee, but they had not organised a meeting in the year prior to the PPS.

Figure 1. Percentage of participating LTCFs with at least one person trained in IPC available, HALT-4, 2023–2024



Source: ECDC HALT-4 PPS data

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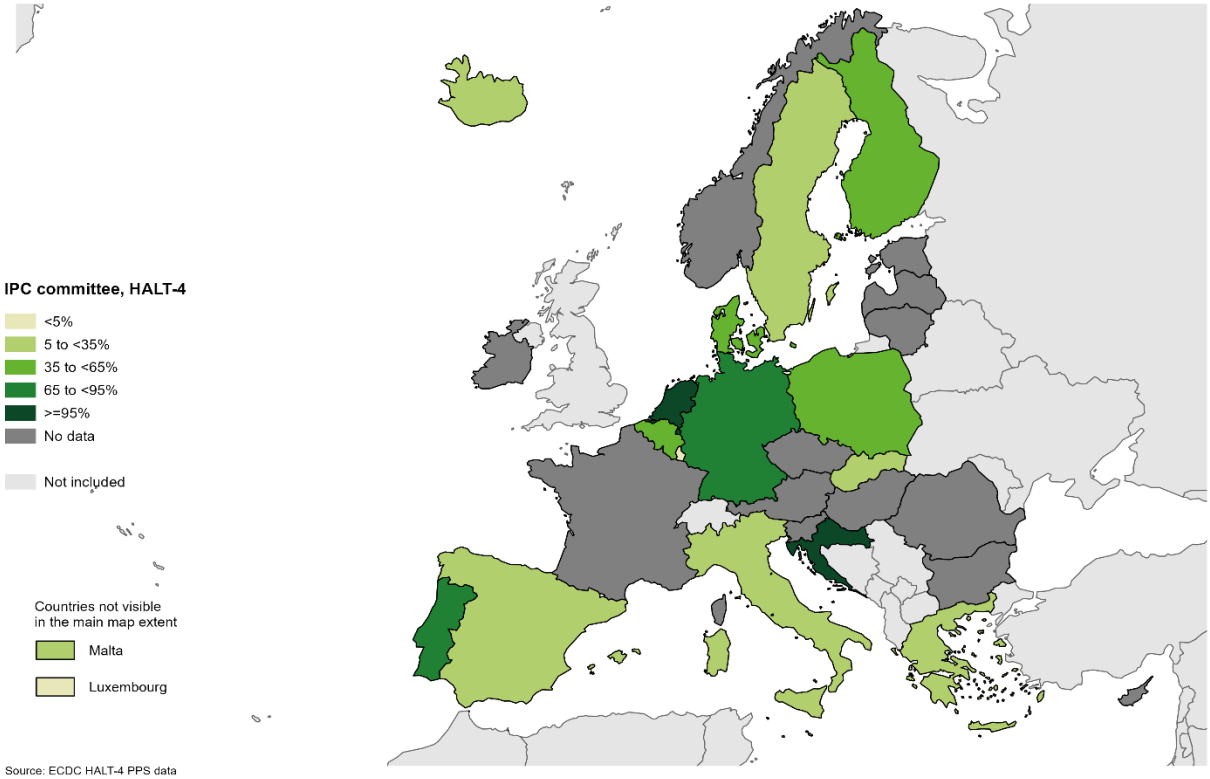
Figure 2. Percentage of participating LTCFs with an IPC committee, HALT-4, 2023–2024



Source: ECDC HALT-4 PPS data

The boundaries and names shown on this map do not imply official endorsement or acceptance by the European Union. ECDC. Map produced on 17 January 2025

Table 10. Overview of IPC resources and protocols available in participating LTCFs, by country, HALT-4, 2023–2024

Country	IPC structures				Written IPC protocols							
	No. of participating LTCFs*	Person with IPC training	IPC committee	Expert IPC advice	No. of participating LTCFs*	Management of MRSA and/or MDRO	Hand hygiene	Management of urinary catheters	Management of venous catheters	Management of enteral feeding	Management of local outbreaks with gastrointestinal infections	Management of local outbreaks with respiratory tract infections
		%	%	%		%	%	%	%	%	%	%
Belgium	69	72.5	50.7	97.1	69	98.6	100	63.8	36.2	53.6	75.4	81.2
Croatia	4	100	100	100	3	100	100	100	66.7	100	100	75.0
Denmark	98	100	53.1	100	98	99.0	100	99.0	96.9	88.8	94.9	94.9
Finland	66	97.0	42.4	100	66	98.5	100	89.4	63.6	72.7	97.0	100
France	-	-	-	-	-	-	-	-	-	-	-	-
Germany	53	88.7	77.4	75.5	49	100	100	98.0	57.1	98.0	100	95.9
Greece	20	100	15.0	70.0	22	27.3	86.4	63.6	36.4	68.2	63.6	63.6
Iceland	3	100	33.3	66.7	3	100	100	100	100	100	100	100
Italy	47	68.1	34.0	80.9	47	59.6	95.7	91.5	91.5	78.7	59.6	61.7
Luxembourg	50	60.0	4.0	96.0	50	94.0	100	98.0	98.0	98.0	86.0	84.0
Malta	12	100	8.3	100	12	83.3	100	100	33.3	91.7	100	100
Netherlands	26	92.3	100	100	-	-	-	-	-	-	-	-
Norway	-	-	-	-	-	-	-	-	-	-	-	-
Poland	18	88.9	50.0	16.7	17	70.6	82.4	64.7	70.6	64.7	64.7	58.8
Portugal	52	67.3	80.8	84.6	52	94.2	98.1	92.3	53.8	55.8	38.5	61.5
Slovakia	60	35.0	15.0	68.3	58	29.3	65.5	46.6	34.5	37.9	43.1	48.3
Spain	75	48.0	10.7	65.3	72	48.6	86.1	73.6	51.4	72.2	65.3	84.7
Sweden	65	100	20.0	100	72	97.2	98.6	95.8	84.7	93.1	97.2	100
Total	**718**	**77.6**	**40.4**	**85.9**	**690**	**81.0**	**94.2**	**84.1**	**66.2**	**75.2**	**77.4**	**82.3**

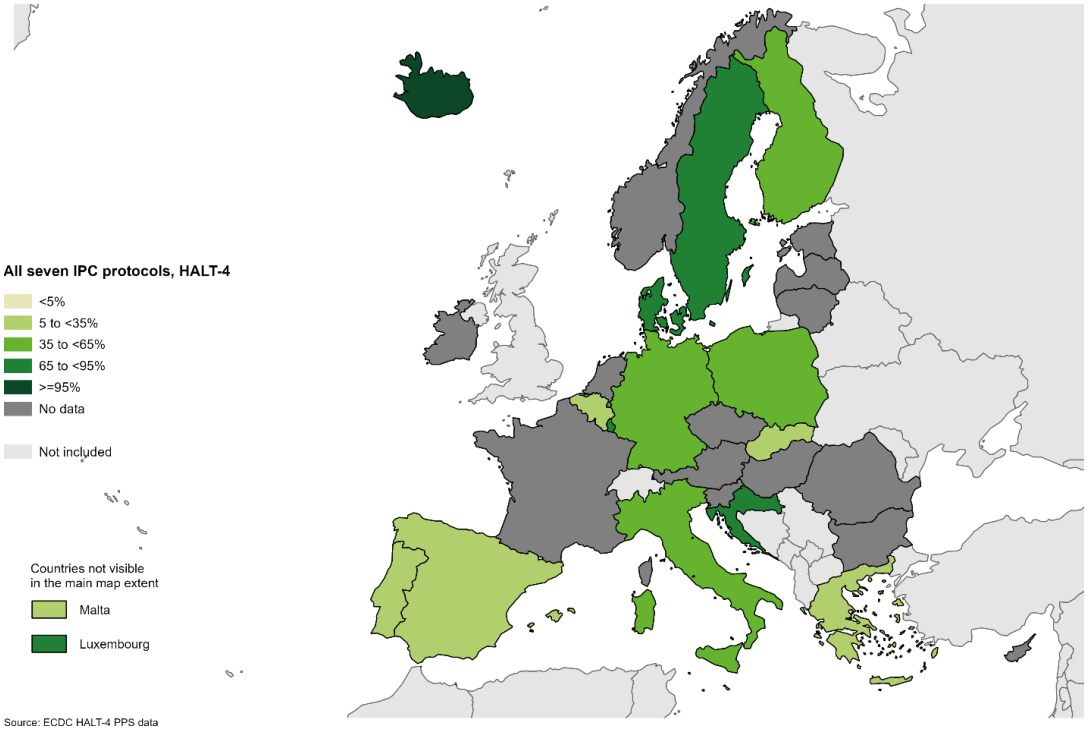
**Only LTCFs with complete data for IPC structures and protocols were included in the table.*

Our analysis included the availability of seven written IPC protocols at LTCF level. As in HALT-3, these included protocols addressing the management of Methicillin-resistant *Staphylococcus aureus* (MRSA) and/or other multidrug-resistant organisms (MDROs), hand hygiene, and the management of urinary catheters, vascular catheters, and enteral feeding. In HALT-4, two additional IPC protocols were introduced: the management of local outbreaks involving gastrointestinal infections and respiratory tract infections. Only LTCFs that provided responses for all seven protocols were included in the analysis (Table 10).

The three most frequently available protocols were for hand hygiene (94.2%), management of urinary catheters (83.1%) and the management of local outbreaks with respiratory tract infections (82.3%). Conversely, the two least commonly available protocols were for enteral feeding (75.2%) and management of vascular catheters/lines (66.2%) (Table 10).

The Netherlands did not collect data on enteral feeding and is therefore not represented in Table 10. All LTCFs in the Netherlands had protocols for the management of MRSA and/or other MDROs, for hand hygiene, the management of local outbreaks with gastrointestinal infections, and the management of local outbreaks with respiratory tract infections. A protocol for the management of urinary catheters was available in 76.9% of the LTCFs and a protocol for the management of vascular catheters in half of the LTCFs.

Figure 3. Percentage of participating LTCFs with all seven selected IPC protocols in writing, HALT-4, 2023–2024



Source: ECDC HALT-4 PPS data
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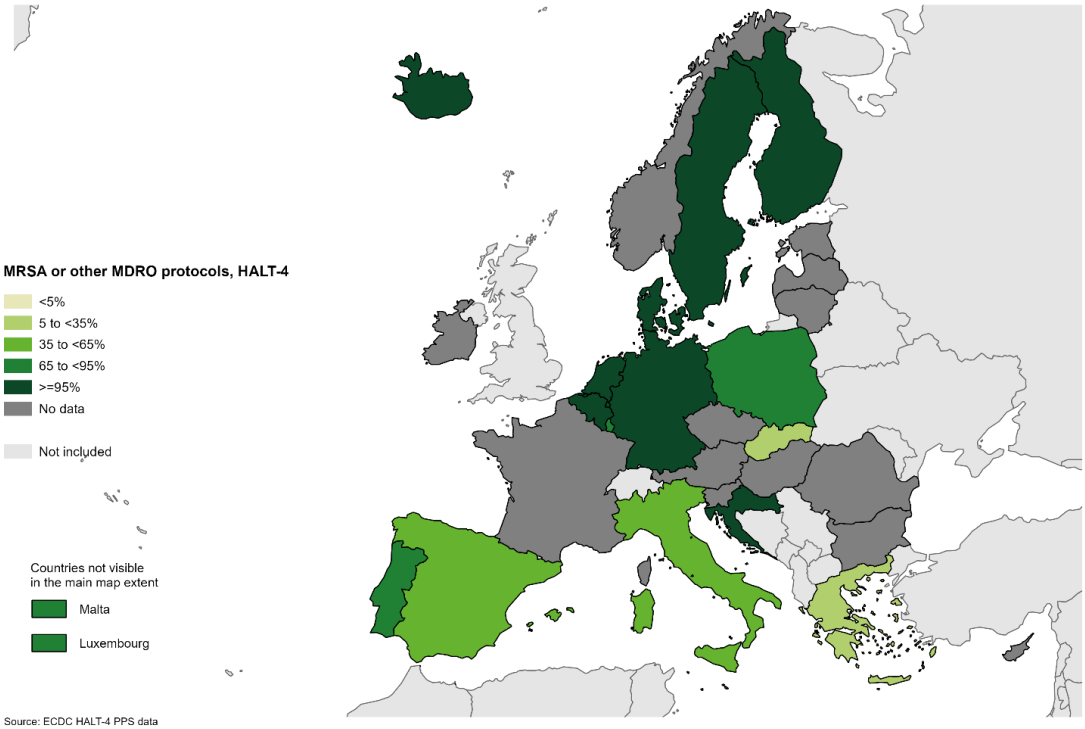
The seven selected protocols are for the management of MRSA and/or other MDROs, urinary catheters, enteral feeding, venous catheters/lines, hand hygiene, local outbreaks involving gastrointestinal infections and local outbreaks involving respiratory tract infections.

Figure 4. Percentage of LTCFs with infection prevention and control protocols in writing MRSA and/or other MDRO, HALT-4, 2023–2024



Source: ECDC HALT-4 PPS data
The boundaries and names shown on this map do not imply official endorsement or acceptance by the European Union. ECDC. Map produced on 19 December 2024

The most frequently reported IPC practices by LTCFs included 'Offer of (booster) immunisation for COVID-19 to all residents' (93.9%), 'offering annual flu immunization to all residents' (82.8%), 'deciding on isolation and additional precautions for MDRO-colonized residents' (74.2%) and 'designation of a responsible for reporting and managing outbreaks' (67.9%). In contrast, the least common practice was 'IPC training for GPs and medical staff' (18.8%). In 1.5% of the participating LTCFs, none of the 12 IPC practices were in place in (Table 11).

In the majority of LTCFs (n=362/615; 58.9%), wearing a mask was not mandatory. Conversely, 120 (19.5%) implemented a universal masking policy at the time of the PPS, requiring face masks for routine care and in all common areas, such as the lunch/dining room or the physiotherapy room. Universal masking was mainly reported in LTCFs from Belgium, Italy and Sweden. Under this policy, all individuals – including staff, residents, visitors, service providers and others – were required to always wear masks, except when eating or drinking. In 21.0% of the LTCFs, healthcare workers were required to wear face masks during routine care (i.e. all contact with non-COVID-19 residents), though masks were not mandatory in common areas of the LTCF. Four LTCFs had missing data.

Table 11. IPC practices present in participating LTCFs, by country, HALT-4, 2023–2024

Country	No. of participating LTCFs*	IPC training of nursing and paramedical staff	IPC training of GPs and medical staff	Development of care protocols	Registration of residents colonized or infected with MDRO	Designation of a responsible for reporting and managing outbreaks	Feedback on surveillance results to the nursing or medical staff of the LTCF	Supervision of disinfection and sterilisation of medical/care material	Decision on isolation & additional precautions for MDRO-colonised residents	Offer of annual immunisation for flu to all residents	Offer of (booster) immunisation for COVID-19 to all residents	Organisation, control, feedback on hand hygiene (on regular basis)	Org., control, feedback of a surveillance /audit of IPC policies & procedures	None of these elements
		%	%	%	%	%	%	%	%	%	%	%	%	%
Belgium	69	85.5	17.4	85.5	92.8	88.4	65.2	60.9	98.6	100	97.1	58.0	40.6	0.0
Croatia	3	66.7	33.3	66.7	66.7	66.7	66.7	100	66.7	100	100	33.3	33.3	0.0
Denmark	98	67.3	9.2	76.5	7.1	63.3	23.5	15.3	69.4	98.0	91.8	49.0	26.5	1.0
Finland	66	71.2	18.2	77.3	57.6	78.8	43.9	42.4	89.4	100	100	62.1	56.1	0.0
France	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Germany	52	98.1	7.7	84.6	67.3	92.3	53.8	63.5	98.1	82.7	84.6	90.4	98.1	0.0
Greece	22	72.7	81.8	68.2	22.7	68.2	54.5	81.8	90.9	100	100	90.9	72.7	0.0
Iceland	2	100	100	100	50.0	100	50.0	50.0	100	100	100	50.0	50.0	0.0
Italy	47	48.9	34.0	53.2	53.2	44.7	36.2	48.9	80.9	91.5	89.4	61.7	42.6	0.0
Luxembourg	50	96.0	4.0	100	98.0	100	100	100	98.0	100	100	92.0	0.0	0.0
Malta	12	91.7	41.7	91.7	91.7	91.7	91.7	83.3	100	100	100	100	83.3	0.0
Netherlands	26	96.2	7.7	96.2	96.2	88.5	69.2	34.6	100	96.2	96.2	96.2	88.5	0.0
Norway	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poland	18	100	72.2	50.0	55.6	72.2	83.3	94.4	83.3	88.9	100	94.4	77.8	0.0
Portugal	48	89.6	29.2	89.6	100	79.2	64.6	70.8	100	97.9	97.9	56.3	41.7	0.0
Slovakia	60	55.0	6.7	51.7	45.0	83.3	30.0	75.0	65.0	90.0	76.7	56.7	20.0	8.3
Spain	65	38.5	38.5	75.4	38.5	83.1	56.9	80.0	78.5	98.5	98.5	70.8	33.8	0.0
Sweden	97	83.5	75.3	91.8	78.4	52.6	49.5	38.1	86.6	99.0	99.0	85.6	71.1	1.0
Total	**735**	**74.8**	**28.8**	**78.9**	**61.0**	**75.2**	**52.4**	**56.7**	**86.0**	**86.3**	**94.4**	**70.3**	**47.6**	**1.0**

**Excludes LTCFs with missing responses to questions on infection prevention and control (IPC) practices; GP: general practitioner; MDRO: multidrug-resistant organism; Org.: organisation; -: not available.*

Hand hygiene in the LTCFs

Nearly all LTCFs (94.2%) reported having a written protocol for hand hygiene (Table 10). The most frequently reported hand hygiene method was disinfection using an alcohol-based solution (81.6%; Table 12). All LTCFs in Germany and in Luxembourg reported this to be their main hand hygiene method. In comparison, fewer LTCFs reported handwashing with water and antiseptic soap (10.1%) or with water and a non-antiseptic soap (8.3%).

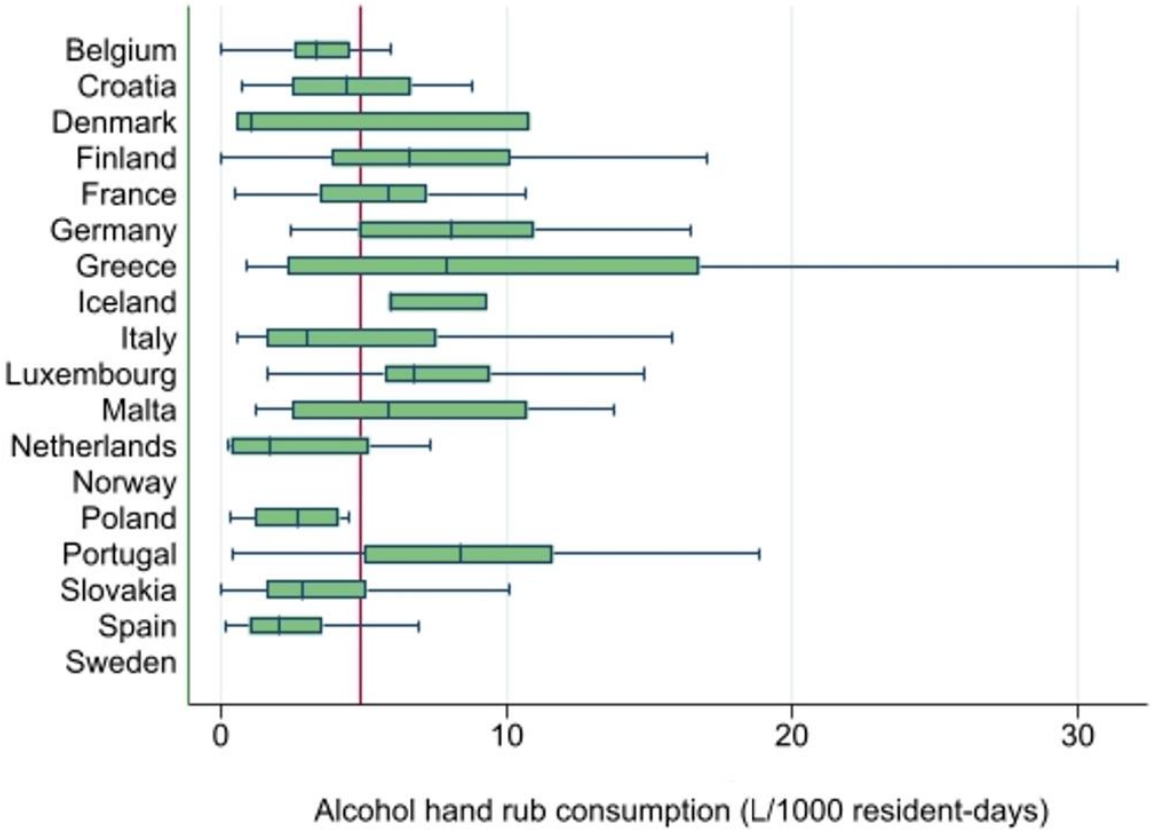
Nearly two-thirds (61.1%) of responding LTCFs had conducted hand hygiene training within the year preceding the PPS. All LTCFs in Germany, Iceland and Malta reported having provided hand hygiene training in the year prior to the PPS.

Table 12. Hand hygiene methods and training in participating LTCFs, by country, HALT-4, 2023–2024

Country	Hand hygiene method				Hand hygiene training	
	No. of participating LTCFs	Disinfection with alcohol solution	Washing with water and non-antiseptic soap	Washing with water and antiseptic soap	N of participating LTCFs	Training in the previous year
		%	%	%		%
Belgium	69	73.9	20.3	5.8	69	58.0
Croatia	4	75.0	0.0	25.0	4	50.0
Denmark	98	96.9	3.1	0.0	98	40.8
Finland	66	95.5	3.0	1.5	65	55.4
France	-	-	-	-	-	-
Germany	55	100	0.0	0.0	55	100
Greece	22	59.1	0.0	40.9	22	72.7
Iceland	3	66.7	33.3	0.0	3	100
Italy	47	66.0	12.8	21.3	46	66.0
Luxembourg	50	100	0.0	0.0	50	84.0
Malta	11	90.9	9.1	0.0	12	100
Netherlands	26	80.8	0.0	19.2	26	34.6
Norway	-	-	-	-	-	-
Poland	19	78.9	5.3	15.8	19	89.5
Portugal	52	86.5	13.5	0.0	52	65.4
Slovakia	61	62.3	14.8	23.0	61	42.6
Spain	75	44.0	34.7	21.3	75	37.3
Sweden	98	93.9	6.1	0.0	72	76.4
Total	**756**	**81.6**	**10.1**	**8.3**	**730**	**61.1**

-: not available.

Figure 5. Distribution of alcohol-based hand rub consumption (litres per 1 000 resident-days) in the previous year in participating LTCFs, by country, HALT-4, 2023–2024



Red vertical line: crude median (4.9 L/1 000 resident-days), no outliers; Box plots indicate the 25th, 50th (median) and 75th percentiles; Adjacent lines indicate the boundary 1.5× the interquartile range

Of the 484 LTCFs that provided data, the median consumption of alcohol-based hand rub in the previous year was 4.9 litres per 1 000 resident-days (Figure 5), with a mean consumption of 6.9 litres per 1 000 resident-days. Greece (11.6 litres per 1 000 resident-days) and Germany (11.4 litres per 1 000 resident-days) reported the highest mean of consumption of alcohol-based hand rub, while Spain reported the lowest (2.7 litres per 1 000 resident-days).

Antimicrobial stewardship resources

The institutional questionnaire assessed the presence of ten key elements of antimicrobial stewardship across the LTCFs. Among the 787 LTCFs with complete data, 38.8% reported having none of these elements in place (Table 13; Figure 6). The absence of these elements was most frequently observed in LTCFs located in Luxembourg (100%), Malta (91.7%), and Germany (88.7%).

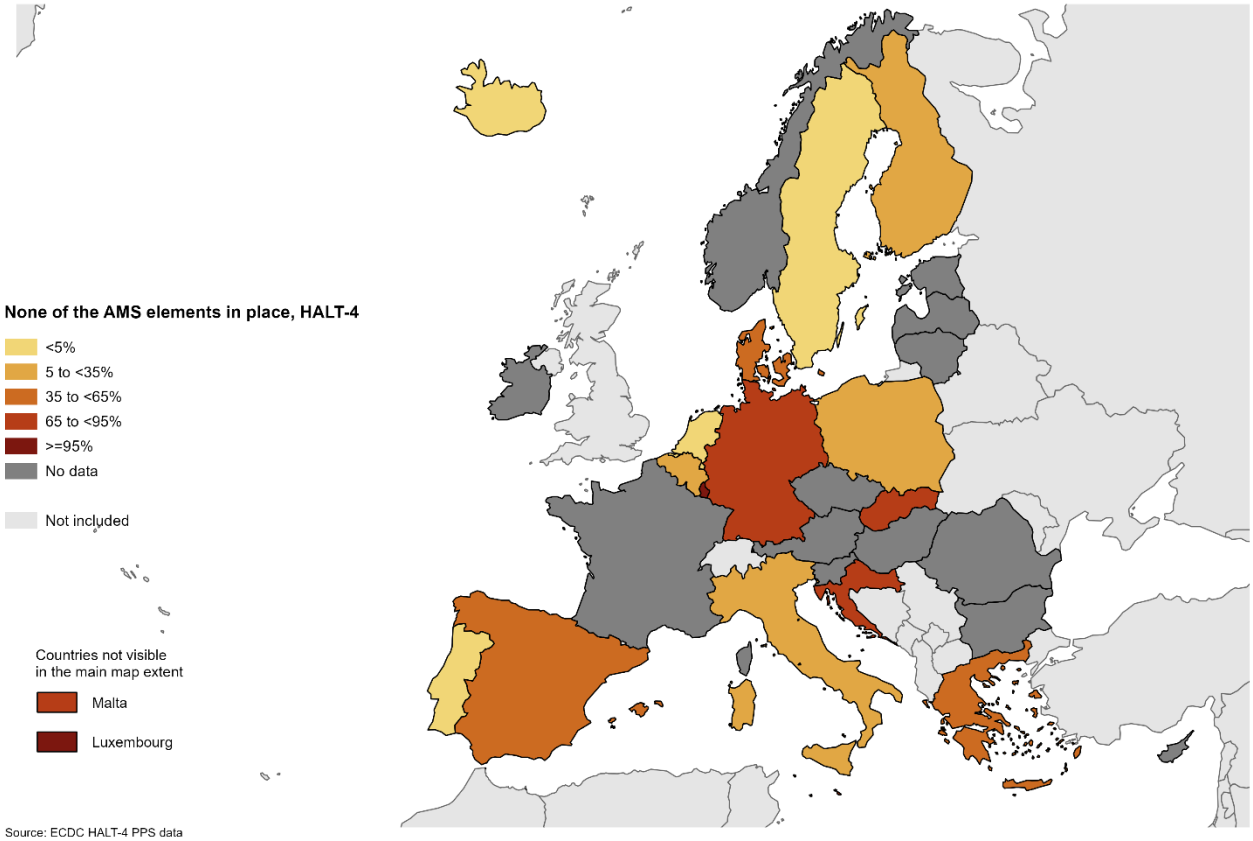
The two most commonly present antimicrobial stewardship elements were a 'therapeutic formulary, comprising a list of antibiotics' (38.2%) and 'written guidelines for appropriate antimicrobial use (good practice) in the LTCF' (36.6%). In Sweden, seven elements of antimicrobial stewardship were present in all LTCFs.

Table 13. Antimicrobial stewardship elements present in participating LTCFs, by country, HALT-4, 2023–2024

Country	No. of LTCFs*	Antimicrobial committee	Training on appropriate prescribing	Written guidelines for antimicrobial use	Data on annual antimicrobial consumption	Reminder of importance of samples	Local antimicrobial resistance profiles	Permission for prescribing restricted antimicrobials	Advice from a pharmacist	Therapeutic formulary	Feedback to GPs on antimicrobial consumption	None of these elements
		%	%	%	%	%	%	%	%	%	%	%
Belgium	69	18.8	10.1	42.0	24.6	29.0	7.2	13.0	47.8	50.7	13.0	21.7
Croatia	3	0.0	0.0	0.0	33.3	0.0	33.3	0.0	0.0	0.0	33.3	66.7
Denmark	98	0.0	4.1	4.1	1.0	10.2	2.0	8.2	20.4	10.2	7.1	62.2
Finland	65	4.6	4.6	29.2	13.8	40.0	21.5	24.6	24.6	36.9	7.7	32.3
France	44	-	-	50.0	-	-	100	-	-	-	56.8	-
Germany	53	0.0	3.8	0.0	1.9	1.9	0.0	1.9	3.8	1.9	1.9	88.7
Greece	22	27.3	18.2	45.5	4.5	18.2	4.5	4.5	0.0	18.2	0.0	36.4
Iceland	3	0.0	0.0	100	100	33.3	100	33.3	33.3	66.7	33.3	0.0
Italy	46	6.5	26.1	56.5	21.7	30.4	17.4	32.6	21.7	50.0	21.7	21.7
Luxembourg	50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100
Malta	12	8.3	0.0	8.3	8.3	8.3	8.3	8.3	8.3	8.3	0.0	91.7
Netherlands	26	92.3	3.8	88.5	84.6	42.3	46.2	30.8	46.2	88.5	76.9	3.8
Norway	-	-	-	-	-	-	-	-	-	-	-	-
Poland	18	38.9	38.9	50.0	55.6	5.6	44.4	55.6	22.2	55.6	22.2	27.8
Portugal	51	19.6	11.8	29.4	52.9	25.5	11.8	31.4	33.3	78.4	21.6	3.9
Slovakia	60	6.7	1.7	5.0	3.3	6.7	3.3	1.7	10.0	13.3	8.3	75.0
Spain	66	3.0	7.6	34.8	10.6	21.2	15.2	10.6	34.8	28.8	22.7	40.9
Sweden	101	100	18.8	100	100	100	100	0.0	0.0	100	100	0.0
Total	**787**	**22.1**	**9.0**	**36.6**	**27.1**	**28.1**	**27.7**	**11.9**	**18.4**	**38.2**	**27.3**	**38.8**

**Excludes LTCFs with missing responses to questions on antimicrobial stewardship elements; GP: general practitioner; -: not available*

Figure 6. Percentage of participating LTCFs reporting having none of the 10† selected antimicrobial stewardship (AMS) elements in place, HALT-4, 2023–2024



† The ten elements are: antimicrobial (AM) committee, training on appropriate prescribing, written guidelines for appropriate AM use, data on annual AM consumption, reminder of the importance of samples, local AM resistance profiles, permission for prescribing restricted AM, advice from a pharmacist, therapeutic formulary, and feedback to GPs on AM consumption.

Written therapeutic guidelines were available in 47.8% of LTCFs for respiratory tract infections (RTIs), 46.5% for UTIs, and 47.5% for wound and soft tissue infections (Table 14). Sweden reported comprehensive availability of all three guidelines in 100% of its LTCFs. In contrast, only 4.0% of LTCFs in Luxembourg had written therapeutic guidelines, and these were solely for wound and soft tissue infections. Figure 7 presents the proportion of LTCFs that had written therapeutic guidelines for all three of these (i.e. RTIs, UTIs and wound and soft tissue infections) by country.

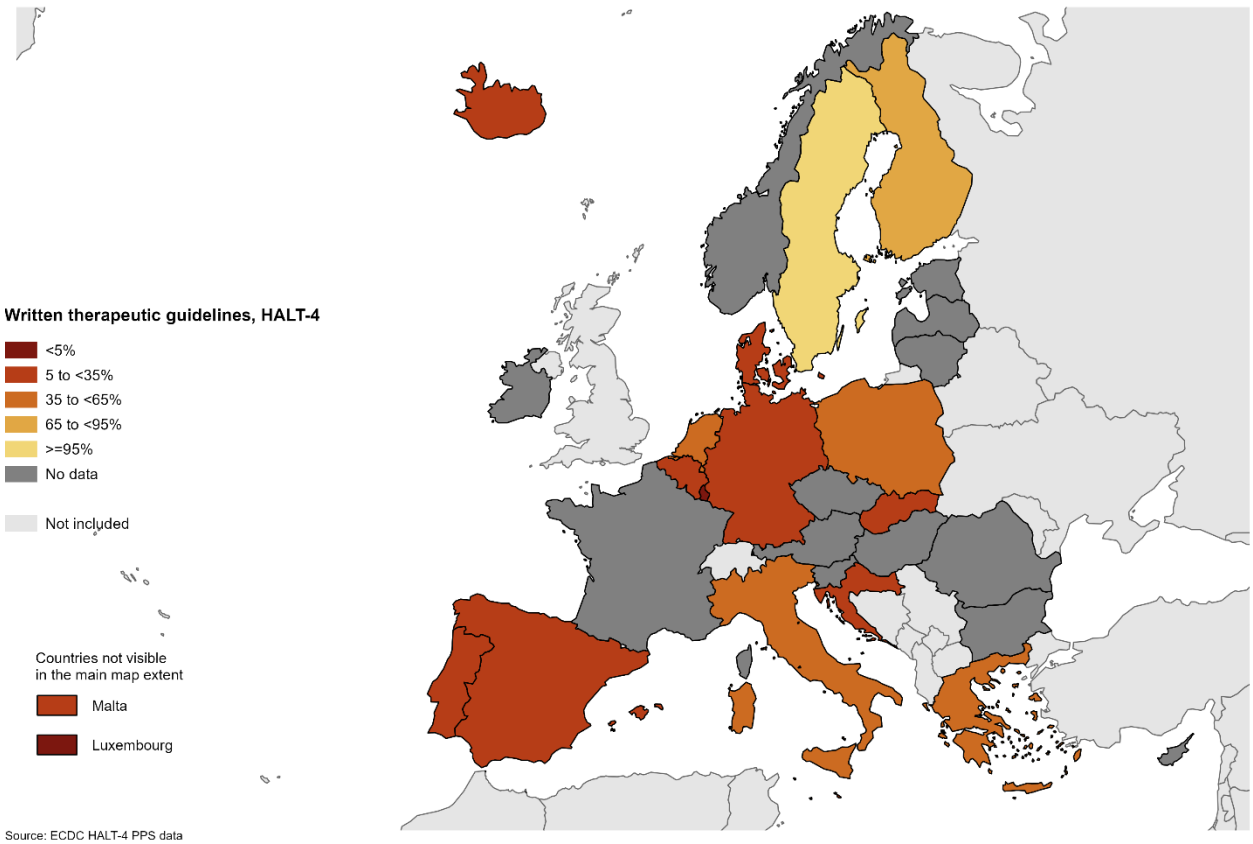
Surveillance programs for HAIs, antimicrobial consumption and antimicrobial-resistant microorganisms were available in 32.9%, 24.2% and 31.3% of the participating LTCFs, respectively. Malta (91.7%) and Croatia (100%) reported the highest proportion of LTCFs with surveillance programs for HAIs, while Luxembourg (2.0%), Germany (5.8%) and Slovakia (6.6%) reported the lowest. None of the participating LTCFs in Iceland and Luxembourg had surveillance programs for antimicrobial consumption. In contrast, all participating LTCFs in the Netherlands and Sweden had surveillance programs for antimicrobial-resistant microorganisms.

Table 14. Availability of written therapeutic antimicrobial guidelines and surveillance programmes in participating LTCFs, by country, HALT-4, 2023–2024

Country	Written therapeutic guidelines				Surveillance programmes			
	No. of participating LTCFs*	Respiratory tract infections	Urinary tract infections	Wound and soft tissue infections	N of participating LTCFs*	Healthcare-associated infections	Antimicrobial consumption	Resistant micro-organisms
		%	%	%		%	%	%
Belgium	69	36.2	36.2	46.4	69	59.4	14.5	36.2
Croatia	4	25.0	25.0	25.0	4	100	25.0	50.0
Denmark	98	35.7	37.8	30.6	98	17.3	2.0	7.1
Finland	64	82.8	70.3	75.0	66	34.8	16.7	31.8
France	-	-	-	-	-	-	-	-
Germany	23	13.0	17.4	17.4	52	5.8	1.9	15.4
Greece	22	63.6	63.6	63.6	22	13.6	22.7	18.2
Iceland	3	33.3	100	66.7	3	33.3	0.0	33.3
Italy	44	59.1	61.4	59.1	46	39.1	26.1	30.4
Luxembourg	50	0.0	0.0	4.0	50	2.0	0.0	6.0
Malta	12	16.7	16.7	16.7	12	91.7	16.7	91.7
Netherlands	26	69.2	53.8	65.4	26	53.8	76.9	100
Norway	-	-	-	-	-	-	-	-
Poland	17	47.1	47.1	47.1	19	52.6	63.2	57.9
Portugal	52	21.2	23.1	17.3	52	48.1	46.2	38.5
Slovakia	61	24.6	24.6	36.1	61	6.6	6.6	9.8
Spain	72	41.7	36.1	31.9	74	33.8	8.1	2.7
Sweden	101	100	100	100	64	56.3	100	100
Total	**718**	**47.8**	**46.5**	**47.5**	**718**	**32.9**	**24.2**	**31.3**

**Excludes LTCFs with missing responses to questions on therapeutic guidelines/surveillance programmes; -: not available*

Figure 7. Percentage of participating LTCFs with written therapeutic guidelines for urinary tract infections, respiratory tract infections and wound and soft tissue infections, HALT-4, 2023–2024



Source: ECDC HALT-4 PPS data

The boundaries and names shown on this map do not imply official endorsement or acceptance by the European Union. ECDC. Map produced on 27 February 2025

Healthcare-associated infections

The Norwegian national PPS collected data on UTIs, lower RTIs, and cellulitis/soft tissue/wound infections. In the absence of microbiological information, UTIs were classified as probable infections. For other types of HAIs not included in the PPS, data imputation was conducted using EU/EEA infection prevalence rates (see 'Methodology'). This process led to the inclusion of 21 additional HAIs for Norway.

Prevalence of HAIs

On the day of the PPS, 1 925 of the 61 045 eligible residents had at least one healthcare-associated infection (crude prevalence: 3.1%). The median prevalence of residents with HAIs was 1.8%, ranging from 0.0% in Sweden to 5.4% in the Netherlands (Table 15). In total, 1 968 HAIs were recorded.

Table 15. Number and prevalence of LTCF residents with at least one HAI, by country, HALT-4, 2023–2024

Country	No. of LTCFs	No. of eligible residents	No. of residents with HAI	Prevalence (%) of residents with at least one HAI (LTCF mean and percentiles)*					N of HAIs
				HAI%	Mean	P25	Median	P75	
Belgium	69	7 345	176	2.4	2.5	0.8	1.6	3.5	178
Croatia	4	974	19	1.9	1.9	0.9	1.7	2.9	19
Denmark	98	3 890	159	4.1	4.8	0.0	3.8	7.0	163
Finland	66	2 611	55	2.1	1.7	0.0	0.0	2.2	57
France	44	3 140	75	2.4	2.8	0.0	1.2	3.7	77
Germany	55	3 988	37	0.9	0.9	0.0	0.0	1.7	37
Greece	22	1 366	45	3.3	3.2	1.6	2.7	4.7	45
Iceland	3	1 390	49	3.5	3.6	2.8	3.1	5.0	54
Italy	47	3 587	108	3.0	5.6	0.0	2.4	6.7	113
Luxembourg	50	5 420	113	2.1	2.4	0.0	1.7	2.9	117
Malta	12	2 800	66	2.4	2.1	0.0	1.3	2.5	66
Netherlands	26	3 005	170	5.7	6.0	2.7	5.4	9.5	177
Norway†	111	5 231	195	3.7	3.7	0.3	3.1	5.3	195
Poland	19	2 109	55	2.6	3.2	0.0	3.2	4.4	57
Portugal	52	1 310	79	6.0	6.4	0.0	4.9	10.0	80
Slovakia	61	4 301	80	1.9	2.4	0.0	1.6	2.7	82
Spain	76	7 316	424	5.8	6.0	2.7	4.6	7.2	431
Sweden	101	1 262	20	1.6	1.7	0.0	0.0	0.0	20
Total	**916**	**61 045**	**1 925**	**3.1**	**3.5**	**0.0**	**1.8**	**4.8**	**1 968**

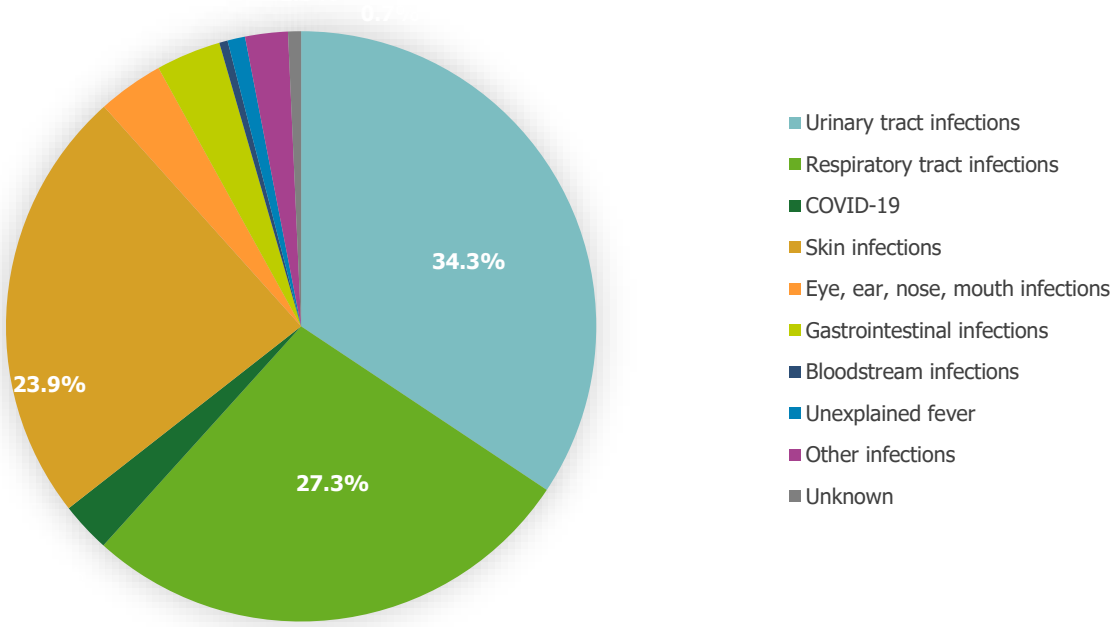
**The random sampling may have resulted in differences in the reported prevalence for Denmark, Norway and Sweden compared to their national report. †Data imputed for infections that were not collected; HAI: Healthcare-associated infection.*

The crude HAI prevalence was calculated as the percentage of residents with at least one active HAI detected on the day of the PPS over the total number of eligible residents on the day of the PPS. The LTCF mean and percentiles were calculated from the crude HAI prevalences of the participating LTCFs in total and by country.

Types of HAI

The majority of reported HAIs (n=1 968) fell into three main categories: UTIs (34.3%), RTIs (27.3%), and skin infections (23.9%). The next most common types were the eye, ear, nose, and mouth infections (3.6%) and gastrointestinal infections (3.6%). Other HAI types accounted for less than 10%, and included COVID-19 (2.7%), other infections (2.3%), unexplained fever (1.0%), and bloodstream infections (0.4%) (Figure 8). Fourteen infections, from six countries, were reported as unknown (0.7%).

Figure 8. Distribution of HAI types (n=1 968) in participating LTCFs, HALT-4, 2023–2024



A total of 676 UTIs were recorded, 34.8% were confirmed through a positive microbiological urine culture, while 65.2% were classified as probable UTIs (i.e. no urine culture taken or result not available or negative). Countries reporting a higher proportion of confirmed UTIs included Croatia (90.9%), France (66.7%), Italy (63.2%), and Portugal (69.6%). UTIs were the most reported infections in eight countries: Croatia (57.9%), Iceland (40.7%), Malta (36.4%), Norway (45.1%), Portugal (57.5%), Slovakia (43.9%), Spain (35.3%), and Sweden (35.0%).

RTIs represented 27.3% (n=538) of all recorded infections. Although RTI is the second most common infection overall, it was only the most commonly reported infection in six countries: Belgium (42.7%), France (31.2%), Greece (48.9%), Italy (44.2%), Luxembourg (39.3%), and Poland (42.1%). Among all RTIs, lower RTIs represented the majority (54.8%), while common cold or pharyngitis accounted for 31.5%.

Overall, skin infections accounted for 23.9% of all recorded infections. In Denmark (39.3%), Finland (33.3%), and the Netherlands (54.8%), they were the most frequently reported type of infection. Among these, cellulitis/soft tissue/wound infections (68.2%) and fungal infections (27.1%) were most commonly reported (Table 16, Figure 9).

Table 16. Distribution of types of HAI (number and relative frequency) in participating LTCFs, by country, HALT-4, 2023–2024

Types of HAI	EU/EEA		Belgium		Croatia		Denmark		Finland		France		Germany		Greece		Iceland		Italy		Luxembourg	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
All types of HAI	**1 968**	**100**	178	100	19	100	163	100	57	100	77	100	37	100	45	100	54	100	113	100	117	100
Urinary tract infections (UTIs)	**676**	**34.3**	63	35.4	11	57.9	49	30.1	14	24.6	18	23.4	9	24.3	19	42.2	22	40.7	38	33.6	25	21.4
Confirmed UTIs	**235**	**11.9**	20	11.2	10	52.6	23	14.1	9	15.8	12	15.6	1	2.7	9	20.0	10	18.5	24	21.2	8	6.8
Probable UTIs	**441**	**22.4**	43	24.2	1	5.3	26	15.9	5	35.7	6	7.8	8	21.6	10	22.2	12	22.2	14	12.4	17	14.5
Respiratory tract infections (RTIs)	**538**	**27.3**	76	42.7	1	5.3	28	17.2	13	22.8	24	31.2	9	24.3	22	48.9	10	18.5	50	44.2	46	39.3
Common cold/pharyngitis	**171**	**8.7**	41	23.0	0	0.0	7	4.3	1	1.7	-	-	3	8.1	1	2.2	0	0.0	6	5.3	31	26.5
'Flu'[a]	**12**	**0.6**	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	2.7	0	0.0	0	0.0	5	4.4	1	0.8
Pneumonia	**58**	**2.9**	0	0.0	1	5.3	9	5.5	8	14.0	8	10.4	0	0.0	1	2.2	1	1.8	11	9.7	3	2.6
Other lower RTIs	**297**	**15.1**	35	19.7	0	0.0	12	7.4	4	7.0	16	20.8	5	13.5	20	44.4	9	16.7	28	24.8	11	9.4
COVID-19os*	**54**	**2.7**	0	0.0	0	0.0	2	1.2	0	0.0	16	20.8	2	5.4	0	0.0	0	0.0	0	0.0	19	16.2
Asymptomatic	**3**	**0.1**	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	2.6
Mild/moderate	**49**	**2.5**	0	0.0	0	0.0	1	0.6	0	0.0	15	19.5	2	5.4	0	0.0	0	0.0	0	0.0	16	13.7
Severe	**2**	**0.1**	0	0.0	0	0.0	1	0.6	0	0.0	1	1.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Skin infections	**471**	**23.9**	23	12.9	2	10.5	64	39.3	19	33.3	12	15.6	9	24.3	3	6.7	13	24.1	12	10.6	20	17.1
Cellulitis/soft tissue/wound inf.	**322**	**16.4**	17	9.5	2	10.5	46	28.2	13	22.8	6	7.8	9	24.3	3	6.7	9	16.7	11	9.7	19	16.2
Herpes simplex or zoster infections	**11**	**0.6**	2	1.1	0	0.0	1	0.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Fungal infections	**127**	**6.4**	1	0.6	0	0.0	17	10.4	6	10.5	6	7.8	0	0.0	0	0.0	4	7.4	1	0.9	0	0.0
Scabies	**11**	**0.6**	3	1.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.8
Eye, ear, nose and mouth inf.	**71**	**3.6**	1	0.6	1	5.3	11	6.7	4	7.0	3	3.9	3	8.1	0	0.0	3	5.5	1	0.9	3	2.6
Conjunctivitis	**45**	**2.3**	1	0.6	1	5.3	7	4.3	4	7.0	-	-	3	8.1	0	0.0	3	5.5	1	0.9	2	1.7
Ear infections	**11**	**0.6**	0	0.0	0	0.0	1	0.6	0	0.0	-	-	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Sinusitis	**2**	**0.1**	0	0.0	0	0.0	1	0.6	0	0.0	-	-	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Oral candidiasis	**13**	**0.7**	0	0.0	0	0.0	2	1.2	0	0.0	3	3.9	0	0.0	0	0.0	0	0.0	0	0.0	1	0.8
Gastrointestinal infections	**70**	**3.6**	8	4.5	0	0.0	3	1.8	1	1.7	2	2.6	2	5.4	0	0.0	1	1.8	6	5.3	1	0.8
Gastroenteritis	**62**	**3.1**	8	4.5	0	0.0	2	1.2	1	1.7	1	1.3	2	5.4	0	0.0	1	1.8	6	5.3	1	0.8
Clostridioides (Clostridium) difficile infection	**8**	**0.4**	0	0.0	0	0.0	1	0.6	0	0.0	1	1.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Bloodstream infections	**9**	**0.5**	0	0.0	0	0.0	1	0.6	1	1.7	2	2.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Unexplained fever	**19**	**1.0**	2	1.1	2	10.5	0	0.0	1	1.7	0	0.0	1	2.7	0	0.0	2	3.7	0	0.0	2	1.7
Other infections	**46**	**2.3**	5	2.8	0	0.0	2	1.2	4	7.0	0	0.0	2	5.4	1	2.2	2	3.7	3	2.6	1	0.8

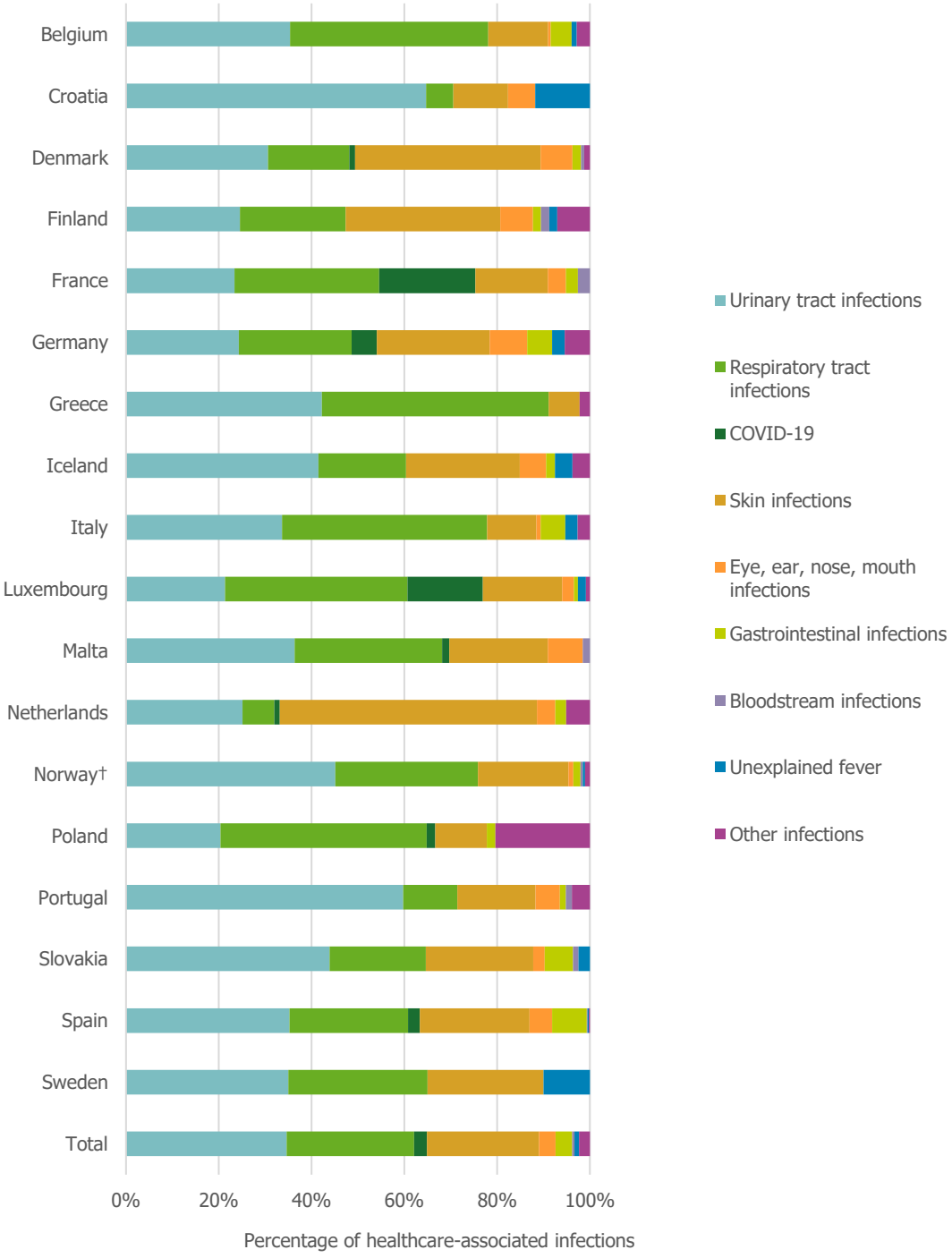
Types of HAI	Malta		Netherlands		Norway†		Poland		Portugal		Slovakia		Spain		Sweden	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
All types of HAI	66	100	177	100	195	100	57	100	80	100	82	100	431	100	20	100
Urinary tract infections (UTIs)	24	36.4	44	24.8	88‡	45.1	11	19.3	46	57.5	36	43.9	152	35.3	7	35.0
Confirmed UTIs	6	9.1	7	3.9	0	0.0	2	3.5	32	40	17	20.7	43	10.0	3	15.0
Probable UTIs	18	27.3	37	20.9	88‡	45.1	9	15.8	14	17.5	19	23.2	109	25.3	4	20.0
Respiratory tract infections (RTIs)	21	31.8	12	6.8	60	30.8	24	42.1	9	11.2	17	20.7	110	25.5	6	30.0
Common cold/pharyngitis	5	7.6	5	2.8	8†	4.1	10	17.5	0	0.0	9	11.0	39	9.0	5	25.0
'Flu'[a]	1	1.5	2	1.1	0	0.0	0	0.0	0	0.0	1	1.2	1	0.2	0	0.0
Pneumonia	3	4.5	1	0.6	0	0.0	0	0.0	2	2.5	2	2.4	8	1.9	0	0.0
Other lower RTIs	12	18.2	4	2.2	52‡	26.7	14	24.6	7	8.7	5	6.1	62	14.4	1	5.0
COVID-19*	1	1.5	2	1.1	0	0.0	1	1.7	0	0.0	0	0.0	11	2.5	-	-
Asymptomatic	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	-	-
Mild/moderate	1	1.5	2	1.1	0	0.0	1	1.7	0	0.0	0	0.0	11	2.5	-	-
Severe	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	-	-
Skin infections	14	21.2	97	54.8	38	19.5	6	10.5	13	16.2	19	23.2	102	23.7	5	25.0
Cellulitis/soft tissue/wound inf.	12	18.2	29	16.4	38‡	19.5	6	10.5	12	15	18	21.9	67	15.5	5	25.0
Herpes simplex or zoster infections	2	3.0	3	1.7	0	0.0	0	0.0	1	1.2	0	0.0	2	0.5	0	0.0
Fungal infections	0	0.0	65	36.7	0	0.0	0	0.0	0	0.0	0	0.0	27	6.3	0	0.0
Scabies	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	1.2	6	1.4	0	0.0
Eye, ear, nose and mouth inf.	5	7.6	7	3.9	2	1.0	0	0.0	4	5.0	2	2.4	21	4.9	0	0.0
Conjunctivitis	3	4.5	4	2.2	2†	1.0	0	0.0	1	1.2	0	0.0	13	3.0	0	0.0
Ear infections	1	1.5	2	1.1	0	0.0	0	0.0	3	3.7	2	2.4	2	0.5	0	0.0
Sinusitis	1	1.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Oral candidiasis	0	0.0	1	0.6	0	0.0	0	0.0	0	0.0	0	0.0	6	1.4	0	0.0
Gastrointestinal infections	0	0.0	4	2.2	3	1.5	1	1.7	1	1.2	5	6.1	32	7.4	0	0.0
Gastroenteritis	0	0.0	3	1.7	3†	1.5	0	0.0	1	1.2	2	2.4	31	7.2	0	0.0
Clostridioides (*Clostridium*) *difficile* infection	0	0.0	1	0.6	0	0.0	1	1.7	0	0.0	3	3.7	1	0.2	0	0.0
Bloodstream infections	1	1.5	0	0.0	1†	0.5	0	0.0	1	1.2	1	1.2	1	0.2	0	0.0
Unexplained fever	0	0.0	0	0.0	1†	0.5	0	0.0	0	0.0	2	2.4	1	0.2	2	10.0
Other infections	0	0.0	9	5.1	2†	1.0	11	19.3	3	3.7	0	0.0	1	0.2	0	0.0

*[a] In HALT-4, 'flu' was defined as fever – a) single >37.8 °C oral/tympanic membrane OR b) repeated >37.2 °C oral OR >37.5 °C rectal OR c) >1.1 °C above baseline from any site – and at least three of the following symptoms: chills, new headache or eye pain, myalgia or body aches, malaise or loss of appetite, sore throat, or new/increased dry cough. *Diagnosis for COVID-19 is made on the sole confirmation of a documented laboratory test (viral RNA target or antigenic detection from an oropharyngeal or nasal swab, or any other appropriate clinical specimen), even in the absence of any clinical signs and symptoms. †Data were imputed for infections that were not collected. ‡ Data from the national PPS.*
: not available.

Eye, ear, nose and mouth infections accounted for 3.6% of all infections, with conjunctivitis and oral candidiasis accounting for 63.4% and 18.3%, respectively. Similarly, gastrointestinal infections made up 3.5% of total infections, with gastroenteritis accounting for the majority among them (88.4%).

COVID-19 was reported if a laboratory test for SARS-CoV-2 (viral RNA target or antigen detection from an appropriate clinical specimen) was positive. A total of 54 COVID-19 cases were recorded (2.7%). These infections were mainly reported by Luxembourg, France and Spain. In Sweden, COVID-19 cases were not recorded as a distinct category, but were instead classified under lower RTIs.

Figure 9. Distribution of HAIs, by infection type, by country, HALT-4, 2023–2024



†Data were imputed for infections that were not collected.

Isolated microorganisms and antimicrobial resistance

Among the 1 610 HAIs which had microbiological results available, the results were either unknown or no examination had been performed on the day of the PPS in 68.3% of HAIs. This ranged from 24.3% in Germany to 93.2% in the Netherlands. Denmark and Norway did not collect these data (Table 17). Additionally, results were not yet available for 8.7% of HAIs on the day of the PPS. Microorganisms could not be identified in 2.0% of HAIs, and cultures were negative in 1.1% of cases.

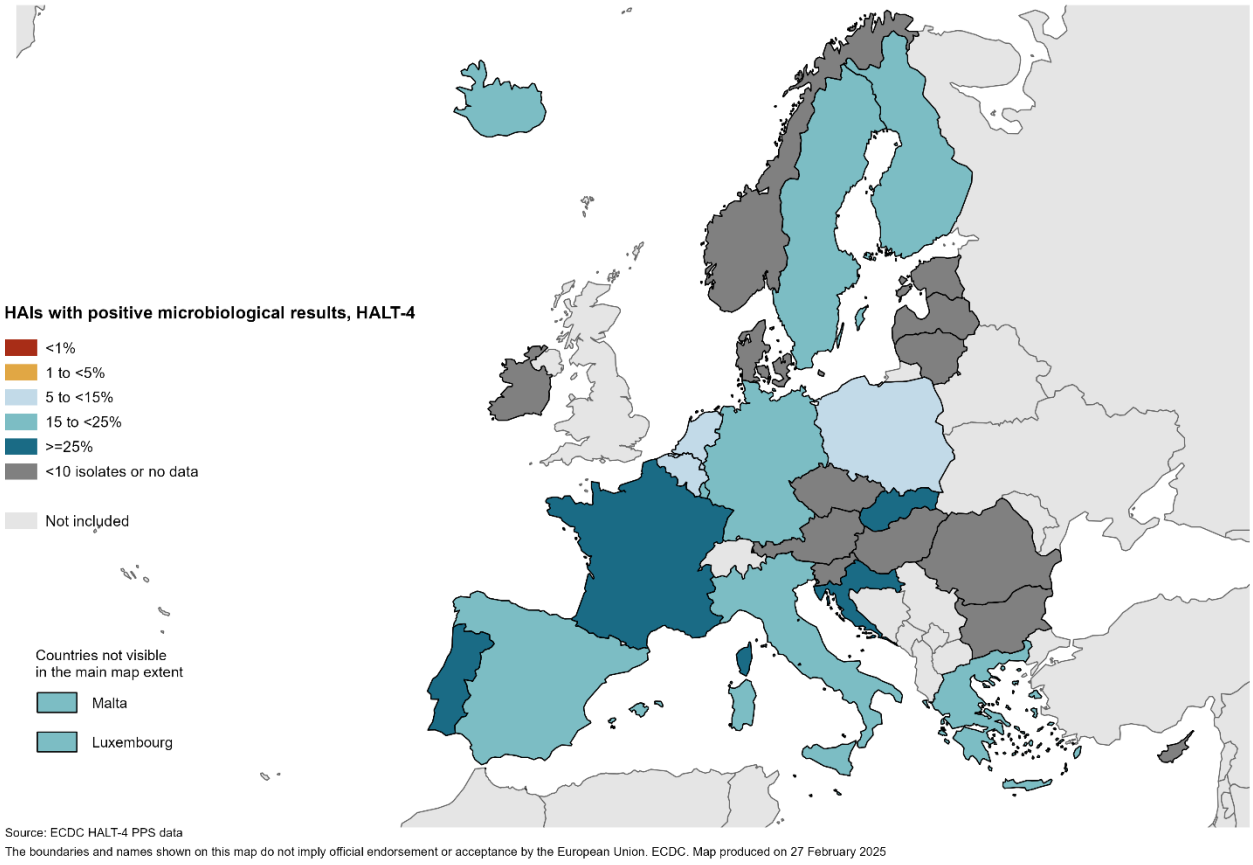
The proportion of HAIs with confirmed positive microbiological results was 20.0%, varying significantly from 6.8% in the Netherlands to 57.9% in Croatia (Figure 10). Overall, 368 microorganisms were identified (Table 18).

Table 17. Microbiological results for HAIs, by country, HALT-4, 2023–2024

Country	No. of HAIs	Microbiological result										No. of isolated identifiable microorganisms
		Examination not done or unknown		Result not available		Microorganism not identifiable		Negative culture		Positive result		
		n	%	n	%	n	%	n	%	n	%	
Belgium	178	116	65.2	25	14.0	5	2.8	7	3.9	25	14.0	27
Croatia	19	5	26.3	2	10.5	1	5.3	0	0.0	11	57.9	13
Denmark	-	-	-	-	-	-	-	-	-	-	-	-
Finland	57	30	52.6	5	8.8	6	10.5	3	5.3	13	22.8	14
France	77	42	54.5	0	0.0	4	5.2	0	0.0	31	40.3	32
Germany	37	9	24.3	21	56.8	0	0.0	0	0.0	7	18.9	10
Greece	45	29	64.4	8	17.8	0	0.0	0	0.0	8	17.8	8
Iceland	54	37	68.5	3	5.6	0	0.0	2	3.7	12	22.2	15
Italy	113	90	79.6	0	0.0	0	0.0	0	0.0	23	20.4	27
Luxembourg	117	73	62.4	18	15.4	0	0.0	1	0.9	25	21.4	25
Malta	66	55	81.8	0	0.0	0	0.0	0	0.0	12	18.2	16
Netherlands	177	165	93.2	0	0.0	0	0.0	0	0.0	12	6.8	15
Norway	-	-	-	-	-	-	-	-	-	-	-	-
Poland	57	53	93.0	0	0.0	0	0.0	0	0.0	4	7.0	4
Portugal	80	31	38.8	6	7.5	5	6.3	0	0.0	38	47.5	41
Slovakia	82	35	42.7	19	23.2	1	1.2	1	1.2	26	31.7	33
Spain	431	317	73.5	30	7.0	10	2.3	2	0.5	72	16.7	85
Sweden	20	13	65.0	3	15.0	0	0.0	1	5.0	3	15.0	3
Total	**1 610**	**1 099**	**68.3**	**140**	**8.7**	**32**	**2.0**	**17**	**1.1**	**322**	**20.0**	**368**

-: not available.

Figure 10. Percentage of HAIs with documented positive microbiological results available on the PPS day, HALT-4, 2023–2024



Negative results = a negative (i.e. sterile) culture from a microbiological sample, microorganism not identifiable, result not (yet) available or unknown, or examination not done.

The most commonly identified microorganisms were *Escherichia coli* (32.6%), SARS-CoV-2 (14.1%), *Klebsiella pneumoniae* (9.8%), *Staphylococcus aureus* (7.9%), *Proteus mirabilis* (6.8%), *Pseudomonas aeruginosa* (5.2%), *Enterococcus* faecalis (3.3%), *Enterobacter cloacae* (1.6%), *Providencia species* (1.6%), *Clostridioides difficile* (1.4%), and *Klebsiella* species, not specified (1.4%). Overall, Enterobacterales represented 56.3% of all reported isolates (Table 18). It is important to interpret these percentages with caution due to the relatively low number of isolates and their variation across countries. Antimicrobial susceptibility testing (AST) was performed for selected bacterium-antimicrobial combinations (n=271; Table 19).

Table 18. **Number and relative frequency (percentage) of microorganisms most commonly reported for HAIs, by country, HALT-4, 2023–2024**

Country	No. of isolates	*Staphylo-coccus aureus*		*Entero-coccus* spp.		Enterobacterales										*Pseudo-monas aeruginosa*		*Acineto-bacter baumannii*		*Clostridioides difficile*		SARS-CoV-2	
						Enterobacterales total		*Escherichia coli*		*Proteus* spp.		*Klebsiella* spp.		*Entero-bacter* spp.									
		n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Belgium	**27**	0	0.0	0	0.0	20	74.1	12	44.4	4	14.8	3	11.1	1	3.7	1	3.7	0	0.0	0	0.0	0	0.0
Croatia	**13**	1	7.7	0	0.0	11	84.6	8	61.5	0	0.0	3	23.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Denmark	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Finland	**14**	2	14.3	0	0.0	10	71.4	9	64.3	0	0.0	1	7.1	0	0.0	1	7.1	0	0.0	0	0.0	0	0.0
France	**32**	0	0.0	0	0.0	12	37.5	7	21.9	2	6.3	3	9.4	0	0.0	1	3.1	0	0.0	1	3.1	16	50.0
Germany	**10**	1	10.0	1	10.0	4	40.0	2	20.0	1	10.0	1	10.0	0	0.0	1	10.0	0	0.0	0	0.0	2	20.0
Greece	**8**	0	0.0	0	0.0	5	62.5	5	62.5	0	0.0	0	0.0	0	0.0	1	12.5	0	0.0	0	0.0	0	0.0
Iceland	**15**	2	13.3	3	20.0	10	66.7	7	46.7	2	13.3	1	6.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Italy	**27**	1	3.7	2	7.4	18	66.7	9	33.3	4	14.8	4	14.8	0	0.0	4	14.8	2	7.4	0	0.0	0	0.0
Luxembourg	**25**	2	8.0	0	0.0	4	16.0	3	12.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	18	76.0
Malta	**16**	1	6.3	1	6.3	8	50.0	4	25.0	0	0.0	2	12.5	2	12.5	1	6.3	0	0.0	0	0.0	0	6.3
Netherlands	**15**	3	20.0	1	6.7	9	60.0	0	0.0	4	26.7	3	20.0	1	6.7	0	0.0	0	0.0	0	0.0	2	13.3
Norway	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poland	**4**	0	0.0	0	0.0	2	50.0	0	0.0	2	50.0	0	0.0	0	0.0	0	0.0	0	0.0	1	25.0	1	25.0
Portugal	**41**	3	7.3	0	0.0	30	73.2	15	36.6	0	0.0	14	34.1	0	0.0	1	2.4	0	0.0	0	0.0	0	0.0
Slovakia	**33**	3	9.1	2	6.1	19	57.6	8	24.2	3	9.1	5	15.2	2	6.1	4	12.1	0	0.0	2	6.1	0	0.0
Spain	**85**	9	10.6	5	5.9	42	49.4	29	34.1	6	7.1	6	7.1	0	0.0	4	4.7	0	0.0	1	1.2	11	12.9
Sweden	**3**	1	33.3	0	0.0	2	66.7	2	66.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	**368**	**29**	**7.9**	**15**	**4.1**	**206**	**56.0**	**120**	**32.6**	**28**	**7.6**	**46**	**12.5**	**6**	**1.6**	**19**	**5.2**	**2**	**0.5**	**5**	**1.4**	**52**	**14.1**

-: not available.

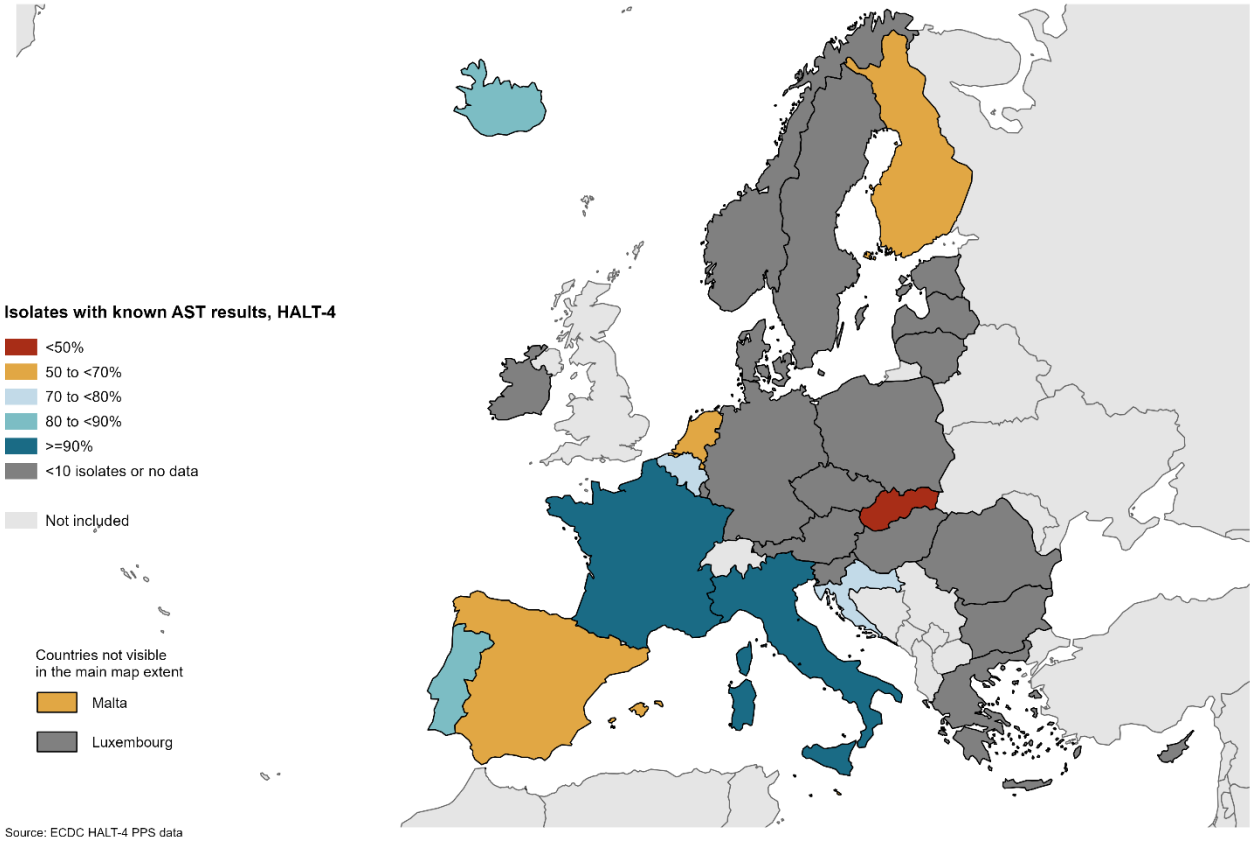
Table 19. Antimicrobial resistance markers in selected microorganisms, HALT-4, 2023–2024

Microorganism	N of isolates	Tested antibiotics[2]	Susceptible[3]		Resistant		Unknown susceptibility	
			n	%	N	%	n	%
Staphylococcus aureus								
	29	OXA	19	65.5	5	-	5	-
		GLY	11	37.9	0	-	18	62.1
***Enterococcus* species.** including:								
Enterococcus faecalis	12	GLY	6	-	0	-	6	-
Enterococcus faecium	1	GLY	1	-	0	-	0	-
Enterococcus species, not specified or other	2	GLY	1	-	1	-	0	-
Enterobacterales[1]. including:								
Escherichia coli	120	C3G	64	53.3	19	15.8	37	30.8
		CAR	44	36.7	0	-	76	63.3
Klebsiella species	46	C3G	22	47.8	7	-	17	36.9
		CAR	18	39.1	4	-	24	52.2
Enterobacter species	6	C3G	1	-	2	-	3	-
		CAR	3	-	0	-	3	-
Proteus species	28	C3G	13	46.4	7	-	8	-
		CAR	13	46.4	2	-	13	46.4
Citrobacter species	2	C3G	0	-	0	-	2	-
		CAR	0	-	0	-	2	-
Serratia species	1	C3G	0	-	1	-	0	-
		CAR	1	-	0	-	0	-
Morganella species	3	C3G	1	-	0	-	2	-
		CAR	0	-	0	-	3	-
Pseudomonas aeruginosa								
	19	CAR	11	57.9	1	-	7	-
Acinetobacter baumannii								
	2	CAR	1	-	1	-	0	-

'-': fewer than 10 isolates, percentage not calculated.
[1] Antimicrobial resistance markers are not collected for other Enterobacterales (e.g. Hafnia spp., Salmonella spp., Shigella spp., Yersinia spp.).
[2] OXA: susceptibility to oxacillin, or other marker of MRSA such as cefoxitin, cloxacillin, dicloxacillin, flucloxacillin, meticillin; GLY: susceptibility to glycopeptides: vancomycin or teicoplanin; C3G: susceptibility to third-generation cephalosporins: cefotaxime, ceftriaxone, ceftazidime; CAR: susceptibility to carbapenems: imipenem, meropenem, doripenem.
[3] Susceptible = susceptible, standard dosing regimen (S) + susceptible, increased exposure (I).

Overall, 68.3% of microorganisms had AST results available for first-level antimicrobial resistance (AMR) markers at the time of the PPS. This percentage ranged from 46.4% in Slovakia to 100% in Italy (based on a total of 27 microorganisms; Figure 11). First-level AMR markers included *Staphylococcus aureus* resistant to oxacillin (MRSA), *Enterococcus faecium* or *Enterococcus faecalis* resistant to glycopeptides, Enterobacterales resistant to third-generation cephalosporins, *Pseudomonas aeruginosa* and *Acinetobacter baumannii* resistant to carbapenems.

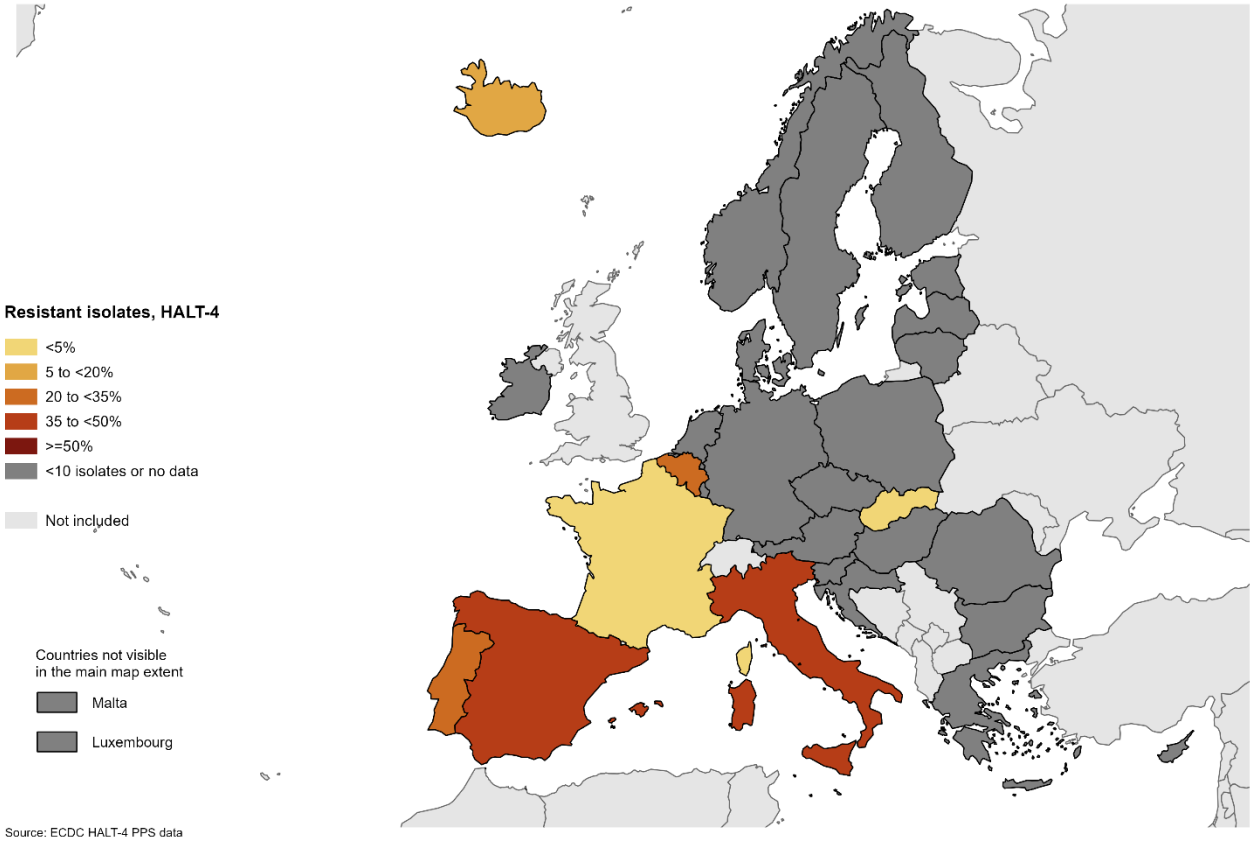
Figure 11. Percentage of isolates with known AST results (AST; first-level AMR markers combined) for HAIs, HALT-4, 2023–2024



First-level AMR markers in HALT-4: Staphylococcus aureus *resistant to oxacillin,* Enterococcus faecalis *or* Enterococcus faecium *resistant to glycopeptides,* Enterobacteriaceae *resistant to third-generation cephalosporins, Pseudomonas aeruginosa and* Acinetobacter baumannii *resistant to carbapenems. If fewer than 10 isolates, results not shown (Germany, Greece, Luxembourg, Poland, and Sweden).*

Among the 185 isolates with available AST results for first-level AMR markers, 23.2% were found to be resistant to the antimicrobials specified in the protocol. Italy (n=12) and Spain (n=11) reported the highest number of resistant isolates. France and Slovakia reported no resistant isolates (Figure 12). Croatia, Finland, Germany, Greece, Luxembourg, Malta, the Netherlands, Poland, and Sweden reported less than ten isolates with available AST results.

Figure 12. Composite index of AMR: percentage of isolates resistant to first-level antimicrobials indicated in the protocol, by country, HALT-4, 2023–2024



First-level AMR markers in HALT-4: Staphylococcus aureus *resistant to oxacillin, enterococci non-susceptible to glycopeptides,* Enterobacteriaceae *resistant to third-generation cephalosporins,* Pseudomonas aeruginosa *and* Acinetobacter baumannii *resistant to carbapenems; Countries with <10 isolates with known antimicrobial susceptibility results not shown (Croatia, Finland, Germany, Greece, Luxembourg, Malta, the Netherlands, Poland, and Sweden).*

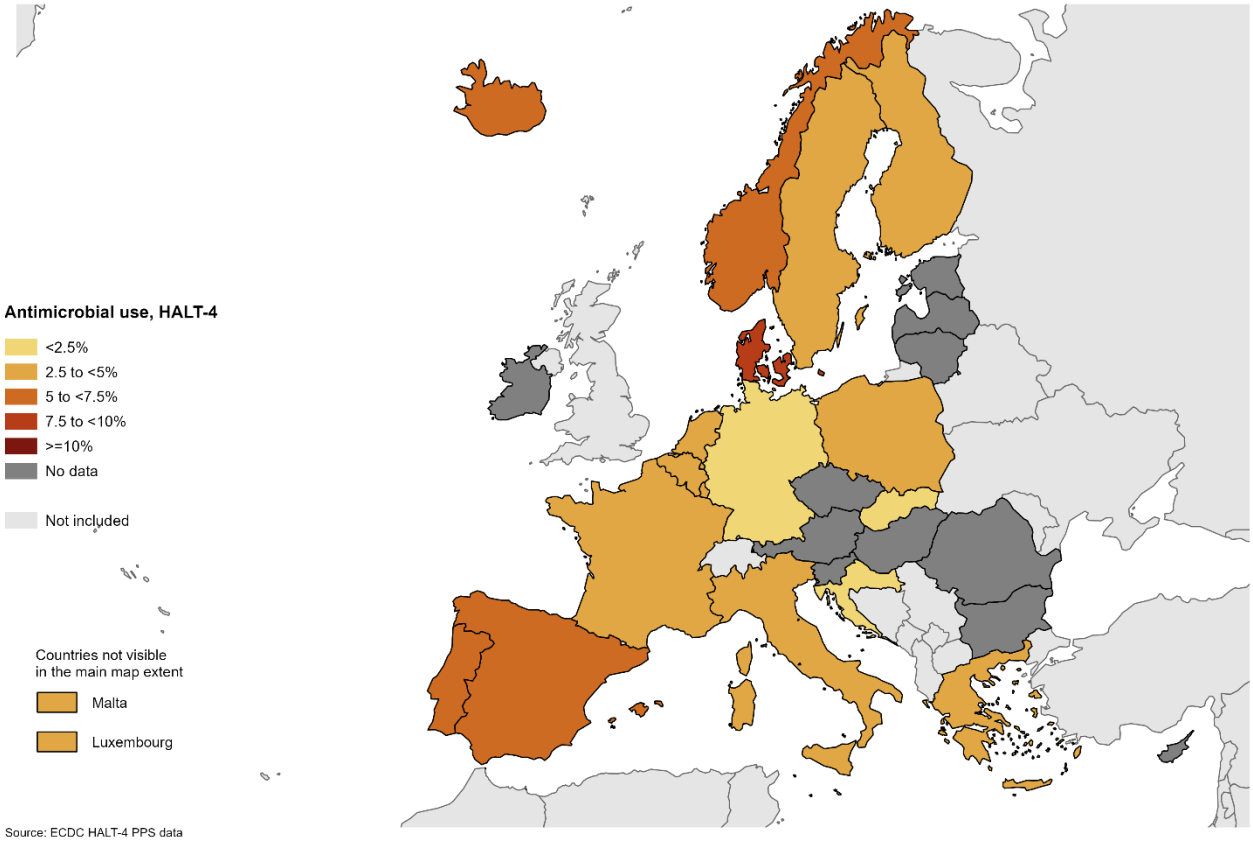
Antimicrobial use

Prevalence of antimicrobial use

On the day of the PPS, 2 502 out of 61 045 eligible residents received at least one antimicrobial agent (crude prevalence: 4.1%). Among these residents, 95.2% received one agent, 4.5% received two antimicrobials, and 0.2% received three or more agents. A total of 2 627 antimicrobial agents were reported. The LTCF median antimicrobial use prevalence was 3.3%, ranging from 0.0% in Sweden to 6.8% in Denmark (Table 20 and Figure 13).

A total of 243 LTCFs reported no antimicrobial use on the day of the PPS. Most of these LTCFs were located in Sweden (27.2%), Germany (10.3%), Finland (9.9%), Slovakia (9.0%) and Norway (9.0%).

Figure 13. Prevalence of eligible LTCF residents receiving at least one antimicrobial agent on the day of the PPS, HALT-4, 2023–2024



Source: ECDC HALT-4 PPS data

The boundaries and names shown on this map do not imply official endorsement or acceptance by the European Union. ECDC. Map produced on 27 February 2025

Table 20. Number and prevalence of eligible LTCF residents receiving at least one antimicrobial agent on the day of the PPS, by country, HALT-4, 2023–2024

Country	No. of eligible residents	No. of residents with antimicrobial agents	Prevalence (%) of residents with at least one antimicrobial agent (LTCF mean and percentiles)*					No. of antimicrobial agents
			AU%	Mean	P25	Median	P75	
Belgium	7 345	337	4.6	4.6	2.6	3.8	6.8	347
Croatia	974	17	1.7	1.6	0.5	1.0	2.6	17
Denmark	3 890	297	7.6	7.6	2.6	6.8	11.5	313
Finland	2 611	115	4.4	4.1	0.0	3.4	6.3	118
France	3 140	81	2.6	2.6	0.0	2.5	3.9	86
Germany	3 988	49	1.2	1.3	0.0	0.9	2.0	51
Greece	1 366	49	3.6	3.5	1.6	3.1	5.1	58
Iceland	1 390	97	7.0	7.4	5.6	6.2	10.4	102
Italy	3 587	116	3.2	4.9	1.3	2.5	6.7	124
Luxembourg	5 420	185	3.4	3.6	2.0	3.1	4.9	195
Malta	2 800	82	2.9	2.8	0.7	2.2	3.7	89
Netherlands	3 005	152	5.1	6.3	2.9	5.4	8.5	163
Norway	5 231	284	5.4	5.4	1.6	4.5	8.3	296
Poland	2 109	52	2.5	2.9	0.0	2.7	4.4	60
Portugal	1 310	67	5.1	5.7	0.0	4.6	8.5	70
Slovakia	4 301	99	2.3	2.4	0.0	1.8	3.2	106
Spain	7 316	375	5.1	6.5	2.9	4.8	6.9	384
Sweden	1 262	48	3.8	4.6	0.0	0.0	7.1	48
Total	**61 045**	**2 502**	**4.1**	**4.7**	**0.0**	**3.3**	**6.7**	**2 627**

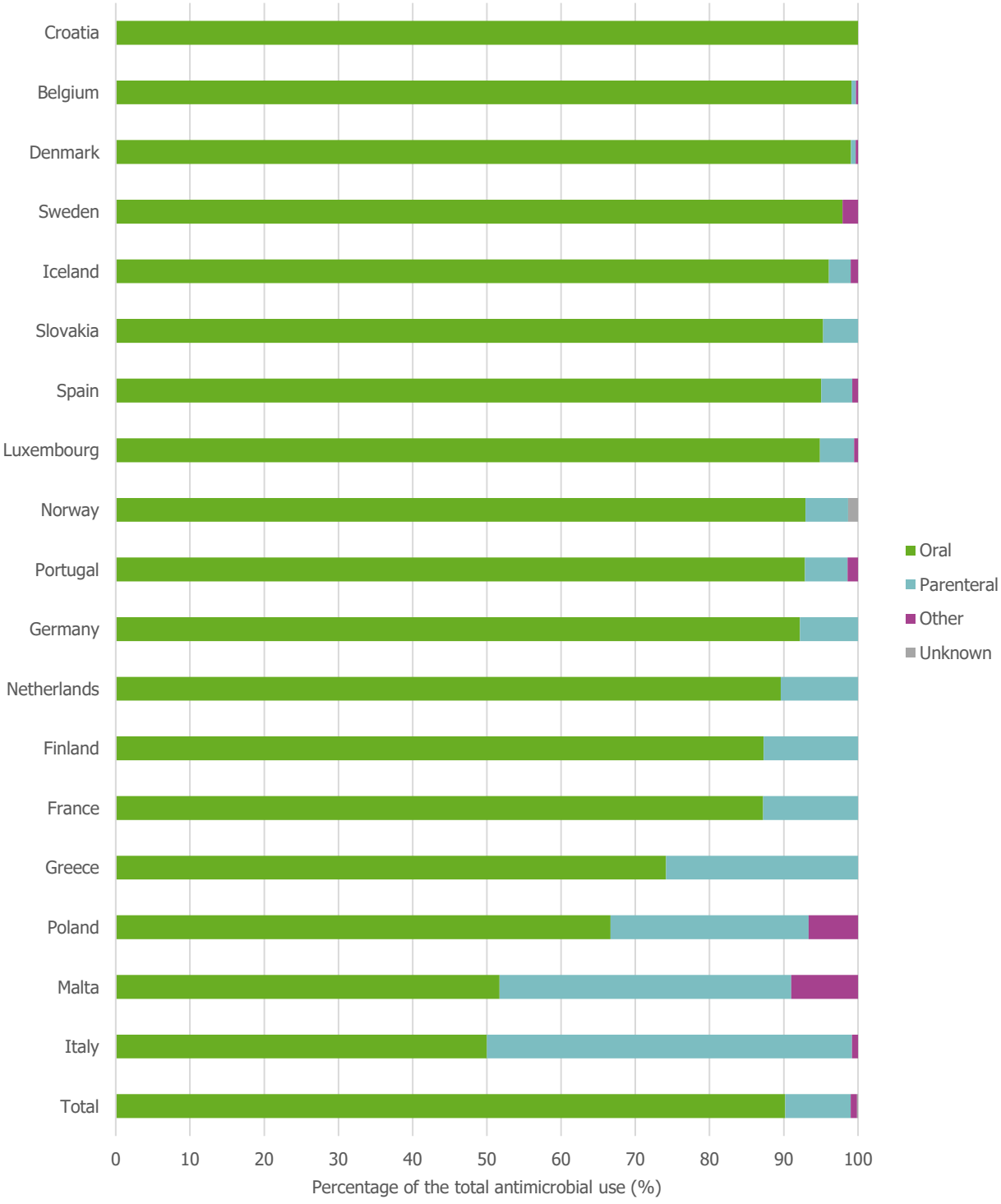
**The random sampling may have resulted in differences in the reported prevalence for Denmark, Norway and Sweden compared to their national report.*

The crude antimicrobial use prevalence was calculated as the percentage of residents with at least one antimicrobial agent on the day of the PPS over the total number of eligible residents on the day of the PPS. The LTCF mean and percentiles were calculated from the crude antimicrobial use prevalence of the participating LTCFs in total and by country.

Characteristics and indications for antimicrobial prescribing

Most antimicrobials were administered orally (90.1%), and in Croatia, all prescriptions were oral (Figure 14). A parenteral route (intramuscular, intravenous, or subcutaneous) was used for 9.0% of the agents, with Italy reporting the highest proportion of this (49.2%). Additionally, 'other' administration route (such as rectal or inhalation) accounted for 0.8% of the agents. In Norway, the route of administration was unknown for 1.3% of the antimicrobials.

Figure 14. Route of administration of antimicrobial agents in descending order of oral administration, by country, HALT-4, 2023–2024



LTCFs reported that the majority of antimicrobials were prescribed within the facility itself (75.6%), followed by 16.8% prescribed in hospitals and 7.2% prescribed elsewhere. The place of prescription was unknown for 10 antimicrobials (0.4%).

The primary reason for antimicrobial prescriptions was treatment (68.8%), followed by prophylaxis (29.1%), while the indication was not documented for 2.1% of the antimicrobials. In Croatia (94.1%), Greece (93.1%), Poland (93.3%), Slovakia (91.5%), and Italy (90.3%), over 90% of all antimicrobial prescriptions were for treatment. In contrast, prophylaxis accounted for at least 40% of all prescriptions in the Netherlands (46.0%), Finland (46.6%), Denmark (54.6%), and Iceland (56.9%) (Figure 15 and Figure 16).

Figure 15. Indication for antimicrobial use in descending order of proportion of prophylaxis, by country, HALT-4, 2023–2024

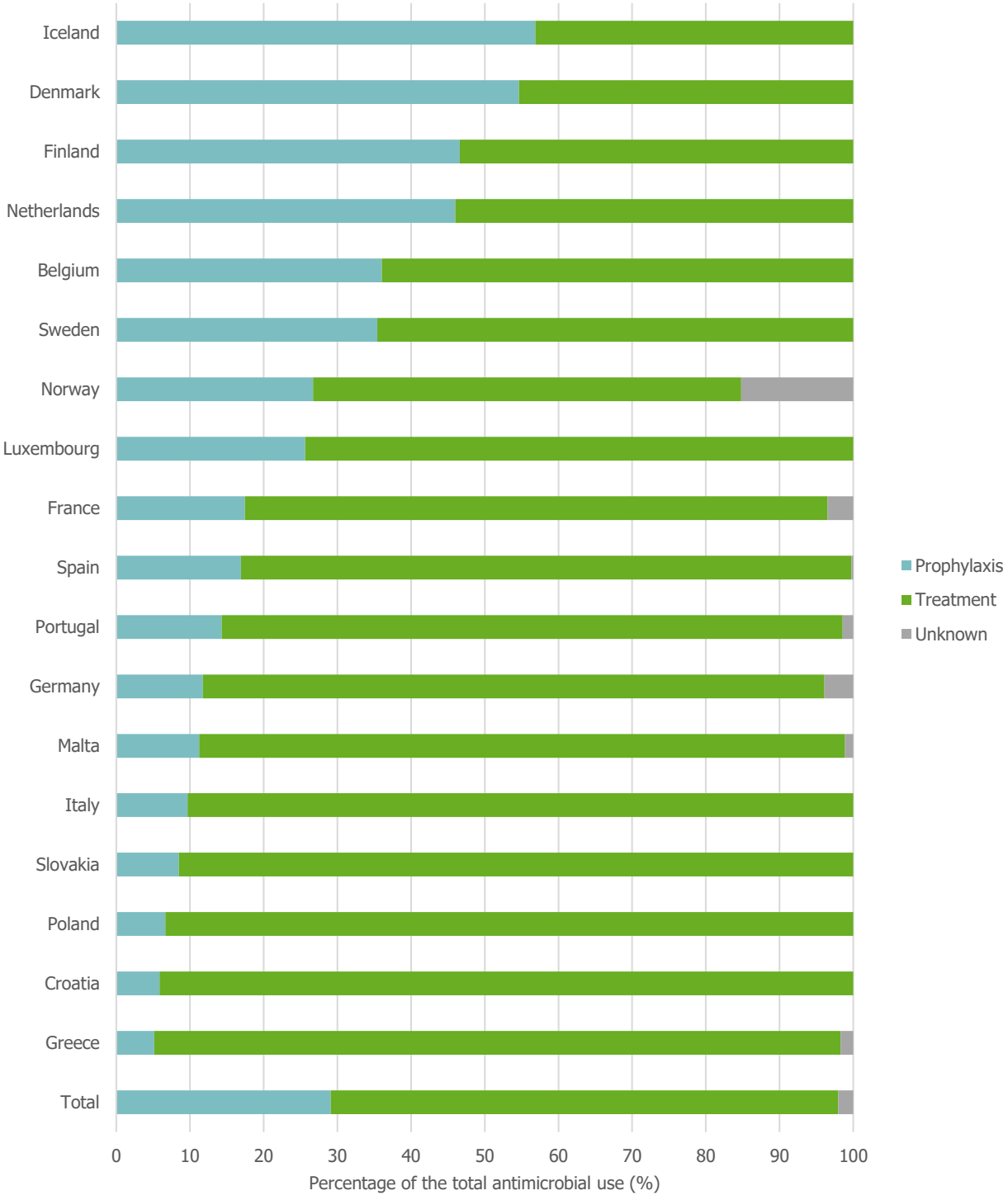
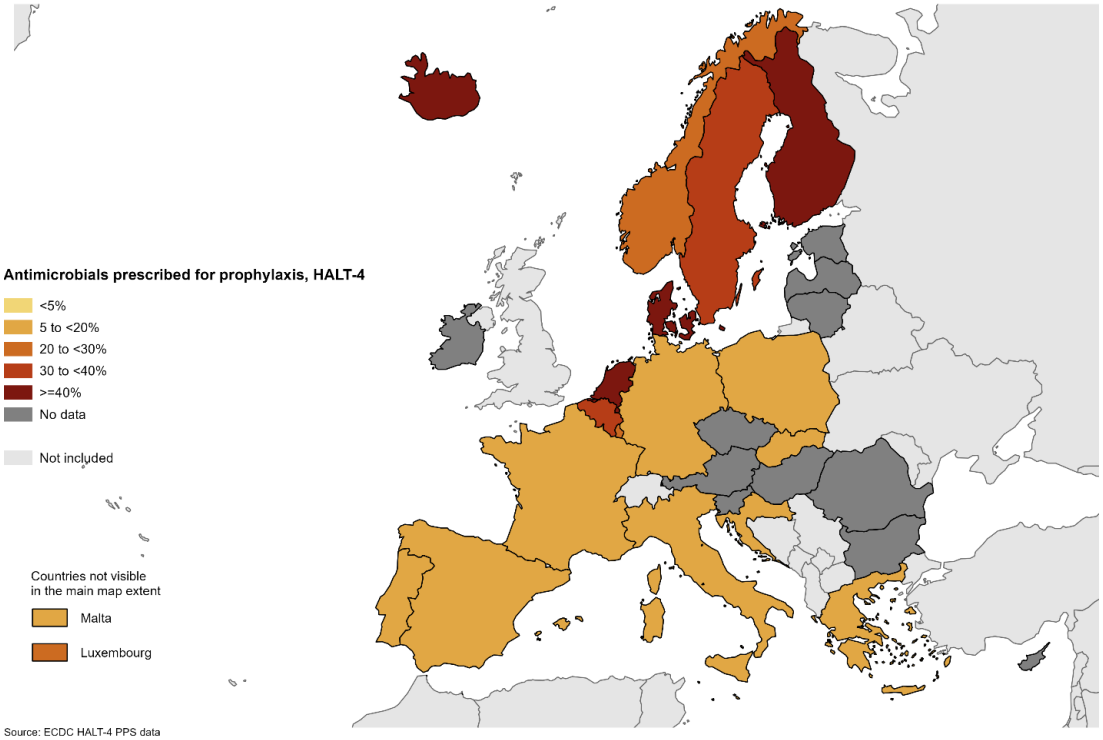


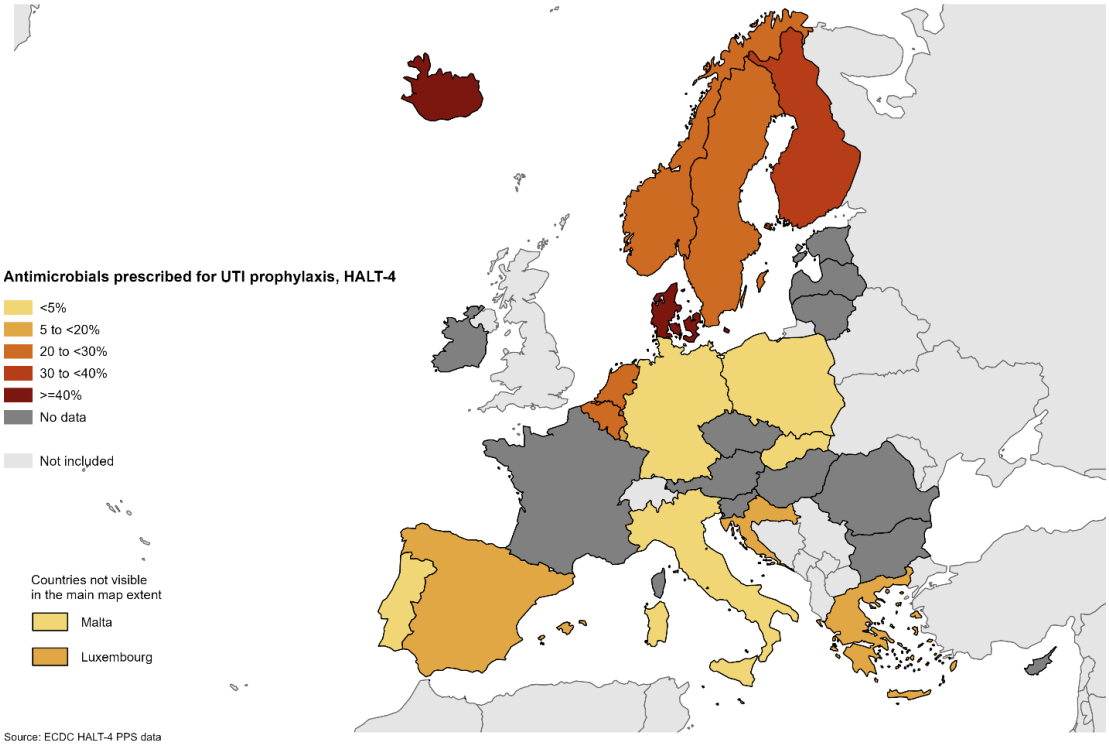
Figure 16. Proportion of antimicrobials prescribed for prophylaxis, HALT-4, 2023–2024



Source: ECDC HALT-4 PPS data
The boundaries and names shown on this map do not imply official endorsement or acceptance by the European Union. ECDC. Map produced on 27 February 2025

Out of 2 627 prescribed antimicrobials, 524 were prescribed for the prevention of UTIs, accounting for 19.9% of all prescriptions and 68.5% of prescriptions for prophylaxis. UTI prophylaxis represented 48.0% of all prescribed antimicrobials in Iceland and 45.4% in Denmark. In contrast, Malta and Poland had the lowest proportions of antimicrobials prescribed for UTI prevention, with 1.1% and 1.7%, respectively (Figure 17).

Figure 17. Percentage of all antimicrobials prescribed for UTI prophylaxis, HALT-4, 2023–2024

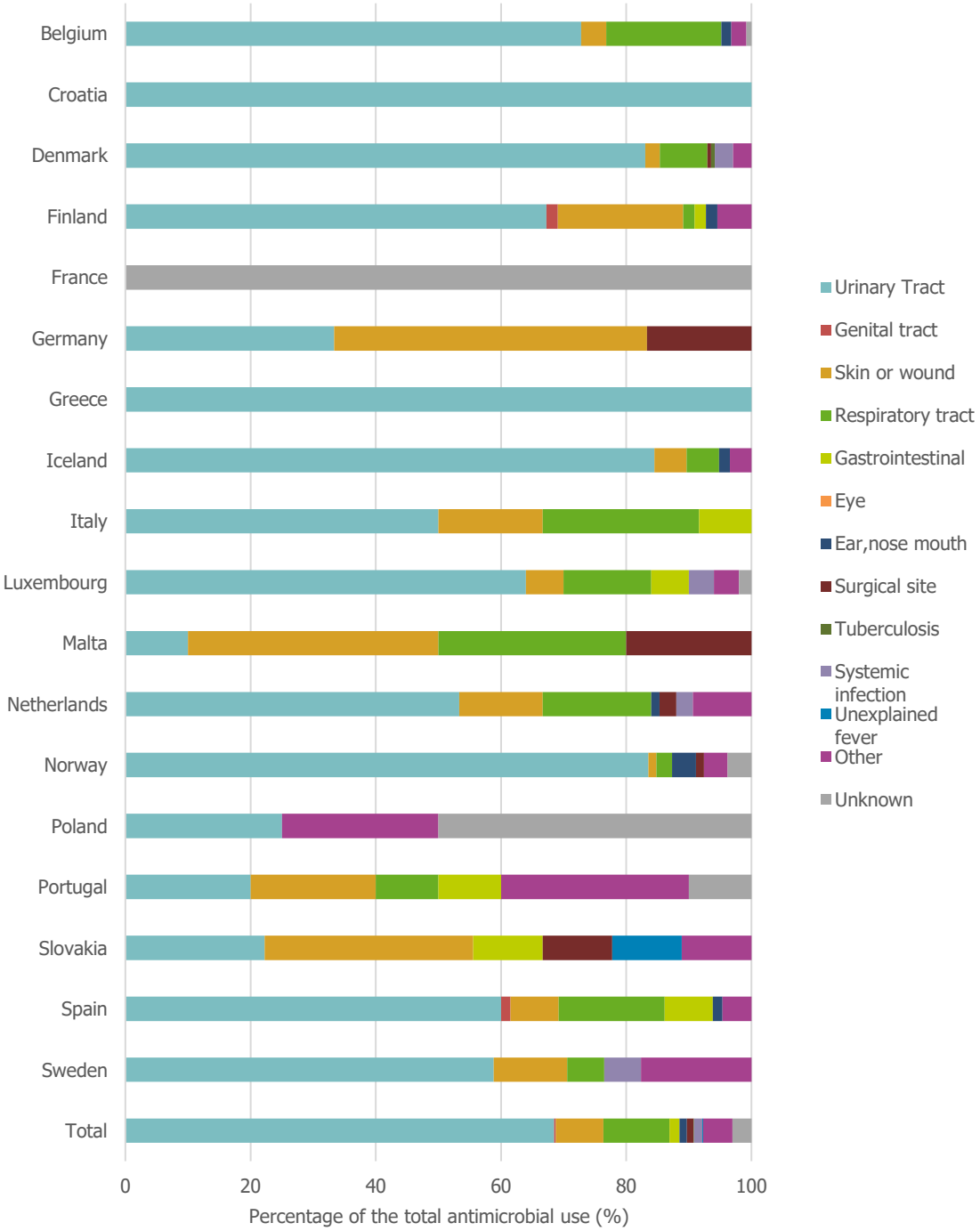


Source: ECDC HALT-4 PPS data
The boundaries and names shown on this map do not imply official endorsement or acceptance by the European Union. ECDC. Map produced on 27 February 2025

Most antimicrobials prescribed as prophylaxis were for UTIs (68.5%), followed by RTIs (10.6%), and skin or wound infections (7.6%). UTIs were the most common indication for prophylaxis in most countries. In Nordic countries, methenamine (J01XX05) was often prescribed for UTI prophylaxis: in Denmark, 14% (n=20/142) of UTI prophylaxis was with methenamine, in Finland 51% (n=19/37), in Iceland 39% (n=19/49), in Norway 85% (n=56/66), and in Sweden 20% (n=2/10). In contrast, in Slovakia (three out of nine), Malta (four out of ten), and Germany (three out of six), skin or wound infections were the primary indication for prophylaxis. Croatia and Greece reported only antimicrobials prescribed for prophylaxis, but they reported only one and three antimicrobials, respectively (Figure 18 and Table 21).

In Poland, the main indication was unknown, with two out of four antimicrobials prescribed for prophylaxis lacking a specified indication. France did not collect data on the indications for prophylaxis.

Figure 18. Sites of diagnosis for antimicrobial prophylaxis use, by country, HALT-4, 2023–2024



The majority of antimicrobials prescribed for treatment were for UTIs (41.8%), RTIs (30.5%) and skin or wound infections (15.4%). In Portugal (64.4%), Croatia (56.2%), Norway (51.7%), and Spain (51.6%), more than half of the antimicrobials prescribed for treatment were for UTIs. RTIs were the main therapeutic indication in Poland (55.3%), Greece (51.8%), Italy (51.8%), France (44.1%), Belgium (41.4%) and Luxembourg (40.0%) (Figure 19 and Table 22). The indication was unknown for 46 antimicrobials (1.8%) prescribed for treatment.

Figure 19. Sites of diagnosis for antimicrobial treatment use, by country, HALT-4, 2023–2024

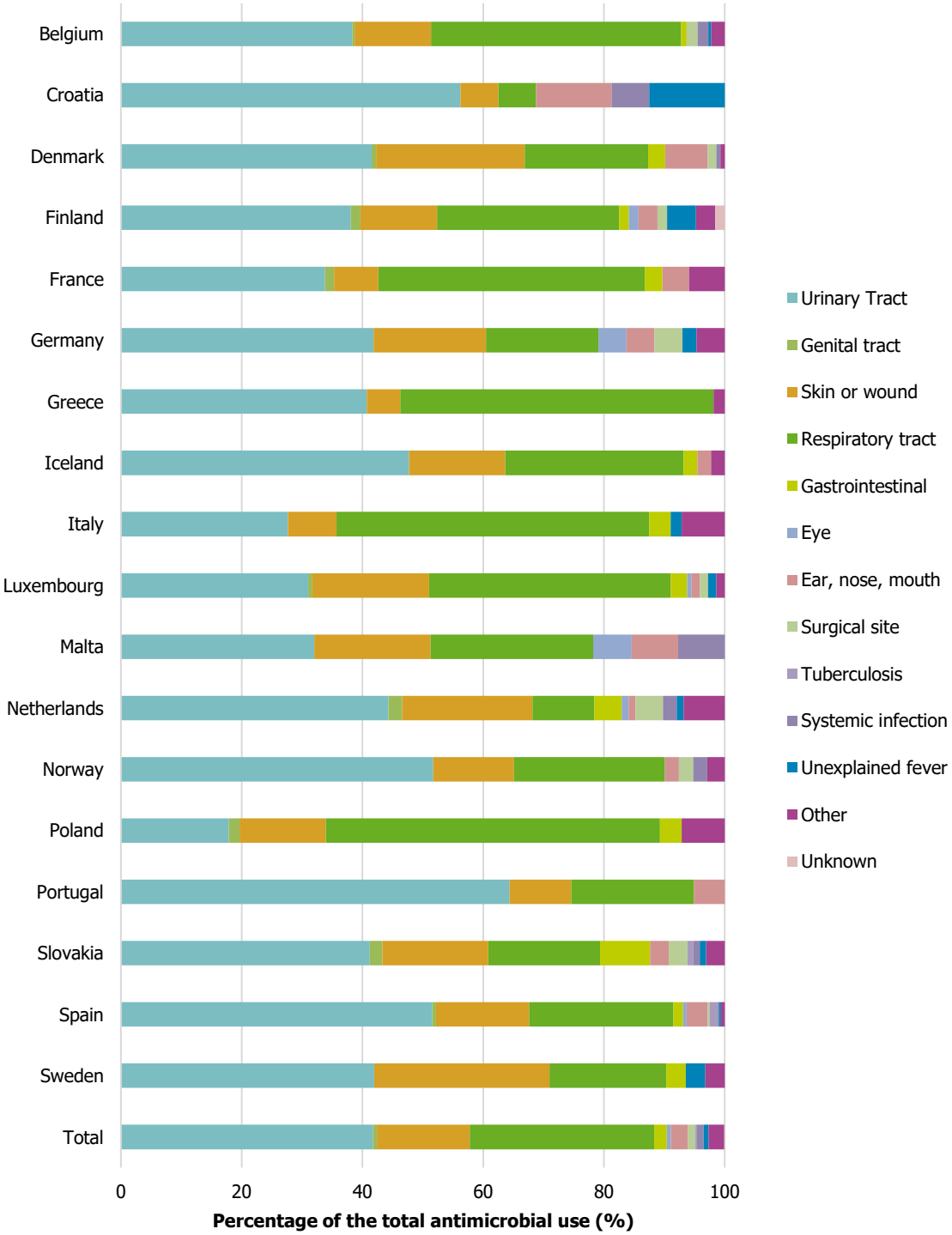


Table 21. Sites of diagnosis for antimicrobial prophylaxis in participating LTCFs, by country, HALT-4, 2023–2024

	No. of AM agents	Urinary tract*		Genital tract		Skin or wound		Respiratory tract		Gastro-intestinal tract		Eye		Ear, nose, mouth		Surgical site		Tuberculosis		Systemic infection		Unexplained fever		Other		Unknown	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Belgium	125	91	72.8	0	0.0	5	4.0	23	18.4	0	0.0	0	0.0	2	1.6	0	0.0	0	0.0	0	0.0	0	0.0	3	2.4	1	0.8
Croatia	1	1	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Denmark	171	142	83.0	0	0.0	4	2.3	13	7.6	0	0.0	0	0.0	0	0.0	1	0.6	1	0.6	5	2.9	0	0.0	5	2.9	0	0.0
Finland	55	37	67.3	1	1.8	11	20.0	1	1.8	1	1.8	0	0.0	1	1.8	0	0.0	0	0.0	0	0.0	0	0.0	3	5.5	0	0.0
France	15	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	15	100
Germany	6	2	33.3	0	0.0	3	50.0	0	0.0	0	0.0	0	0.0	0	0.0	1	16.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Greece	3	3	100	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Iceland	58	49	84.5	0	0.0	3	5.2	3	5.2	0	0.0	0	0.0	1	1.7	0	0.0	0	0.0	0	0.0	0	0.0	2	3.4	0	0.0
Italy	12	6	50.0	0	0.0	2	16.7	3	25.0	1	8.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Luxembourg	50	32	64.0	0	0.0	3	6.0	7	14.0	3	6.0	0	0.0	0	0.0	0	0.0	0	0.0	2	4.0	0	0.0	2	4.0	1	2.0
Malta	10	1	10.0	0	0.0	4	40.0	3	30.0	0	0.0	0	0.0	0	0.0	2	20.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Netherlands	75	40	53.3	0	0.0	10	13.3	13	17.3	0	0.0	0	0.0	1	1.3	2	2.7	0	0.0	2	2.7	0	0.0	7	9.3	0	0.0
Norway	79	66	83.5	0	0.0	1	1.3	2	2.5	0	0.0	0	0.0	3**	3.8	1	1.3	0	0.0	0	0.0	0	0.0	3	3.8	3	3.8
Poland	4	1	25.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	25.0	2	50.0
Portugal	10	2	20.0	0	0.0	2	20.0	1	10.0	1	10.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	30.0	1	10.0
Slovakia	9	2	22.2	0	0.0	3	33.3	0	0.0	1	11.1	0	0.0	0	0.0	1	11.1	0	0.0	0	0.0	1	11.1	1	11.1	0	0.0
Spain	65	39	60.0	1	1.5	5	7.7	11	16.9	5	7.7	0	0.0	1	1.5	0	0.0	0	0.0	0	0.0	0	0.0	3	4.6	0	0.0
Sweden	17	10	58.8	0	0.0	2	11.8	1	5.9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	5.9	0	0.0	3	17.6	0	0.0
Total	**765**	**524**	**68.5**	**2**	**0.3**	**58**	**7.6**	**81**	**10.6**	**12**	**1.6**	**0**	**0.0**	**9**	**1.2**	**8**	**1.0**	**1**	**0.1**	**10**	**1.3**	**1**	**0.1**	**36**	**4.7**	**23**	**3.0**

In Nordic countries, methenamine (J01XX05) was often prescribed for UTI prophylaxis: in Denmark, 14% (n=20/142) of UTI prophylaxis was with methenamine, in Finland 51% (n=19/37), in Iceland 39% (n=19/49), in Norway 85% (n=56/66), and in Sweden 20% (n=2/10). Eye + Ear, nose, mouth.*

Table 22. Sites of diagnosis for antimicrobial treatment in participating LTCFs, by country, HALT-4, 2023–2024

	No. of AM agents	Urinary tract		Genital tract		Skin or wound		Respiratory tract		Gastro-intestinal tract		Eye		Ear, nose, mouth		Surgical site		Tuberculosis		Systemic infection		Unexplained fever		Other		Unknown	
		n	%	n	%	n	%	n	n	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Belgium	222	85	38.3	1	0.5	28	12.6	92	41.4	2	0.9	0	0.0	0	0.0	4	1.8	0	0.0	4	1.8	1	0.5	5	2.3	0	0.0
Croatia	16	9	56.3	0	0.0	1	6.3	1	6.3	0	0.0	0	0.0	2	12.5	0	0.0	0	0.0	1	6.3	2	12.5	0	0.0	0	0.0
Denmark	142	59	41.5	1	0.7	35	24.6	29	20.4	4	2.8	0	0.0	10	7.0	2	1.4	0	0.0	1	0.7	0	0.0	1	0.7	0	0.0
Finland	63	24	38.1	1	1.6	8	12.7	19	30.2	1	1.6	1	1.6	2	3.2	1	1.6	0	0.0	0	0.0	3	4.8	2	3.2	1	1.6
France	68	23	33.8	1	1.5	5	7.4	30	44.1	2	2.9	0	0.0	3	4.4	0	0.0	0	0.0	0	0.0	0	0.0	4	5.9	0	0.0
Germany	43	18	41.9	0	0.0	8	18.6	8	18.6	0	0.0	2	4.7	2	4.7	2	4.7	0	0.0	0	0.0	1	2.3	2	4.7	0	0.0
Greece	54	22	40.7	0	0.0	3	5.6	28	51.9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	1.9	0	0.0
Iceland	44	21	47.7	0	0.0	7	15.9	13	29.5	1	2.3	0	0.0	1	2.3	0	0.0	0	0.0	0	0.0	0	0.0	1	2.3	0	0.0
Italy	112	31	27.7	0	0.0	9	8.0	58	51.8	4	3.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	1.8	8	7.1	0	0.0
Luxembourg	145	45	31.0	1	0.7	28	19.3	58	40.0	4	2.8	1	0.7	2	1.4	2	1.4	0	0.0	0	0.0	2	1.4	2	1.4	0	0.0
Malta	78	25	32.1	0	0.0	15	19.2	21	26.9	0	0.0	5	6.4	6	7.7	0	0.0	0	0.0	6	7.7	0	0.0	0	0.0	0	0.0
Netherlands	88	39	44.3	2	2.3	19	21.6	9	10.2	4	4.5	1	1.1	1	1.1	4	4.5	0	0.0	2	2.3	1	1.1	6	6.8	0	0.0
Norway	172	89	51.7	0	0.0	23	13.4	43	25.0	0	0.0	0	0.0	4*	2.3	4	2.3	0	0.0	4	2.3	0	0.0	5	2.9	0	0.0
Poland	56	10	17.9	1	1.8	8	14.3	31	55.4	2	3.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	4	7.1	0	0.0
Portugal	59	38	64.4	0	0.0	6	10.2	12	20.3	0	0.0	0	0.0	3	5.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Slovakia	97	40	41.2	2	2.1	17	17.5	18	18.6	8	8.2	0	0.0	3	3.1	3	3.1	1	1.0	1	1.0	1	1.0	3	3.1	0	0.0
Spain	318	164	51.6	2	0.6	49	15.4	76	23.9	5	1.6	2	0.6	11	3.5	1	0.3	4	1.3	1	0.3	1	0.3	2	0.6	0	0.0
Sweden	31	13	41.9	0	0.0	9	29.0	6	19.4	1	3.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	3.2	1	3.2	0	0.0
Total	**1 808**	**755**	**41.8**	**12**	**0.7**	**278**	**15.4**	**552**	**30.5**	**38**	**2.1**	**12**	**0.7**	**50**	**2.8**	**23**	**1.3**	**5**	**0.3**	**20**	**1.1**	**15**	**0.8**	**47**	**2.6**	**1**	**0.1**

** Eye + Ear, nose, mouth*

Only 21.3% of antimicrobials prescribed for prophylaxis had an end or review date documented. End or review date was recorded most commonly in France (73.3%), Malta (60.0%), and Spain (52.3%), In Iceland, none of the prophylactic antimicrobials (n=58) had an end or review date documented (Figure 21).

Figure 20). Croatia reported only one antimicrobial prescribed for prophylaxis for which an end or review date was documented in the resident's record.

Among the 1 808 antimicrobials prescribed for treatment, 79.1% had an end or review date documented. In four countries – France (98.5%), Portugal (98.3%), Spain (97.2%), and Luxembourg (95.1%) – more than 95% of antimicrobials for treatment had an end or review date documented (Figure 21).

Figure 20. Distribution of the availability of an end/review date for antimicrobial prophylaxis in the resident notes in descending order of the proportion of documented end/review date, HALT-4, 2023–2024

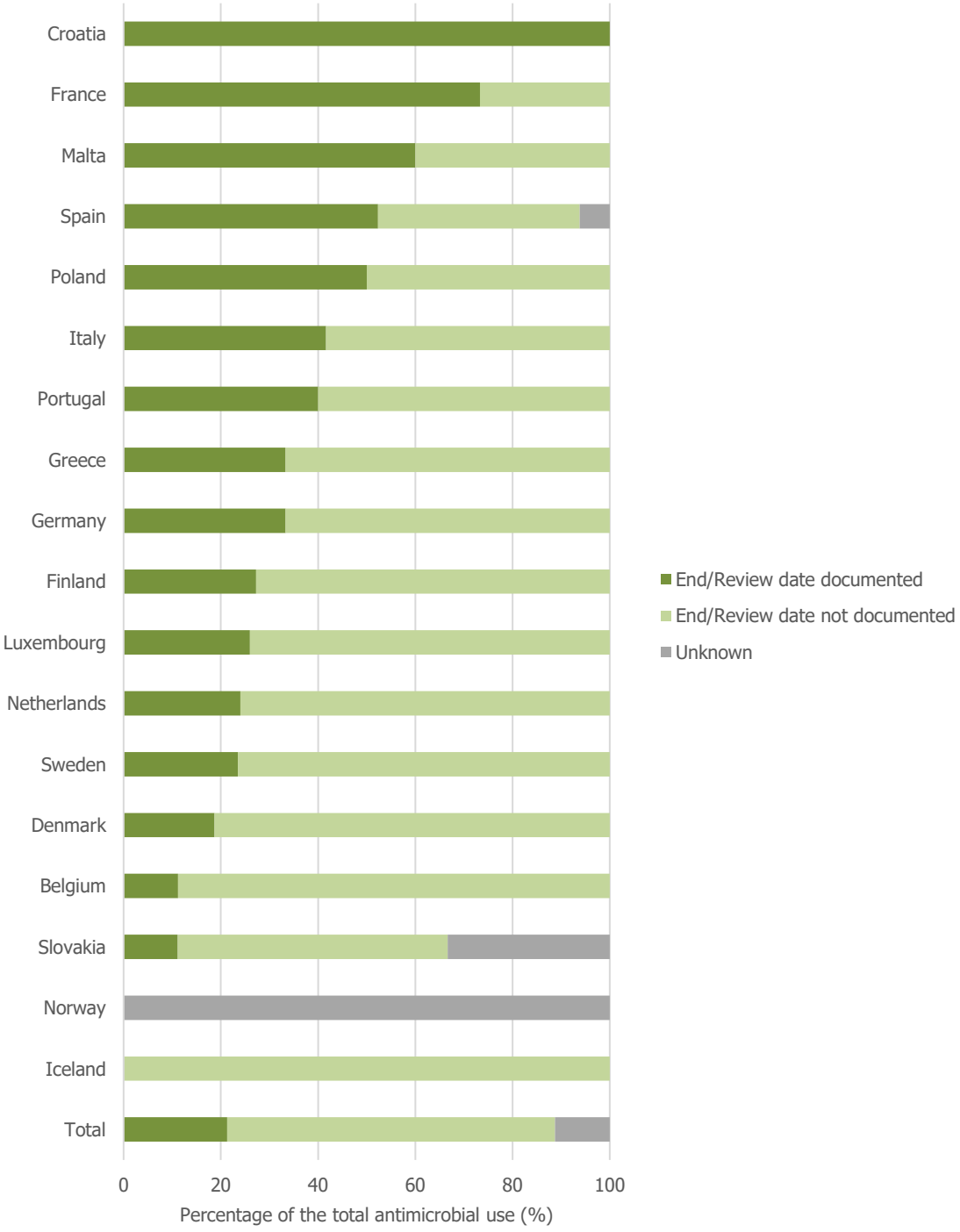
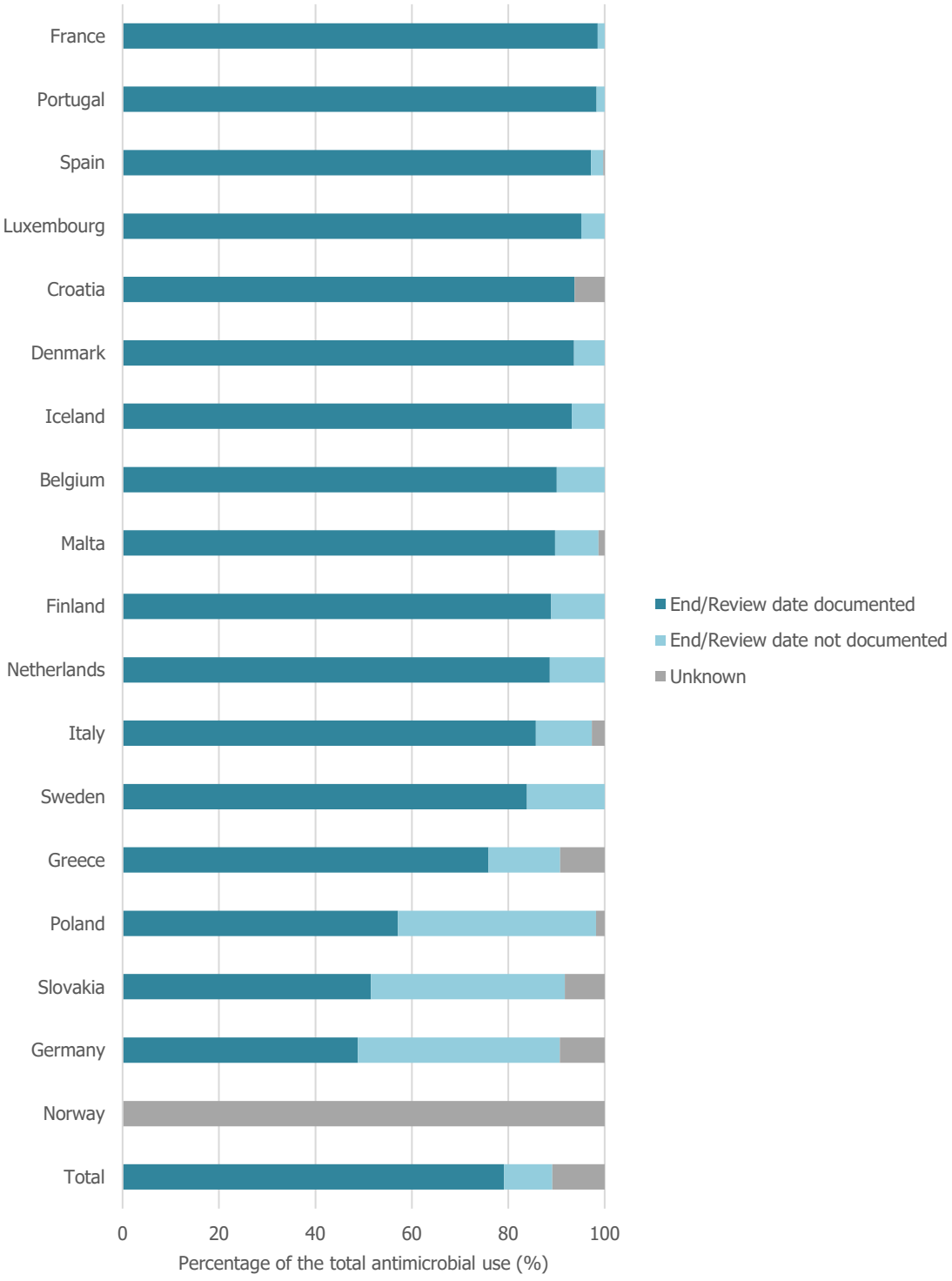


Figure 21. Distribution of the availability of an end/review date for antimicrobial treatment in the resident notes in descending order of the proportion of documented end/review date, HALT-4, 2023–2024

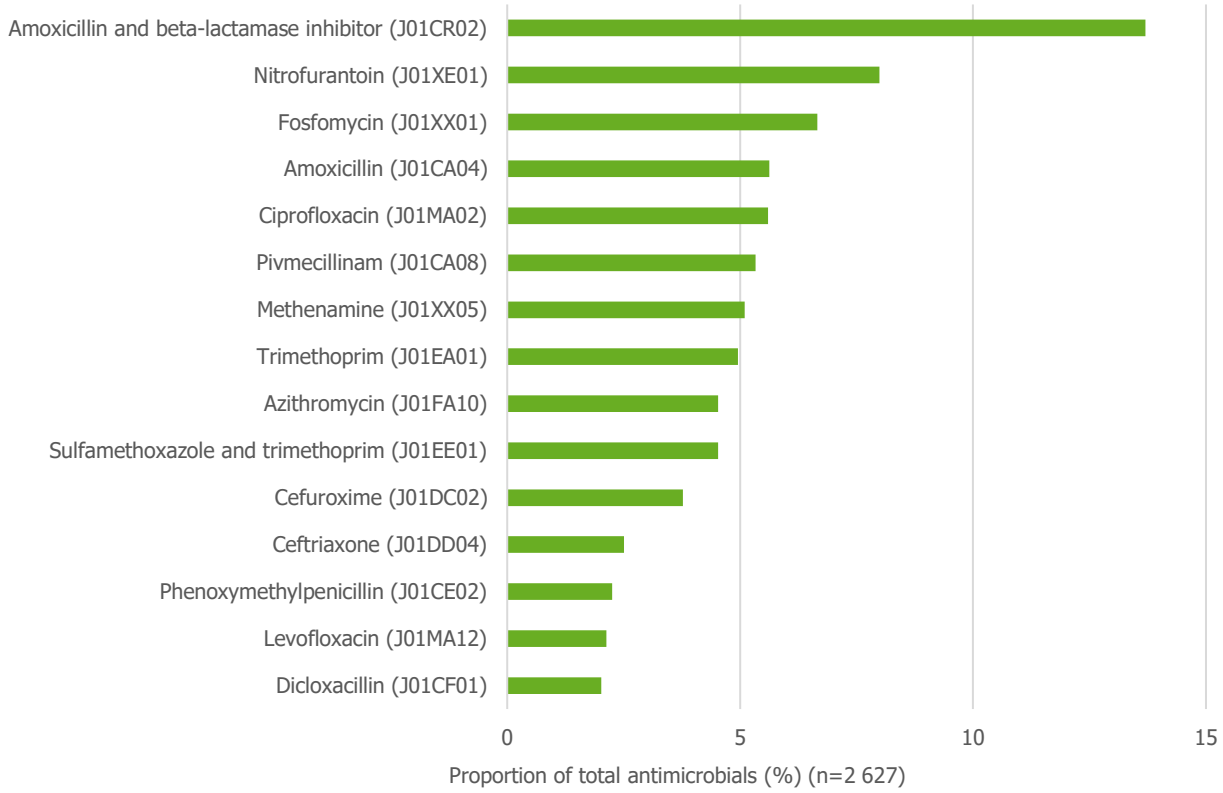


Antimicrobial agents prescribed in the LTCFs

Antibacterials for systemic use (ATC J01) were by far the most commonly prescribed antimicrobials, accounting for 94.9% of all reported antimicrobials. Antimycotics (J02) and antifungals (D01BA) for systemic use accounted for 1.4% and 0.2%, respectively. Antibiotics used as intestinal anti-infectives (A07AA) and nitroimidazole-derived antiprotozoals (P01AB) were prescribed less frequently, at 1.0% and 0.8%, respectively. Additionally, eight antimycobacterials (J04; 0.3%), used for the treatment of mycobacteria, were prescribed on the day of the PPS. Only one resident from Luxembourg in the entire PPS database was reported receiving COVID-19 antivirals on the day of the PPS day, in 2023.

Fifteen antimicrobial agents accounted for over 75% of the total antimicrobial use in the participating LTCFs (n=2 015/2 627 antimicrobial agents; Figure 22). The most commonly prescribed agent was amoxicillin with beta-lactamase inhibitor (J01CR02; 13.7%), followed by nitrofurantoin (J01XE01; 8.0%) and fosfomycin (J01EX01; 6.7%). In the Netherlands, some LTCFs did not systematically collect the ATC code of certain antimicrobials; these accounted for 1.2% of all antimicrobials.

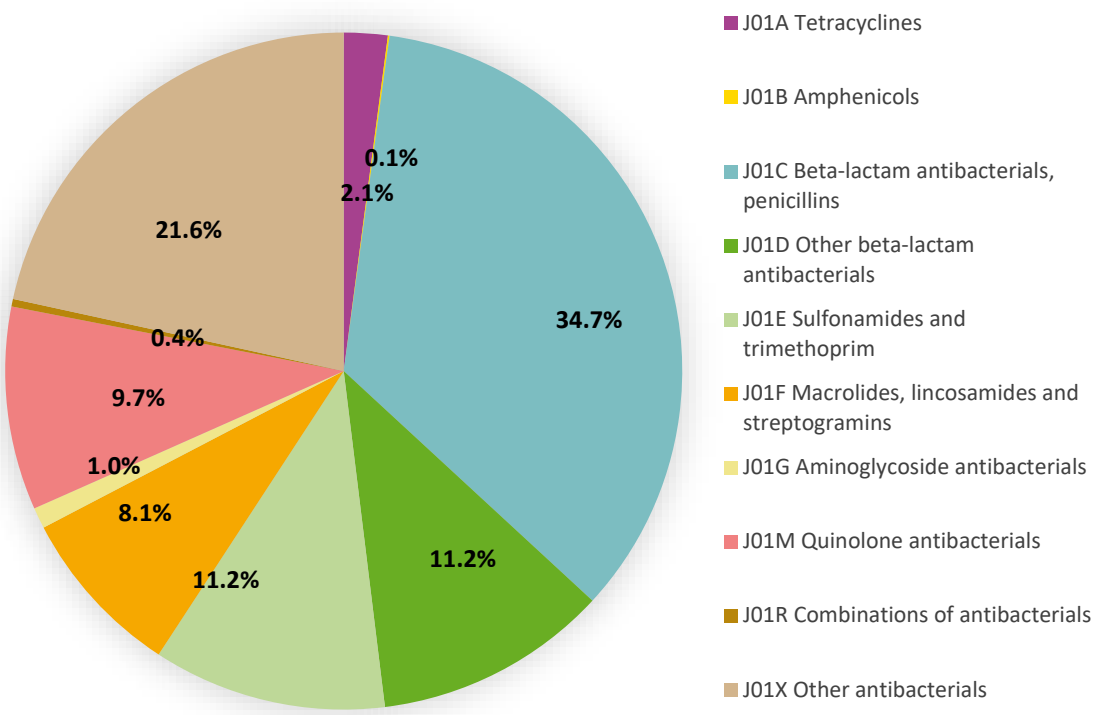
Figure 22. Antimicrobial agents accounting for over 75% of the total antimicrobial use in the participating LTCFs, HALT-4, 2023–2024



Antibacterials for systemic use (ATC J01)

A total of 2 493 antibacterials for systemic use (J01) were reported. The most commonly used subgroups within this category were penicillins (J01C; 34.7%), 'other antibacterials' (J01X; 21.6%), sulfonamides and trimethoprim (J01E; 11.2%), other beta-lactam antibacterials (J01D; 11.2%), and quinolones (J01M; 9.7%) (Figure 23).

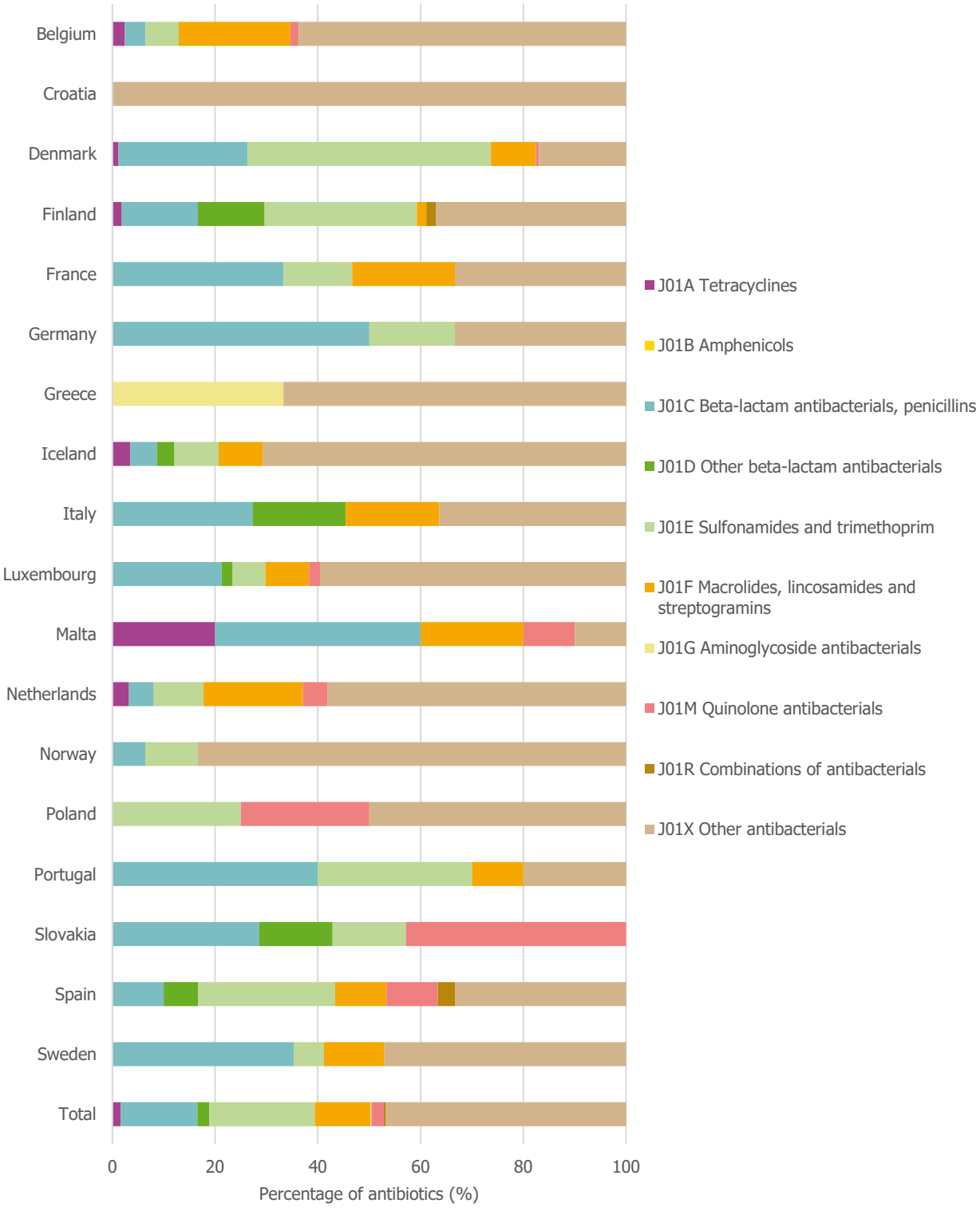
Figure 23. Distribution of antibacterials for systemic use (ATC J01; n=2 473), HALT-4, 2023–2024



The most commonly prescribed subgroup of antibacterials for systemic use (J01) was 'beta-lactam antibacterials, penicillins' (J01C), which occurred in 12 countries (Figure 24). 'Other antibacterials' (J01X) was the most common subgroup in Belgium (34.3%), Iceland (46.5%), and the Netherlands (37.6%). 'Other beta-lactam antibacterials' (J01D) was the most prescribed subgroup in Croatia (29.4%) and Italy (39.2%). In Greece, the most commonly prescribed subgroup of antibacterials was quinolones (J01M).

In 12 countries, 'other antibacterials' (J01X) was the most commonly prescribed subgroup for prophylaxis. France reported an equal number of 'other antibacterials' (J01X) and beta-lactam antibacterials, penicillins (J01C). The latter subgroup was primarily prescribed in Germany (three out of six), Malta (four out of ten), and Portugal (four out of ten). In Denmark, sulfonamides and trimethoprim (J01E) were the most commonly prescribed antibacterials for prophylaxis, while in Slovakia (three out of seven), quinolone antibacterials (J01M) predominated (Figure 24 and Table 23)

Figure 24. Distribution of antibacterials for systemic use (ATC J01) used for prophylaxis, by country, HALT-4, 2023–2024



Beta-lactam antibacterials, penicillins (J01C), were the most frequently prescribed subgroup for treatment in all countries, except for Croatia, Greece, and Italy. In Croatia and Italy, the most common subgroup was 'other beta-lactam antibacterials' (J01D), while in Greece, quinolones (J01M) were prescribed most commonly (Figure 25 and Table 24). For 46 antibacterials for systemic use (J01; 1.9%), it was unknown whether the antibacterial was prescribed for prophylactic or treatment purposes.

Figure 25. Distribution of antibacterials for systemic use (ATC J01) used for treatment, by country, HALT-4, 2023–2024

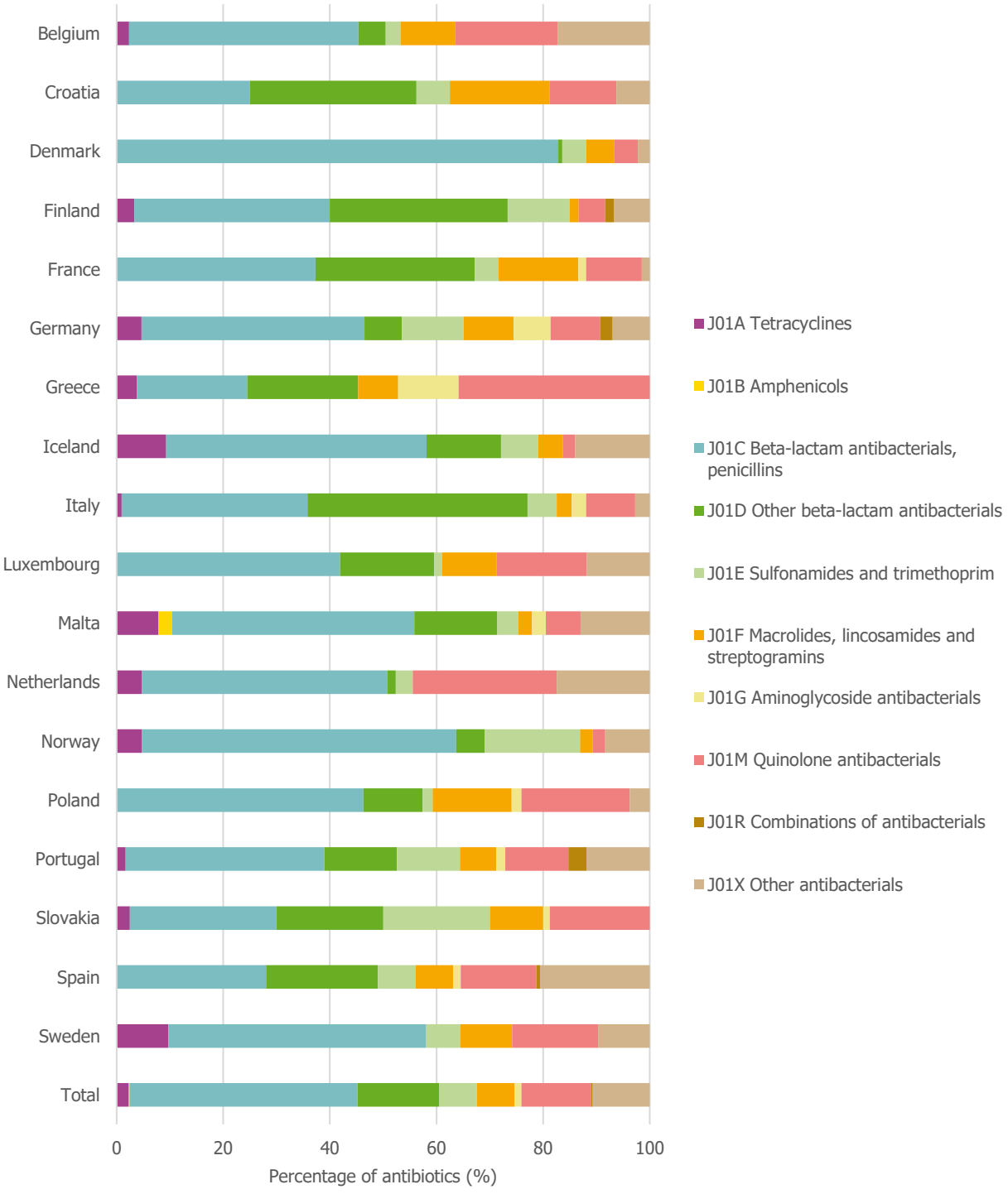


Table 23. Distribution of antibacterials for systemic use (ATC J01) used for prophylaxis, by country, HALT-4, 2023–2024

Country	All J01 for systemic use	Tetracyclines (J01A)		Amphenicols (J01B)		Beta-lactams, penicillins (J01C)		Other beta-lactams (J01D)		Sulfonamides and trimethoprim (J01E)		Macrolides. lincosamides and streptogramins (J01F)		Amino-glycosides (J01G)		Quinolones (J01M)		Combinations of antibacterials (J01R)		Other antibacterials (J01X)	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Belgium	124	3	2.4	0	0.0	5	4.0	0	0.0	8	6.5	27	21.8	0	0.0	2	1.6	0	0.0	79	63.7
Croatia	1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	100
Denmark	171	2	1.2	0	0.0	43	25.1	0	0.0	81	47.4	15	8.8	0	0.0	1	0.6	0	0.0	29	17.0
Finland	54	1	1.9	0	0.0	8	14.8	7	13.0	16	29.6	1	1.9	0	0.0	0	0.0	1	1.9	20	37.0
France	15	0	0.0	0	0.0	5	33.3	0	0.0	2	13.3	3	20.0	0	00	0	0.0	0	0.0	5	33.3
Germany	6	0	0.0	0	0.0	3	50.0	0	0.0	1	16.7	0	0.0	0	0.0	0	0.0	0	0.0	2	33.3
Greece	3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	33.3	0	0.0	0	0.0	2	66.7
Iceland	58	2	3.4	0	0.0	3	5.2	2	3.4	5	8.6	5	8.6	0	0.0	0	0.0	0	0.0	41	70.7
Italy	11	0	0.0	0	0.0	3	27.3	2	18.2	0	0.0	2	18.2	0	0.0	0	0.0	0	0.0	4	36.4
Luxembourg	47	0	0.0	0	0.0	10	21.3	1	2.1	3	6.4	4	8.5	0	0.0	1	2.1	0	0.0	28	59.6
Malta	10	2	20.0	0	0.0	4	40.0	0	0.0	0	0.0	2	20.0	0	0.0	1	10.0	0	0.0	1	10.0
Netherlands	62	2	3.2	0	0.0	3	4.8	0	0.0	6	9.7	12	19.4	0	0.0	3	54.8	0	0.0	36	58.1
Norway	78	0	0.0	0	0.0	5	6.4	0	0.0	8	10.3	0	0.0	0	0.0	0	0.0	0	0.0	65	83.3
Poland	4	0	0.0	0	0.0	0	0.0	0	0.0	1	25.0	0	0.0	0	0.0	1	25.0	0	0.0	2	50.0
Portugal	10	0	0.0	0	0.0	4	40.0	0	0.0	3	30.0	1	10.0	0	0.0	0	0.0	0	0.0	2	20.0
Slovakia	7	0	0.0	0	0.0	2	28.6	1	14.3	1	14.3	0	0.0	0	0.0	3	42.9	0	0.0	0	0.0
Spain	60	0	0.0	0	0.0	6	10.0	4	6.7	16	26.7	6	10.0	0	0.0	6	10.0	2	3.3	20	33.3
Sweden	17	0	0.0	0	0.0	6	35.3	0	0.0	1	5.9	2	11.8	0	0.0	0	0.0	0	0.0	8	47.1
Total	**738**	**12**	**1.6**	**0**	**0.0**	**110**	**14.9**	**17**	**2.3**	**152**	**20.6**	**80**	**10.8**	**1**	**0.1**	**18**	**2.4**	**3**	**0.4**	**345**	**46.7**

Table 24. Distribution of antibacterials for systemic use (ATC J01) used for treatment, by country, HALT-4, 2023–2024

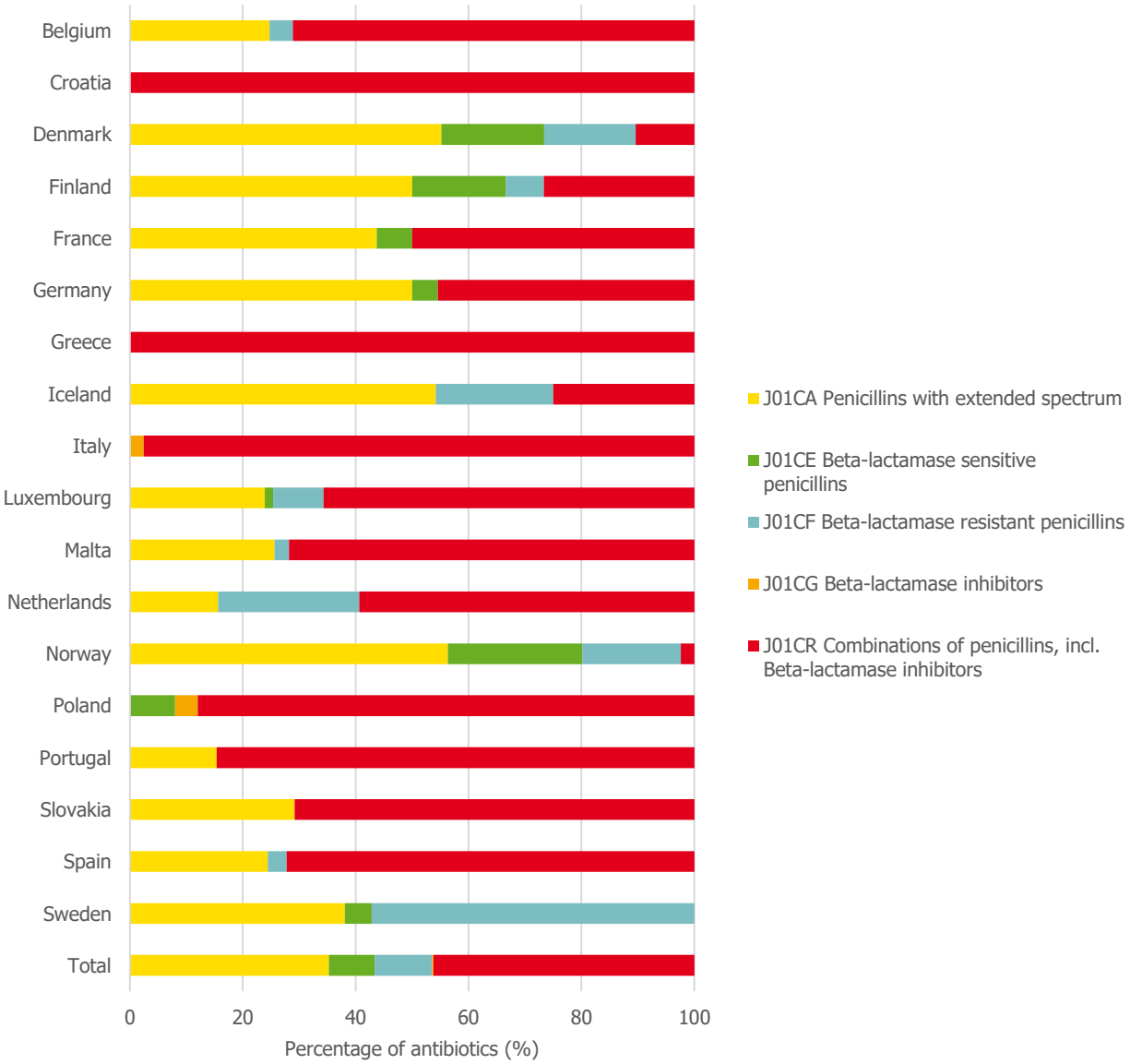
	All J01 for systemic use	Tetracyclines (J01A)		Amphe-nicols (J01B)		Beta-lactams, penicillins (J01C)		Other beta-lactams (J01D)		Sulfonamides and trimethoprim (J01E)		Macrolides. lincosamides and streptogramins (J01F)		Amino-glycosides (J01G)		Quinolones (J01M)		Combinations of antibacterials (J01R)		Other antibacterials (J01X)	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Belgium	214	5	2.3	0	0.0	92	43.0	11	5.1	6	2.8	22	10.3	0	0.0	41	19.2	0	0.0	37	17.3
Croatia	16	0	0.0	0	0.0	4	25.0	5	31.3	1	6.3	3	18.8	0	0.0	2	12.5	0	0.0	1	6.3
Denmark	134	0	0.0	0	0.0	111	82.8	1	0.7	6	4.5	7	5.2	0	0.0	6	4.5	0	0.0	3	2.2
Finland	60	2	3.1	0	0.0	22	33.7	20	33.3	7	11.7	1	1.7	0	0.0	3	5.0	1	1.7	4	6.7
France	67	0	0.0	0	0.0	25	37.3	20	29.9	3	4.5	10	14.9	1	1.5	7	10.4	0	0.0	1	1.5
Germany	43	2	4.7	0	0.0	18	41.9	3	7.0	5	11.6	4	9.3	3	7.0	4	9.3	1	2.3	3	7.0
Greece	53	2	3.8	0	0.0	11	20.8	11	20.8	0	0.0	4	7.5	6	11.3	19	35.8	0	0.0	0	0.0
Iceland	43	4	9.3	0	0.0	21	48.8	6	14.0	3	7.0	2	4.7	0	0.0	1	2.3	0	0.0	6	14.0
Italy	109	1	0.9	0	0.0	38	34.9	45	41.3	6	5.5	3	2.8	3	2.8	10	9.2	0	0.0	3	2.8
Luxembourg	136	0	0,0	0	0.0	57	41.9	24	17.6	2	1.5	14	10.3	0	0.0	23	16.9	0	0.0	16	11.8
Malta	77	6	7.8	2	2.6	35	45.5	12	15.6	3	3.9	2	2.6	2	2.6	5	6.5	0	0.0	10	13.0
Netherlands	63	3	4.8	0	0.0	29	46.0	1	1.6	2	3.2	0	0.0	0	0.0	17	27.0	0	0.0	11	17.5
Norway	168	8	4.8	0	0.0	99	58.9	9	5.4	30	17.9	4	2.4	0	0.0	4	2.4	0	0.0	14	8.3
Poland	54	0	0.0	0	0.0	25	46.3	6	11.1	1	1.9	8	14.8	1	1.9	11	20.4	0	0.0	2	3.7
Portugal	59	1	1.7	0	0.0	22	37.3	8	13.6	7	11.9	4	6.8	1	1.7	7	11.9	2	3.4	7	11.9
Slovakia	80	2	2.5	0	0.0	22	27.5	16	20.0	16	20.0	8	10.0	1	1.3	15	18.8	0	0.0	0	0.0
Spain	296	0	0.0	0	0.0	83	28.0	62	20.9	21	7.1	21	7.1	4	1.4	42	14.2	2	0.7	61	20.6
Sweden	31	3	9.7	0	0.0	15	48.4	0	0.0	2	6.5	3	9.7	0	0.0	5	16.1	0	0.0	3	9.7
Total	**1 703**	**39**	**2.3**	**2**	**0.1**	**729**	**42.8**	**260**	**15.3**	**121**	**7.1**	**120**	**7.0**	**22**	**1.3**	**222**	**13.0**	**6**	**0.4**	**182**	**10.7**

Beta-lactams, penicillins (ATC J01C)

The most frequently prescribed subgroup within the beta-lactam antibacterials, penicillins (J01C; n=865) was combinations of penicillins, including beta-lactamase inhibitors (J01CR), which accounted for 46.2% of prescriptions in the subgroup and was prescribed in all participating countries except Sweden (Figure 29). This was followed by penicillins with extended spectrum (J01CA; 35.3%) and beta-lactamase-resistant penicillins (J01CF; 10.2%). Beta-lactamase-sensitive penicillins (J01CE) were less common (8.1%). Two beta-lactamase inhibitors (J01CG) were reported (0.2%), one in Poland and one in Italy.

Antibacterial agents in the J01C category were primarily prescribed for treatment purposes (84.3%), with the majority targeting RTIs (39.1%), UTIs (29.6%), and skin or wound infections (21.8%). Prophylaxis accounted for 12.7% of prescriptions, mainly aimed at preventing UTIs (34.5%), skin or wound infections (25.4%), and other unspecified purposes (11.8%). The prescription indication was unavailable for 26 out of 865 (3.0%) reported prescriptions of penicillins (J01C).

Figure 26. Distribution of use of beta-lactam antibacterials, penicillins (ATC J01C), by subgroups and country, HALT-4, 2023–2024

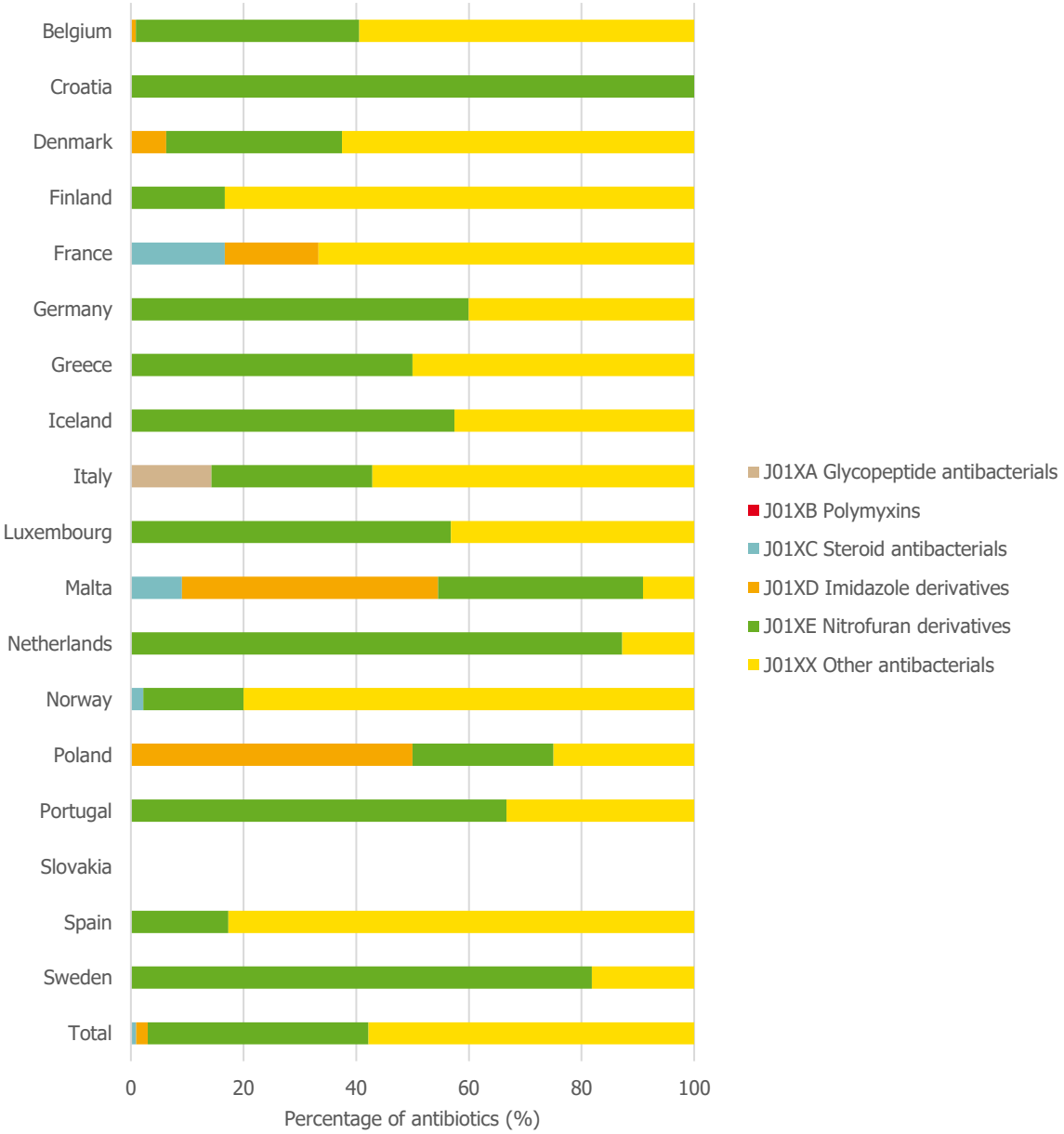


Other antibacterials (ATC J01X)

Among the 'other antibacterials' (J01X; n=538), the most commonly used subgroups were 'other antibacterials' (J01XX; 57.8%) and 'nitrofuran derivatives' (J01XE; 39.2%) (Figure 30). Prescriptions for 'imidazole derivatives' (J01XD; 2.0%), 'steroid antibacterials' (J01XC; 0.7%), and 'glycopeptide antibacterials' (J01XA; 0.2%) were infrequent, and no 'polymyxins' (J01XB) were prescribed.

The 'other antibacterials' (J01X) category was primarily prescribed for prophylaxis (n=345; 64.1%), almost exclusively aimed at preventing UTIs (n=333; 96.5%). When prescribed for treatment, 'other antibacterials' (J01X) were mainly used to treat UTIs (92.9%; n=169/182), with a smaller number of prescriptions for skin or wound infections (2.2%; n=4/182). The indication was not recorded for 13 prescriptions.

Figure 27. Distribution of use of other antibacterials (ATC J01X), by subgroups and country, HALT-4, 2023–2024



Other antibacterials (ATC J01XX)

Among the 'other antibacterials' subgroup (J01XX; n=311), the most commonly used agents were fosfomycin (J01XX01; 56.3%), mainly prescribed in Belgium (n=69) and Spain (n=67), and methenamine (J01XX05; 43.1%). Additionally, one nitroxoline was prescribed in Luxembourg and one bacitracin in Malta. Table 25 illustrates the distribution of use by subgroup and country.

Methenamine (J01XX05; n=134) was only prescribed in Nordic countries; Norway (n=72), Denmark (n=20), Finland (n=20), Iceland (n=20), and Sweden (n=2). These were primarily prescribed to prevent UTIs, in Denmark (n=20; 100%), Finland (n=19; 95.0%), Iceland (n=19; 95.0%), Norway (n=56; 77.8%), and Sweden (n=2; 100%).

Table 25. Distribution of the use of 'other antibacterials' subgroup (ATC J01XX), by antibiotic and country, HALT-4, 2023–2024

Country	Other antibacterials (J01X)	Fosfomycin (J01XX01)		Methenamine (J01XX05)		Nitroxoline (J01XX07)		Bacitracin (J01XX10)	
		n	%	n	%	n	%	n	%
Belgium	69	69	100	0	0.0	0	0.0	0	0.0
Croatia	0	0	0.0	0	0.0	0	0.0	0	0.0
Denmark	20	0	0.0	20	100	0	0.0	0	0.0
Finland	20	0	0.0	20	100	0	0.0	0	0.0
France	4	4	100	0	0.0	0	0.0	0	0.0
Germany	2	2	100	0	0.0	0	0.0	0	0.0
Greece	1	1	100	0	0.0	0	0.0	0	0.0
Iceland	20	0	0.0	20	100	0	0.0	0	0.0
Italy	4	4	100	0	0.0	0	0.0	0	0.0
Luxembourg	19	18	94.7	0	0.0	1	5.3	0	0.0
Malta	1	0	0.0	0	0.0	0	0.0	1	100
Netherlands	6	6	100	0	0.0	0	0.0	0	0.0
Norway	72	0	0.0	72	100	0	0.0	0	0.0
Poland	1	1	100	0	0.0	0	0.0	0	0.0
Portugal	3	3	100	0	0.0	0	0.0	0	0.0
Slovakia	0	0	0.0	0	0.0	0	0.0	0	0.0
Spain	67	67	100	0	0.0	0	0.0	0	0.0
Sweden	2	0	0.0	2	100	0	0.0	0	0.0
Total	**306**	**175**	**56.3**	**134**	**43.1**	**1**	**0.3**	**1**	**0.3**

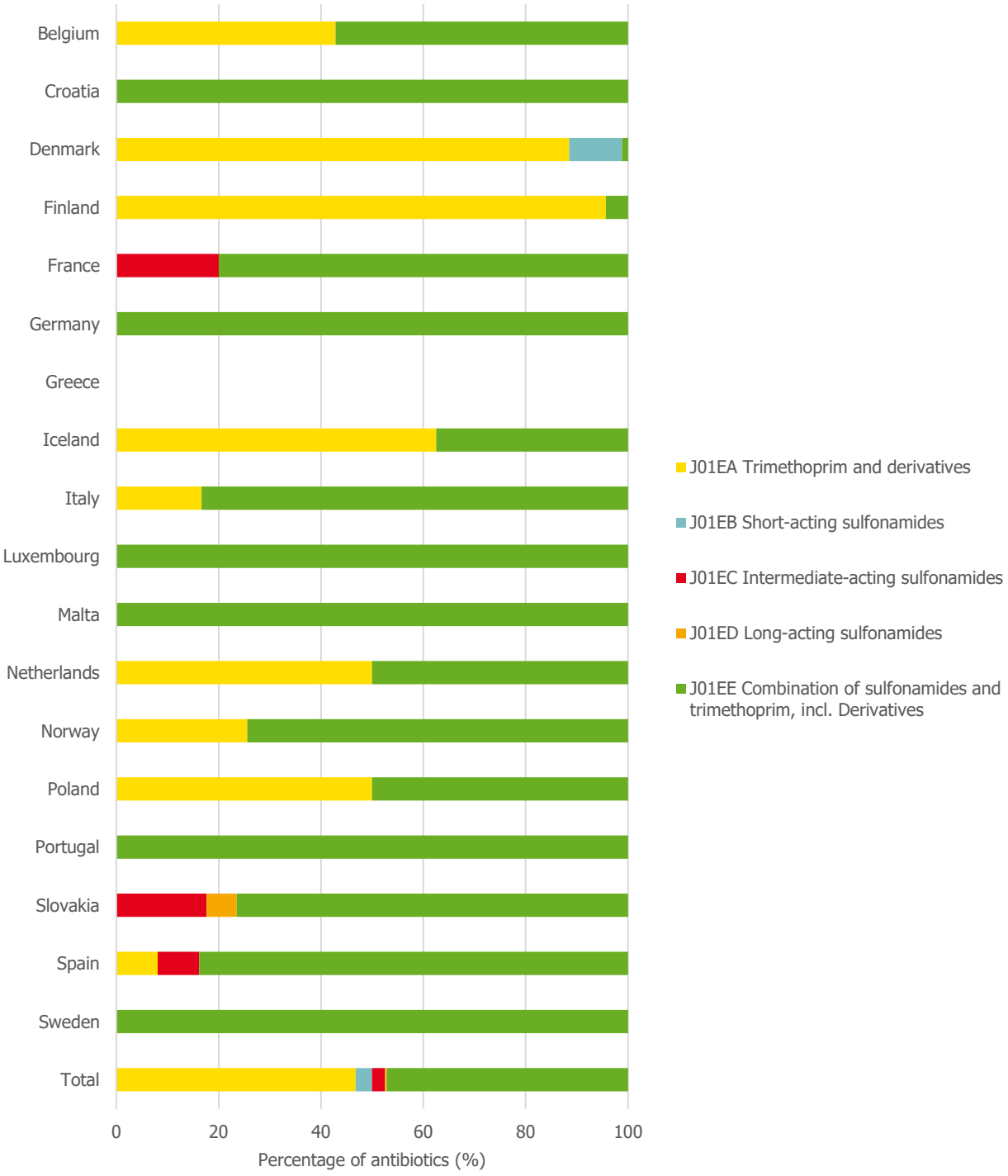
None of the other 'J01XX' molecules were reported and, therefore, are not shown.

Sulfonamides and trimethoprim (ATC J01E)

The most commonly prescribed sulfonamides and trimethoprim (J01E; n=278) were combinations of sulfonamides and trimethoprim, including derivatives (J01EE; 47.1%) and trimethoprim and derivatives (J01EA; 46.8%) (Figure 31). Short-acting sulfonamides (J01EB) were only prescribed in Denmark and long-acting sulfonamides (J01ED) only in Slovakia. Intermediate-acting sulfonamides (J01EC; 2.5%) were only prescribed in France, Slovakia, and Spain. In Sweden, no sulfonamides and trimethoprim were prescribed on the day of the PPS.

Most prescriptions of sulfonamides and trimethoprim (J01E) were for prophylaxis (54.7%), primarily to prevent UTIs (84.2%), with a smaller proportion for other unspecified purposes (4.6%). When prescribed for treatment, they were mainly for UTIs (77.7%) and skin or wound infections (8.3%). The prescription type and/or indication were not recorded for eight prescriptions.

Figure 28. Distribution of use of sulfonamides and trimethoprim (ATC J01E), by subgroups and country, HALT-4, 2023–2024

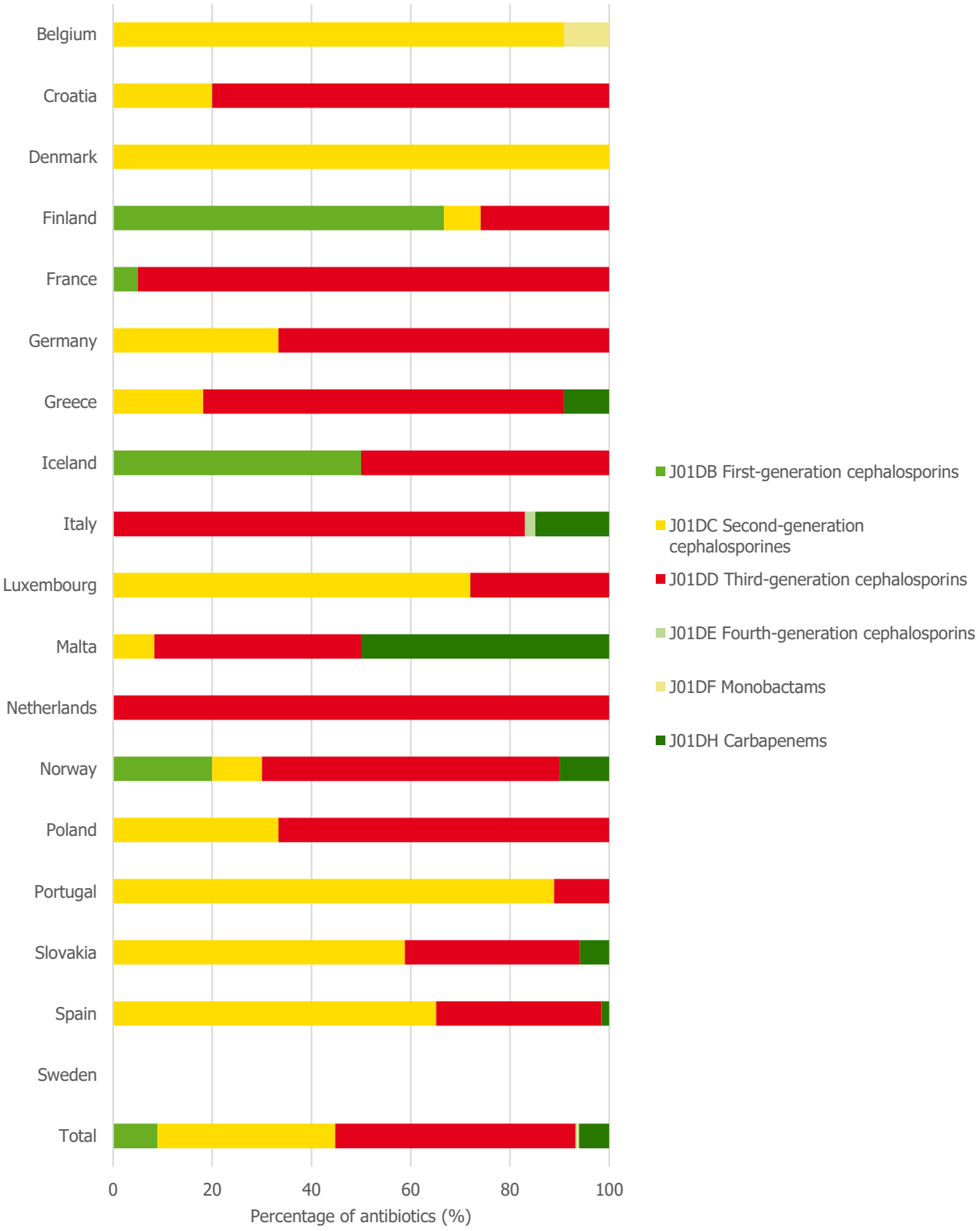


Other beta-lactams (ATC J01D)

The most commonly prescribed 'other beta-lactams' (J01D; n=279) were third-generation cephalosporins (J01DD; 48.4%), followed by second-generation cephalosporins (J01DC; 35.8%) and first-generation cephalosporins (J01DB; 9.0%) (Figure 32). Fewer prescriptions were reported for carbapenems (J01DH; 6.1%), with only one prescription for monobactam (J01DF; 0.4%) in Belgium, and one for 'fourth-generation cephalosporins' (J01DE; 0.4%) in Italy. In Sweden, no 'other beta-lactams' were prescribed on the day of the PPS.

'Other beta-lactams' were mainly prescribed for treatment (93.2%), including UTIs (45.0%), RTIs (38.5%) and skin or wound infections (7.7%). Prophylaxis accounted for 6.1%, primarily for preventing UTIs (41.2%) and skin or wound infections (35.3%). The indication was not recorded for two prescriptions.

Figure 29. Distribution of use of 'other beta-lactams' (ATC J01D), by subgroups and country, HALT-4, 2023–2024



Quinolone antibacterials (ATC J01M)

All quinolone antibacterials (J01M; n=242) prescribed in the participating countries were fluoroquinolones (J01MA). The most commonly prescribed fluoroquinolones were ciprofloxacin (J01MA02; 60.7%) and levofloxacin (J01MA12; 23.1%).

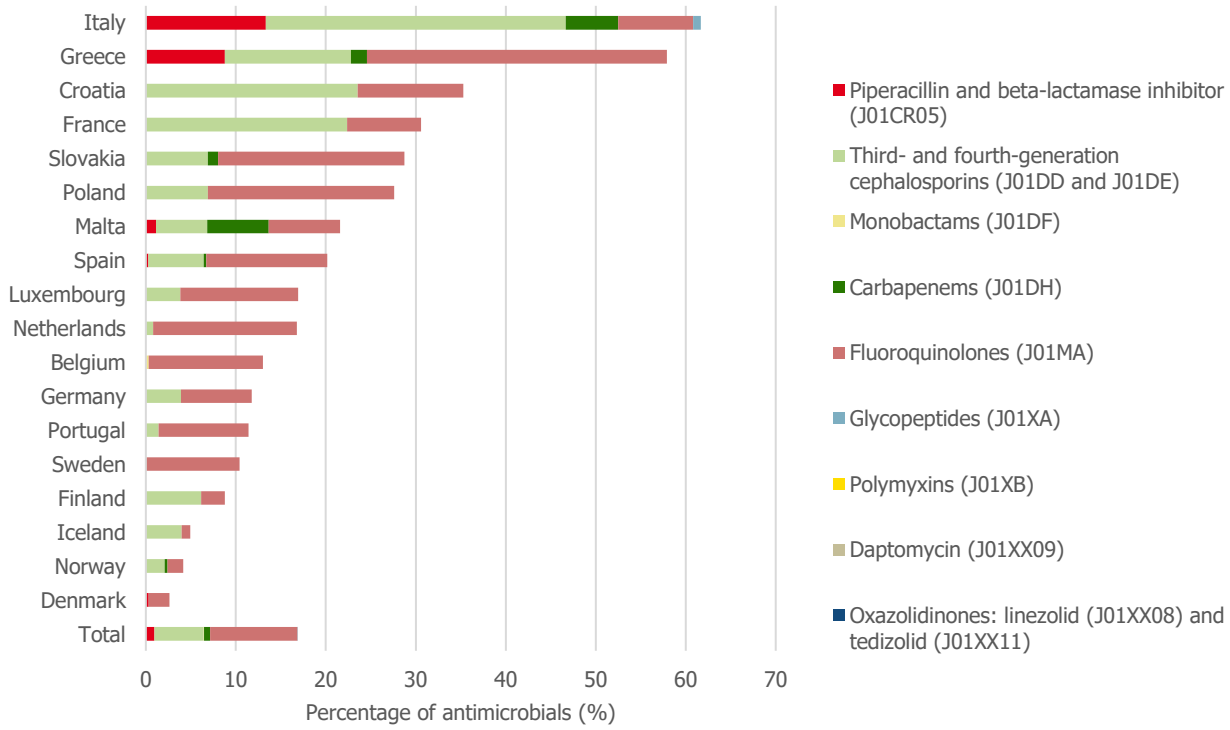
The primary indications for quinolone treatment (n=222; 91.7%) were UTIs (54.5%), RTIs (32.0%), and skin or wound infections (4.9%). Quinolones were also used for prophylaxis (n=18; 7.4%), mainly for UTIs (50.0%) and other unspecified purposes (22.2%). The indication was not recorded for two prescriptions.

Broad-spectrum antibacterials

The percentage of broad-spectrum antibacterials as defined in the ECDC, European Food Safety Authority (EFSA) and European Medicines Agency (EMA) Joint Scientific Opinion among antibacterials for systemic use (J01) [9] varied widely across countries, ranging from 2.6% in Denmark to 57.9% in Greece and 61.7% in Italy. Four countries – Denmark (2.6%), Norway (4.2%), Iceland (4.9%), and Finland (8.8%) – reported less than 10.0% broad-spectrum antibacterials. In 12 countries, broad-spectrum antibacterials accounted for percentages ranging between 10.0% and 40.0%.

Fluoroquinolones (J01MA) were prescribed in all participating countries and were the primary broad-spectrum antibacterials in 13 countries. No polymyxins (J01XB), daptomycin (J01XX09) or oxazolidinones (linezolid (J01XX08) and tedizolid (J01XX11)) were prescribed (**Error! Reference source not found.**).

Figure 30. Distribution of broad-spectrum antibacterials among all antibacterials for systemic use (ATC group J01), by country, HALT-4, 2023–2024



Results for the specialised LTCFs

Eight countries submitted data for specialised LTCFs (n=181) not covered in the previous chapters (Table 3). These specialised LTCFs included 5 067 residents. The two most commonly reported types of specialised LTCFs were 'LTCFs for people with intellectual disabilities' (n=120) with 1 690 eligible residents, mainly reported from Sweden, and 'rehabilitation centres' (n=29) with 1 369 eligible residents (Table 26).

In these specialised LTCFs, 166 residents had at least one HAI on the day of the PPS (crude prevalence: 3.3%), with a total of 172 recorded HAIs. The most frequently reported HAIs were UTIs (43.0%), followed by RTIs (18.0%) and skin or wound infections (16.9%) (Table 27). The median HAI prevalence across all specialised LTCFs was 0.0%, with variations observed between types of LTCF. HAI prevalence ranged from 0.0% in LTCFs for people with intellectual disabilities, palliative care centres, sanatoria, and 'other LTCFs' to 5.2% in rehabilitation centres (Table 27).

Table 26. Distribution of demographics, risk factors and care load indicators in the resident population of specialised LTCFs, by type of LTCF, HALT-4, 2023–2024

Type of LTCF	No. of LTCFs	No. of eligible residents	Median %									
			Residents older than 85 years	Male residents	Residents with a urinary catheter	Residents with a vascular catheter	Residents with pressure sores	Residents with other wounds	Residents with recent surgery	Residents with incontinence (for urine and/or faeces)	Residents with disorientation (in time and/or space)	Residents with impaired mobility (wheelchair user or bedridden)
LTCFs for people with intellectual disabilities	120	1 690	44.4	30.9	0.0	0.0	0.0	4.8	0.0	71.4	100	33.3
Rehabilitation centres	29	1 369	20.8	48.0	7.8	0.0	6.9	15.4	3.8	53.3	36.7	61.1
LTCFs for people with physical disabilities	12	403	28.2	38.8	9.3	0.0	7.3	11.7	0.0	60.8	63.5	73.5
Psychiatric LTCFs	10	1 061	24.3	31.2	2.1	0.0	0.9	4.4	0.0	43.0	54.8	14.8
Other LTCFs	5	364	26.7	40.9	2.0	0.0	2.6	6.6	0.0	73.7	52.6	39.4
Sanatorium	3	134	40.0	29.7	7.9	0.0	5.3	5.5	2.2	70.3	40.0	68.4
Palliative care centres	2	46	21.3	30.0	51.2	4.4	22.9	3.8	9.4	81.5	49.2	91.2
Total	**181**	**5 067**	**40.0**	**35.3**	**4.9**	**0.0**	**0.0**	**8.3**	**0.0**	**66.7**	**87.5**	**37.5**

Table 27. Distribution of types of HAI associated with the current LTCF (number and relative frequency), by type of specialised LTCF, HALT-4, 2023–2024

Type of HAI	LTCFs for people with intellectual disabilities		Rehabilitation centres		LTCFs for people with physical disabilities		Psychiatric LTCFs		Other LTCFs		Sanatorium		Palliative care centres		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
All types of HAI	**44**	**100**	**77**	**100**	**28**	**100**	**22**	**100**	**1**	**100**	**0**	**-**	**0**	**-**	**172**	**100**
Urinary tract infections (UTIs)	9	20.4	40	51.9	18	64.3	6	27.3	1	100	0	-	0	-	74	43.0
Confirmed UTIs	1	2.3	27	35.1	13	46.4	3	13.6	0	0.0	0	-	0	-	44	25.6
Probable UTIs	8	18.2	13	16.9	5	17.9	3	13.6	1	100	0	-	0	-	30	17.4
Respiratory tract infections (RTIs)	13	29.5	11	14.3	3	10.7	4	18.2	0	0.0	0	-	0	-	31	18.0
Common cold/pharyngitis	8	18.2	0	0.0	0	0.0	1	4.5	0	0.0	0	-	0	-	9	5.2
Flu	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	-	0	-	0	0.0
Pneumonia	1	2.3	2	2.6	0	0.0	2	9.1	0	0.0	0	-	0	-	5	2.9
Other lower RTIs	4	9.1	9	11.7	3	10.7	1	4.5	0	0.0	0	-	0	-	17	9.9
COVID-19	11	25.0	2	2.6	0	0.0	1	4.5	0	0.0	0	-	0	-	14	8.1
Asymptomatic	1	2.3	1	1.3	0	0.0	1	4.5	0	0.0	0	-	0	-	3	1.7
Mild/moderate	10	22.7	1	1.3	0	0.0	0	0.0	0	0.0	0	-	0	-	11	6.4
Severe	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	-	0	-	0	0.0
Skin infections	6	13.6	8	10.4	5	17.9	10	45.4	0	0.0	0	-	0	-	29	16.9
Cellulitis/soft tissue/wound inf.	6	13.6	6	7.8	1	3.6	4	18.2	0	0.0	0	-	0	-	17	9.9
Herpes simplex or zoster infections	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	-	0	-	0	0.0
Fungal infections	0	0.0	2	2.6	4	14.3	6	27.3	0	0.0	0	-	0	-	12	7.0
Scabies	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	-	0	-	0	0.0
Eye, ear, nose and mouth inf.	2	4.5	2	2.6	0	0.0	0	0.0	0	0.0	0	-	0	-	4	2.3
Conjunctivitis	2	4.5	1	1.3	0	0.0	0	0.0	0	0.0	0	-	0	-	3	1.7
Ear infections	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	-	0	-	0	0.0
Sinusitis	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	-	0	-	0	0.0
Oral candidiasis	0	0.0	1	1.3	0	0.0	0	0.0	0	0.0	0	-	0	-	1	0.6
Gastrointestinal infections	2	4.5	1	1.3	1	3.6	0	0.0	0	0.0	0	-	0	-	4	2.3
Gastroenteritis	2	4.5	0	0.0	1	3.6	0	0.0	0	0.0	0	-	0	-	3	1.7
Clostridioides (*Clostidium*) *difficile* infection	0	0.0	1	1.3	0	0.0	0	0.0	0	0.0	0	-	0	-	1	0.6
Bloodstream infections	1	2.3	2	2.6	0	0.0	0	0.0	0	0.0	0	-	0	-	3	1.7
Unexplained fever	0	0.0	4	5.2	0	0.0	0	0.0	0	0.0	0	-	0	-	4	2.3
Other infections	0	0.0	7	9.1	1	3.6	1	4.5	0	0.0	0	-	0	-	9	5.2

Table 28. Number and prevalence of LTCF residents with at least one HAI or with at least one antimicrobial agent in specialised LTCFs, by type of LTCF, HALT-4, 2023–2024

Type of LTCF	No. of eligible residents	No. of residents with HAI	Prevalence (%) of residents with at least one HAI				No. of residents with antimicrobial agent(s)	Prevalence (%) of residents with at least one antimicrobial agent			
			HAI%	P25	P50	P75		AU%	P25	P50	P75
LTCFs for people with intellectual disabilities	1 690	44	2.6	0.0	0.0	0.0	40	2.4	0.0	0.0	0.0
Rehabilitation centres	1 369	71	5.2	2.3	5.2	10.5	118	8.6	5.4	7.8	11.8
LTCFs for people with physical disabilities	403	28	6.9	0.0	1.9	7.2	27	6.7	0.0	3.6	6.5
Psychiatric LTCFs	1 061	22	2.1	0.0	2.5	8.3	19	1.8	0.3	2.5	4.0
Other LTCFs	364	1	0.3	0.0	0.0	0.0	11	3.0	0.0	0.0	2.0
Sanatoria	134	0	0.0	0.0	0.0	0.0	2	1.5	0.0	1.1	2.6
Palliative care centres	46	0	0.0	0.0	0.0	0.0	1	2.2	0.0	2.5	5.0
Total	**5 067**	**166**	**3.3**	**0.0**	**0.0**	**3.2**	**218**	**4.3**	**0.0**	**0.0**	**5.0**

HAI% - crude prevalence. i.e. (number of eligible residents with at least one HAI / number of eligible residents) × 100; AU: antimicrobial use.

A total of 238 antimicrobial agents were prescribed, the majority were administered orally (84.4%), followed by 14.7% administered parenterally and 0.8% via other administration routes. Most antimicrobials (74.4%) were prescribed for the treatment of infections, most commonly for UTIs (44.1%), followed by RTIs (16.4%) and skin or wound infections (12.4%). Prophylaxis accounted for 25.6% of the total antimicrobial use, primarily aimed at preventing UTIs (52.5%), RTIs (13.1%), and unspecified infections (9.8%).

Antibacterials for systemic use (J01) represented 91.2% of all reported antimicrobials in specialised LTCFs. Other antimicrobials were prescribed less frequently, including antimycotics for systemic use (J02; 2.5%), antimycobacterials for tuberculosis treatment (J04A; 2.5%), intestinal anti-infectives (A07AA; 2.1%), nitroimidazole-derived antiprotozoals (P01AB; 0.4%), and antifungals for systemic use (D01BA; 0.4%).

A total of 217 antibacterials for systemic use (ATC J01) were recorded. The most commonly prescribed groups were beta-lactams, penicillins (J01C; 26.7%), followed by 'other antibacterials' (J01X; 20.7%), quinolones (J01M; 16.6%), sulfonamides and trimethoprim (J01E; 12.4%), and 'other beta-lactams' (J01D; 9.7%) (Table 29)

Table 29. Distribution of antibacterials for systemic use (ATC J01) in specialised LTCFs, by type of LTCF, HALT-4, 2023–2024

Antibacterials for systemic use (ATC J01)	LTCFs for people with intellectual disabilities		Rehabilitation centres		LTCFs for people with physical disabilities		Psychiatric LTCFs		Other LTCFs		Sanatorium		Palliative care centres		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
For prophylaxis	**10**	**100**	**34**	**100**	**10**	**100**	**6**	**100**	**1**	**100**	**0**	**-**	**0**	**-**	**61**	**100**
Tetracyclines (J01A)	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	-	0	-	0	0.0
Amphenicols (J01B)	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	-	0	-	0	0.0
Beta-lactams, penicillins (J01C)	4	40.0	4	11.8	2	20.0	1	16.7	0	0.0	0	-	0	-	11	18.0
Other beta-lactams (J01D)	0	0.0	1	2.9	0	0.0	0	0.0	0	0.0	0	-	0	-	1	1.6
Sulfonamides and trimethoprim (J01E)	0	0.0	7	20.6	3	30.0	1	16.7	1	100	0	-	0	-	12	19.7
Macrolides, lincosamides and streptogramins (J01F)	0	0.0	4	11.8	1	10.0	0	0.0	0	0.0	0	-	0	-	5	8.2
Aminoglycosides (J01G)	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	-	0	-	0	0.0
Quinolones (J01M)	0	0.0	5	14.7	0	0.0	0	0.0	0	0.0	0	-	0	-	5	8.2
Combinations of antibacterials (J01R)	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	-	0	-	0	0.0
Other antibacterials (J01X)	6	60.0	13	38.2	4	40.0	4	66.7	0	0.0	0	-	0	-	27	44.3
For treatment	**30**	**100**	**86**	**100**	**14**	**100**	**13**	**100**	**10**	**100**	**2**	**100**	**1**	**100**	**156**	**100**
Tetracyclines (J01A)	6	20.0	2	2.3	1	7.1	0	0.0	0	0.0	0	0.0	0	0.0	9	5.8
Amphenicols (J01B)	0	0.0	0	0.0	0	0.0	1	7.7	0	0.0	0	0.0	0	0.0	1	0.6
Beta-lactams, penicillins (J01C)	11	36.7	24	27.9	3	21.4	4	30.8	3	30.0	1	50.0	1	100	47	30.1
Other beta-lactams (J01D)	3	10.0	12	13.9	2	14.3	0	0.0	3	30.0	0	0.0	0	0.0	20	12.8
Sulfonamides and trimethoprim (J01E)	1	3.3	11	12.8	0	0.0	0	0.0	3	30.0	0	0.0	0	0.0	15	9.6
Macrolides, lincosamides and streptogramins (J01F)	2	6.7	4	4.6	0	0.0	2	15.4	1	10.0	0	0.0	0	0.0	9	5.8
Aminoglycosides (J01G)	0	0.0	2	2.3	4	28.6	0	0.0	0	0.0	0	0.0	0	0.0	6	3.8
Quinolones (J01M)	4	13.3	20	23.3	3	21.4	3	23.1	0	0.0	1	50.0	0	0.0	31	19.9
Combinations of antibacterials (J01R)	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Other antibacterials (J01X)	3	10.0	11	12.8	1	7.1	3	23.1	0	0.0	0	0.0	0	0.0	18	11.5

LTCFs for people with intellectual disabilities

A total of 120 LTCFs for people with intellectual disabilities were enrolled across Belgium (n=2; 1.7%), Slovakia (n=3; 2.5%) and mostly Sweden (n=115; 95.8%) (Table 2). The median size of the LTCFs was 10 beds, with an average of 16.5 beds.

Among the 1 690 eligible residents, the median percentage of residents older than 85 years was 44.4% and 30.9% were male. All residents were disoriented, and the majority (71.4%) were incontinent for urine and/or faeces. The median percentage of residents with impaired mobility was 33.3%. Only a few of these LTCFs reported residents with wounds other than pressure sores (median: 4.8%). The median percentage of residents with urinary or vascular catheters or who had undergone recent surgery was 0.0% (Table 26).

Medical care for residents was primarily provided by GPs (96.7%), and most physicians in charge of coordinating medical activities were external to the LTCFs (98.3%). Two LTCFs had no coordinating physician. A person with IPC training was present in 49.2% of the LTCFs, and 56.7% of these LTCFs had access to external IPC advice. The most frequently reported hand hygiene method was disinfection using an alcohol-based solution (93.3%), and hand hygiene training was conducted in 61.7% of the LTCFs in the year preceding the PPS. HAIs surveillance was implemented in 29.2% of the LTCFs, antimicrobial consumption surveillance in 54.2%, and surveillance of antimicrobial-resistant microorganisms in 53.3%.

An HAI was reported in 44 eligible residents (crude prevalence: 2.6%), resulting in a median prevalence of residents with at least one HAI of 0.0% (Table 28). The majority of these 44 HAIs were RTIs (29.5%, of which 61.5% were common cold or pharyngitis), COVID-19 (25.0%, of which 90.9% were mild/moderate cases), UTIs (20.4%, of which 88.9% were probable), and skin infections (13.6%, all cases of cellulitis/soft tissue/wound infections) (Table 27). Overall, 12 cultures were positive, with 12 microorganisms isolated. The most reported microorganism was SARS-CoV-2 (n=11; 91.7%), with only one other microorganism (Enterococcus faecalis).

There were 40 residents in LTCFs for people with intellectual disabilities who were reported to have been receiving at least one antimicrobial agent on the day of the PPS (crude prevalence: 2.4%). The median prevalence of residents with at least one antimicrobial agent was 0.0% (Table 28). A total of 41 antimicrobial agents were prescribed, with 95.1% being administered orally and two (4.9%) antimicrobial agents administered parentally.

Antimicrobial agents were mainly prescribed for treatment purposes (75.6%) rather than for prophylaxis (24.4%). The majority of antimicrobials prescribed for treatment were for UTIs (35.5%), skin or wound infections (32.3%), RTIs (12.9%) and unspecified purposes (12.9%). Prophylaxis (n=10) was most frequently for the prevention of UTIs (70.0%).

Antibacterials for systemic use (ATC group J01) represented 97.6% of all reported antimicrobials, while antifungals (D01BA) represented 2.4% (n=1). Among the antibacterials for systemic use (J01, n=40), the most commonly prescribed groups were beta-lactams, penicillins (J01C; 37.5%), 'other antibacterials' (J01X; 22.5%), tetracyclines (J01A; 15.0%), quinolones (J01M; 10.0%), 'other beta-lactams' (J01D; 7.5%), macrolides, lincosamides and streptogramins (J01F; 5.0%), and sulfonamides and trimethoprim (J01E; 2.5%) (Table 29).

Rehabilitation centres

A total of 29 rehabilitation centres from Belgium (n=5), Greece (n=2), the Netherlands (n=2) and mostly Portugal (n=20) participated in the PPS (Table 2). The median size of these LTCFs was 31 beds, with on average 59.9 beds.

Among the 1 369 eligible residents, more than half were incontinent for urine and/or faeces (53.3%) or had impaired mobility (61.1%). The median percentage of residents older than 85 years was 20.8% and 48.0% were male. Within these LTCFs, 36.7% residents were disoriented, while 15.4% had wounds other than pressure sores. Fewer residents had urinary catheters (7.8%), pressure sores (6.9%) or had undergone recent surgery (3.8%). The median percentage of residents with vascular catheters was 0.0% (Table 26).

Medical care for residents was provided by medical staff in 48.3% of rehabilitation centres and by GPs in 24.1%. In 27.6% of these LTCFs, both medical staff and GPs were involved. Coordinating medical physicians were internal to the LTCFs in 65.5% of cases, although three LTCFs reported having no coordinating physician. A staff member with IPC training was present in 96.5% of LTCFs, and 82.7% had access to external IPC advice. The most frequently reported hand hygiene method was disinfection with an alcohol-based solution (86.2%), and hand hygiene training had been conducted in 89.6% of LTCFs within the year leading up to the PPS. Surveillance systems were widely implemented, with HAI surveillance in 93.1% of these LTCFs, antimicrobial consumption surveillance in 79.3%, and surveillance of antimicrobial-resistant microorganisms in 75.9%.

HAIs were reported in 71 eligible residents, resulting in a crude prevalence of 5.2%. The median prevalence of residents with at least one HAI was also 5.2% (Table 28). A total of 77 HAIs were recorded, with UTIs accounting for the majority of HAIs (51.9%), of which 67.5% were confirmed UTIs. RTIs made up 14.3%, with 81.8% of

these being lower RTIs. Skin infections represented 10.4%, of which 75.0% were classified as cellulitis, soft tissue, or wound infections, while 9.1% were categorised as non-specific infections (Table 29). Among 35 positive cultures, 41 microorganisms were identified. The most frequently isolated microorganisms were *Klebsiella pneumoniae* (n=15; 36.6%), *Escherichia coli* (n=11; 26.8%), and *Enterococcus faecalis* (n=4; 9.8%).

In rehabilitation centres, 118 residents were reported to have been receiving at least one antimicrobial agent on the day of the PPS (crude prevalence: 8.6%). The median prevalence of residents with at least one antimicrobial was 7.8% (Table 28).

A total of 135 antimicrobial agents were prescribed, with the majority (73.3%) being administered orally, and 20.7% given parenterally.

Antimicrobial agents were predominantly prescribed for treatment (74.8%) rather than prophylaxis (25.2%). Among antimicrobials used for treatment, the primary indications were UTIs (44.5%), unspecified purposes (12.9%), RTIs (9.9%), and surgical site infections (9.9%). For prophylaxis, the most common indications were UTIs (38.2%), followed by unspecified purposes (17.6%), RTIs (14.7%), and genital infections (14.7%).

Antibacterials for systemic use (ATC group J01) accounted for 88.9% of all reported antimicrobials. Additionally, six antimycobacterials for tuberculosis treatment (J04A; 4.4%), four antimycotics for systemic use (J02; 3.0%), four antibiotics used as intestinal anti-infectives (A07; 3.0%), and one antiprotozoal prescription (P01; 0.7%) were reported. Among antibacterials for systemic use (J01, n=120), the most commonly reported groups were beta-lactams, penicillins (J01C; 23.3%), quinolones (J01M; 20.8%), 'other antibacterials' (J01X; 20.0%), sulfonamides and trimethoprim (J01E; 15.0%), and 'other beta-lactams' (J01D; 10.8%) (Table 29).

LTCFs for people with physical disabilities

A total of 12 LTCFs for people with physical disabilities from Greece (n=1), Italy (n=1), the Netherlands (n=2) and mostly Portugal (n=18) participated in the PPS. The median size of these LTCFs was 31 beds, with on average 35.2 beds.

Among the 403 eligible residents, more than half were incontinent for urine and/or faeces (60.8%), were disoriented (63.5%), or suffered from impaired mobility (73.5%). The median percentage of residents older than 85 years was 28.2%, and 38.8% were male. Regarding the risk factors, 9.3% of the residents had urinary catheters, 7.3% had pressure sores and 11.7% had other types of wounds. The median percentage of residents with vascular catheters or with recent surgery was 0.0% (Table 26).

Medical care for residents was mainly provided by GPs (66.7%). The majority of coordinating physicians were internal to the LTCFs (n=6/11; 54.5%), while 36.7% were external, and one LTCF had both. A staff member with IPC training was present in 91.7% of the LTCFs, and an equal percentage had access to external IPC advice. The most frequently reported hand hygiene method was disinfection using an alcohol-based solution (75.0%), and hand hygiene training was conducted in 58.3% of the LTCFs in the year preceding the PPS. HAI surveillance was implemented in 83.3% of the LTCFs, antimicrobial consumption surveillance in 75.0%, and surveillance of antimicrobial-resistant microorganisms in 58.3%.

An HAI was reported in 28 eligible residents, resulting in a crude prevalence of 6.9%, while the median prevalence of residents with at least one HAI was 1.9% (Table 28)

The majority of these 28 HAIs were UTIs (63.4%, of which 72.2% were classified as probable UTIs), skin infections (17.9%, of which 80.0% were fungal infections), and RTIs (10.7%, which were all lower RTIs) (Table 27). Overall, 13 cultures were positive, with 13 microorganisms isolated. The majority were *Escherichia coli* (n=7; 53.8%).

A total of 27 residents in LTCFs for people with physical disabilities were reported to have been receiving at least one antimicrobial agent on the day of the PPS (crude prevalence: 6.7%). The median prevalence of residents with at least one antimicrobial agent was 3.6% (Table 28). In total, 27 antimicrobial agents were prescribed, with 81.5% being administered orally and 18.5% administered parentally.

Antimicrobial agents were mainly prescribed for treatment (63.0%) rather than for prophylaxis (37.0%). The majority of antimicrobials prescribed for treatment purposes were for UTIs (58.8%), and RTIs (17.6%). Prophylaxis was most frequently for UTIs (7/10), and RTIs (2/10).

Antibacterials for systemic use (AT group J01) represented 88.9% of all reported antimicrobials. In addition, there was one antimycotic for systemic use (J02; 3.7%), one antimicrobial with an unspecified ATC code (3.7%), and one antibiotic used as intestinal anti-infectives (A07; 3.7%). Among antibacterials for systemic use (J01, n=24), the most commonly prescribed groups were 'other antibacterials' (J01X; 20.8%), beta-lactams, penicillins (J01C; 20.8%), and aminoglycosides (J01G; 16.7%) (Table 29).

Psychiatric LTCFs

A total of 10 psychiatric LTCFs from Belgium (n=3), Germany (n=1), Greece (n=1) and the Netherlands (n=5) participated in the PPS. The median size of the LTCFs was 51 beds, with on average of 133.2 beds.

Among the 1 061 eligible residents, more than half were disoriented (54.8%). The median percentage of residents older than 85 years was 24.3% and 31.2% were male. In these LTCFs, 53.3% were incontinent for urine and/or faeces and 14.8% suffered from impaired mobility. Fewer residents had urinary catheters (2.1%), pressure sores (0.9%) or other types of wounds (4.4%). The median percentage of residents with vascular catheters or with recent surgery was 0.0% (Table 26).

In the participating psychiatric LTCFs, medical care was primarily provided by medical staff (55.6%). Six LTCFs had an internal coordinating physician, while three had an external coordinating physician, and one had both. An individual trained in IPC was present in 90.0% of the LTCFs, and the same percentage had access to external IPC advice. The most commonly reported hand hygiene method was disinfection with an alcohol-based solution (90.0%), while hand hygiene training was conducted in 40.0% of the LTCFs in the year preceding the PPS. Surveillance for HAIs was present in 90.0% of the LTCFs, antimicrobial consumption surveillance in 70.0%, and surveillance of antimicrobial-resistant microorganisms in 80.0%.

An HAI was reported in 22 residents, representing a crude prevalence of 2.1%. The median prevalence of residents with at least one HAI was slightly higher, at 2.5% (Table 28). The majority of these 22 HAIs were skin infections (45.4%), with 60.0% classified as fungal infections and 40.0% as cellulitis/soft tissue/wound infections. UTIs accounted for 27.3%, with half of them confirmed, while RTIs represented 18.2%, of which 50.0% were pneumonia cases (Table 27). Four positive cultures were reported, identifying one *Klebsiella pneumoniae*, one *Klebsiella oxytoca*, one *Escherichia coli*, and one SARS-CoV-2.

In psychiatric LTCFs, 19 residents had at least one antimicrobial agent on the day of the PPS (crude prevalence: 1.8%). The median prevalence was 2.5% (Table 28). A total of 21 antimicrobial agents were prescribed, with an equal proportion administered orally (90.5%) and via another route (9.5%).

Antimicrobial agents were predominantly prescribed for treatment (71.4%) rather than prophylaxis (28.6%). Among antimicrobials prescribed for treatment purposes, the most common indications were UTIs (46.7%), and RTIs (40.0%). For prophylaxis, antimicrobials were primarily prescribed to prevent UTIs (five out of six).

Antibacterials for systemic use (ATC group J01) accounted for 90.5% of all reported antimicrobials. Additionally, one antimycotic for systemic use (J02; 4.8%) and one antimicrobial with an unspecified ATC code (4.8%) were reported. Among systemic antibacterials (J01, n=19), 'other antibacterials' (J01X) represented the largest proportion (36.8%), followed by beta-lactams, penicillins (J01C; 26.3%) (Table 29).

Other LTCFs

Italy (n=1), Portugal (n=1) and Slovakia (n=3) enrolled five LTCFs not classified in the previous categories. The median size of these LTCFs was 30 beds (mean: 78.4 beds).

Among the 364 eligible residents, more than half were incontinent for urine and/or faeces (73.7%) or were disoriented (52.6%). The median percentage of residents older than 85 years was 26.7%, and 40.9% were male. In these LTCFs, 39.4% residents had impaired mobility. Fewer residents had urinary catheters (2.0%), pressure sores (2.6%) or other types of wounds (6.6%). The median percentage of residents with vascular catheters or with recent surgery was 0.0% (Table 26).

In these LTCFs, medical care was provided either by GPs (n=2) or by medical staff (n=2), and one LTCF had both. Out of the five 'other LTCFs', four had coordinating physicians, the majority external to the LTCF (n=3). A person with IPC training was present in 80.0% of the LTCFs, and the same percentage had access to external IPC advice. The most frequently reported hand hygiene method was handwashing with water and antiseptic soap in three LTCFs, while disinfection using an alcohol-based solution was reported in two. Hand hygiene training was conducted in four 'other LTCFs' in the year preceding the PPS. Two LTCFs conducted both surveillance of antimicrobials and antimicrobial-resistant microorganisms.

One probable UTI was reported in the 'other LTCFs', resulting in a crude prevalence of residents with at least one HAI of 0.3%.

There were 11 residents with at least one antimicrobial agent on the day of the PPS (crude prevalence: 3.0%). The median prevalence was 0.0% (Table 28). All 11 antimicrobial agents were administered orally.

Of these, ten antimicrobial agents were prescribed for treatment and one for prophylaxis. Half were prescribed to treat UTIs, and the other half to treat RTIs. The single prophylactic antimicrobial agent was prescribed to prevent RTIs. All prescribed antimicrobials were antibacterials for systemic use (J01).

Sanatoria

Italy (n=1) and Slovakia (n=2) enrolled three sanatoria, with a total of 134 eligible residents. The median size of the LTCFs was 38 beds (mean: 50 beds).

More than half of the residents were incontinent for urine and/or faeces (70.3%), or had impaired mobility (68.4%). The median percentage of residents older than 85 years was 40.0%, and 29.7% were male. In these LTCFs, 40.0% residents were disoriented. Fewer residents had urinary catheters (7.9%), pressure sores (5.3%), other types of wounds (5.5%), or had undergone recent surgery (2.2%). The median percentage of residents with vascular catheters was 0.0% (Table 26).

Among the three sanatoria, medical care was provided by GPs in one LTCF, by the medical staff in another, and by both in the third. All responding sanatoria (n=2) had an external coordinating physician. Staff with IPC training was present in two LTCFs, and all three had access to external IPC advice. The most frequently reported hand hygiene method was disinfection using an alcohol-based solution, while handwashing with water and antiseptic soap was reported in one. Hand hygiene training was conducted in one sanatorium in the year preceding the PPS. One LTCF reported conducting both surveillance of HAIs and antimicrobial-resistant microorganisms.

Although no HAIs were reported in the participating sanatoria, two antimicrobial agents – one beta-lactam, penicillin (J01C) and one quinolone (J01M) – were prescribed orally to treat a RTI and a skin or wound infection, respectively.

Palliative care centres

Two palliative care centres were enrolled in Slovakia, with a total of 46 eligible residents. The median size of these LTCFs was 20 beds (mean: 23.0 beds).

Most residents had impaired mobility (median: 91.2%), and more than half were incontinent for urine and/or faeces (median: 81.5%) or had a urinary catheter (median: 51.2%). The median percentage of residents older than 85 years was 21.3%, and 30.0% were male. In these LTCFs, 22.9% residents had pressure sores. Fewer residents had vascular catheters (4.4%), recent surgery (9.4%) or wounds other than pressure sores (3.8%) (Table 266).

In one palliative care centre, medical care was provided by GPs, while in the other, it was managed by the medical staff. Both LTCFs had a coordinating physician, with one being internal and the other external. Neither LTCF had staff with IPC training, but both had access to external IPC advice. Hand hygiene training was conducted in both palliative care centres in the year preceding the PPS, and hand disinfection with an alcohol-based solution was the only reported main method of hand hygiene. One of the LTCFs had a surveillance system for antimicrobial-resistant microorganisms in place.

Although no HAIs were reported in the palliative care centres, one antibacterial agent was prescribed orally to treat a skin or wound infection.

Discussion and conclusions

Participation

The HALT-4 PPS was conducted during three surveillance periods: April–June 2023, September-November 2023, and April–June 2024. This third surveillance period was added because of delays caused by the COVID-19 pandemic. The majority of countries participated during the last surveillance period. All EU/EEA countries were invited to participate to the PPS. A total of 18 EU/EEA countries participated, enrolling 1 097 LTCFs and 61 045 eligible residents, out of a total of 90 001 residents, included in the final sample. Denmark, Norway, and Sweden enrolled a disproportionately high number of LTCFs, requiring a random sampling of their LTCFs to ensure alignment with the participation levels of other countries. Similarly, France and Italy, which also enrolled a large number of LTCFs, provided the ECDC with randomised subsamples of their LTCFs.

Compared to HALT-3, fewer countries participated in the HALT-4 PPS [1–3]. Ireland and Latvia cited insufficient human resources as the reason for not participating but plan to conduct their own PPSs in 2025. Austria, Czechia and Lithuania were unable to perform the HALT-4 PPS as they had to prioritise other surveillance activities such as the ECDC PPS of HAIs and antimicrobial use in acute care hospitals. On the other hand, Iceland participated in the PPS in LTCFs for the first time. In Iceland, HALT-4 was considered a pilot project, and as such, the three largest LTCFs in Iceland were recruited, as these centres had sufficient resources to participate.

Several countries, including Belgium, Germany, the Netherlands, and Poland, reported significant difficulties in enrolling LTCFs, particularly following the COVID-19 pandemic. LTCFs were hesitant to participate, citing factors such as a shortage of healthcare professionals, limited resources, and general fatigue, including surveillance fatigue, as key reasons for their reluctance [10].

Comparisons between the different PPSs in LTCFs should be approached with caution, considering differences in methodology, variations in participating countries and LTCF sample representativeness. Additionally, the lack of identifiers to track individual LTCFs across PPSs, and limitations inherent to the PPS methodology, including random variations from single-day data collection, should be considered. Importantly, no validation study was performed in HALT-4 due to limited resources for participation.

Types of LTCF

General nursing homes and mixed LTCFs were the most commonly enrolled LTCFs in the HALT-4 PPS. Along with residential homes, these three main types of LTCFs were grouped together for the main analysis, as was done in the HALT-3 PPS. Specialised LTCFs were addressed in a separate chapter. Eight countries submitted data for these specialised LTCFs, which is slightly less than in the previous HALT PPS (14 out of 26 countries).

LTCFs for people with intellectual disabilities represented 66.3% of all specialised LTCFs. As in HALT-3, Sweden enrolled the largest number of these LTCFs. Rehabilitation centres were the second largest category of specialised LTCFs, with Portugal enrolling the most LTCFs (HALT-4: 69.0% versus HALT-3: 79.5%). For the first time in HALT surveillance, sanatoria were enrolled in Italy (n=1) and Slovakia (n=2). Eight countries enrolled only general nursing homes, residential homes and/or mixed LTCFs.

Among the countries that provided complete datasets, Norway and Denmark enrolled the largest number of LTCFs, while Iceland enrolled the fewest. However, these LTCFs accounted for nearly half of the beds available in the country. Two countries, Portugal and Sweden, enrolled individual LTCF units rather than entire LTCFs.

As a result, variations in the types of LTCFs recruited nationally will partly explain differences in the recorded prevalence and distribution of structure and process indicators for IPC and antimicrobial stewardship.

Healthcare-associated infections

Unlike in the HALT-3 PPS, only HAIs associated with the current LTCF were collected in HALT-4. As a result, surgical site infections were not recorded. The crude prevalence of a resident with a least one HAI (3.1%) was comparable to the prevalence found in the HALT-3 PPS for the HAIs associated with the current LTCF (3.1%) and to that reported in HALT-2 (3.4%), where only HAIs associated with the current LTCF were included. Similarly to HALT-2 and HALT-3, decision algorithms were used, enabling data collectors to determine whether a resident met the HAI case definitions by ticking signs and symptoms of infections on a data collection form [9]. The median country prevalence of a resident with a least one HAI was 1.8% in the current PPS. The Netherlands (5.4%) and Portugal (4.9%) reported the highest median prevalence of a resident with at least one HAI. On the other hand, Greece, who reported the highest median prevalence in HALT-3 (6.0%), had 3.3% lower prevalence in 2023–2024 (2.7%). The prevalence of Denmark, Norway and Sweden should be interpreted with caution, as a random subsampling

was applied and this may have resulted in national discrepancies compared to the prevalence reported in their national reports.

As also observed in HALT-3, the most common HAIs was UTIs, RTIs, and skin infections. These three infections accounted for 85.5% of all reported HAIs. This distribution remained consistent with previous HALT PPSs, suggesting stable infection trends in LTCFs over time. However, a notable shift was observed: RTIs, which were the most common infection type in HALT-3 (34.8%), were surpassed by UTIs in the HALT-4 PPS (27.3%), even when including COVID-19 (2.7%) into the RTIs. This shift could be explained by the changes in respiratory infection dynamic during and after the COVID-19 pandemic 2020-2024, as well as by reinforced IPC measures taken in follow-up of the pandemic, and the mandatory use of face masks (reported by 19.5% of the LTCFs).

Since this is the first HALT PPS conducted after the pandemic, COVID-19 infections were included as infection type. Nonetheless, only a few countries reported COVID-19 cases, primarily France and Luxembourg. This limited reporting is likely due to the discontinuation of systematic testing and/or COVID-19 surveillance in LTCFs, done at varying points of time in different countries. Consequently, COVID-19 infections (2.7%) may have been classified as (lower) RTIs if no systematic testing was performed.

The cross-sectional (point prevalence) design of the HALT-4 PPS has certain limitations in accuracy compared to continuous surveillance, potentially underestimating cases among residents who were hospitalised, whether or not because of HAI, on the day of the PPS. Additionally, data collection was scheduled outside of outbreak-prone seasons, likely resulting in under-reported cases of seasonal infections, such as influenza and gastrointestinal infections. This seasonal gap limits the ability to accurately assess the full range of infection challenges faced by LTCFs throughout the year. To address these limitations, a prevalence-to-incidence analysis is planned based on the HALT-4 longitudinal study and HALT-4 PPS data. This analysis aims to provide a more comprehensive understanding by extrapolating prevalence data to estimate incidence rates, offering deeper insights into the frequency, distribution, and trends of HAIs over time.

The prevalence of residents with at least one HAI on the day of the PPS was higher in rehabilitation centres (5.2%) and in LTCFs for physically disabled persons (6.9%) than in the main aggregated LTCF group, consisting of general nursing homes, residential homes and mixed facilities. The prevalence rates in these specialised LTCFs also slightly decreased compared to HALT-3 PPS, in which they were 6.6% and 8.8%, respectively. The other specialised LTCFs reported a lower prevalence. Unlike in HALT-3, no infections were reported in the two palliative care centres. The three main HAIs across all specialised LTCFs were UTIs, RTIs, and skin infections. However, in LTCFs for people with intellectual disabilities, COVID-19 was the second most frequently reported HAI.

Antimicrobial resistance

As in HALT-3, microbiological data were collected for residents who met the HAI case definitions, rather than from those who received an antimicrobial agent. To maintain the feasibility of this cross-sectional (single-day) PPS, data collectors were not required to revisit residents' files to gather any missing microbiological data after the day of the PPS. Consequently, the HALT-4 PPSs only records the number of residents with HAIs who had microbiological results available on the day of the PPS, rather than the total number who eventually obtained results. Since the national surveillance system in Sweden used the HALT-2 protocol, microbiological and resistance data from this country were collected only for residents who received an antimicrobial agent, rather than for those with an HAI. Portugal fully adhered to the HALT-4 protocol, reporting both antimicrobial use and microbiological testing data. In Portugal, an increase in the microbiological confirmation of HAIs was observed compared to previous HALT PPSs, suggesting an improvement in diagnostic practices within the country's long-term care settings.

Compared to HALT-3 PPS, samples were not taken, or microbiological results were unavailable most of the time (HALT-4: 77.0% versus HALT-3: 75.8%). A positive result was reported for 20.0% of the reported HAIs. The five most frequently reported microorganisms (*Escherichia coli*, SARS-CoV-2, *Staphylococcus aureus*, *Klebsiella pneumoniae* and *Proteus mirabilis*) remained the same as in the HALT-3 PPS, with the exception that SARS-CoV-2 is now the second most frequently reported microorganism.

AMR data for microorganisms isolated from HAIs were only collected for *Staphylococcus aureus*, *Enterococcus species*, *Enterobacterales*, *Pseudomonas aeruginosa* and *Acinetobacter baumannii*. In 2019, the European Committee on Antimicrobial Susceptibility Testing (EUCAST) revised the definitions for susceptibility testing categories as follows: 'S' (Susceptible, standard dosing regimen), 'I' (Susceptible, increased exposure), and 'R' (Resistant) [11]. As in the HALT-3 PPS, a composite index of AMR was used to present the percentage of isolates with known AST results that had AMR. Overall, 68.3% of microorganisms had AST results available for first-level AMR markers at the time of the PPS, slightly less than in the HALT-3 (77.6%). Among these, 23.2% were resistant to the antimicrobials of interest. This may be difficult to compare with previous results, as the definition has changed. In 2016, intermediate and resistant microorganisms were reported as non-susceptible microorganisms (HALT-3: 28.0%).

Antimicrobial use

In the HALT-4 PPS, the prevalence of residents receiving at least one antimicrobial agent on the day of the PPS was 4.1%, closely aligning with the prevalence reported in HALT-3 (4.9%). The median prevalence across LTCFs was slightly lower in 2023–2024, at 3.3%. Denmark reported the highest median prevalence of antimicrobial use at 6.8%, with a 2.2% decrease compared to HALT-3. Spain, who had reported the highest median prevalence in HALT-3 (10.8%) – partially explained by the more post-acute (step-down) character of the LTCFs that participated in the region of Catalonia compared to those participating in the region of Madrid – reported much lower prevalence in 2023–2024 (4.8%). The prevalence of Denmark, Norway and Sweden should be interpreted with caution, as a random subsampling was performed, which may have resulted in differences in the prevalence results compared to their national reports.

In line with findings from previous PPSs, antimicrobials were predominantly administered orally in LTCFs, with 90.0% of prescriptions being oral - a proportion consistent with previous PPSs. The most common indication for antimicrobial use remained treatment, accounting for 68.7% of prescriptions (compared to 69.5% in HALT-3). However, a notable decline was observed in the use of antimicrobials for UTI prophylaxis. Prophylaxis for UTI accounted for 19.8% of total prescriptions in HALT-4 PPS, down from 22.0% in previous PPSs in LTCFs. This shift may reflect enhanced efforts to reduce unnecessary prophylaxis in LTCFs.

In Nordic countries – Denmark, Finland, Iceland, Norway and Sweden – methenamine (J01XX05) is used to prevent UTIs with certain indications. In Norway, methenamine represented 85% of all antimicrobial prophylaxis for UTIs, while in Finland it accounted for 51%. In Denmark, Sweden and Iceland it accounted respectively for 14%, 20% and 39%. In Norway, methenamine is prescribed for the UTI prophylaxis when other treatments have failed, while in Finland, it is recommended as a choice for long-term UTI prophylaxis in older adults.

The HALT-4 PPS collected data on whether antimicrobials had a documented end or review date in the residents' files. Among therapeutic antimicrobials, 79.5% included a documented end or review date, representing a slight decline from 84.5% in the HALT-3 PPS. In contrast, most prophylactic antimicrobials lacked such documentation, with 67.9% having no end or review date recorded, showing a small improvement from 73.3% in HALT-3 PPS.

Compared to previous PPSs in LTCFs, beta-lactams, penicillins (J01C; 34.4%) and 'other antibacterials' (J01X; 21.4%) remained the two most commonly reported groups of systemic antibacterial agents (30.2% and 18.6% in HALT-3, respectively) [12]. The next two most frequently reported antibacterial agents were sulfonamides and trimethoprim (J01E; 11.3%) and other beta-lactams (J01D; 11.2%) (13.3% and 12.6% in HALT-3, respectively). A significant change was observed in the use of quinolones (J01M; 9.9%), which fell from the third to the fifth position (14.9% in HALT-3). This decline reflects the EMA's 2018 recommendation to restrict the use of fluoroquinolone and quinolone antibiotics due to safety concerns related to side effects [13]. This trend suggests that efforts to limit the use of these agents have been effective across LTCFs. However, there remains a wide variation in the use of broad-spectrum antimicrobials, including fluoroquinolones, by country, varying from under 3% to over 60% of all antimicrobial prescriptions.

As in previous HALT PPSs, carbapenems (J01DH) remained rarely used, with reports of their use limited to five countries – Greece, Italy, Malta, Slovakia, and Spain. This limited usage aligns with their classification as a last-resort treatment and reflects adherence to antimicrobial stewardship principles.

The prevalence of residents receiving at least one antimicrobial agent on the day of the PPS was much higher in rehabilitation centres (8.6%) and LTCFs for people with physical disabilities (7.4%), while it was lower in other specialised LTCFs. The antimicrobial agents were mainly systemic antibacterial agents prescribed for treatment, most commonly beta-lactams, penicillins (J01C). In psychiatric LTCFs, 'other antibacterials' (J01X) were the most frequently administered antimicrobial agents.

Structure and process indicators

The HALT-4 PPS protocol included an institutional questionnaire designed to gather information from each participating LTCF on structural and process indicators for IPC and antimicrobial stewardship, similar to previous PPSs in LTCFs. While the goal was to collect a representative sample from each participating country, voluntary participation may have introduced selection bias in the PPS. This potential bias arises for IPC structure and process indicators when LTCFs with established IPC resources are more likely to participate than those with limited IPC practices.

The percentage of LTCFs with all three core IPC structures (in-house IPC expertise, external IPC advisory support, and an IPC committee) slightly increased from 31% in HALT-3 to 33.5% in HALT-4. Access to external IPC 'help and advice' and the presence of an IPC committee rose from 84.6% to 85.6% and from 39.1% to 40.5%, respectively, between HALT-3 PPS and HALT-4 PPS. There was also a notable increase in healthcare workers receiving IPC training, from 71.0% in HALT-3 to 77.5% in HALT-4. This increase in IPC training for healthcare workers, potentially influenced by the COVID-19 pandemic, reflects heightened awareness and prioritisation of

infection control during public health crises. More LTCFs reported having IPC protocols in place, particularly protocols for managing vascular catheters, which increased by 6%, suggesting a targeted focus on high-risk areas. However, the limited progress in establishing comprehensive IPC structures indicates persistent challenges, particularly in LTCFs with fewer resources or limited external support.

The percentage of LTCFs with written therapeutic antimicrobial guidelines for RTIs increased by 4%, while guidelines for UTIs and wounds showed slight decreases. Surprisingly, fewer LTCFs reported conducting HAIs surveillance (from 35.5% to 32.9%), antimicrobial consumption surveillance (from 31.0% to 24.2%), and antimicrobial-resistant microorganism surveillance (from 41.5% to 31.3%). Similarly, fewer LTCFs reported providing healthcare workers with training on hand hygiene in the year preceding the PPS (a decrease of 5%). However, a higher percentage of LTCFs reported using alcohol-based hand rub as their main hand hygiene practice (81.6%) compared to HALT-3 (70.3%). The median use of alcohol-based hand rub also slightly increased to 4.9 litres per 1 000 resident-days in HALT-4, compared to 4.3 litres per 1 000 resident-days in HALT-3. This slight increase in alcohol-based hand rub use aligns with global recommendations for improved hand hygiene practices, though it is clearly less pronounced than the increase observed in acute-care hospitals (+13.9% versus +69.5%) and indicates that there is still room for improvement. In acute care hospitals, the median use of alcohol-based hand rub was 34.4 litres per 1 000 patient-days; the consumption reported in psychiatric wards (10.5 litres per 1 000 patient-days) was closer to the consumption reported in the LTCFs, albeit still over twice as high.

In HALT-3, fewer than one-third (28.5%) of LTCFs lacked all ten of the AMS elements assessed. In HALT-4 PPS, this percentage increased to 38.8%. Eight out of the ten AMS elements showed a decrease in implementation, ranging from 2.8% to 11.7%. However, certain AMS measures, such as 'local antimicrobial resistance profiles' (27.7%) and 'permission for prescribing restricted antimicrobials' (11.9%), have seen minimal improvement, with only slight increases in LTCFs implementing these practices (25.7% and 9.6%, respectively, in HALT-3 PPS).

The majority of residents had a median vaccination coverage of over 90.0% for both COVID-19 and influenza. However, coverage was notably lower among healthcare workers. Significant variations were observed between countries, which may in part be explained by differences in the definition of full vaccination (outlined in the Annex 1). In Finland, a booster dose was not recommended for healthcare workers, while in Belgium, Iceland and Italy, healthcare workers were required to have received a booster dose to be considered fully vaccinated.

The results of these structure and process indicators should be interpreted with caution. The countries and LTCFs that participated in previous years are not the same as those involved in HALT-4, with less countries participating in 2023–2024. The variations observed may be therefore partly due to differences in the participating countries and/or LTCFs.

Participation to other LTCF activities

Prior to the HALT-4 PPS, a longitudinal study was conducted in ten EU countries (Belgium, Finland, France, Greece, Italy, Lithuania, Luxembourg, the Netherlands, Poland and Spain), providing the first European assessment of HAIs in LTCFs over an extended period (2022–2023). The objective of the study was to estimate the incidence and duration of HAIs, alongside HAI-related hospitalisations and deaths, among LTCF residents.

From 2020 to March 2023, 17 EU/EEA countries (Austria, Belgium, Croatia, Cyprus, Denmark, France, Germany, Ireland, Italy, Lithuania, Luxembourg, the Netherlands, Norway, Portugal, Slovenia, Spain, and Sweden) voluntarily participated in a COVID-19 surveillance in LTCFs. The primary aim of this surveillance was to monitor the spread and impact of the virus among residents. The surveillance was designed to collect timely and reliable data to identify outbreaks, understand transmission dynamics within LTCFs, and assess the number of COVID-19 cases and fatalities among residents. The highest incidence rates were recorded in 2020 and from late 2021 to early 2022. Case-fatality rates showed a gradual decline: from 21.3% end of 2020 to around 3-4% in 2022 and early 2023. These findings highlighted the significant impact of the pandemic on LTCF residents, who are particularly vulnerable to respiratory tract infections [14].

Future steps and recommendations

As in previous PPSs in LTCFs, the following points should remain a priority for LTCFs at the national and EU/EEA level:

- Strengthen IPC in LTCFs by ensuring core competencies for IPC professionals, allocating adequate resources for IPC programmes, implementing robust quality control and surveillance systems, developing comprehensive guidelines, and promoting awareness and training activities;
- Prioritise hand disinfection with alcohol-based hand rub as the cornerstone of hand hygiene practices, while launching targeted initiatives to amplify awareness of its pivotal role in preventing HAIs and combating antimicrobial-resistant microorganisms at both the EU/EEA and country level;
- Develop and implement tailored antimicrobial stewardship programmes. These programmes should optimise antimicrobial prescribing practices by focusing on rationalising the use of antimicrobials for prophylaxis, promoting the adoption of diagnostic tests to guide treatment, and ensuring that LTCF staff responsible for residents' nursing care have easy and timely access to microbiological results, enabling informed and effective decision-making in patient care.
- Ensure appropriate use of antimicrobial agents for UTIs:
  - by promoting alternatives to the use of antimicrobials for the prevention of UTIs in LTCFs (EU/EEA and country level);
  - by developing guidance for UTI diagnosis in the elderly residents, that distinguishes asymptomatic bacteriuria from symptomatic UTIs (EU/EEA and country level);
  - by providing guidelines for the treatment and prevention of UTIs at national and LTCF levels (EU/EEA and country level);
  - by implementing the surveillance of UTIs and antimicrobial use for UTIs, at LTCF level (EU/EEA country level).
- Analyse the association between the structure and process indicators of IPC and antimicrobial stewardship in European LTCFs, to support the production of evidence-based LTCF-specific guidelines (EU/EEA and country level).

For future PPSs in LTCFs:

- Continue to monitor HAIs and antimicrobial use using a standardised methodology across Europe;
- Continue to provide training to LTCF staff to harmonise the interpretation of case definitions;
- Explore additional measures to promote the participation of LTCFs in these PPSs and their associated validation studies;
- Promote, in collaboration with national authorities, the importance of having robust national/regional registries of LTCFs and LTCF beds, to improve understanding and comparability of long-term care systems between countries and at EU/EEA level, and to enable the improved extrapolation of prevalence and incidence of HAIs and antimicrobial use in LTCFs, including calculation of burden estimates;
- Future revisions of the HALT protocol should ensure compatibility with previous PPSs, while considering the usefulness and feasibility of the indicators.

It is important to note that countries with a strong culture of research in LTCFs struggled to identify LTCFs to voluntarily participate, presumably due to the repercussions of the COVID-19 pandemic, during which LTCFs were at the centre of attention, receiving substantial and sustained focus from various stakeholders (including researchers), and are now facing significant fatigue from participation and data registration as well as staff shortages. On the other hand, other countries, such as Iceland, where IPC and antimicrobial stewardship in LTCFs have been placed high on the agenda, participated for the first time. In general, the participation in the HALT-4 was good, with the participating 18 EU/EEA countries representing a large proportion of the EU/EEA population, and the majority of the participating countries reaching a good representativeness.

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Annex 1

National definitions of full vaccination[ii]

Belgium: In mid-September 2023, a new COVID-19 vaccination campaign was launched with a specific recommendation from the Superior Health council for revaccination of individuals at high risk. This included anyone aged 65 years or over, long-term care facility residents, individuals with previously identified underlying conditions, those with immunocompromising conditions and their household members, pregnant women, and healthcare workers.

Finland: Definition of fully vaccinated for COVID-19 in May 2024:

- Elderly people in nursing homes: a booster was recommended in autumn 2023;
- Healthcare workers: one vaccine dose, with no boosters recommended for the healthcare personnel;
- Fully vaccinated for influenza;
- Residents and healthcare workers: the most recent influenza vaccine received.

Germany: Fully vaccinated meant that both residents and healthcare workers needed to have received three vaccine doses, regardless of the type of vaccine.

Iceland: Fully vaccinated was defined as having received a COVID-19 vaccine booster dose between 01.09.2023 and 30.04.2024 (same definition used for influenza vaccination). This definition aligns with the timing of the 2024 survey, during which recommendations for COVID-19 vaccinations for the general population shifted to regular vaccination only for risk groups.

Italy: For COVID-19, residents and healthcare workers were considered fully vaccinated if they had completed a primary vaccination cycle (two doses of a two-dose vaccine or one dose of a single-dose vaccine) plus one booster dose (as per the indications of the Ministry of Health). For influenza, residents and healthcare workers were required to havereceived the seasonal flu vaccine during the 2023 season.

Netherlands: No data on healthcare worker vaccination is available in the Netherlands, as there is no legal permission to collect it.

Slovakia: Vaccination follows the SPC (Summary of Product Characteristics) for each vaccine. A booster dose of the COVID-19 vaccine is recommended for immunocompromised individuals. The basic vaccination schedule consists of three doses, with the fourth dose serving as a booster. The booster dose can be administered at least three months after the third dose. For immunocompromised individuals, the fourth dose is considered a booster and is also recommended if they have recovered from COVID-19. A person is considered fully vaccinated after receiving three doses.

Spain: Residents and healthcare workers (both considered the target population) were considered to have complete COVID-19 vaccination if they were vaccinated during the autumn-winter 2023–2024 season, or later, following the latest COVID-19 vaccination recommendations.

Sweden: The national vaccination campaign for influenza and COVID-19 started on 15 October 2023 (week 42), though vaccination may have begun earlier in LTCFs. The question asked was, "What percentage of residents are vaccinated against COVID-19 according to the current recommendations?" The timing of the survey in 2023 may have influenced the responses. For influenza vaccination, the question inquired about the percentage usually vaccinated, but responders may have provided data for 2023 instead.

[ii] These definitions were provided by the NFPs/OCPs of the cited countries.

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