ARHAI Scotland Annual Report

2024

NHS National Services Scotland

Antimicrobial Resistance and Healthcare Associated Infection

An NHS Scotland Assure Service

Contents

Alternative formats

This publication can be made available in large print, Braille (English only), audio tape and different languages. Please contact nss.equalitydiversity@nhs.scot for further information.

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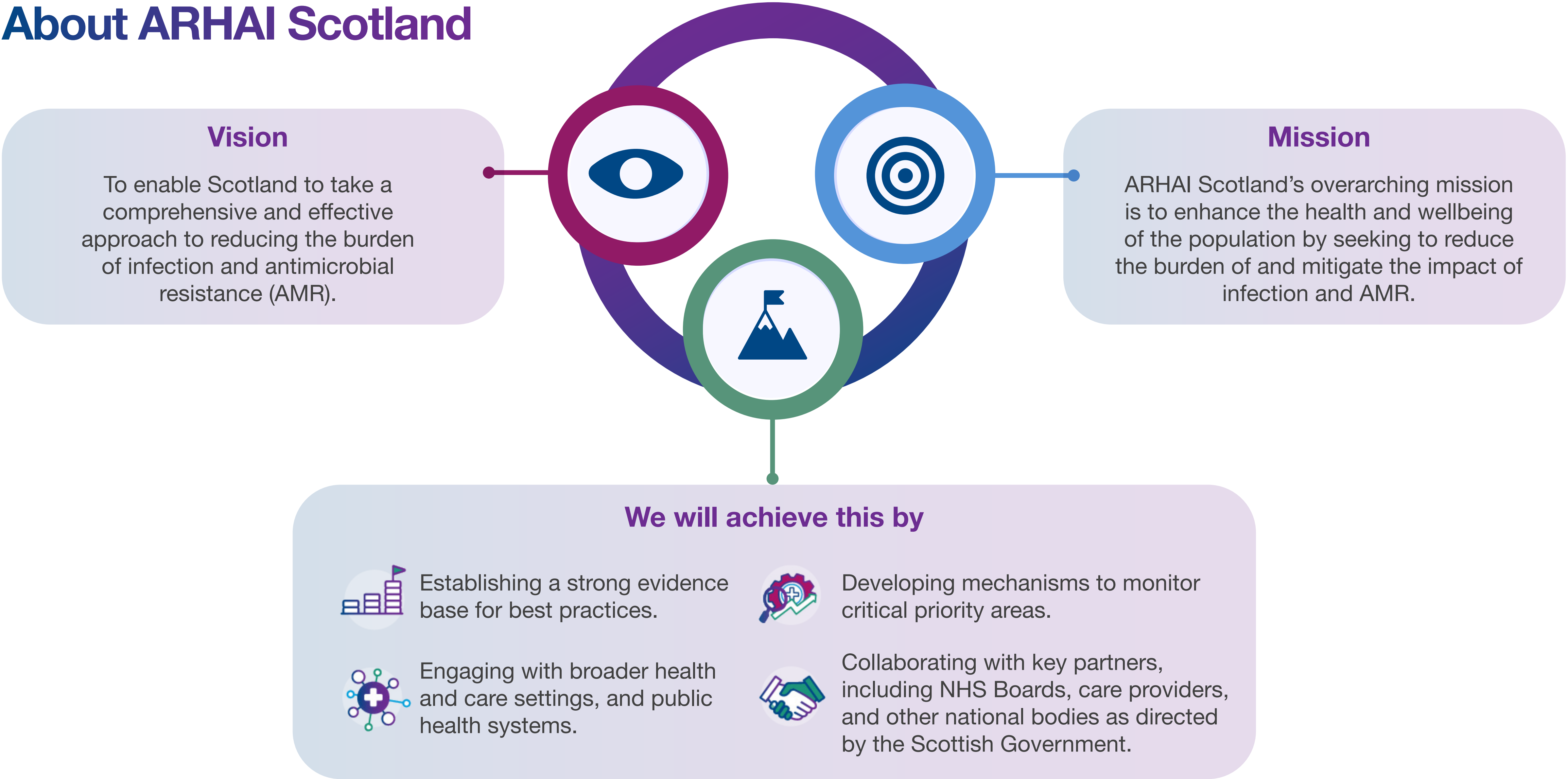NHS National Services Scotland
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Reference this document as:

Antimicrobial Resistance and Healthcare Associated Infection Scotland. ARHAI Scotland 2024 Annual Report. ARHAI Scotland, Glasgow 2025 [Report]

About ARHAI Scotland

Vision

To enable Scotland to take a comprehensive and effective approach to reducing the burden of infection and antimicrobial resistance (AMR).

Mission

ARHAI Scotland's overarching mission is to enhance the health and wellbeing of the population by seeking to reduce the burden of and mitigate the impact of infection and AMR.

We will achieve this by

Establishing a strong evidence base for best practices.

Developing mechanisms to monitor critical priority areas.

Engaging with broader health and care settings, and public health systems.

Collaborating with key partners, including NHS Boards, care providers, and other national bodies as directed by the Scottish Government.

The work of ARHAI Scotland is grounded in delivering a comprehensive range of functions in collaboration with stakeholders across health, care, and other sectors.

ARHAI Scotland's functions include:

- **Surveillance and Monitoring:** Assessing the impact of infections and antimicrobial resistance on health.

- **Clinical Assurance:** Reducing infection related risk in the healthcare built environment.

- **Programme Coordination:** Overseeing national infection prevention and control (IPC) and AMR programmes.

- **Expert Advice and Horizon Scanning:** Providing specialised IPC/AMR guidance and foresight.

- **Outbreak Response:** Preparing for and responding to healthcare-associated infection (HCAI) outbreaks and incidents.

- **Workforce Development:** Collaborating with NHS Education for Scotland and higher education associations to cultivate a confident, knowledgeable, and competent IPC workforce.

- **Professional Practice:** Promoting high standards of professional conduct.

- **Research and Innovation:** Conducting research in collaboration with external organisations and academic institutions, to generate evidence for actionable interventions.

- **Guidance Development:** Creating and maintaining national evidence-based IPC guidelines for Scotland.

ARHAI Scotland activities 2024

Around the world, healthcare-associated infections (HCAIs) and antimicrobial resistance (AMR) continue to pose important challenges to patient safety in all settings where care is provided.

This annual report highlights the key programmes of work delivered by ARHAI Scotland in 2024, aimed at promoting best practice in infection prevention and control (IPC), reducing HCAIs, and AMR. Alongside our planned programmes of work, we also provided real time expert IPC advice and support, ensuring a responsive and resilient approach across Scotland's health and care settings.

Health and Care
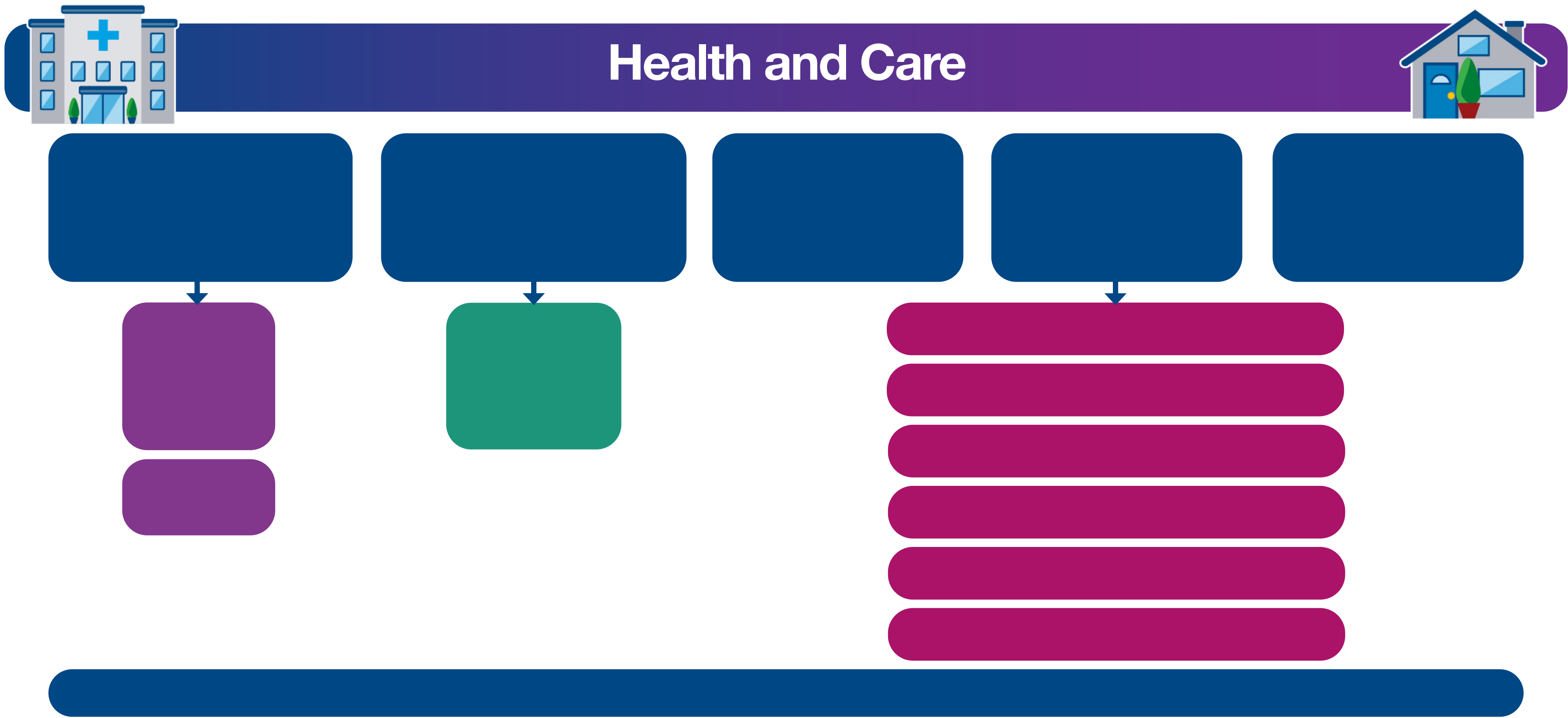
Infection prevention and control evidence and guidance

National Infection Prevention and Control Manual (NIPCM)

The National Infection Prevention and Control Manual (NIPCM) is a single source of infection prevention and control (IPC) guidance that is considered best practice for all health and care settings in Scotland. In 2024, there was significant new content development, with the launch of Chapter 4 to support guidance on reducing risk in the healthcare built environment.

Since its launch in 2012, the NIPCM has provided up to date evidence-based IPC guidance, supported where necessary by expert opinion, allowing healthcare staff to make informed decisions and apply effective IPC measures.

The NIPCM remains fully accessible through a web-based platform with 176,527 visits worldwide in 2024. Of these, 143,626 (81.4%) were from the United Kingdom (UK). The NIPCM evidence base has informed national policies beyond Scotland. Both England and Northern Ireland have drawn on its content to shape their national IPC guidance, while NHS Wales have adopted the NHS Scotland NIPCM in full.

ARHAI Scotland is committed to the continuous review, development and maintenance of all content within the NIPCM. New content is shaped by emerging scientific evidence, horizon scanning, stakeholder engagement, strategic priorities and insights gained from incidents and outbreaks of infection. The NIPCM is updated in real-time with our stakeholders playing a vital role in shaping and influencing our work. Their feedback on the clinical aspects of our scientific literature reviews helps to ensure that our guidance is evidence-based, informed by expert opinion where evidence is limited and is practical and operational in health and care settings.

Quarterly updates to the NIPCM include ongoing development of our Healthcare Associated Infection (HAI) Compendium, new additions to our glossary, updates to the A-Z of pathogens following emerging evidence and the publication of the evidence tables for our scientific literature reviews.

Key improvements for 2024 were as follows:

- A pilot of our updated manual methodology was completed; designed to demonstrate scientific rigor and transparency. The full development process is scheduled for ratification through our internal governance groups during 2025.

- The A-Z of pathogens resource was updated to clearly indicate whether each organism is classified as notifiable, strengthening its value as a practical reference for healthcare professionals.

- Appendix 13 NHS Scotland Minimum Alert Organism/Condition list was updated to strengthen surveillance for key pathogens.

The Ventilator Associated Pneumonia literature review was published.

Following the completion of two literature reviews in 2024, the NIPCM was updated to reflect the following points:

- **Hand hygiene products:**
  This update supports a new recommendation advising that alcohol-based hand rub (ABHR) and non ABHR can be used in health and care settings provided specified standards are met. This resulted in a key change from the terms 'ABHR' to 'hand rub' across the relevant resources including the NIPCM and Care Home Infection Prevention and Control Manual (CHIPCM).

- **Transmission-based precautions (TBPs):**
  To our knowledge, no other country has incorporated the World Health Organization's technical consultation on transmission through the air into their own IPC guidance, placing us at the forefront of this work. Our TBPs definitions literature review was published in August 2024.

Given the complexity and scale of this work, we formed a multidisciplinary, multi-agency stakeholder working group in 2024. This group is tasked with developing evidence-based recommendations and good practice points, drawing on scientific evidence and expert opinion. They will also oversee updates to Chapter 2 of the NIPCM and related NIPCM content.

Aligned to this work are two additional scientific literature reviews focused on surgical face masks and respiratory protective equipment. The results of these reviews will be guided by the ongoing work on TBPs to ensure consistent and informed updates.

As the national body responsible for IPC guidance in Scotland, ARHAI Scotland continued to lead IPC content for commissioned work and contributed to the development of Public Health Scotland (PHS) Guidance.

Published key commissioned guidance included:

- PHS Guidance for the public health management of acute respiratory infections (ARI) in community, social and residential care settings for health protection teams in partnership with the Scottish Health Protection Network.

- PHS Guidance on prevention and control of *Clostridioides difficile* Infection in community-based settings in Scotland in partnership with the Scottish Health Protection Network.

- ARHAI Scotland Cataract surgery including high flow pathways/ IPC principles was underpinned by a rapid review and expert opinion aimed at improving the delivery of cataract surgery in Scotland following which two publications were accepted for peer reviewed journals: Development of an infection prevention and control pathway to facilitate high-throughput cataract surgery in Scotland and Infection prevention and control factors associated with post-cataract surgery endophthalmitis - a review of the literature from 2010 – 2023.

Published reactive guidance included ARHAI Scotland Mpox IPC advice for healthcare settings. Which was updated in response to an evolving international incident involving clade 1 Mpox. Following international review of high consequence infectious disease (HCID) definitions, the definitions were strengthened to provide clear distinction of IPC management between HCID and non-HCID Mpox Clades.

Care Home Infection Prevention and Control Manual (CHIPCM)

The Care Home Infection Prevention and Control Manual (CHIPCM) continues to evolve as a dedicated IPC resource for the adult care home sector, hosted within the NIPCM website. The two core chapters, Standard Infection Controls Precautions (SICPs) and TBPs, are fully aligned with the NIPCM evidence base, supported by additional context-specific materials and resources.

In 2024, a new Care Home IPC Resource Toolkit was launched, providing a regularly updated compendium of national and international IPC guidance and tools to support the local adoption and implementation of IPC practice within care homes.

A review of the CHIPCMs accessibility and functionality has been undertaken by obtaining feedback from stakeholders, with considered analysis of stakeholder feedback planned for 2025/2026. Work also commenced on a gap analysis of the NHS Board IPC support arrangements being provided for care homes.

Further care home support resources reviewed and updated during 2024 included the care home IPC resource documents for the prevention and control of respiratory and gastrointestinal illnesses.

Additionally, the potential value of a voluntary Care Home IPC Self Evaluation Toolkit was explored, leading to the development of a revised prototype. This evolved into the Care Home IPC Standards Checklist, approved for pilot in 2025/2026. The checklist is designed to supplement existing local IPC governance and support care homes in self-assessment, assurance and monitoring their compliance with the IPC standards.

Reducing infection related risk in the healthcare built environment

Reducing infection related risk in the healthcare built environment remains a key priority for ARHAI Scotland. In 2024, significant progress was made with the launch of Chapter 4: Infection Control in the Built Environment and Decontamination within the National Infection Prevention and Control Manual (NIPCM).

Chapter 4 provides a central, evidence-based resource to support safe practices related to the built environment and decontamination within healthcare settings.

Key milestones achieved included:

Completion of an [Infection prevention and control (IPC) for safe healthcare water systems](#) literature review using the new NIPCM methodology, following extensive stakeholder consultation recommendations and good practice points for clinical practice were developed. This informed the launch of new content in Chapter 4 of the NIPCM in August 2024 aimed at supporting the prevention and management of water related infection incidents and outbreaks. Implementation was scheduled for the 1st January 2025, with ongoing content development planned 2025/2026.

Key future priorities scheduled for 2025/2026 include:

- **Undertake** scientific literature review for dental unit waterlines to develop IPC good practice points and recommendations.

- **Progress** scientific ventilation literature review. Research findings will inform new IPC ventilation related content within Chapter 4.

- **To develop** national guidance for fungal species infection risk reduction in healthcare settings.

- **Provide** subject matter expertise input into the pilot of a new pathway designed to improve how healthcare environmental infection incidents are assessed and reported, helping to make the process more consistent and reliable.

IPC clinical assurance for major infrastructure projects

NHS Scotland Assure provides national specialist support to ensure healthcare construction projects are safe, compliant and free from avoidable risk through review of the design, construction and maintenance across NHS Scotland. Through the Key Stage Assurance Review (KSAR) and the 'NHS Scotland Design Assessment Process (NDAP), they help NHS Boards meet IPC requirements from design stage onward. ARHAI Scotland IPC specialists continued to support these projects as part of multidisciplinary teams, ensuring infection risks are considered throughout the building lifecycle.

2024

8	4	5
KSARs completed	**health boards involved**	**construction projects across NHS Scotland**

During 2024, eight KSARs were completed, supporting the progression of healthcare design and construction projects across NHS Scotland. As part of the Assurance service, ARHAI Scotland also supported two NHS board project teams through the commissioning of their new healthcare facilities which opened in 2024. These included the NHS Golden Jubilee National Treatment Centre and Greater Glasgow and Clyde (North East Hub).

Key resources published in 2024 included:

A suite of Notes for Board resources to assist board IPC teams through health care construction projects

- IPC Risks in Haemato-oncology and Bone Marrow Transplant Units
- IPC Risks in the Design of a Neonatal Unit
- IPC Risks in the Design of a Critical Care Unit, Level 2 and 3 Care
- Air Sampling within Operating Theatres
- KSAR: Notes for Board Infection Prevention and Control Teams

Infection prevention and control workforce development

Throughout 2024, ARHAI Scotland remained committed to workforce development, patient safety and quality improvement through our continued collaboration with partner organisations to support the delivery of infection prevention and control (IPC) education and training. We supported multidisciplinary health and care staff to enable them to prevent and minimise infection risks across all health and care settings.

Cross-organisational educational support

ARHAI Scotland continued to work collaboratively with NHS Education for Scotland (NES), Public Health Scotland (PHS) and Glasgow Caledonian University (GCU), contributing IPC and epidemiology expertise to the postgraduate module on IPC in a Global Contextand aligning national IPC education resources with current evidence base to support Scottish Government Healthcare Associated Infection Strategy 2023 to 2025 and National Action Plan for Antimicrobial Resistance.

GCU IPC in a Global Context

ARHAI Scotland as subject matter experts supported students undertaking the postgraduate module on IPC in a Global Context at GCU by development of course materials and through live question-and-answer panel sessions. IPC topics included routes of transmission and hierarchy of controls; epidemiology and surveillance of hospital acquired infection (HAI); development of a national surveillance system; IPC evidence for HAI prevention; development of evidence-based IPC guidance and outbreak management.

NES Scottish Infection Prevention and Control Education Pathway (SIPCEP) modules

ARHAI Scotland provided subject matter expertise to inform NES Scottish Infection Prevention and Control Education Pathway (SIPCEP) modules, that are widely used across health and care settings in Scotland.

Health protection in children and young people settings, including education settings webinar

ARHAI Scotland supported the Scottish Health Protection Network in the delivery of two webinars to over 700 staff. These webinars were delivered to raise awareness of the guidance and the IPC components, supporting staff working in these settings.

Epidemiology and surveillance for IPC training course

ARHAI Scotland and NES jointly hosted two one-day courses for IPC staff across NHS Scotland. The course content included foundational epidemiology for healthcare associated infections, national and local surveillance systems for outbreak investigations, statistical methods for epidemiological analysis and interactive sessions on case definitions, line lists, epidemic curves and epidemiological timelines. During 2024, 62 IPC professionals in Scotland completed the course. Evaluation of the course showed that participants felt the learning objectives were met and reported improved knowledge in key epidemiology and surveillance skills. Further evaluation of the impact of the course on IPC practice is planned and ARHAI Scotland continues to work with NES to deliver these training courses to IPC staff.

National campaigns

Each year ARHAI Scotland, in collaboration with NES, support and promote campaigns to raise awareness of World Hand Hygiene Day and the importance of winter preparedness. In 2024, to strengthen communications, new campaign web pages were launched on the NIPCM website.

Key IPC messages and infographics for the winter season 2024/25 were shared with stakeholders to support local planning across NHS Boards and organisations.

World Hand Hygiene Day 5th May 2024

Driven by the World Health Organization (WHO) 'SAVE LIVES: Clean Your Hands' campaign, the global theme for 2024 was "promoting knowledge and capacity building of health and care workers through innovative and impactful training and education, on infection prevention and control, including hand hygiene." In support of the WHO 2024 call to action on hand hygiene, ARHAI Scotland promoted campaign messages via social media using WHO materials, including posters, banners, newsletters and weblinks. These efforts aimed to support the IPC workforce in reinforcing the importance of hand hygiene. Campaign web pages received 2,044 views from 1,555 individual users.

Winter preparedness

The new winter campaign page was launched in 2024 to support health and care staff in reducing the risk of seasonal infections such as influenza and norovirus. This page provided accessible IPC guidance, campaign assets for local communication, and direct links to relevant resources within the NIPCM and Care Home Infection Prevention and Control Manual (CHIPCM). The seasonal campaign resources remained live within the NIPCM from commencement, until cessation of the winter season. Designed to strengthen preparedness and promote effective IPC practices, it received 2,125 views from 1,322 users.

Source: nes.scot.nhs.uk

National IPC care home webinars

ARHAI Scotland continues to actively engage with our care home stakeholders to support targeted workforce education. In collaboration with the Care Home IPC Working Group two themed Back to Basics webinars were successfully delivered:

- Care Home IPC Scabies: This session focused on recognising, treating, assessing and managing scabies infestations, including outbreak controls.
- Care Home IPC Waste Management: This webinar addressed best practice in IPC waste handling within care home settings. Both webinars aimed to enhance staff knowledge, promote the use of the Care Home IPC Manual and signpost relevant guidance. Evaluation feedback from the evaluations was highly positive, with 100% of respondents indicating that they would recommend ARHAI Scotland Care Home Webinar Sessions.

IPC educational animations

The first of five educational animations (introduction) on IPC risks related to the design, construction, commissioning and handover of healthcare water and above ground drainage systems was completed in 2024. The remaining four animations in this series are scheduled for completion during the calendar years 2025/2026 and 2026/2027.

Education and training goals for 2025

- Develop updated transmission-based precautions (TBPs) guidance, including risk assessment education.
- Continue to support Higher Education Institutions.
- Hold further IPC epidemiology and surveillance events.
- Continue to promote ARHAI Scotland's work at conferences and events.
- Publish High Consequence Infectious Disease Personal Protective Equipment Addendum and supporting education.
- Deliver further care home webinars and education.
- Continue to support and promote annual IPC campaigns.
- Continued close working with our national partners, including NHS Education for Scotland.
- Publish ARHAI Scotland Toolbox Talk on IPC Risks in the Healthcare Built Environment – for Construction and Maintenance.
- Develop ARHAI Scotland Toolbox Talk on IPC Risks in the Healthcare Built Environment – For Building Services.
- Develop a series of educational animations regarding the IPC risk associated with the design, construction, commissioning and handover of healthcare ventilation systems.

Antimicrobial use and antimicrobial resistance

Antimicrobial resistance (AMR) occurs when microorganisms such as bacteria and fungi, evolve to withstand antimicrobial treatment. This resistance arises primarily through genetic adaptation, particularly in response to exposure to antimicrobials in human healthcare, animal husbandry, and the wider environment. As a direct result of AMR, common infections become increasingly difficult or sometimes impossible to treat. This compromises the safety of health provision, such as childbirth, medical procedures, surgeries, cancer therapy, and organ transplantation. Therefore, AMR represents one of the most pressing threats to global health. AMR also has wide-ranging impacts on socio-economic development, food security and the environment.

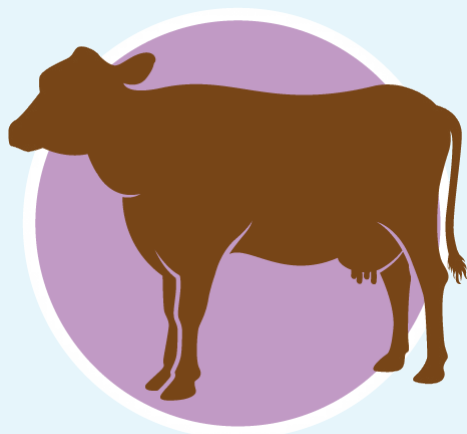## Antimicrobial Resistance - Contributing Factors

Antimicrobial resistance happens when microorganisms change and become resistant to the antimicrobials used to treat the infections they cause.

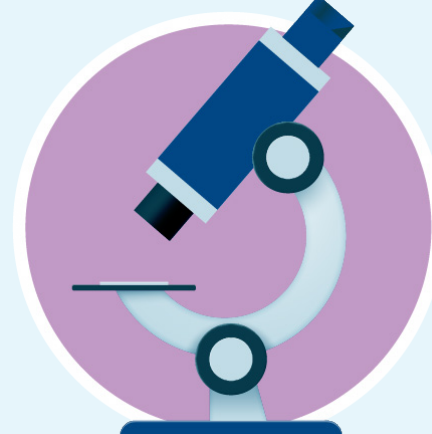**Over-prescribing of antimicrobials**

Patients not finishing their treatment

Over-use of antimicrobials in agriculture

Poor infection prevention and control in healthcare settings

Lack of hygiene and poor sanitation

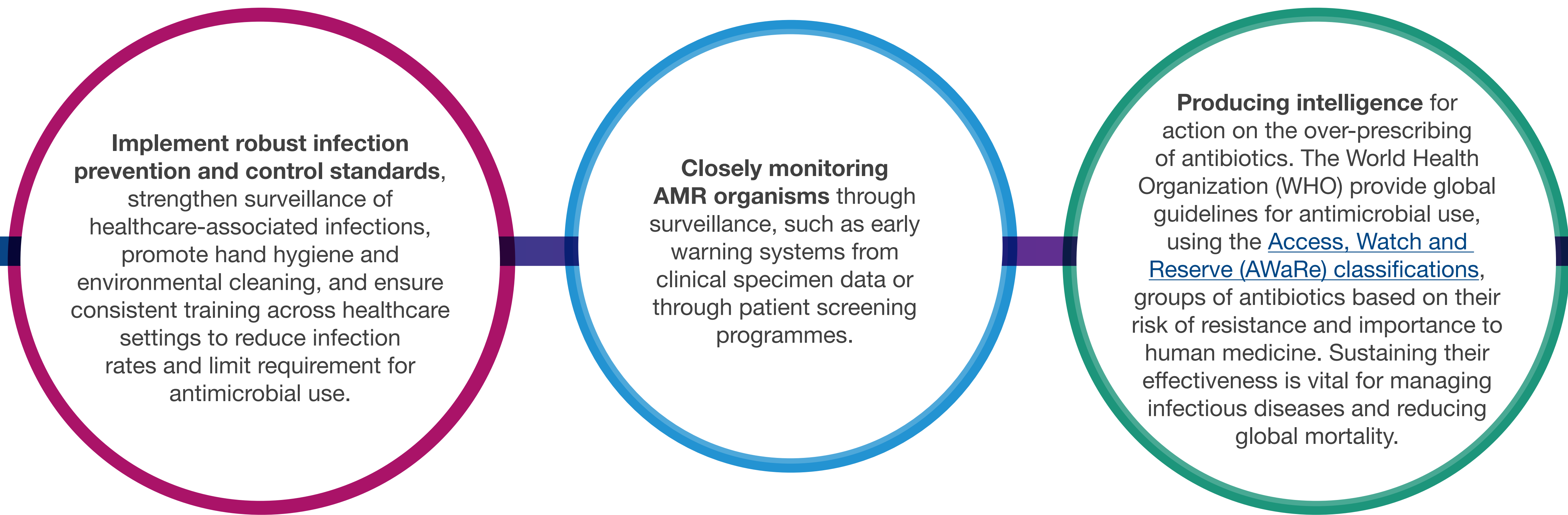**Lack of new antimicrobials being developed**

What can ARHAI Scotland do to tackle antimicrobial resistance in healthcare settings?

Although AMR is a natural evolutionary process, its rapid acceleration and global transmission are largely driven by human activities.

Acknowledging this, the United Kingdom (UK) Government established a 20-Year Vision for AMR - to contain, control, and mitigate human-driven resistance by 2040. The vision outlines the multidisciplinary and collective actions required to tackle AMR.

Three key areas of action for ARHAI Scotland include:

Implement robust infection prevention and control standards, strengthen surveillance of healthcare-associated infections, promote hand hygiene and environmental cleaning, and ensure consistent training across healthcare settings to reduce infection rates and limit requirement for antimicrobial use.

Closely monitoring AMR organisms through surveillance, such as early warning systems from clinical specimen data or through patient screening programmes.

Producing intelligence for action on the over-prescribing of antibiotics. The World Health Organization (WHO) provide global guidelines for antimicrobial use, using the Access, Watch and Reserve (AWaRe) classifications, groups of antibiotics based on their risk of resistance and importance to human medicine. Sustaining their effectiveness is vital for managing infectious diseases and reducing global mortality.

ARHAI Scotland's 2024 achievements in tackling AMR

Surveillance and early warning systems

In 2024, ARHAI Scotland continued to deliver robust surveillance and early warning systems to monitor and respond to AMR threats. **Key activities included:**

Early detection of unusual phenotypes: Routine monitoring for organisms displaying unexpected resistance as per NIPCM Appendix 13, enabling a rapid clinical and public health response. This includes monitoring emerging threats such as carbapenemase-producing organisms (CPOs) and *Candidozyma auris* (*C. auris*).

Monitoring national multi-drug resistant organism screening compliance: Monitoring uptake of clinical risk assessment based screening for early detection and management of patients colonised or infected with carbapenemase-producing Enterobacterales (CPE) and meticillin-resistant *Staphylococcus aureus* (MRSA).

AMU surveillance: Real-time monitoring of antibiotic use for respiratory infections supported stewardship efforts led by the Scottish Antimicrobial Prescribing Group (SAPG). Monitoring and reporting of antibiotics in the WHO AWaRe categories. Feedback on antimicrobial prescribing was provided to GP practices biannually. Collaboration with the SAPG Dental Subgroup ensured regular reporting of dental prescribing data.

One Health surveillance: Ongoing collaboration with partners across veterinary and environmental health to assess AMU and AMR patterns beyond the human health sector.

Data and intelligence for action

ARHAI Scotland produce publicly available reports to raise awareness on AMU and AMR as well as maintain a suite of interactive tools to support evidence-based decision-making. **These included:**

- ARHAI Indicators Discovery Dashboards: Providing NHS Boards and prescribers with quarterly updates on local AMU and AMR trends via the Public Health Scotland (PHS) Discovery platform.

- The SONAAR Annual Report, presents data on AMU and AMR trends in human and animal health. Its release in November each year aligns with World Antimicrobial Awareness Week and European Antibiotic Awareness Day, reinforcing Scotland's national commitment to tackling AMR. For this publication ARHAI Scotland and PHS will take a collaborative approach with ARHAI Scotland providing 'intelligence on human antimicrobial use and antimicrobial resistance for a range of key pathogens, and PHS providing animal health intelligence, ensuring a continued One Health approach to antimicrobial surveillance and antimicrobial stewardship.

The UK National Action Plan: Confronting Antimicrobial Resistance

The publication of the ARHAI Annual Report 2024 coincides with the transition from the 2019–2024 UK National Action Plan (NAP, Tackling Antimicrobial Resistance) to the new 2024–2029 NAP: Confronting Antimicrobial Resistance, in support of the UK's 20-year vision.

In 2025, ARHAI Scotland will continue to play our part supporting the delivery of the UK AMR NAP implementation plan and measurement of impact within Scotland, building on our role in monitoring and reporting trends in antimicrobial use and resistance.

ARHAI Scotland's key activities in support of the UK AMR NAP include

Data and Intelligence to Inform Action: provide robust intelligence and evidence for action, informing the development of local and national interventions and initiatives to tackle AMR.

Track Emerging and Key Pathogens: Continue monitoring unusual and emerging pathogens, such as CPOs/CPE and *C. auris*, in partnership with UK counterparts.

Leadership: Provide leadership, and expert advice and guidance on infection prevention and control, and stewardship, to reduce infections and antimicrobial use.

Align Policy and Strategy: Track progress toward Scottish and UK AMR targets, including improving access to timely, actionable AMU and AMR intelligence. Collaborate with SAPG to inform and align the Scottish Supplementary AMU NAP Targets with national policy and strategic priorities and monitor progress towards their achievement.

Benchmark Internationally: Evaluate Scotland's global performance, identifying strengths and areas for improvement.

Improve Accessibility of Data: Use visual aids in infographic reports, including the forthcoming SONAAR report, to clearly communicate AMR and AMU trends to stakeholders and the public.
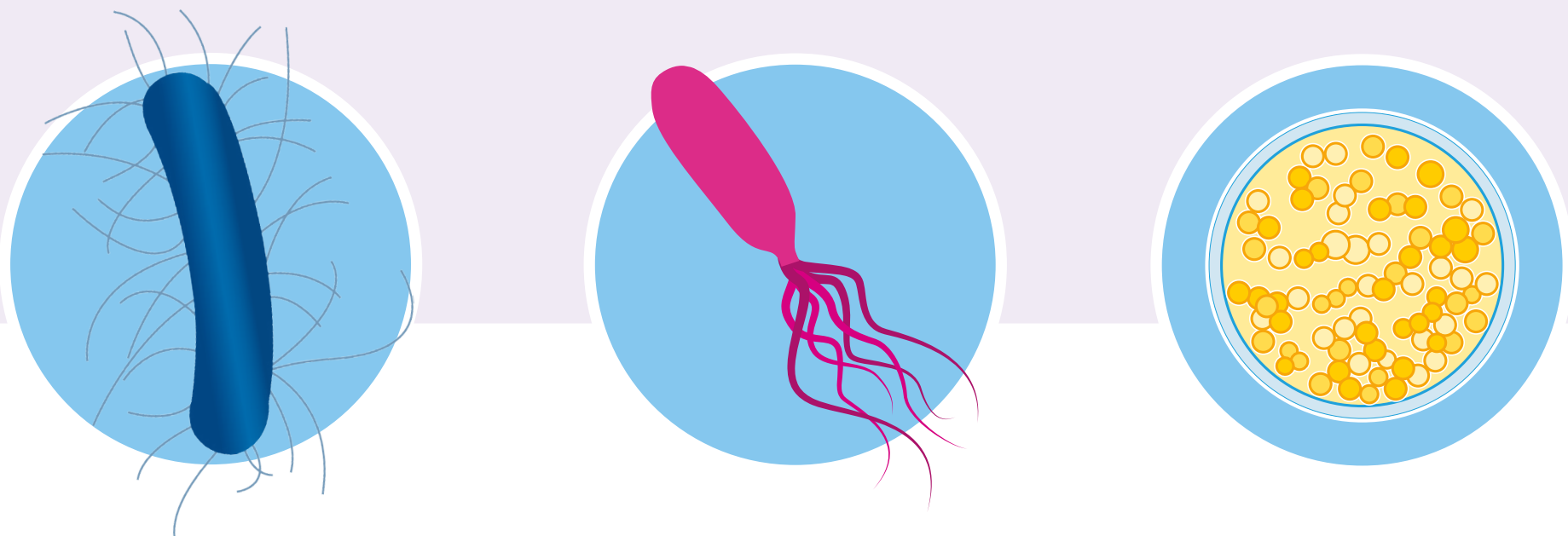
Surveillance and monitoring

Surveillance of healthcare associated infection in Scotland

ARHAI Scotland coordinate the national surveillance programme of healthcare associated infection (HCAI) monitoring the burden of key HCAI, supporting benchmarking and providing intelligence to inform the development of interventions.

Surveillance Activities in 2024

**In 2024, surveillance of three key infection types continued:**

- ***Clostridioides difficile* infection (CDI)**
- ***Staphylococcus aureus* bacteraemia (SAB)**
- ***Escherichia coli* bacteraemia (ECB)**

ARHAI Scotland published updated national surveillance protocols for:

- Surveillance of Healthcare Associated Infections in intensive care units (ICU)

- Protocol for the Scottish Surveillance Programme for CDI infection

Rate of CDI, SAB and ECB per 100,000 population
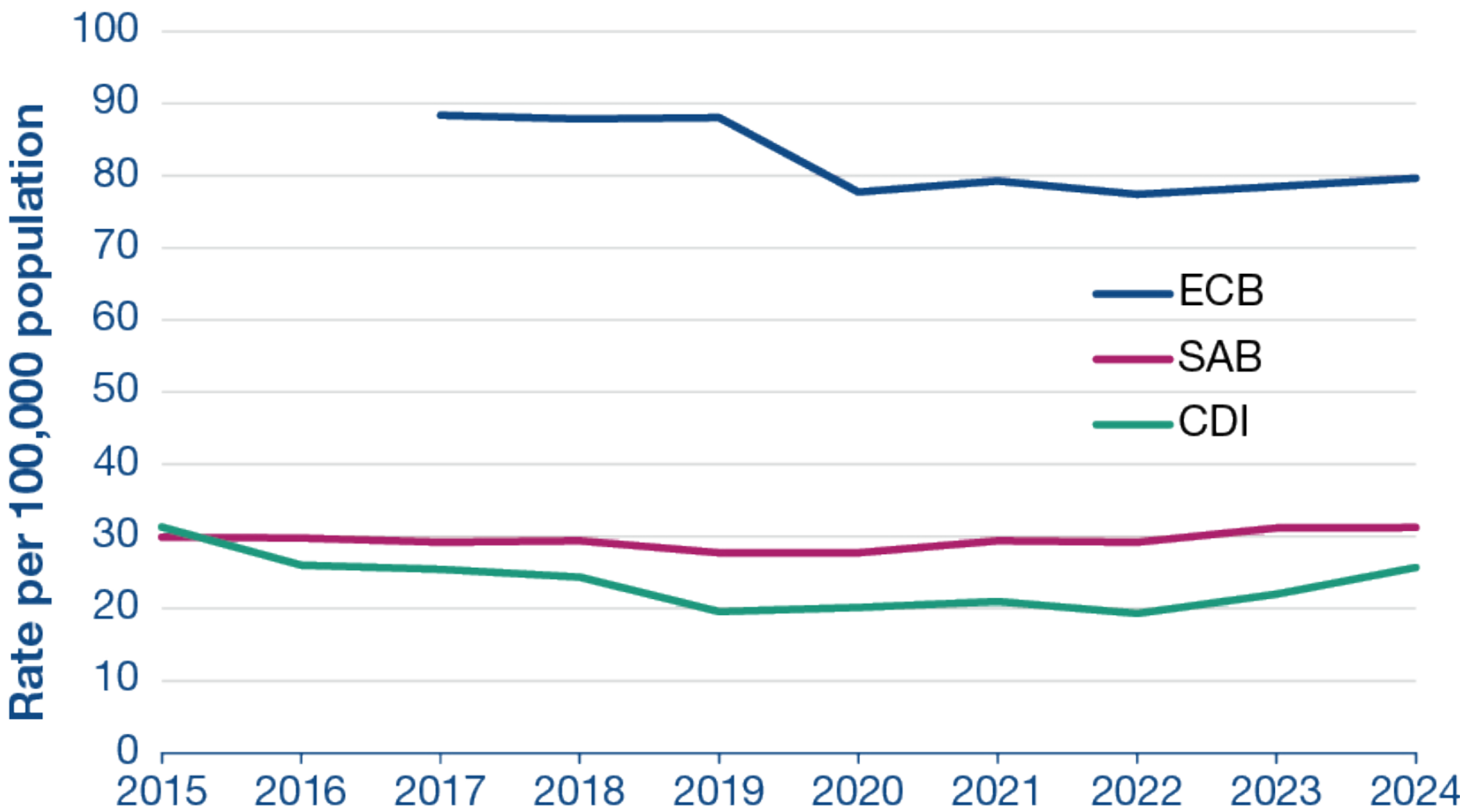
ARHAI Scotland continued to provide epidemiological data and intelligence to clinical networks in support of quality improvement and reduction strategies.

Surveillance priorities for 2025

National surveillance of surgical site infection (SSI) remained paused during 2024, though some boards continued with local surveillance.

In 2024, ARHAI Scotland undertook a review of future options for national caesarean birth SSI surveillance alongside infection prevention and control (IPC), midwifery and obstetrics/gynaecology stakeholders. The outcome will be considered with the wider national surveillance review.

ARHAI Scotland are undertaking a comprehensive review of the national mandatory surveillance programme to make recommendations for future priorities, including the use of smarter solutions for surveillance. Stakeholder engagement via surveys and short life working groups will be undertaken to inform the review in 2025. The ARHAI surveillance review is a key deliverable in the Scottish Government HCAI Strategy 2023 to 2025.

ARHAI Scotland continued to support local IPC Teams in surveillance methodology through delivery of online training videos via the ARHAI Training Channel.

Trends in key HCAI rates continued to be published quarterly in 2024 and provided in Discovery, supporting local NHS boards with data for benchmarking and to inform quality improvement and reduction strategies.

Continue to support the national surveillance system for monitoring the burden of healthcare associated infection in ICUs.

Continue to support the development of a competent and confident IPC workforce in by delivery of epidemiology and surveillance training in conjunction with NHS Education Scotland.

Hospital activity and pressures

Healthcare delivery, activity and the inpatient population are evolving, and healthcare systems continue to experience pressure. These changes in healthcare delivery across hospitals and the community settings can influence the risk of Healthcare Associated Infection (HCAI) and affect the interpretation of related epidemiological data. HCAI epidemiology should be interpreted with caution and consider the wider context of healthcare systems pressures.
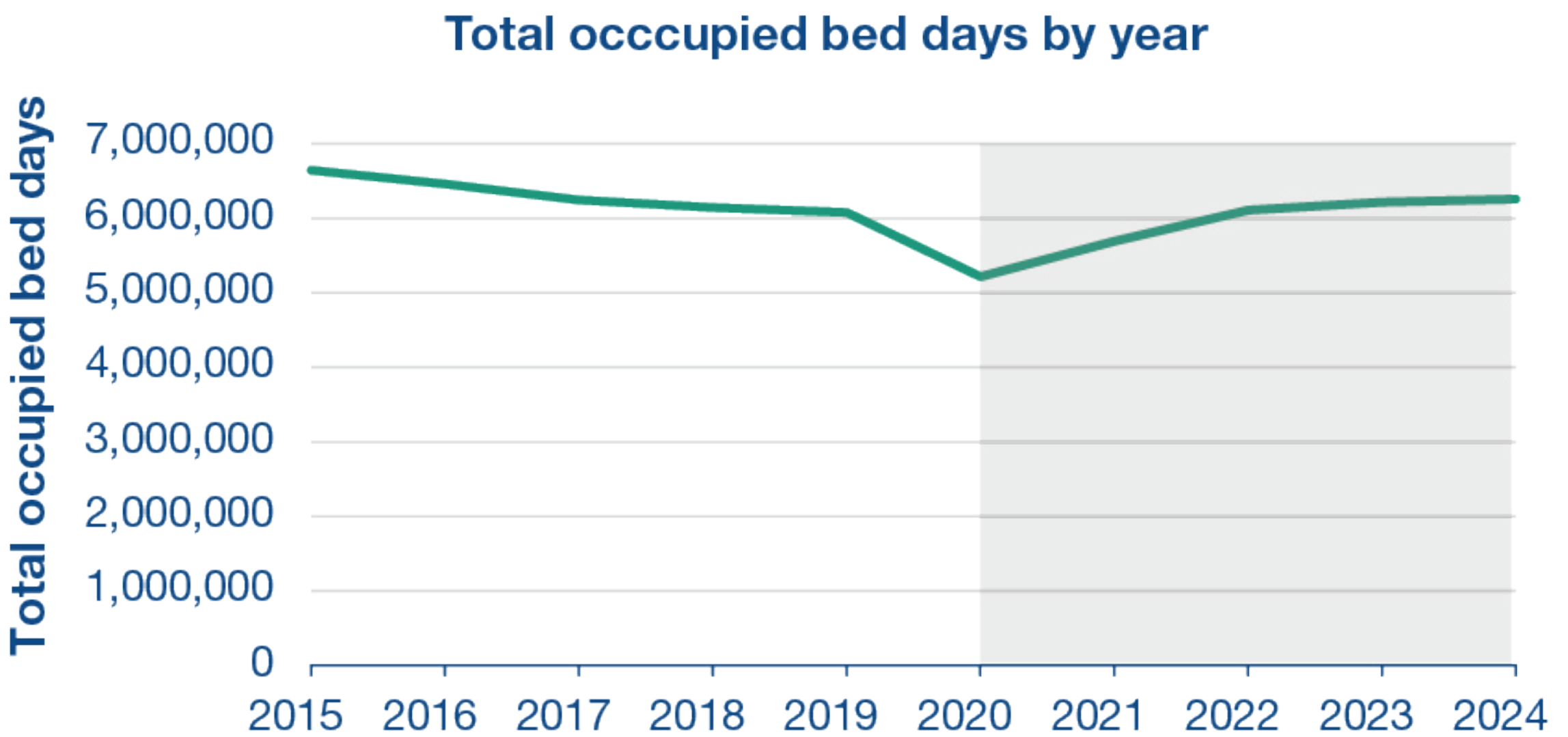
Hospital activity

Total occupied bed days

6,261,731 **total occupied bed days (TOBDs)** in **2024** compared to **6,217,359** in **2023**.

⬆ The **five year trend** has **increased** with a **5.0%** average **increase** each year.

Total occcupied bed days by year

Note: Grey shaded area highlights the period used to test for the five year linear trend, data for ten years is available to aid interpretation. More information on data sources and methods is available in the metadata.

Elective and emergency admissions

475,682 emergency inpatient admissions in **2024** compared to **486,342** in **2023.**

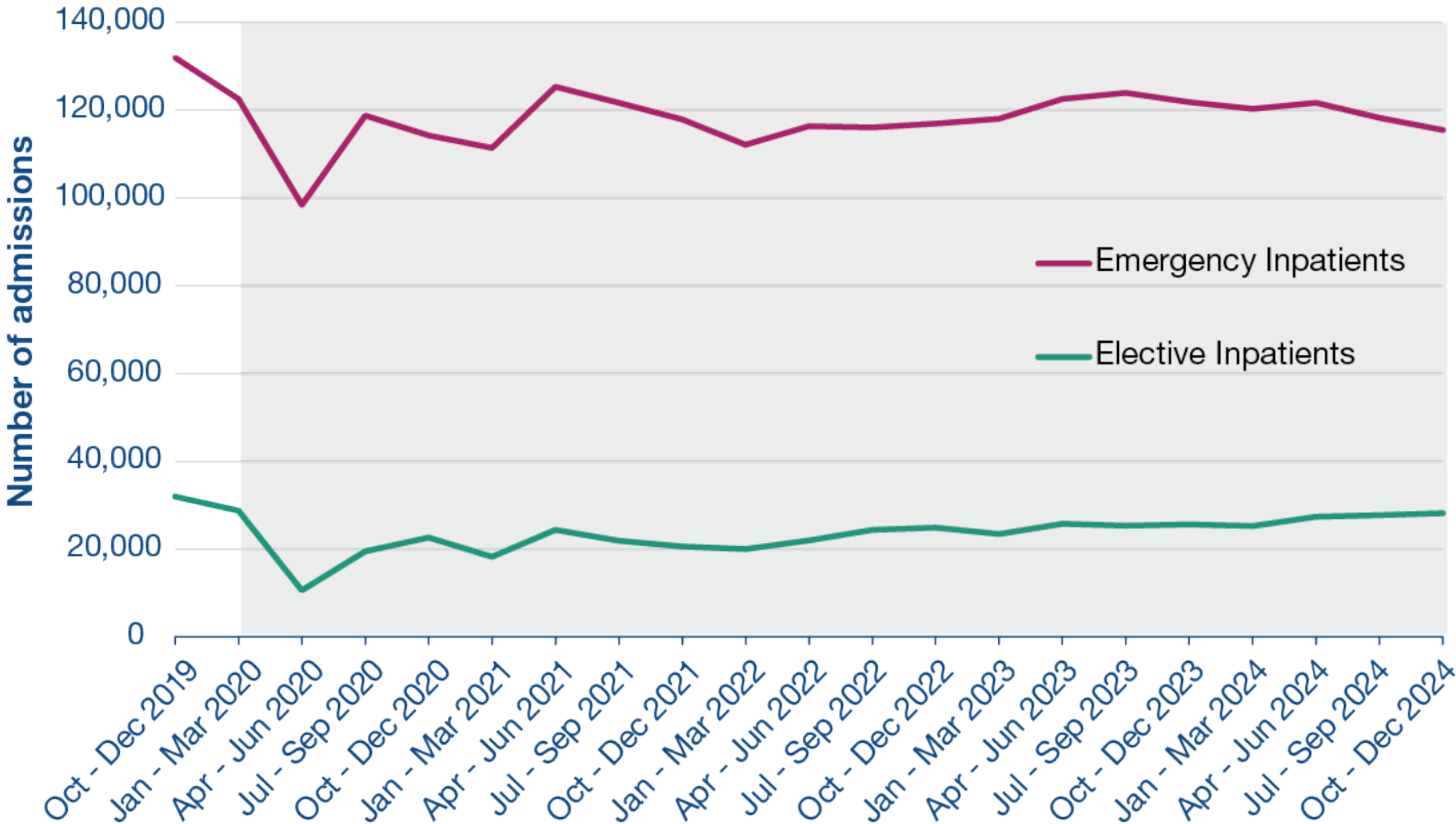The **five year trend** has **remained stable**.

108,586 elective inpatient admissions in **2024** compared to **100,228** in **2023**.

The **five year trend** has **increased** with an **8.5%** average **increase** each year.

Number of elective and emergency admissions, by quarter

Emergency Inpatients

Elective Inpatients

Note: Grey shaded area highlights the period used to test for the five year linear trend. Data from quarter four 2019 is available to aid interpretation. More information on data sources and methods is available in the metadata.

Hospital pressures

| Delayed discharges	Accident and Emergency (A&E) attendances

The percentage of total occupied bed days due to **delayed discharges increased** by **0.9%** in **2024 (12.0%)** compared to **2023 (11.1%)**.

The **five year trend** has **increased** with a **10.3%** average **increase** each year.

68.4% of **Accident and Emergency (A&E) attendances** were seen within **the 4 hour target** in **2024**, a **decrease** from **69.9%** in **2023**.

The **five year trend** has **decreased** with a **7.8%** average **decrease** each year.
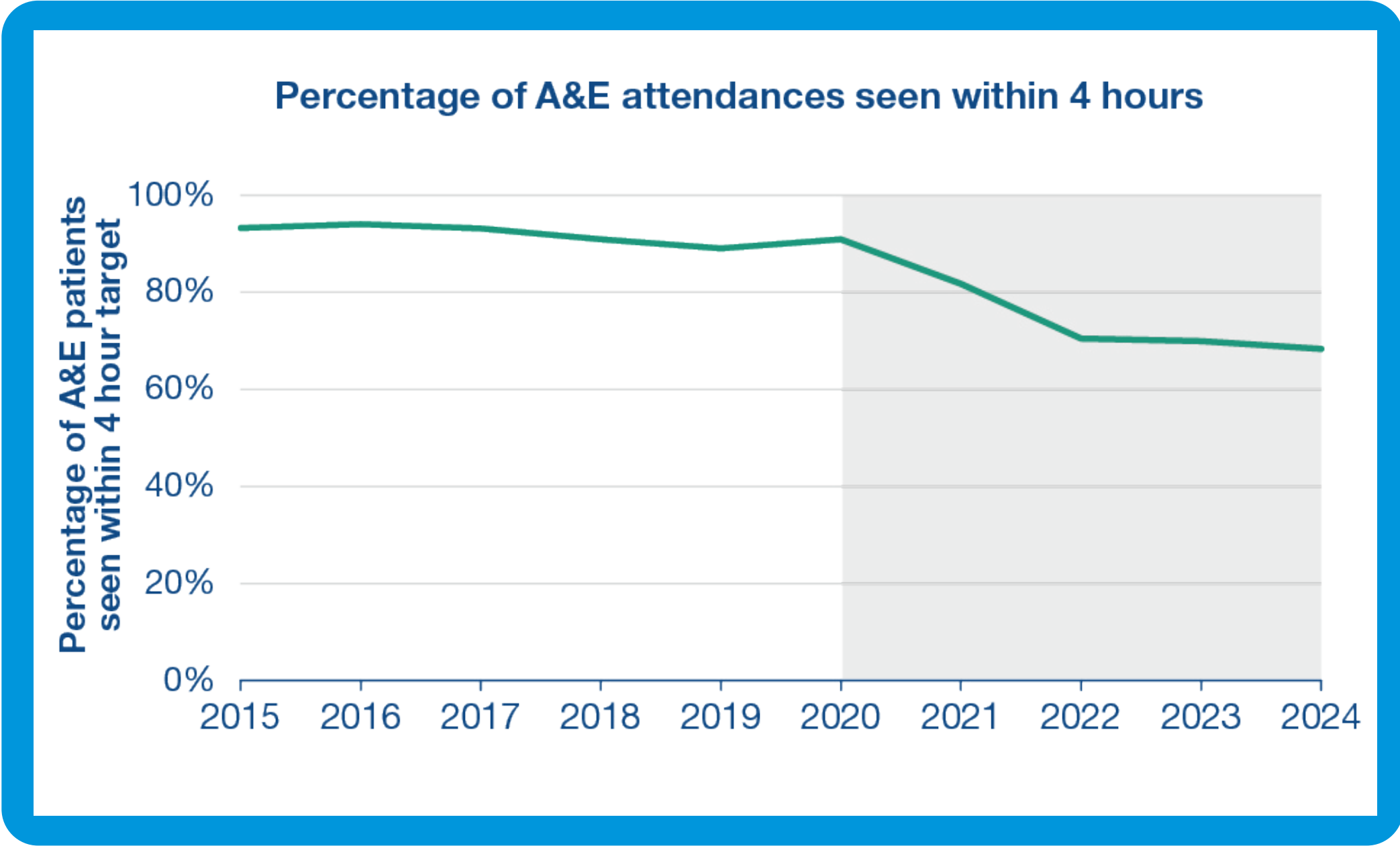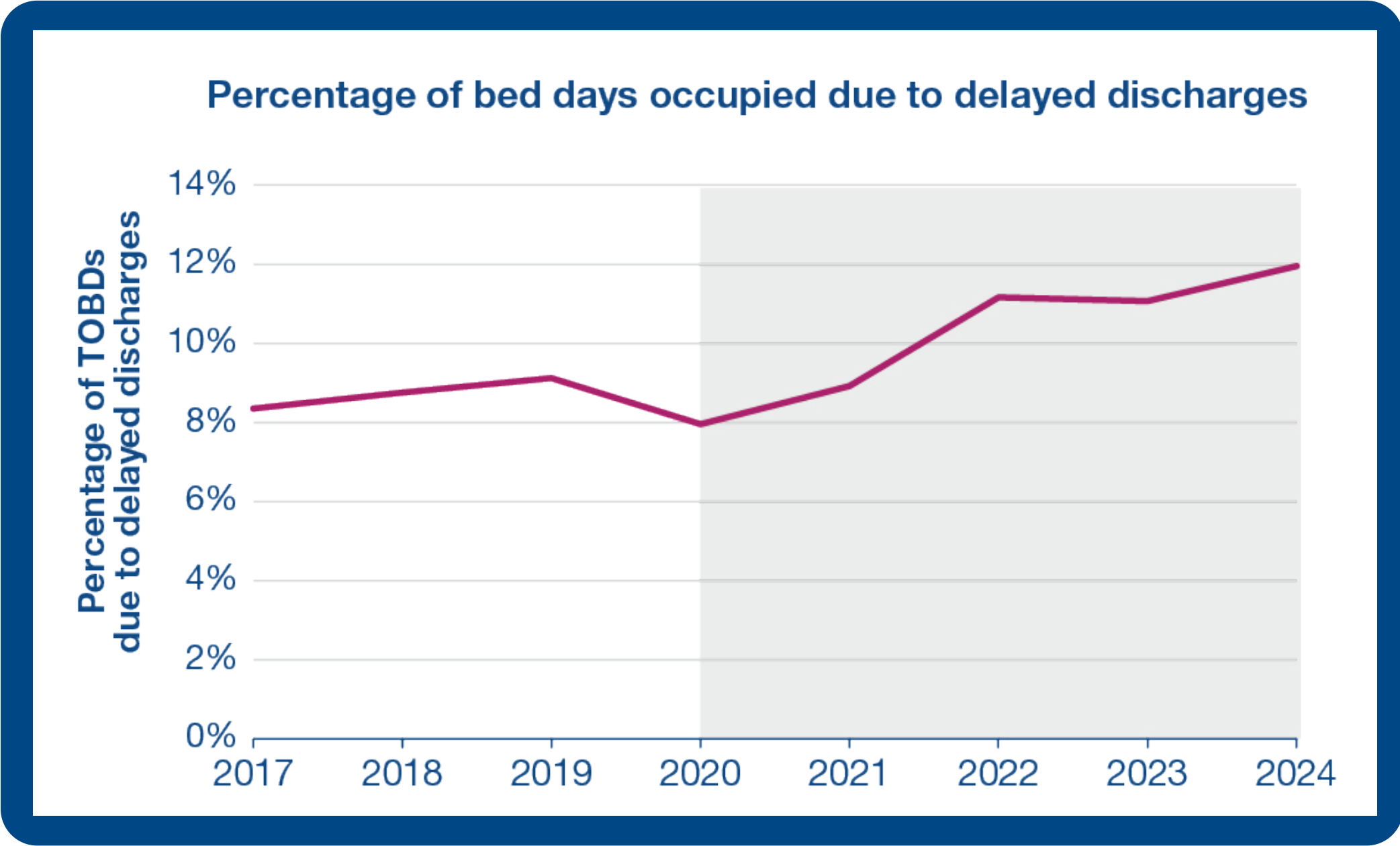
Percentage of bed days occupied due to delayed discharges

Percentage of A&E attendances seen within 4 hours

Note: Grey shaded area highlights the period used to test for the five year linear trend. Data from 2017 for delayed discharges, and 2015 for A&E attendances is available to aid interpretation. More information on data sources and methods is available in the metadata.
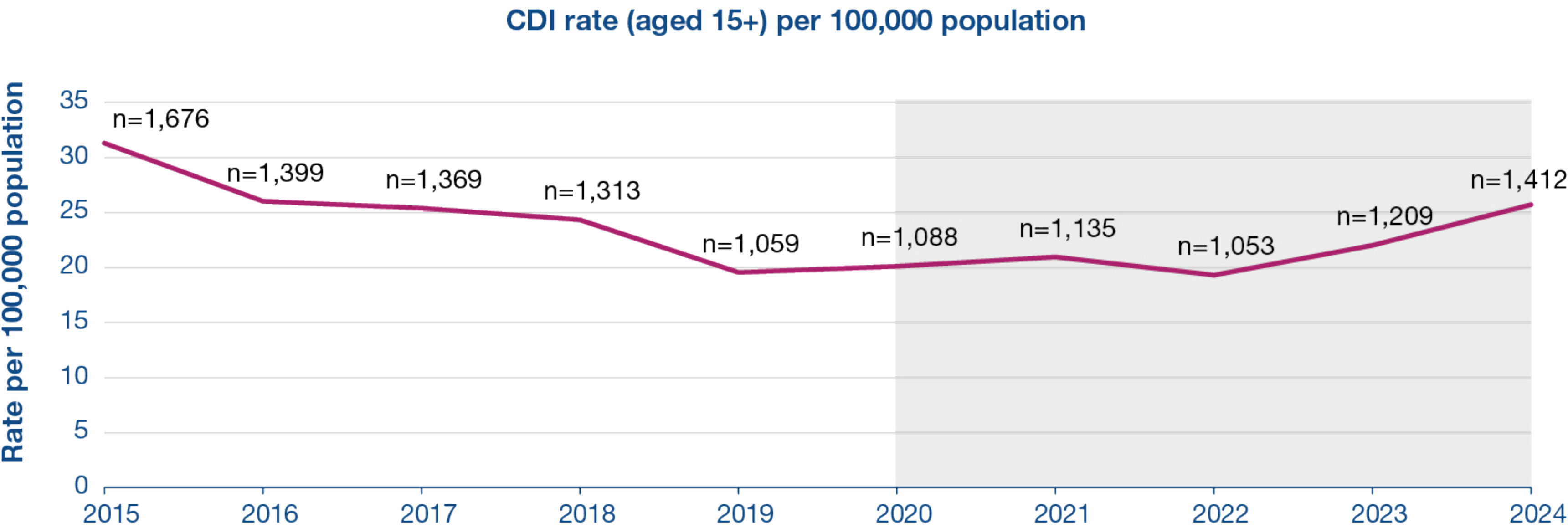
Clostridioides difficile infection

Epidemiological data

In **2024**, there were **1,412** cases of *Clostridioides difficile* infection (CDI) reported in **patients aged 15 years and older** in **Scotland**, compared to **1,209** cases in **2023**.

The **annual incidence rate** was **25.7** per 100,000 population. There has been a **16.8% increase** in the **rate** between **2023** and **2024**.

The **rate** in 2024 was **27.9% higher** compared to 2020.　　　　**No linear trend** over the **past five years** was observed.

CDI rate (aged 15+) per 100,000 population

Rate per 100,000 population

n=1,676
n=1,399
n=1,369
n=1,313
n=1,059
n=1,088
n=1,135
n=1,053
n=1,209
n=1,412

35
30
25
20
15
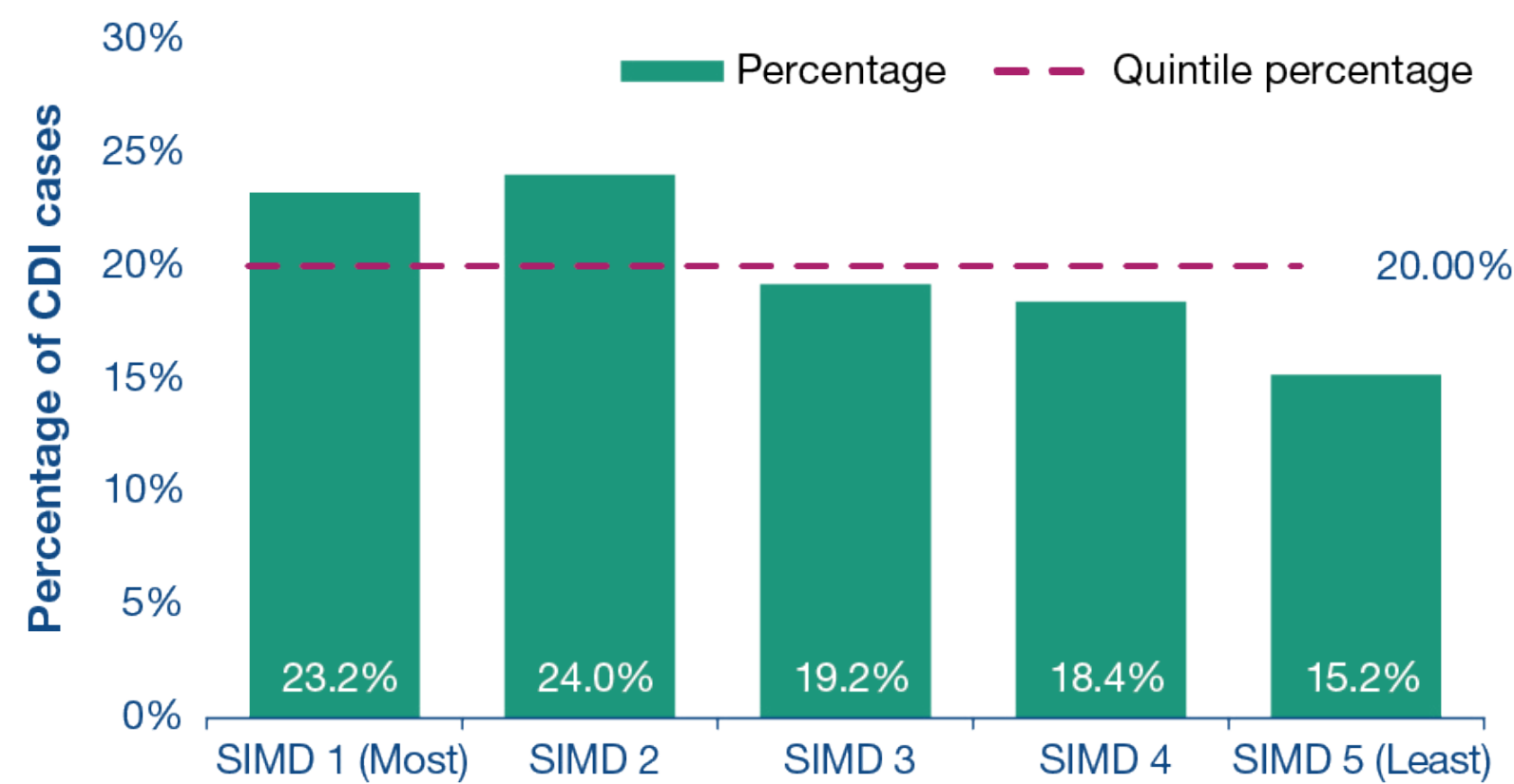10
5
0

2015　2016　2017　2018　2019　2020　2021　2022　2023　2024

Note: Grey shaded area highlights the period used to test for the five year linear trend. Data for ten years of the surveillance programme is available to aid interpretation. More information on data sources and methods is available in the metadata.
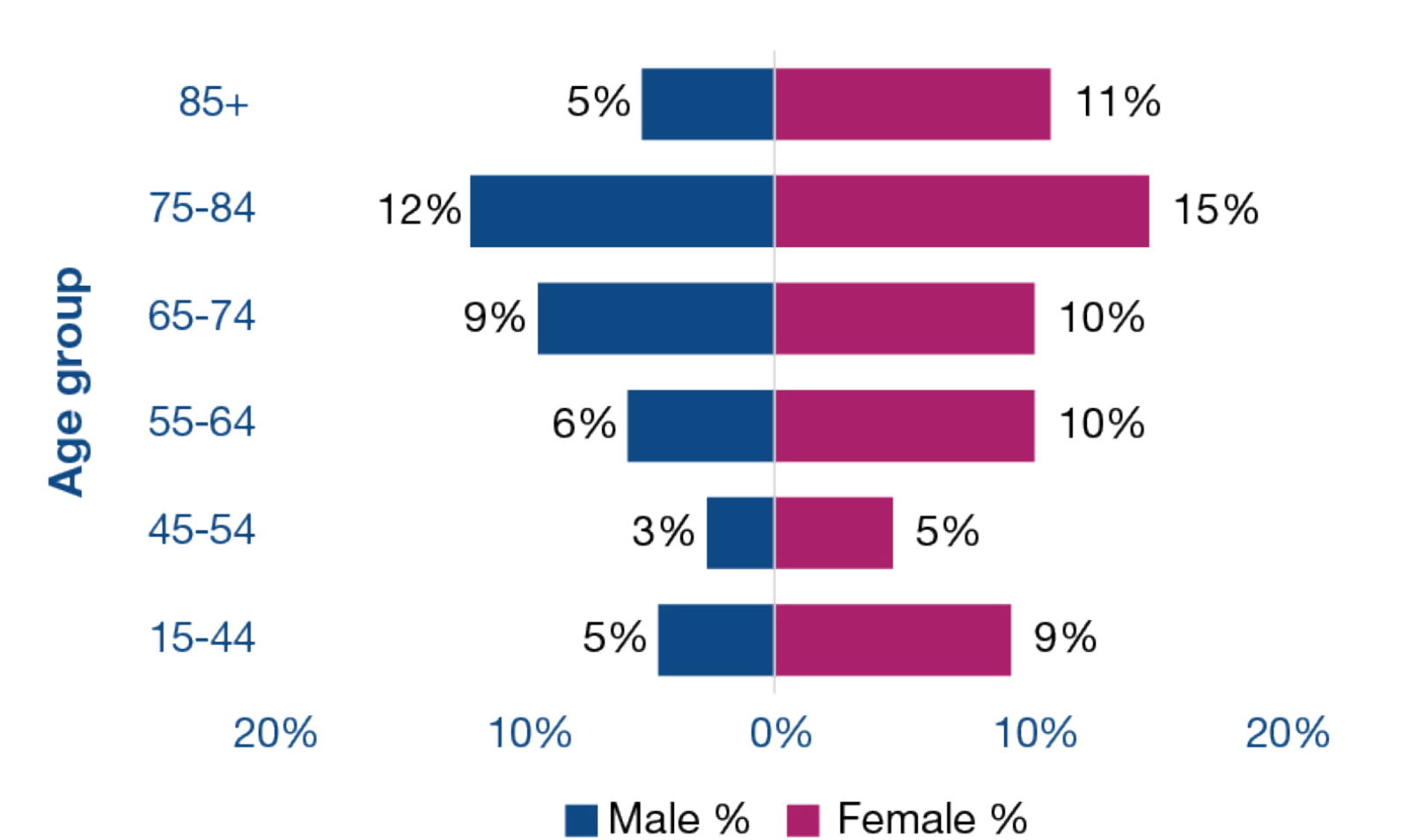
Health inequalities and demographics

In **2024**, **47.2%** of **CDI cases** occured among **individuals living in the 40% most deprived areas of Scotland**.

CDI cases per Scottish Index of Multiple Deprivation (SIMD) quintile in 2024

Legend: ■ Percentage - - Quintile percentage

- SIMD 1 (Most): 23.2%
- SIMD 2: 24.0%
- SIMD 3: 19.2%
- SIMD 4: 18.4%
- SIMD 5 (Least): 15.2%
- Quintile percentage: 20.00%

In **2024**, **60.3%** of **CDI cases** were **female** and **62.6%** were in **people aged 65 and over**.

Age and sex of CDI cases in 2024

Age group	Male %	Female %
85+	5%	11%
75-84	12%	15%
65-74	9%	10%
55-64	6%	10%
45-54	3%	5%
15-44	5%	9%

Origin of infection

In **2024**, **73.2%** of **CDI** cases were **healthcare associated infection (HCAI)**. The **percentage** has **remained unchanged** between **2023** and **2024.**

CDI cases by origin of infection (healthcare or community associated)
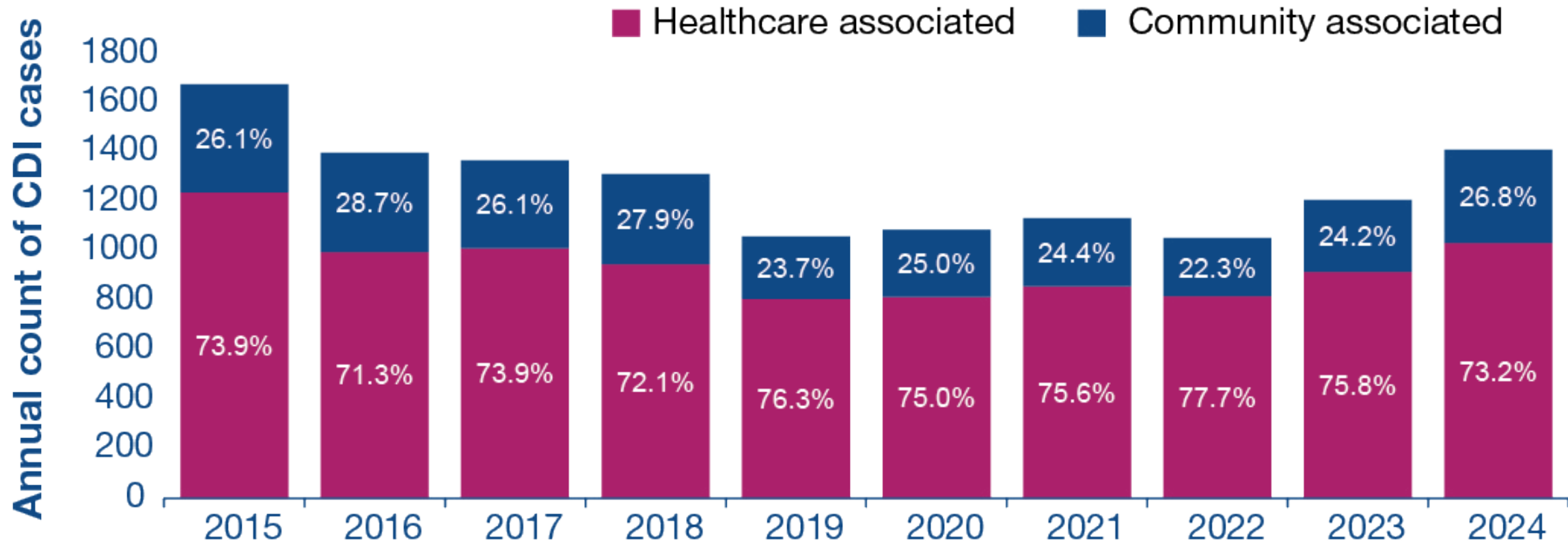
Legend: ■ Healthcare associated ■ Community associated

Year	Healthcare	Community
2015	73.9%	26.1%
2016	71.3%	28.7%
2017	73.9%	26.1%
2018	72.1%	27.9%
2019	76.3%	23.7%
2020	75.0%	25.0%
2021	75.6%	24.4%
2022	77.7%	22.3%
2023	75.8%	24.2%
2024	73.2%	26.8%

Note: Healthcare associated infections include hospital acquired infections. See metadata for definitions of healthcare and community associated infections. More information on data sources and methods is available in the metadata.

Healthcare associated CDI

There were **1,034 cases** in patients aged **15 years and older** in **2024**.

The **annual incidence rate** was **16.5** per 100,000 bed days.

There has been a **12.0% increase** in the **rate** between **2023** and **2024**.

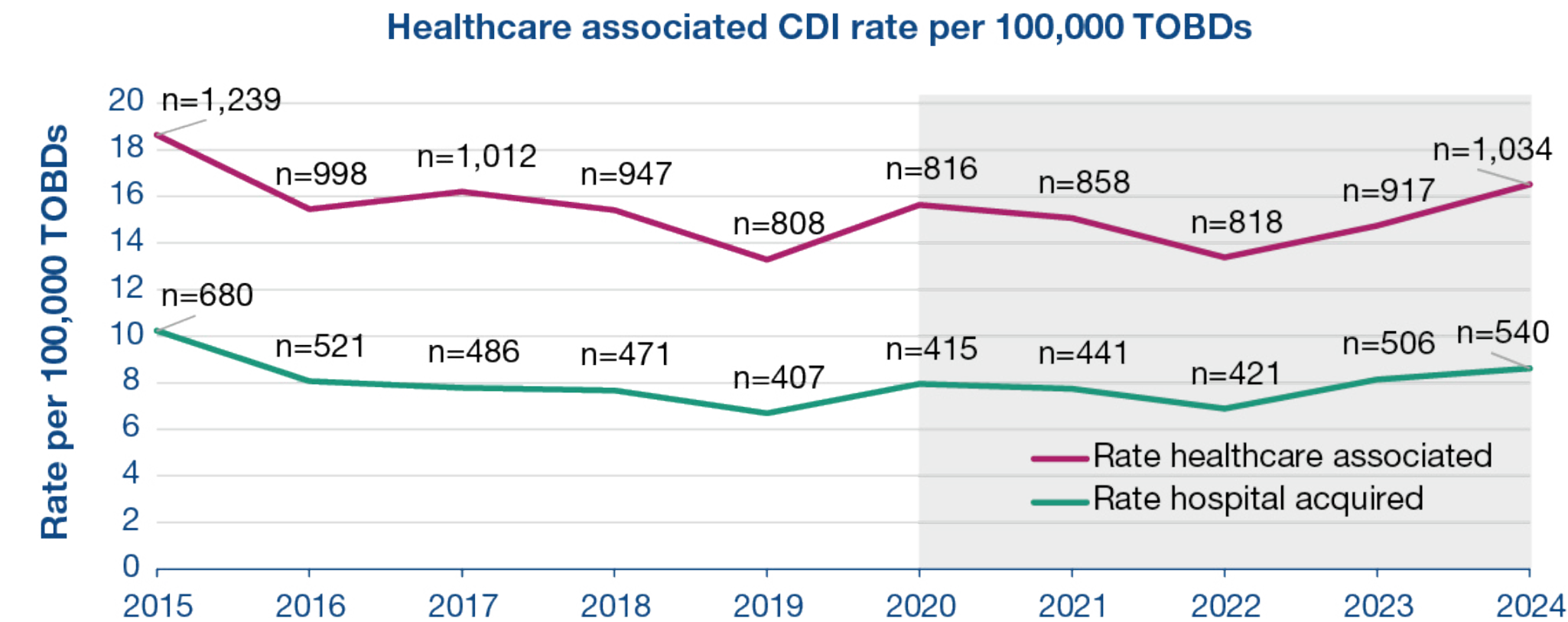The **five year trend** has **remained stable**.

Hospital acquired CDI

Of all healthcare associated **CDI** cases, **540 (52.2%)** were **hospital acquired infections (HAI)**.

The **annual incidence rate** was **8.6** per 100,000 bed days.

The **rate** has **remained unchanged** between **2023** and **2024**.

The **five year trend** has **remained stable**.

Healthcare associated CDI rate per 100,000 TOBDs

n=1,239
n=998
n=1,012
n=947
n=816
n=858
n=917
n=818
n=1,034
n=808
n=680
n=521
n=486
n=471
n=415
n=441
n=506
n=540
n=421
n=407

Rate per 100,000 TOBDs

— Rate healthcare associated
— Rate hospital acquired

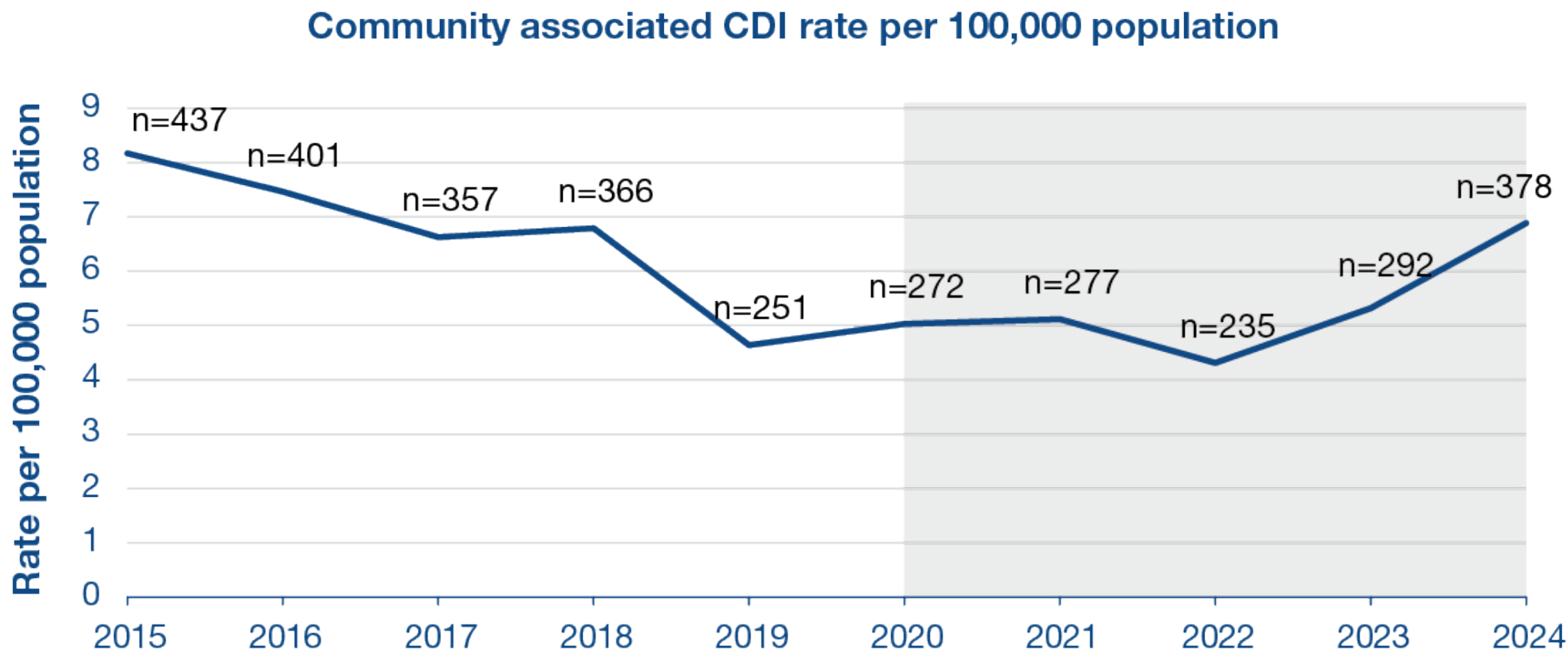2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

Community associated CDI

There were **378 cases** in **patients aged 15 years and older** in **2024**. The **annual incidence rate** was **6.9** per 100,000 population.

There has been a **29.5% increase** in the **rate** between **2023** and **2024**.

The **rate** in **2024** was **36.9% higher** compared to **2020**. **No linear trend** over the **past five years** was observed.

Community associated CDI rate per 100,000 population

Rate per 100,000 population

n=437
n=401
n=357
n=366
n=251
n=272
n=277
n=235
n=292
n=378

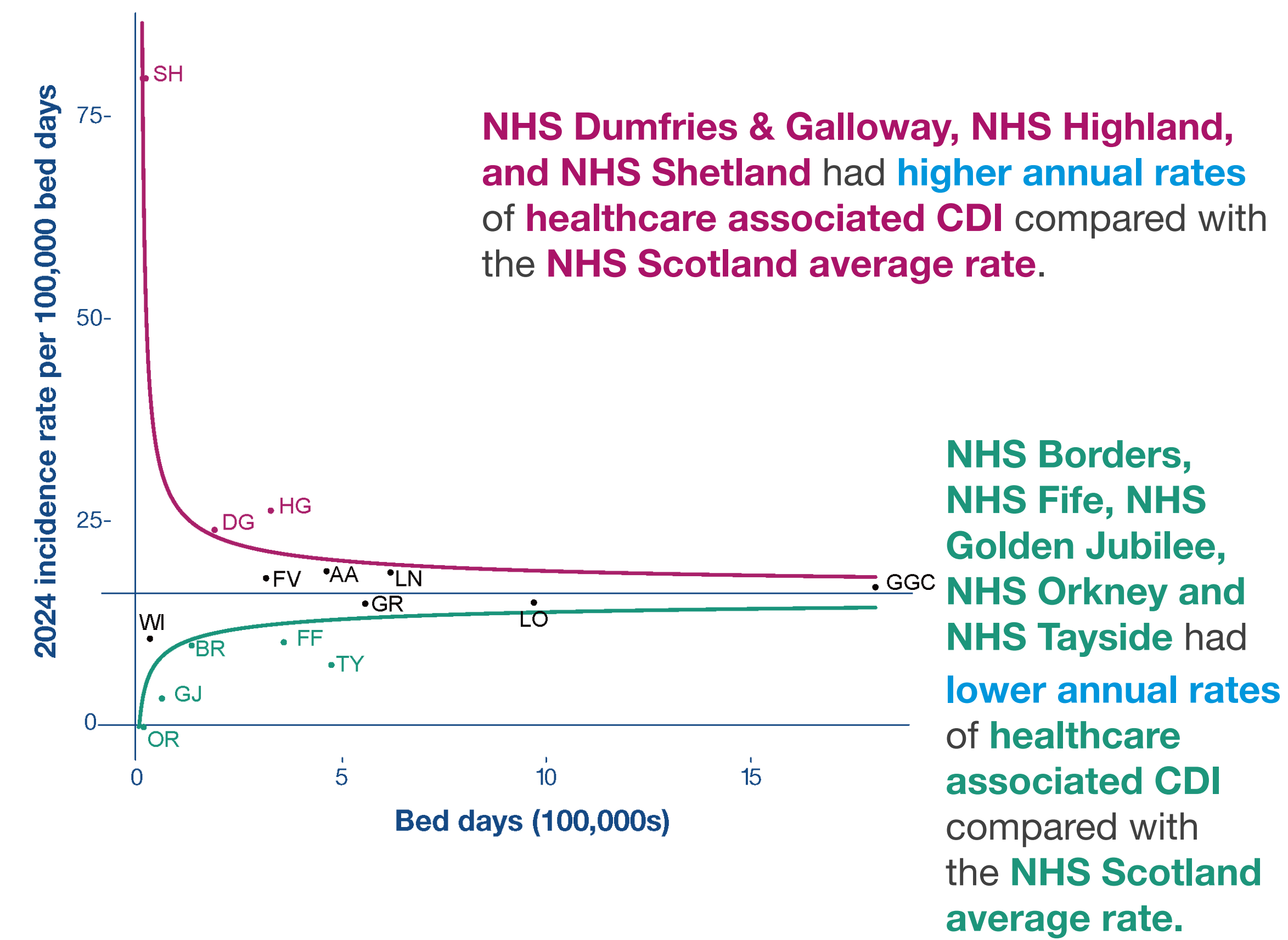2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

Note: Grey shaded area highlights the period used to test for the five year linear trend. Data for ten years of the surveillance programme is available to aid interpretation. More information on data sources and methods is available in the metadata.
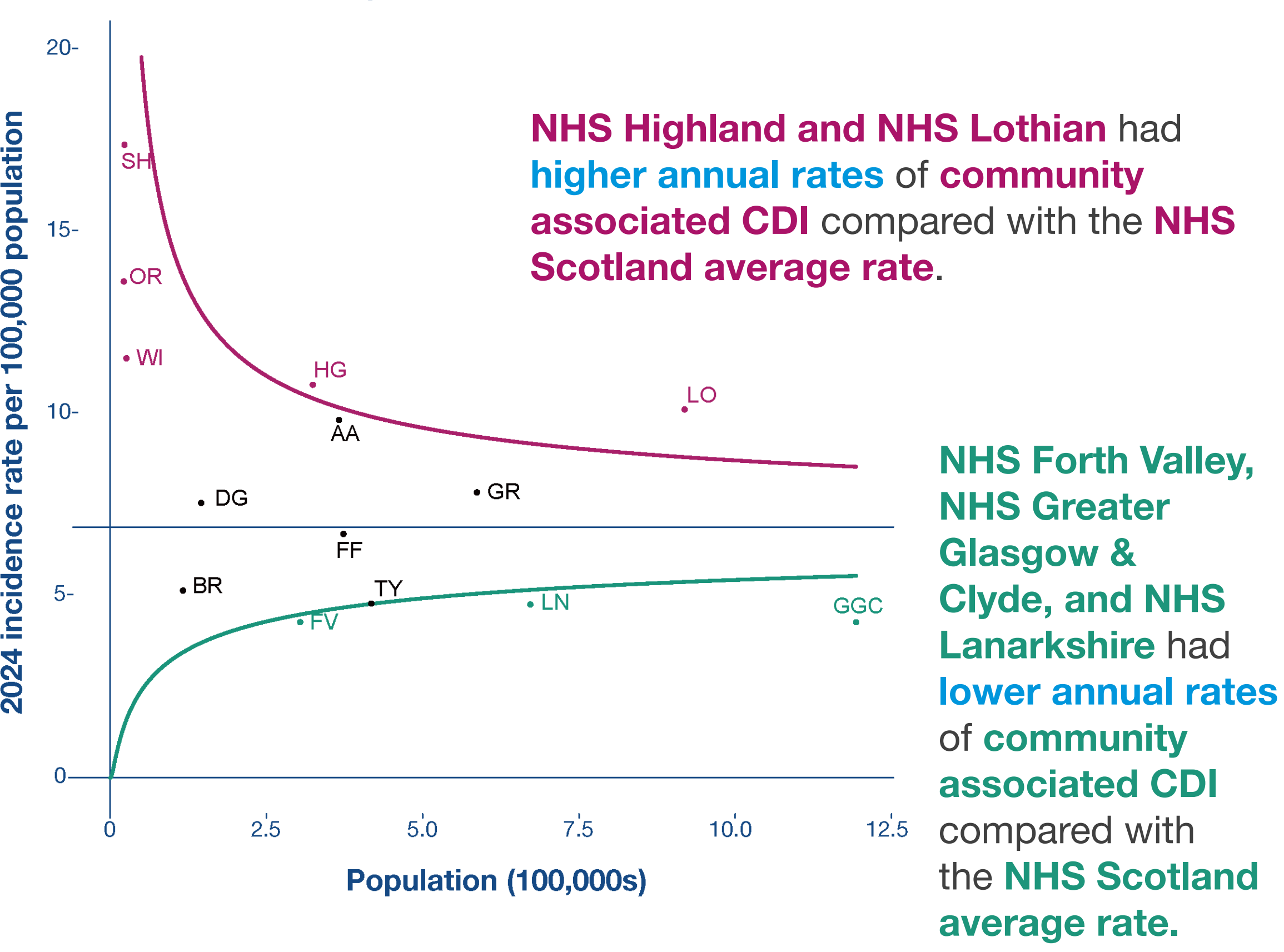
Variation by health board

Benchmarking data is essential to support local and national quality improvement initiatives. Annual **funnel plot analysis** is useful to demonstrate **the NHS Scotland boards** that are **higher or lower** than the **NHS Scotland annual rate** for quality improvement purposes.

NHS Scotland Boards CDI healthcare associated infection funnel plot 2024

NHS Dumfries & Galloway, NHS Highland, and NHS Shetland had **higher annual rates** of **healthcare associated CDI** compared with the **NHS Scotland average rate**.

NHS Borders, NHS Fife, NHS Golden Jubilee, NHS Orkney and NHS Tayside had **lower annual rates** of **healthcare associated CDI** compared with the **NHS Scotland average rate.**

NHS Board CDI community associated infection funnel plot 2024

NHS Highland and NHS Lothian had **higher annual rates** of **community associated CDI** compared with the **NHS Scotland average rate**.

NHS Forth Valley, NHS Greater Glasgow & Clyde, and NHS Lanarkshire had **lower annual rates** of **community associated CDI** compared with the **NHS Scotland average rate.**

Note: NHS board rates are not adjusted for differences in the patient population. More information on data sources and methods is available in the metadata.

Quarterly data exceedance reporting

NHS boards are required to submit improvement plans in response to **higher than average quarterly rates** of **healthcare or community associated CDI**, as identified through the underline exception reporting process.

Eight improvement plans were developed by **NHS boards** during **2024**, four in response to **higher than average quarterly rates** of **healthcare associated CDI**, and **four** in response to **higher than average quarterly rates** of **community associated CDI**.

In response to the national increase in the incidence of CDI in Scotland, ARHAI Scotland issued a Briefing Note to stakeholders to raise awareness and direct stakeholders to existing guidance and resources.

For further information please see the quarterly epidemiological reports.

All cause case fatality

In **2024**, the **30 day all cause case fatality rate** for **CDI** in **patients aged 15 years and older** was **10.1%**.
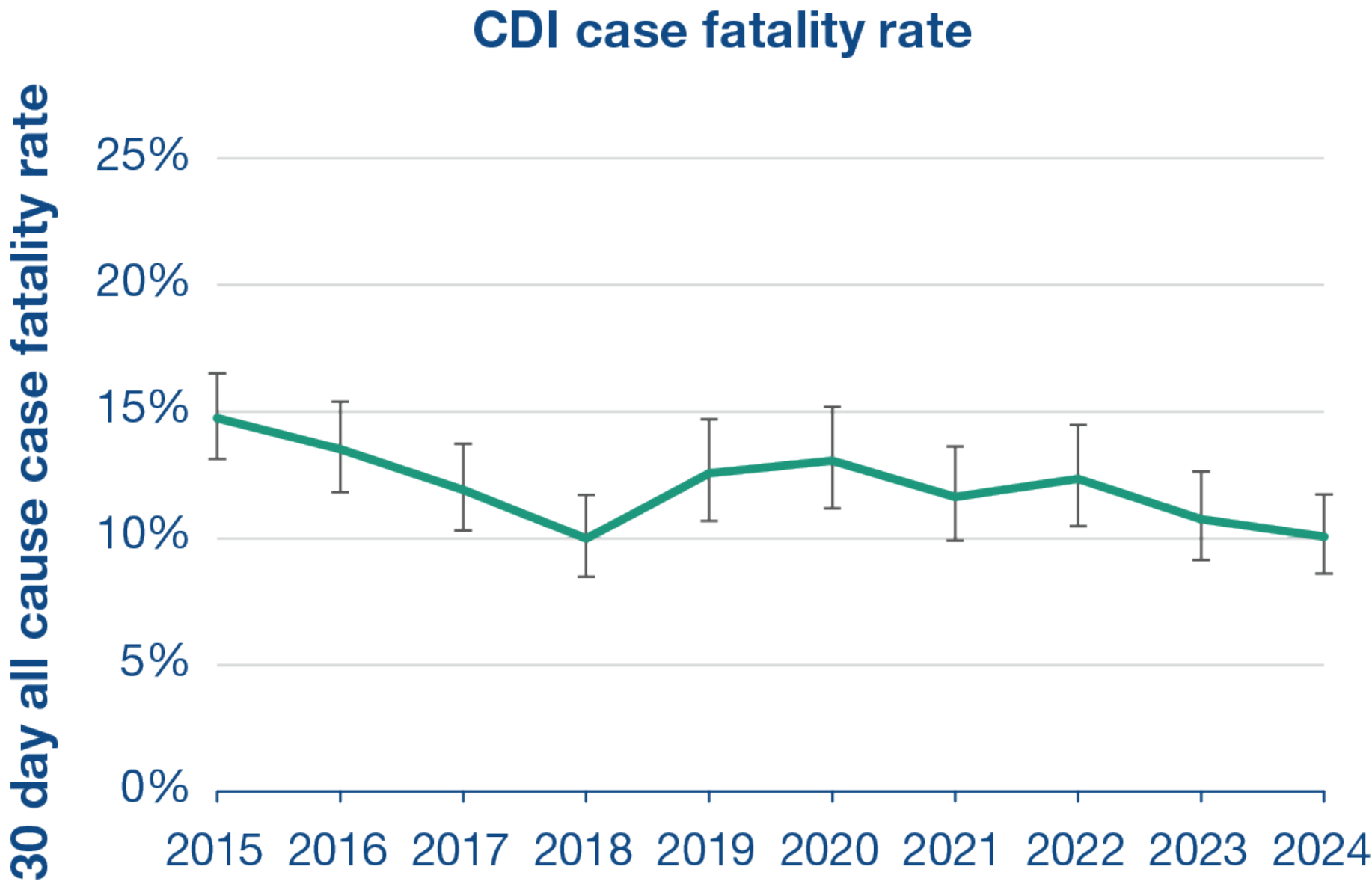
CDI case fatality rate

Note: Rates are not adjusted for differences in the patient population over time. More information on data sources and methods is available in the metadata.

Molecular epidemiological data

The **three most prevalent ribotypes (RT)** reported by **clinical surveillance** in **2024** were **RT 014/020/220 (14.1%)**, **RT 005/042/339 (13.8%)** and **RT 002/277 (11.6%)**.

The **three most prevalent RT** reported by the **snapshot surveillance scheme** in **2024** were **RT 014/020/220 (14.1%)**, **RT 005/042/339 (13.2%)** and **RT 015 (12.2%)**.
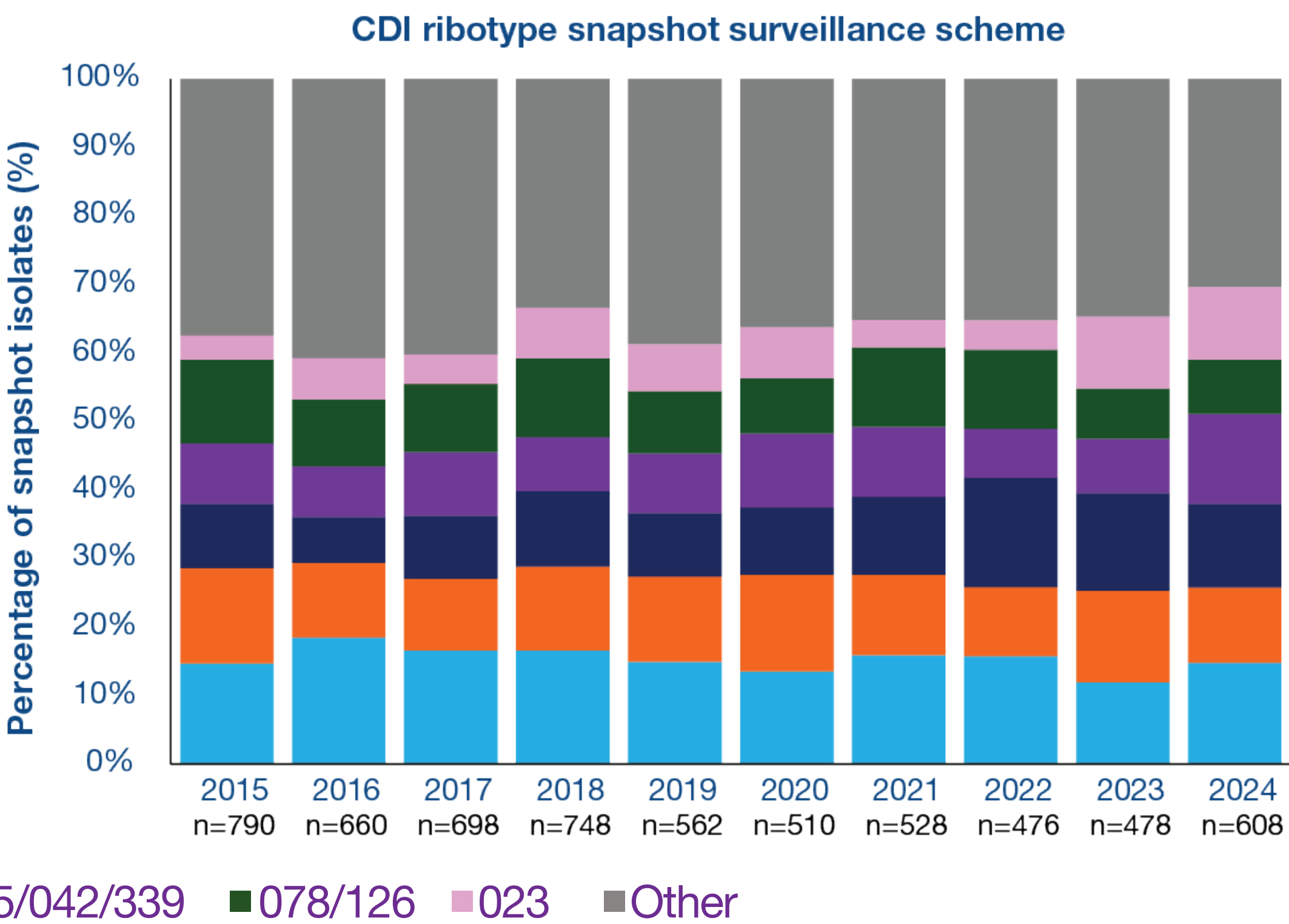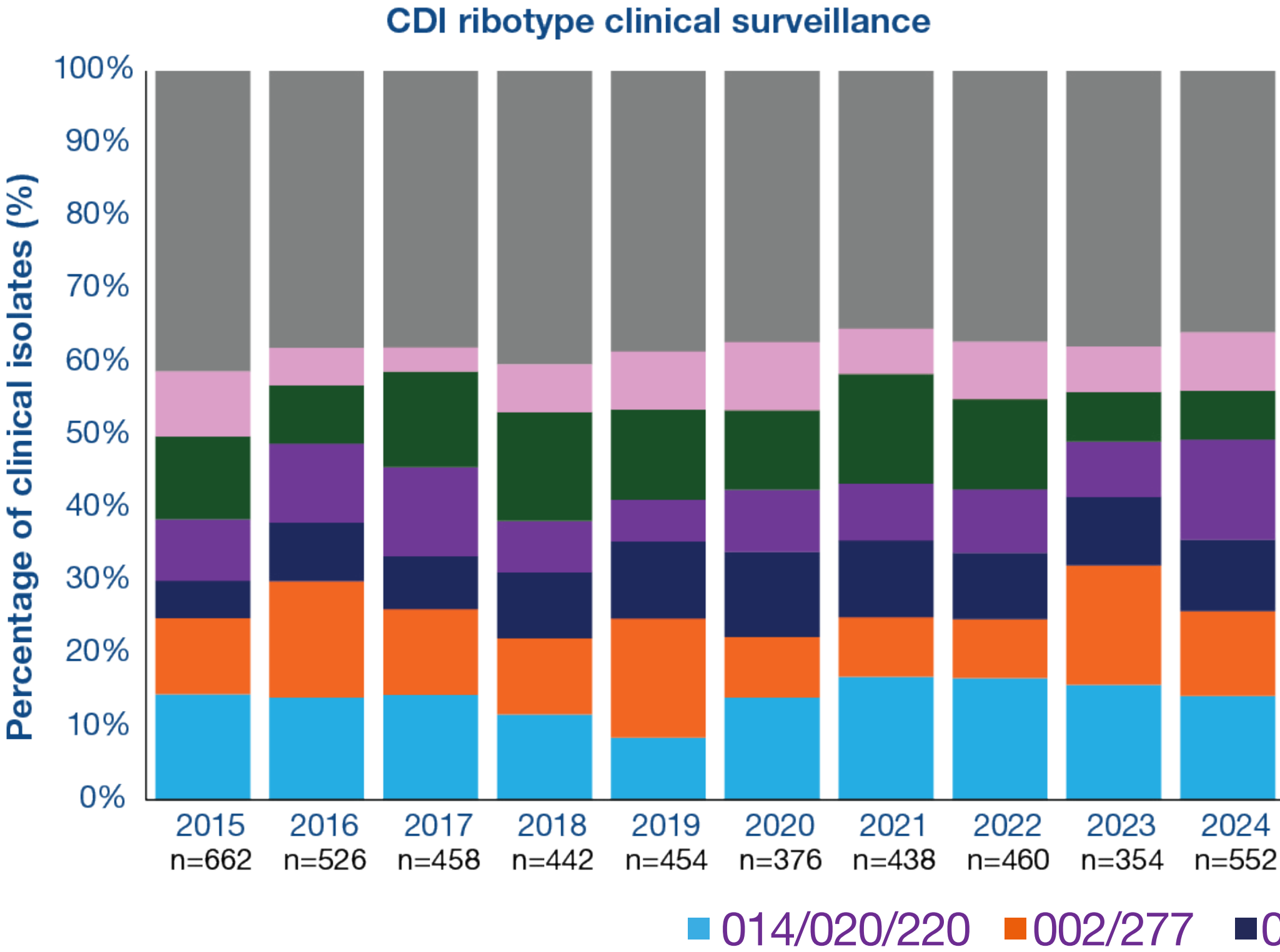

Note: These are inclusive of both healthcare and community associated CDI. Any ribotypes with an average reporting percentage of <3% were grouped in the OTHER category. Due to a shortage of DNA polymerase in 2022 and early 2023, *C. difficile* ribotypes were inferred from whole genome sequencing (WGS) derived Multi-Locus Sequence Typing (MLST), therefore ribotypes belonging to the same sequence type have been grouped for analysis. Polymerase chain reaction (PCR) ribotyping was resumed in early 2023. More information on data sources and methods is available in the metadata.

Staphylococcus aureus bacteraemia

Epidemiological data

In **2024**, there were **1,715** cases of *Staphylococcus aureus* bacteraemia (SAB) reported in **Scotland**, compared to **1,712** cases in **2023**.
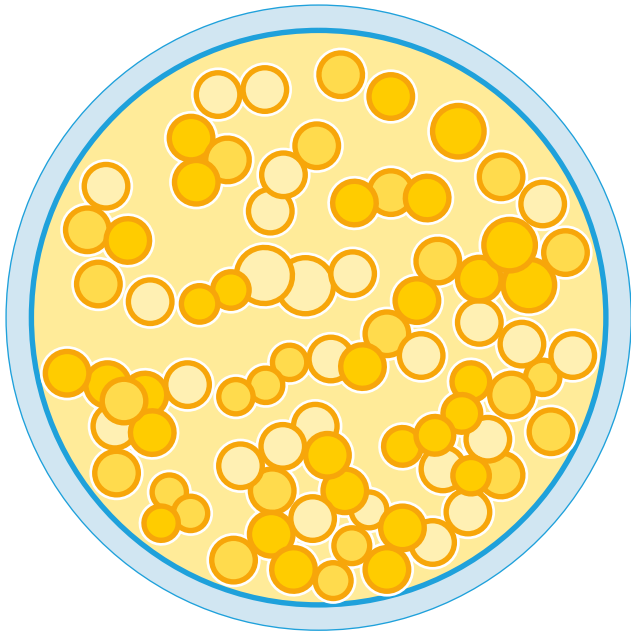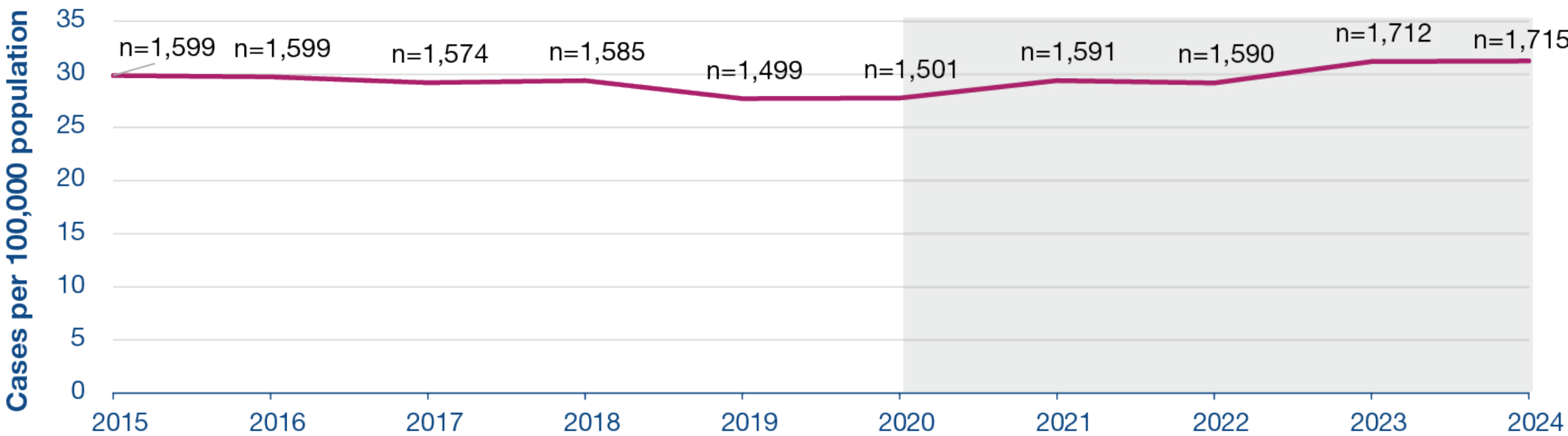
The **annual incidence rate** was **31.2** per 100,000 population.

The rate **remained unchanged** between **2023** and **2024**.

The **five year trend** has **increased** with a **3.0%** average increase each year.

SAB rate per 100,000 population

Cases per 100,000 population

n=1,599 n=1,599 n=1,574 n=1,585 n=1,499 n=1,501 n=1,591 n=1,590 n=1,712 n=1,715

2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

Note: Grey shaded area highlights the period used to test for the five year linear trend. Data for ten years of the surveillance programme is available to aid interpretation. More information on data sources and methods is available in the metadata.

96.4% (n = 1,654) of all **SAB** cases were **meticillin-sensitive *Staphylococcus aureus* (MSSA)**.

3.6% (n = 56) of all **SAB** cases were **meticillin-resistant *Staphylococcus aureus* (MRSA)**.

The **rate** of **MSSA** bacteraemia in **2024** was **30.1** per 100,000 population.

The **rate remained unchanged** between **2023** and **2024**.

There has been a **2.8%** year-on-year **increase** over the **last five years**.

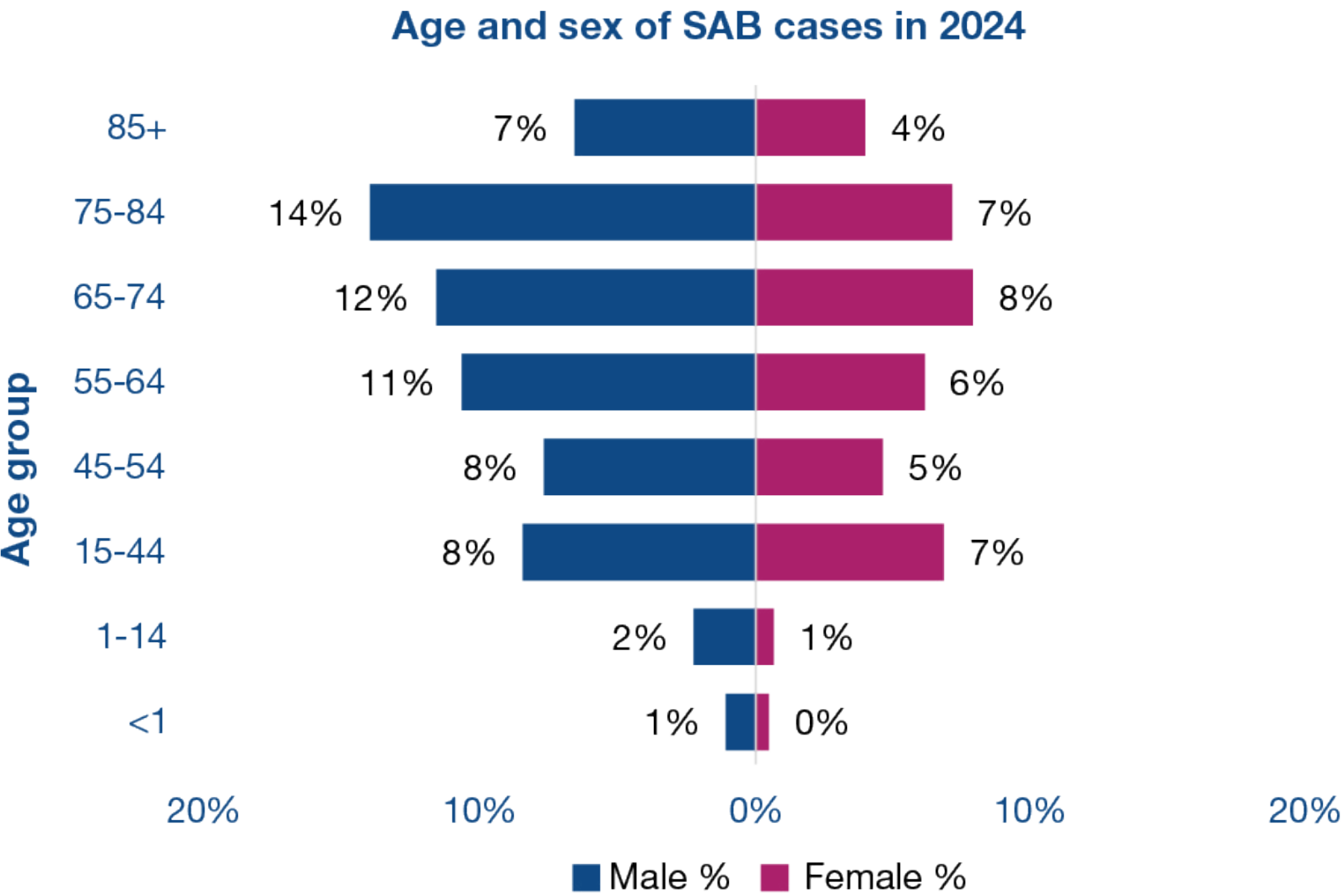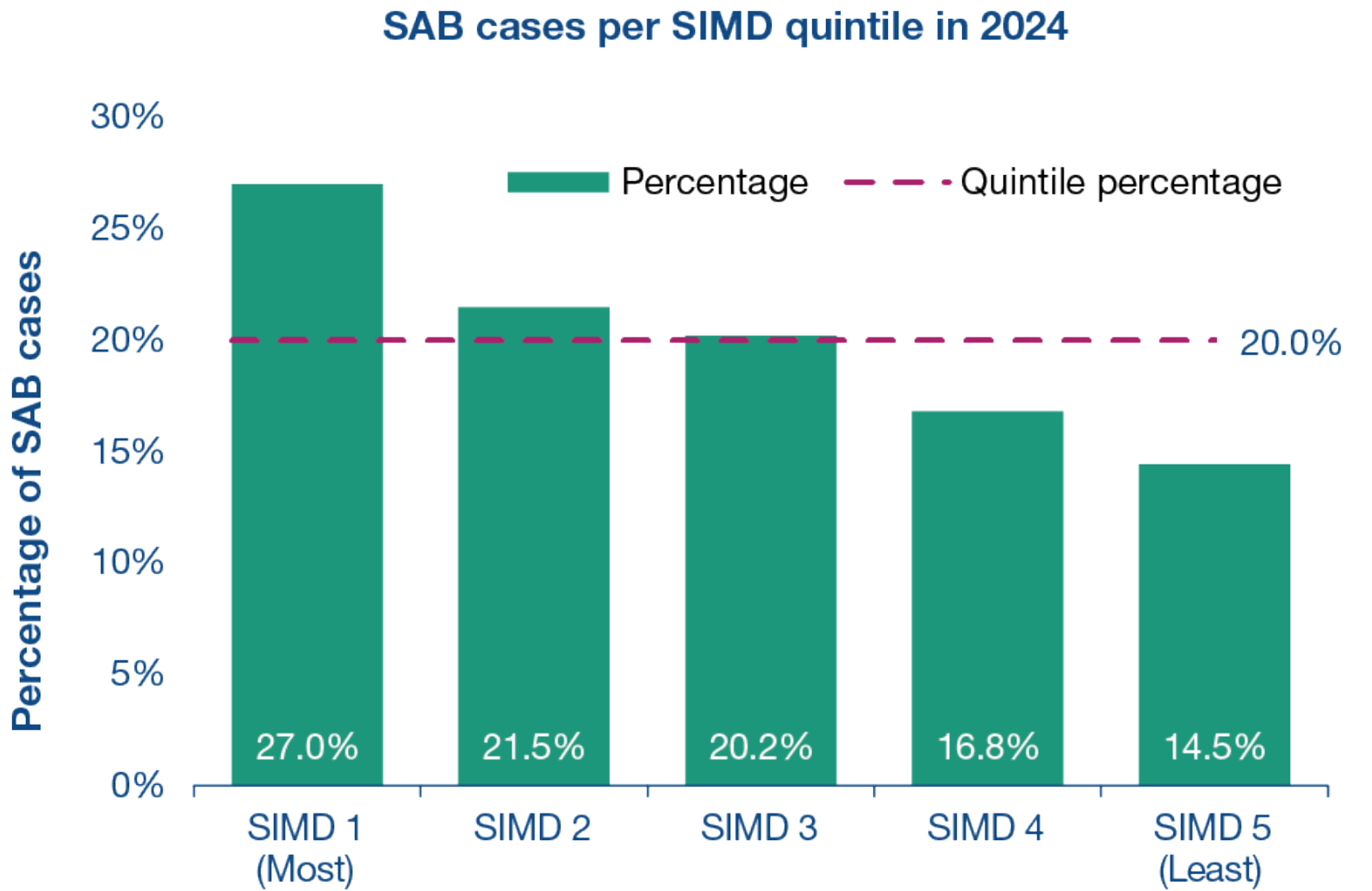The **rate** of **MRSA** bacteraemia in **2024** was **1.1** per 100,000 population.

The **rate remained unchanged** between **2023** and **2024** and over the **last five years**.

Health inequalities and demographics

In **2024**, **48.5%** of **SAB cases** occured among **individuals living in the 40% most deprived areas of Scotland**.
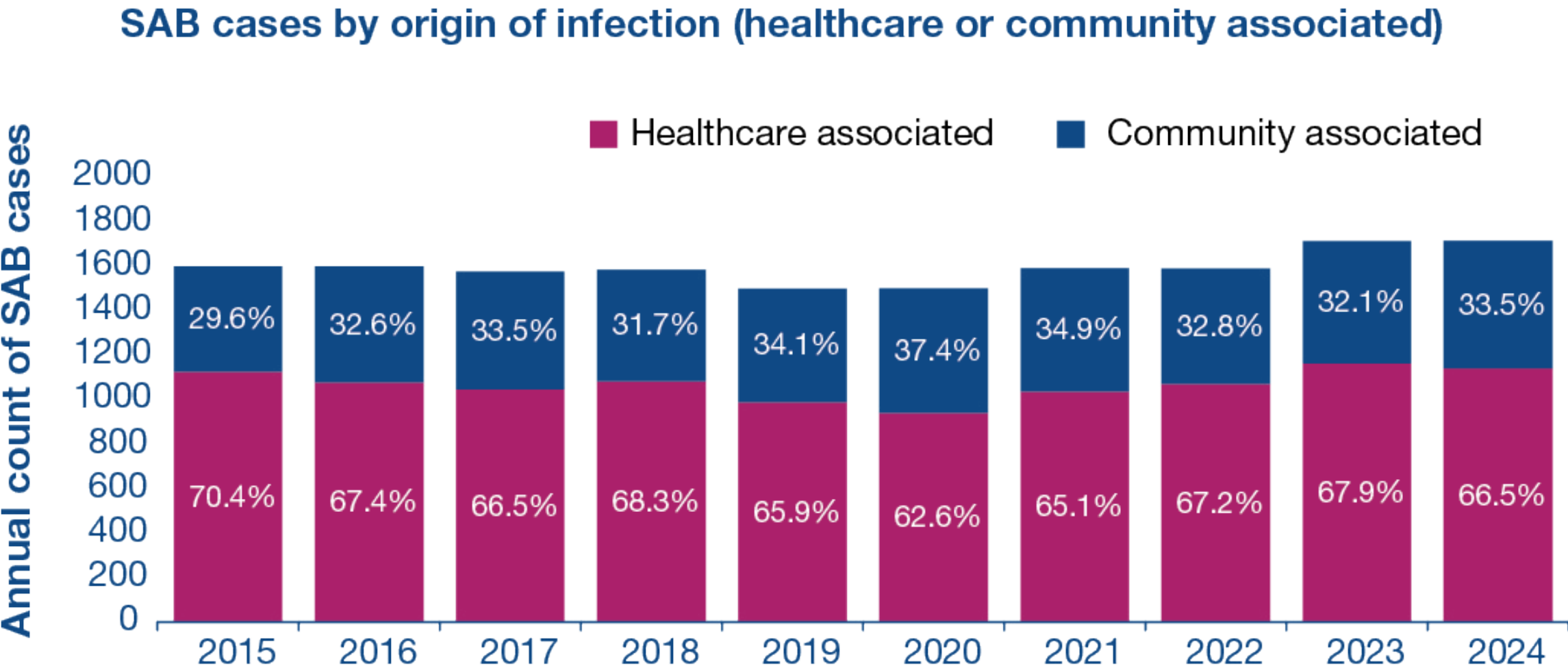
SAB cases per SIMD quintile in 2024

Legend: Percentage — Quintile percentage

20.0%

SIMD 1 (Most)	SIMD 2	SIMD 3	SIMD 4	SIMD 5 (Least)
27.0%	21.5%	20.2%	16.8%	14.5%

In **2024**, **37.6%** of **SAB cases** were **female** and **51.1%** were in people **aged 65 and over.**

Age and sex of SAB cases in 2024

Age group	Male %	Female %
85+	7%	4%
75-84	14%	7%
65-74	12%	8%
55-64	11%	6%
45-54	8%	5%
15-44	8%	7%
1-14	2%	1%
<1	1%	0%

Origin of infection

In **2024**, **66.5%** of **SAB** cases were **healthcare associated.**

The percentage has **remained unchanged** between **2023** and **2024**.

SAB cases by origin of infection (healthcare or community associated)

Legend: Healthcare associated — Community associated

Year	Community associated	Healthcare associated
2015	29.6%	70.4%
2016	32.6%	67.4%
2017	33.5%	66.5%
2018	31.7%	68.3%
2019	34.1%	65.9%
2020	37.4%	62.6%
2021	34.9%	65.1%
2022	32.8%	67.2%
2023	32.1%	67.9%
2024	33.5%	66.5%

Note: Healthcare associated infections include hospital acquired infections. See metadata for definitions of healthcare and community associated infections. More information on data sources and methods is available in the metadata.

Healthcare associated SAB

There were **1,141** cases in **2024**.

The **annual incidence rate** was **18.2** per 100,000 bed days.

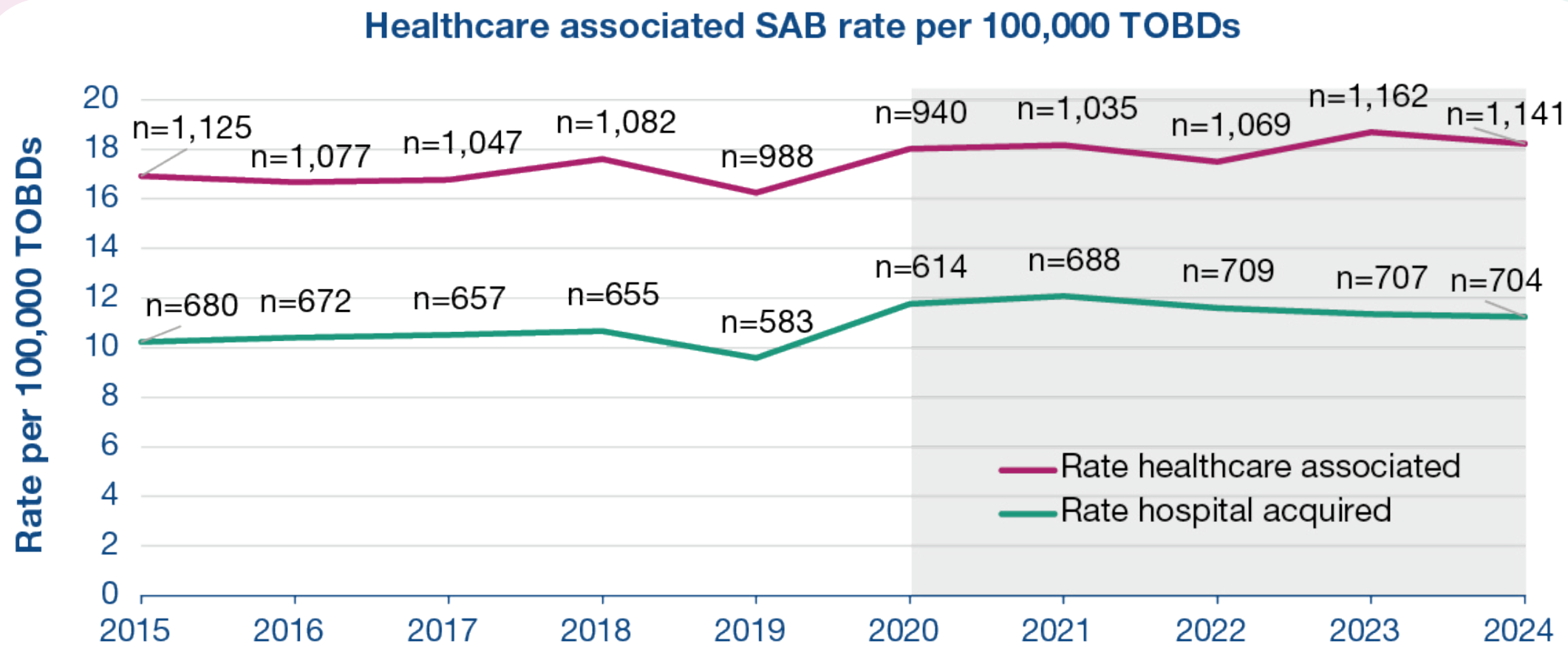The rate has **remained unchanged** between **2023** and **2024**.

The **five year trend** has **remained stable**.

Hospital acquired SAB

Of all healthcare associated **SAB** cases, **704 (61.7%)** were **hospital acquired infections**. The **annual incidence rate** was **11.2** per 100,000 bed days.

The **rate** has **remained unchanged** between **2023** and **2024**.

The **five year trend** has **remained stable**.

Healthcare associated SAB rate per 100,000 TOBDs

Rate per 100,000 TOBDs

- Rate healthcare associated
- Rate hospital acquired

Healthcare associated n values: n=1,125, n=1,077, n=1,047, n=1,082, n=988, n=940, n=1,035, n=1,069, n=1,162, n=1,141

Hospital acquired n values: n=680, n=672, n=657, n=655, n=583, n=614, n=688, n=709, n=707, n=704

Years: 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024
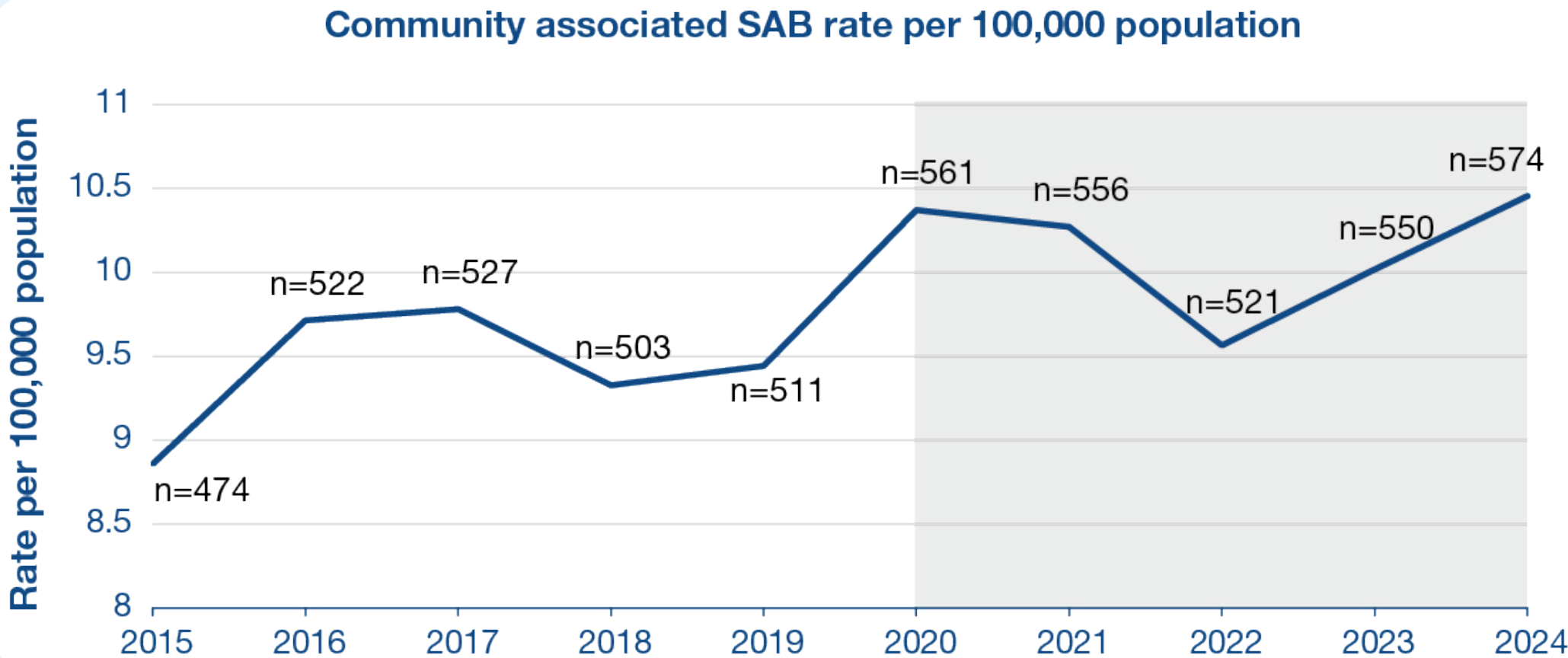
Community associated SAB

There were **574** cases of **community associated SAB** in **2024**.

The **annual incidence rate** was **10.5** per 100,000 population.

The **rate** has **remained unchanged** between **2023** and **2024**.

The **five year trend** has **remained stable**.

Community associated SAB rate per 100,000 population

Rate per 100,000 population

n values: n=474, n=522, n=527, n=503, n=511, n=561, n=556, n=521, n=550, n=574

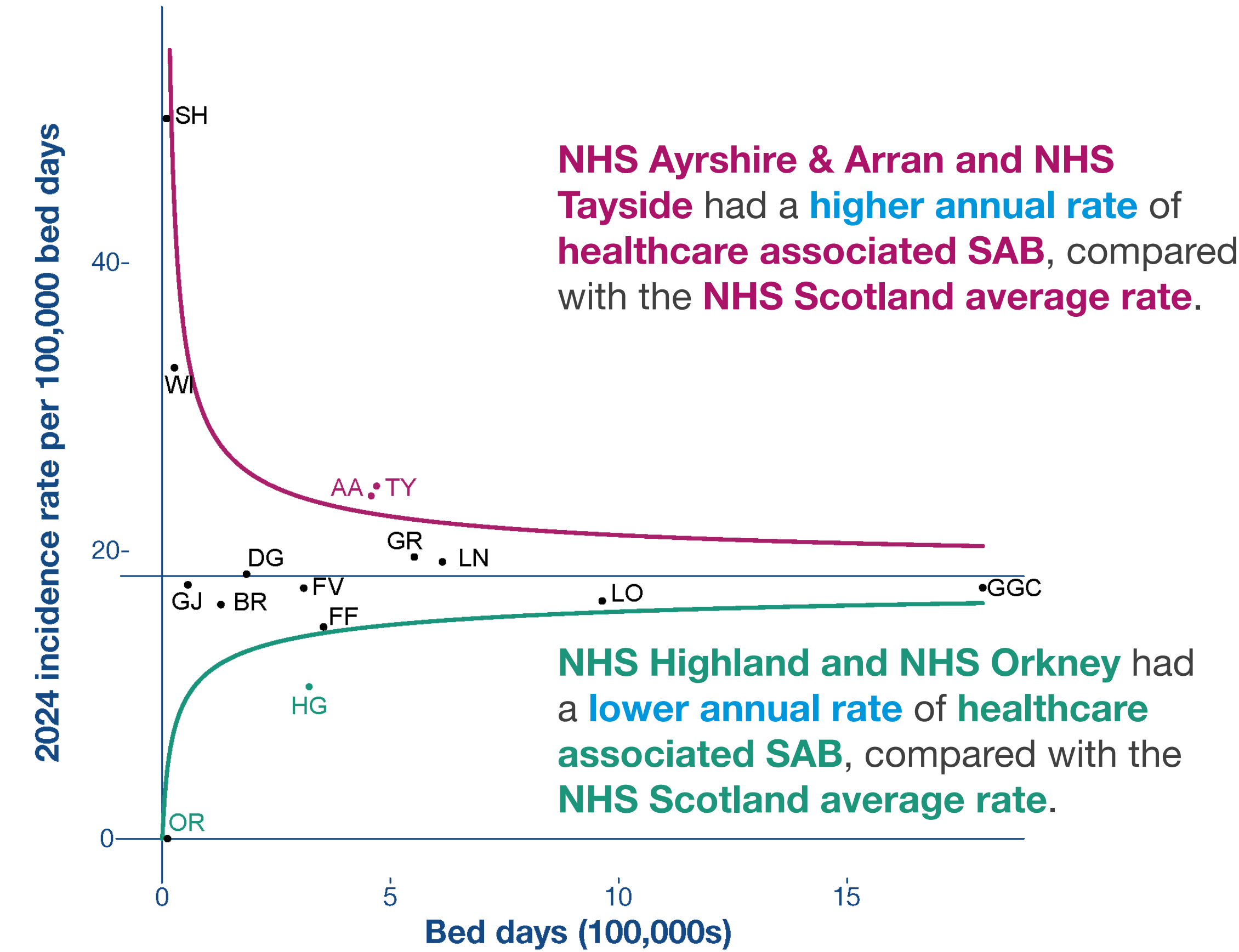Years: 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024

Note: Grey shaded area highlights the period used to test for the five year linear trend. Data for ten years of the surveillance programme is available to aid interpretation. More information on data sources and methods is available in the metadata.
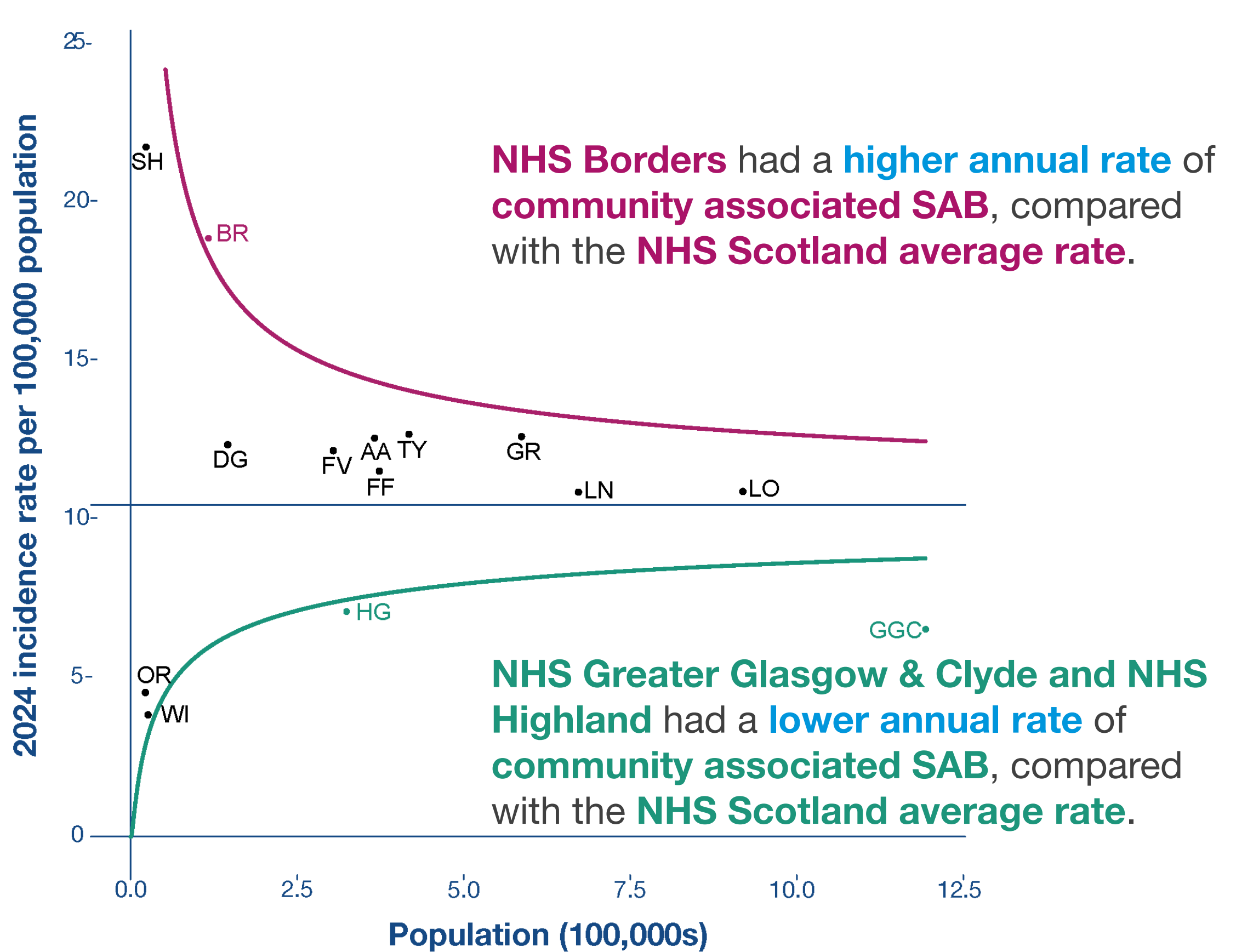
Variation by health board

Benchmarking data is essential to support local and national quality improvement initiatives. Annual **funnel plot analysis** is useful to demonstrate the **NHS Scotland boards** that are **higher or lower** than the **NHS Scotland annual rate**.

NHS Scotland boards SAB healthcare associated infection funnel plot 2024

NHS Ayrshire & Arran and NHS Tayside had a **higher annual rate** of **healthcare associated SAB**, compared with the **NHS Scotland average rate**.

NHS Highland and NHS Orkney had a **lower annual rate** of **healthcare associated SAB**, compared with the **NHS Scotland average rate**.

NHS Scotland board SAB community associated infection funnel plot 2024

NHS Borders had a **higher annual rate** of **community associated SAB**, compared with the **NHS Scotland average rate**.

NHS Greater Glasgow & Clyde and NHS Highland had a **lower annual rate** of **community associated SAB**, compared with the **NHS Scotland average rate**.

Note: NHS board rates are not adjusted for differences in the patient population. More information on data sources and methods is available in the metadata.

Quarterly data exceedance reporting

NHS boards are required to submit improvement plans in response to **higher than average quarterly rates** of **healthcare or community associated SAB**, as identified through the <u>exception reporting process</u>.
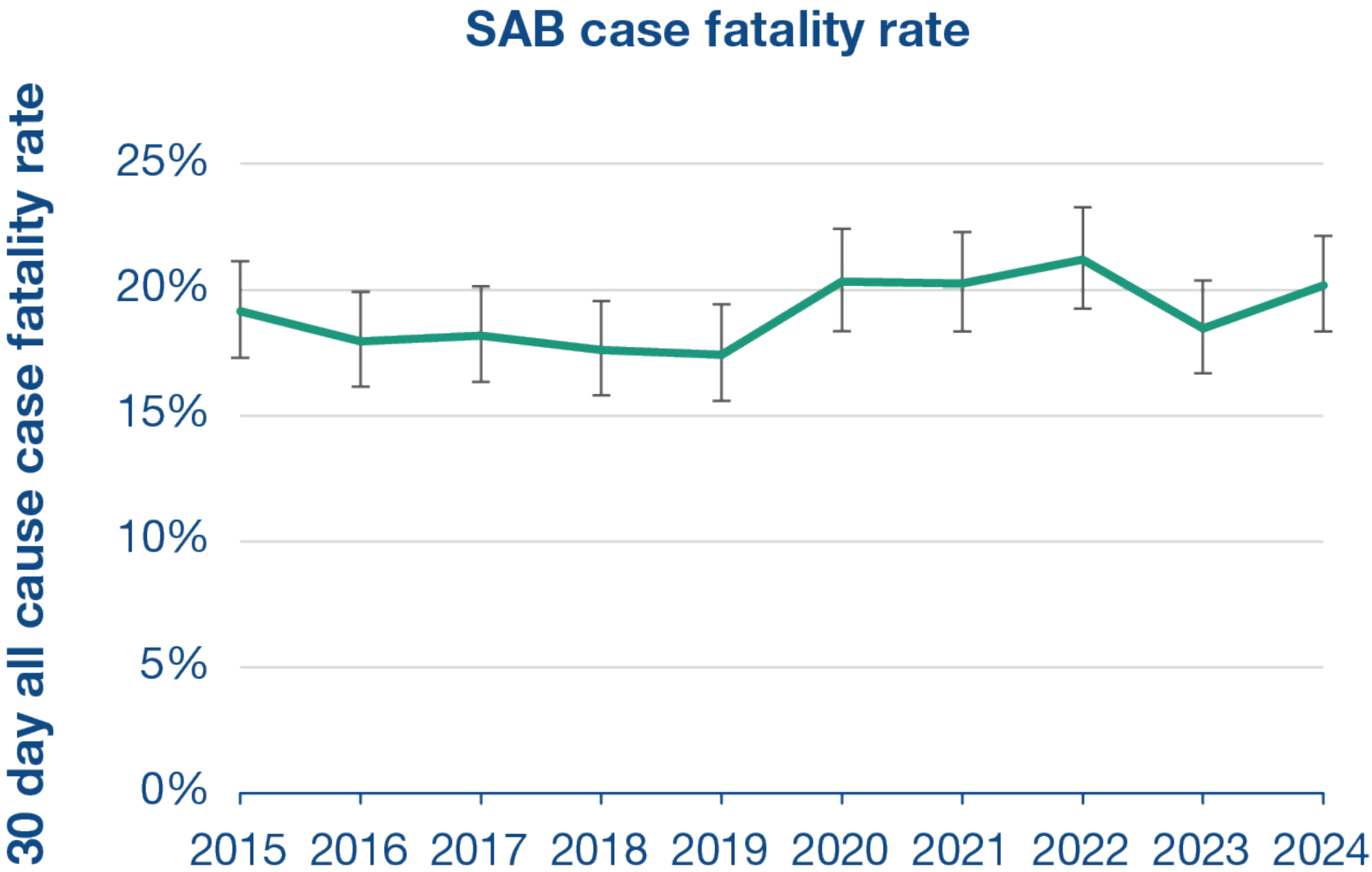
One improvement plan was developed by an NHS board during 2024 in response to **higher than average quarterly rates** of **healthcare associated SAB**.

For further information please see the <u>quarterly epidemiological reports</u>.

All cause case fatality

In **2024**, the **30 day all cause case fatality rate** for **SAB patients** was **20.2%**.

SAB case fatality rate

Note: Rates are not adjusted for differences in the patient population over time. More information on data sources and methods is available in the metadata.

Primary source

Surveillance of primary source provides local and national data for quality improvement and interventions.

In **2024**, the **primary source** for **healthcare associated SAB** were known for **78.2%** of cases.

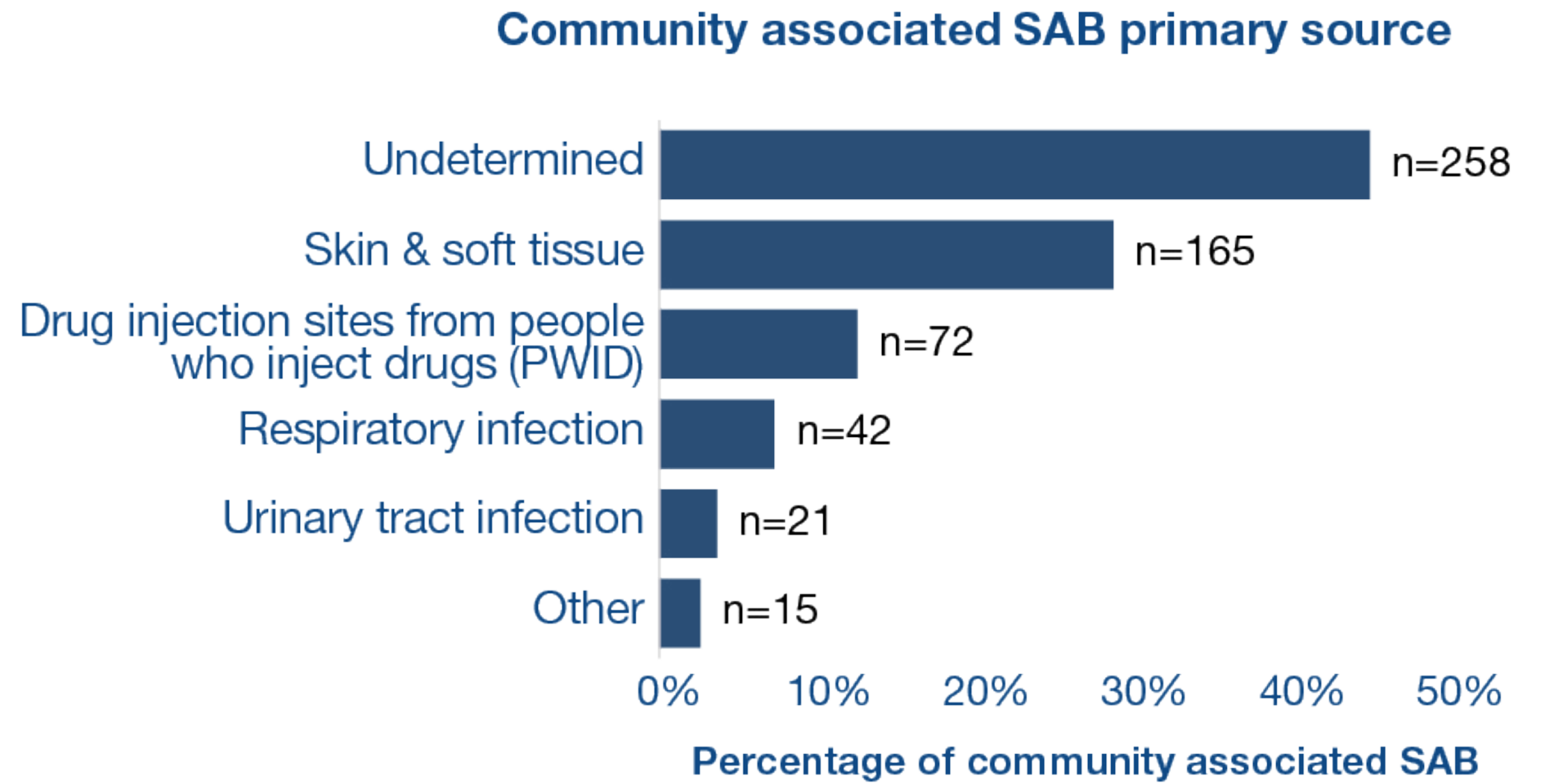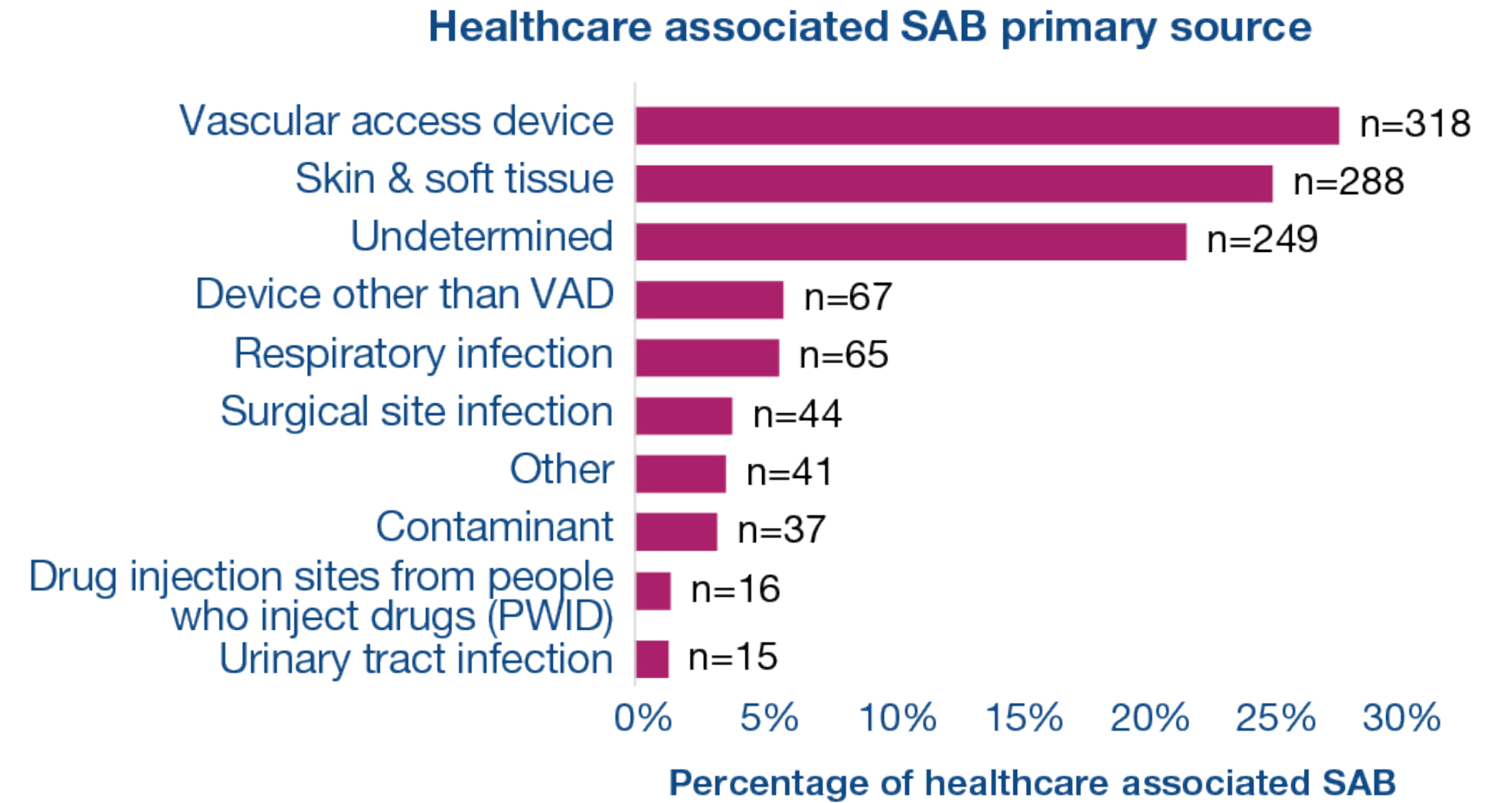The most common **primary source** (as determined by the clinical team) include:

27.9% Vascular access device (VAD)
25.3% Skin and soft tissue

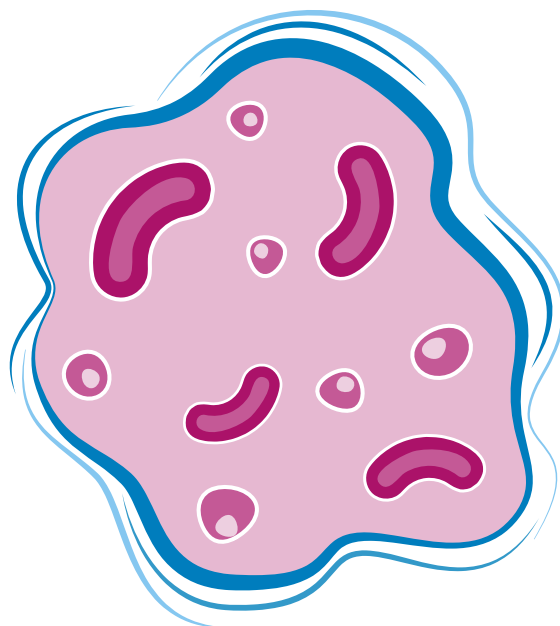In **2024**, the **primary source** for **community associated SAB** were known for **55.0%** of cases.

The most common **primary source** (as determined by the clinical team) include:

28.8% Skin and soft tissue
12.6% Drug injection sites from people who inject drugs (PWID)

Healthcare associated SAB primary source

Primary source	n
Vascular access device	n=318
Skin & soft tissue	n=288
Undetermined	n=249
Device other than VAD	n=67
Respiratory infection	n=65
Surgical site infection	n=44
Other	n=41
Contaminant	n=37
Drug injection sites from people who inject drugs (PWID)	n=16
Urinary tract infection	n=15

Percentage of healthcare associated SAB

Community associated SAB primary source

Primary source	n
Undetermined	n=258
Skin & soft tissue	n=165
Drug injection sites from people who inject drugs (PWID)	n=72
Respiratory infection	n=42
Urinary tract infection	n=21
Other	n=15

Percentage of community associated SAB

Gram-negative bacteraemia

Epidemiological data

In **2024**, there were **5,781 Gram-negative bacteraemia** in **Scotland** caused by **5 key Gram-negative pathogens**.

- ***Escherichia coli* (n = 4,375)**
- ***Klebsiella pneumoniae* (n = 860)**
- ***Pseudomonas aeruginosa* (n = 257)**
- ***Klebsiella oxytoca* (n = 210)**
- **Acinetobacter species (n = 79)**

In **2024**, there were **4,375** cases of *Escherichia coli* **bacteraemia (ECB)** reported in **Scotland**, compared to **4,309** cases in **2023**.

The **annual incidence rate** was **79.7** per 100,000 population. The **rate** has **remained unchanged** between **2023** and **2024**.

The **five year trend** has **remained stable**.

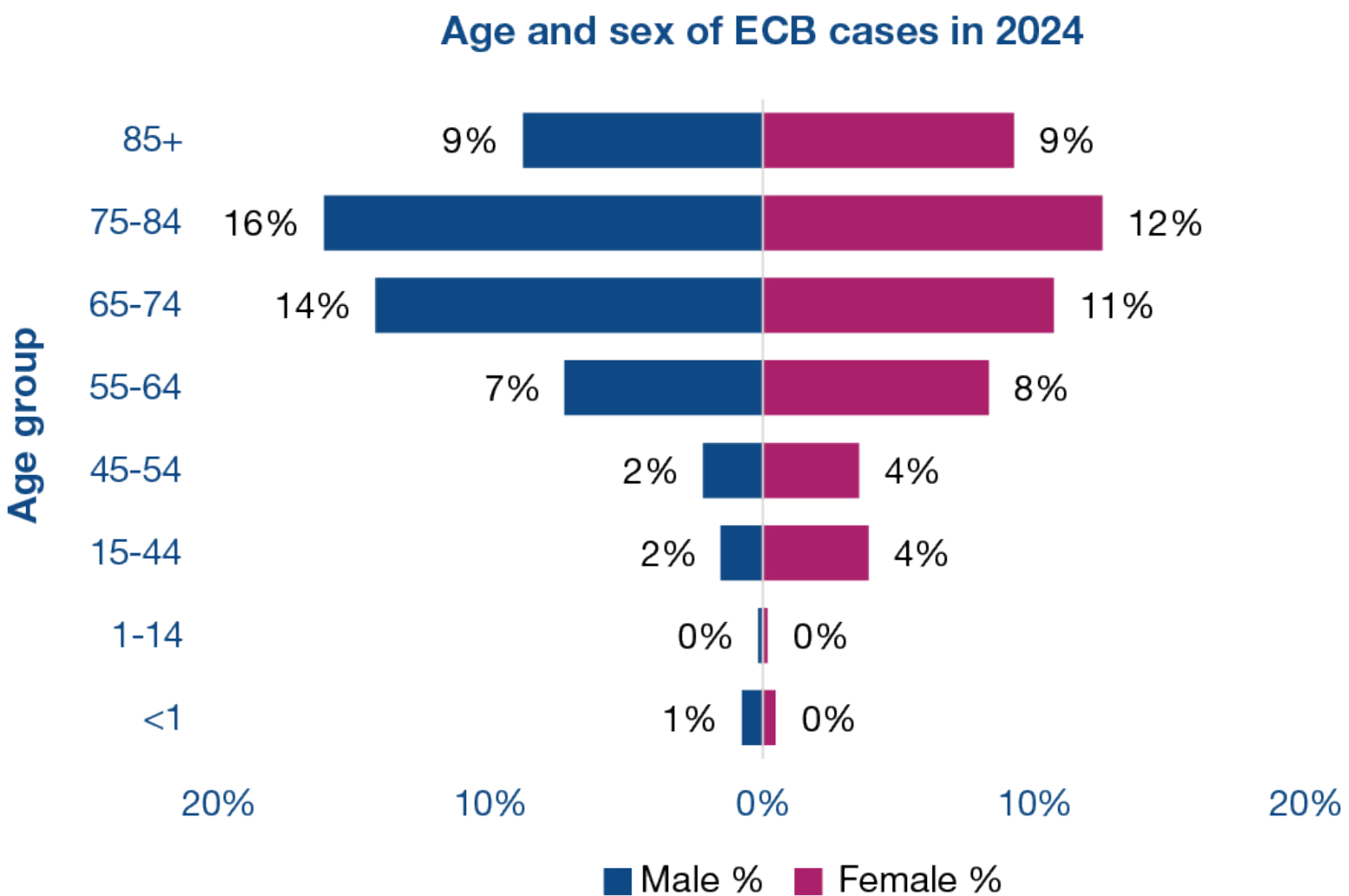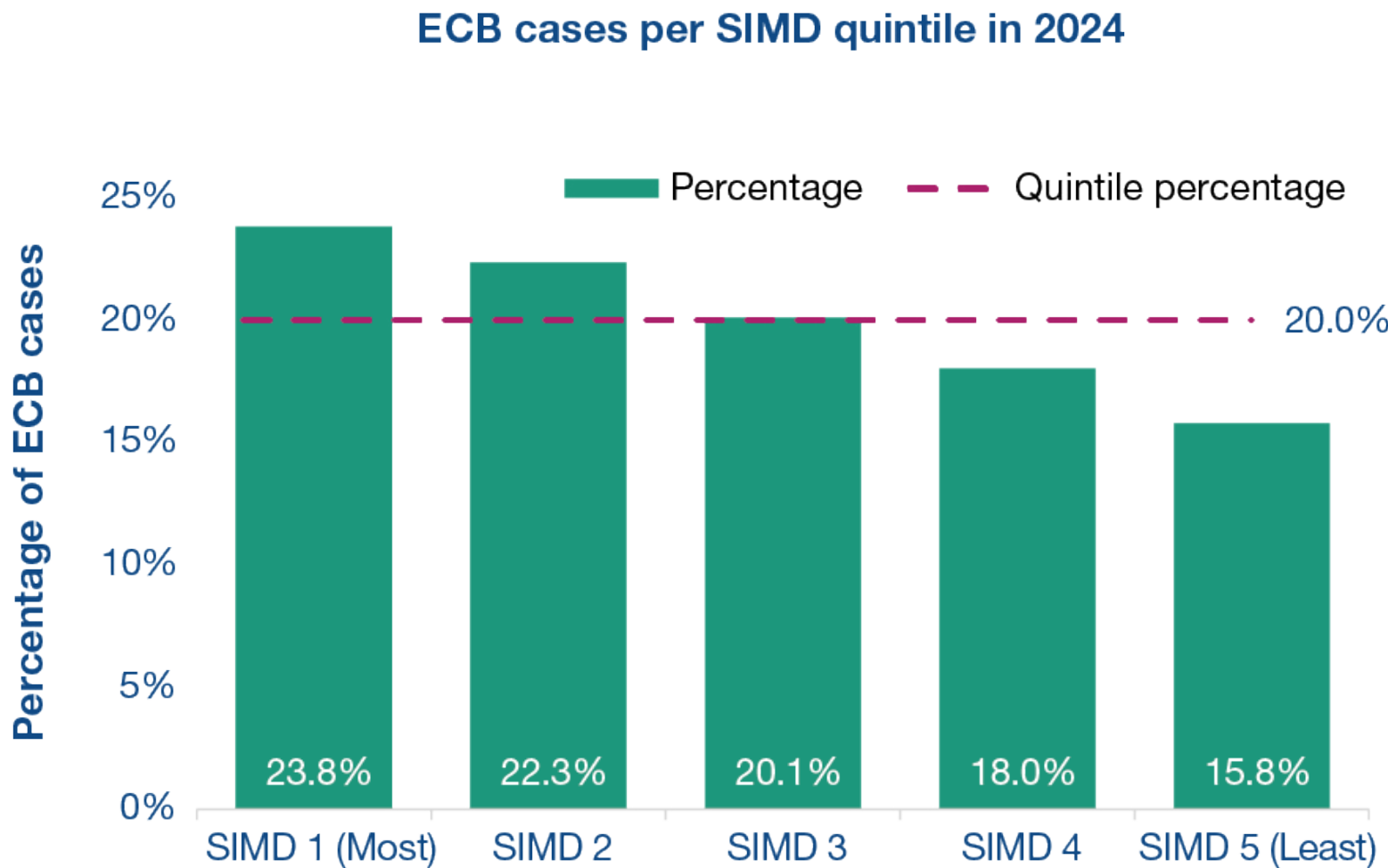### Five key Gram-negative pathogens, including ECB, per 100,000 population
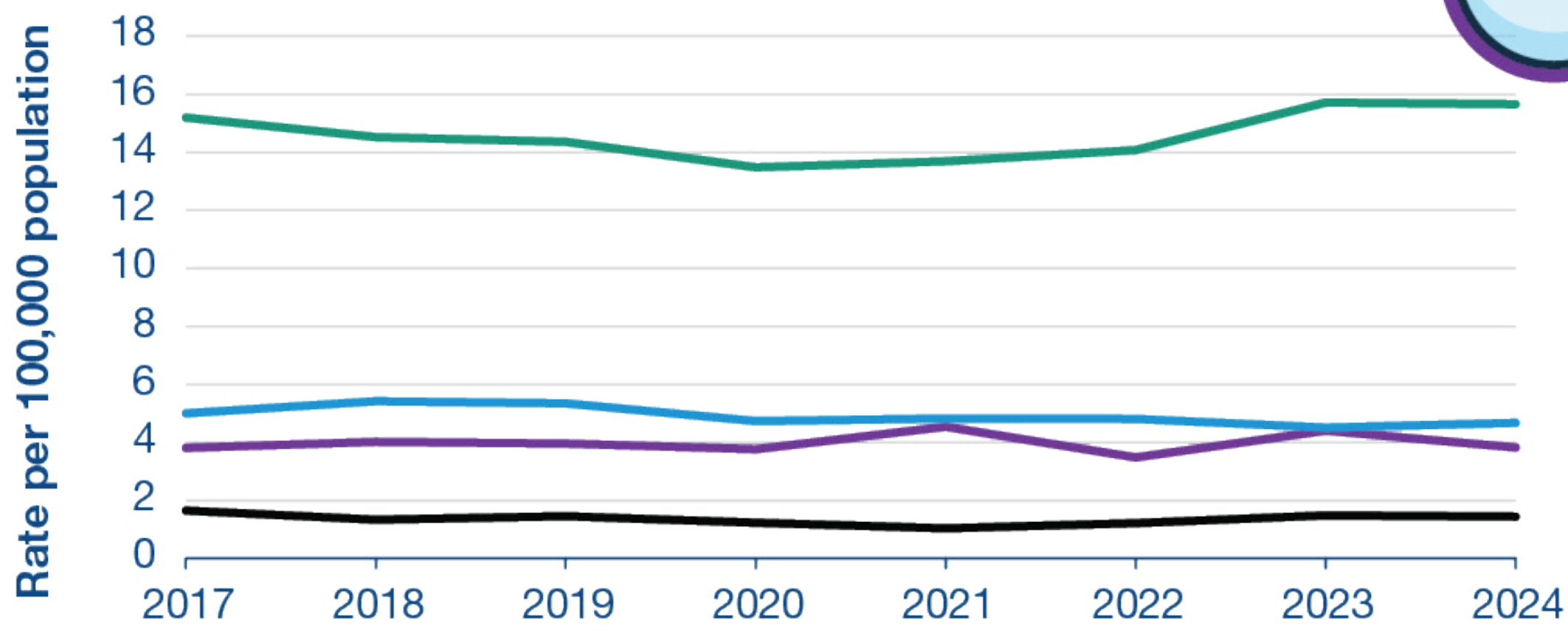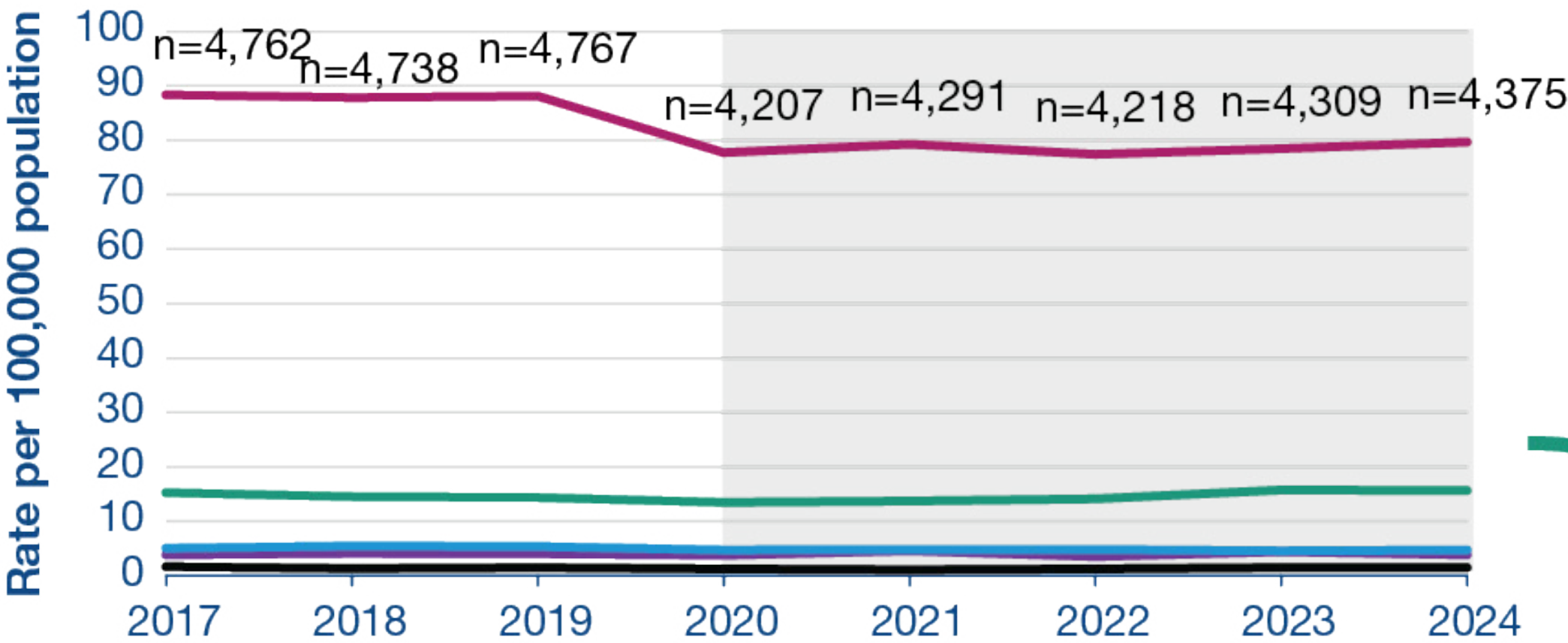
Note: Grey shaded area highlights the period used to test for the five year linear trend on ECB. Data for eight years of the surveillance programme is available to aid interpretation. More information on data sources and methods is available in the metadata.

Health inequalities and demographics

In **2024**, **46.1%** of **ECB cases** occured among **individuals living in the 40% most deprived areas of Scotland**.
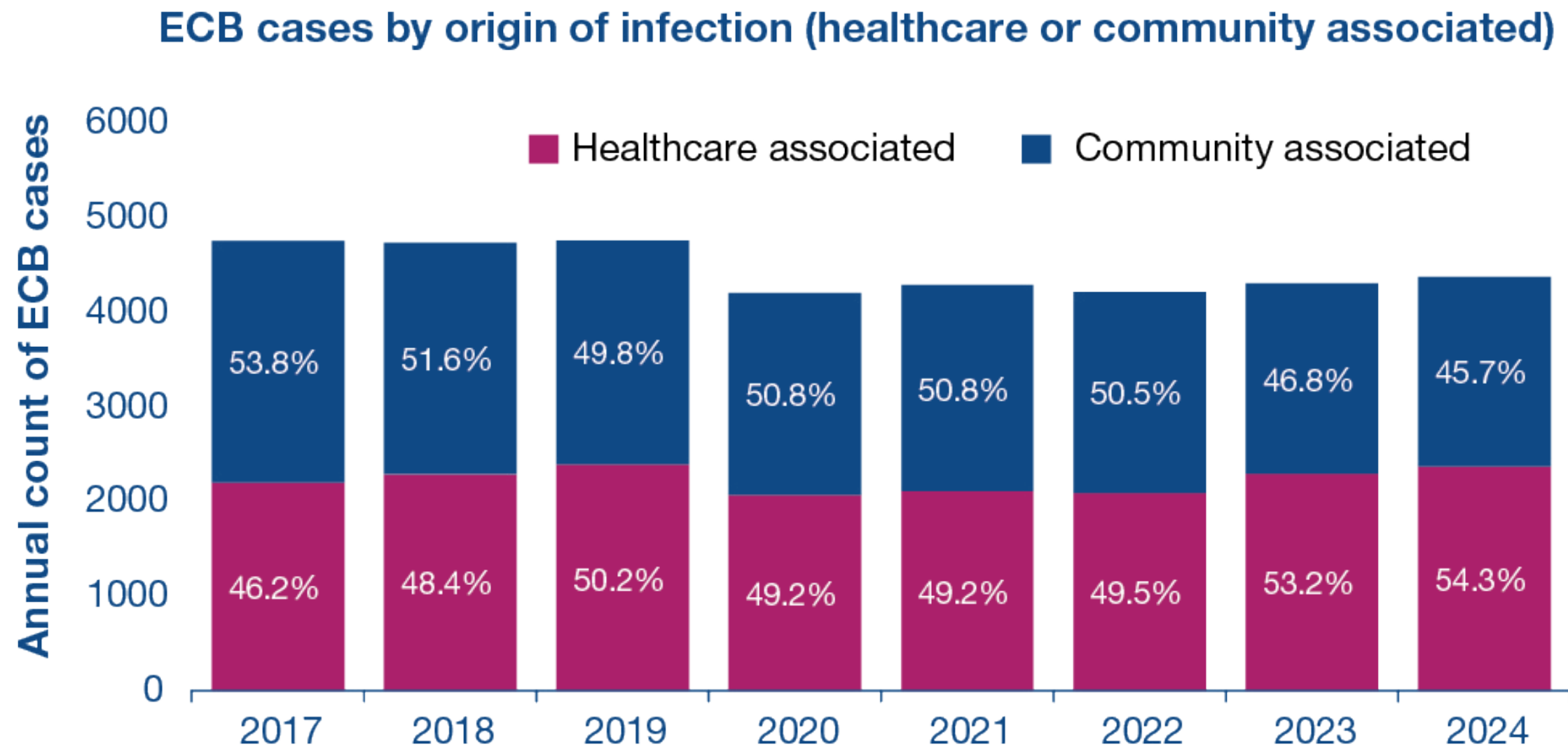
ECB cases per SIMD quintile in 2024

Percentage — — Quintile percentage

Percentage of ECB cases

- 25%
- 20%
- 15%
- 10%
- 5%
- 0%

20.0%

SIMD 1 (Most)	SIMD 2	SIMD 3	SIMD 4	SIMD 5 (Least)
23.8%	22.3%	20.1%	18.0%	15.8%

In **2024**, **48.8%** of **ECB cases** were **female** and **71.6%** were in **people aged 65 and over.**

Age and sex of ECB cases in 2024

Age group

Age group	Male %	Female %
85+	9%	9%
75-84	16%	12%
65-74	14%	11%
55-64	7%	8%
45-54	2%	4%
15-44	2%	4%
1-14	0%	0%
<1	1%	0%

20% 10% 0% 10% 20%

■ Male % ■ Female %

Origin of infection

In **2024**, **54.3%** of **ECB** cases were **healthcare associated.**

The **percentage** has **remained unchanged** between **2023** and **2024.**

ECB cases by origin of infection (healthcare or community associated)

Annual count of ECB cases

■ Healthcare associated   ■ Community associated

Year	Healthcare associated	Community associated
2017	46.2%	53.8%
2018	48.4%	51.6%
2019	50.2%	49.8%
2020	49.2%	50.8%
2021	49.2%	50.8%
2022	49.5%	50.5%
2023	53.2%	46.8%
2024	54.3%	45.7%

Note: Healthcare associated infections include hospital acquired infections, see metadata for definitions of healthcare and community associated infections. More information on data sources and methods is available in the metadata.

Healthcare associated ECB

Hospital acquired ECB

There were **2,375** cases in **2024**.

The **annual incidence rate** was **37.9** per 100,000 bed days.

The **rate** has **remained unchanged** between **2023** and **2024**.

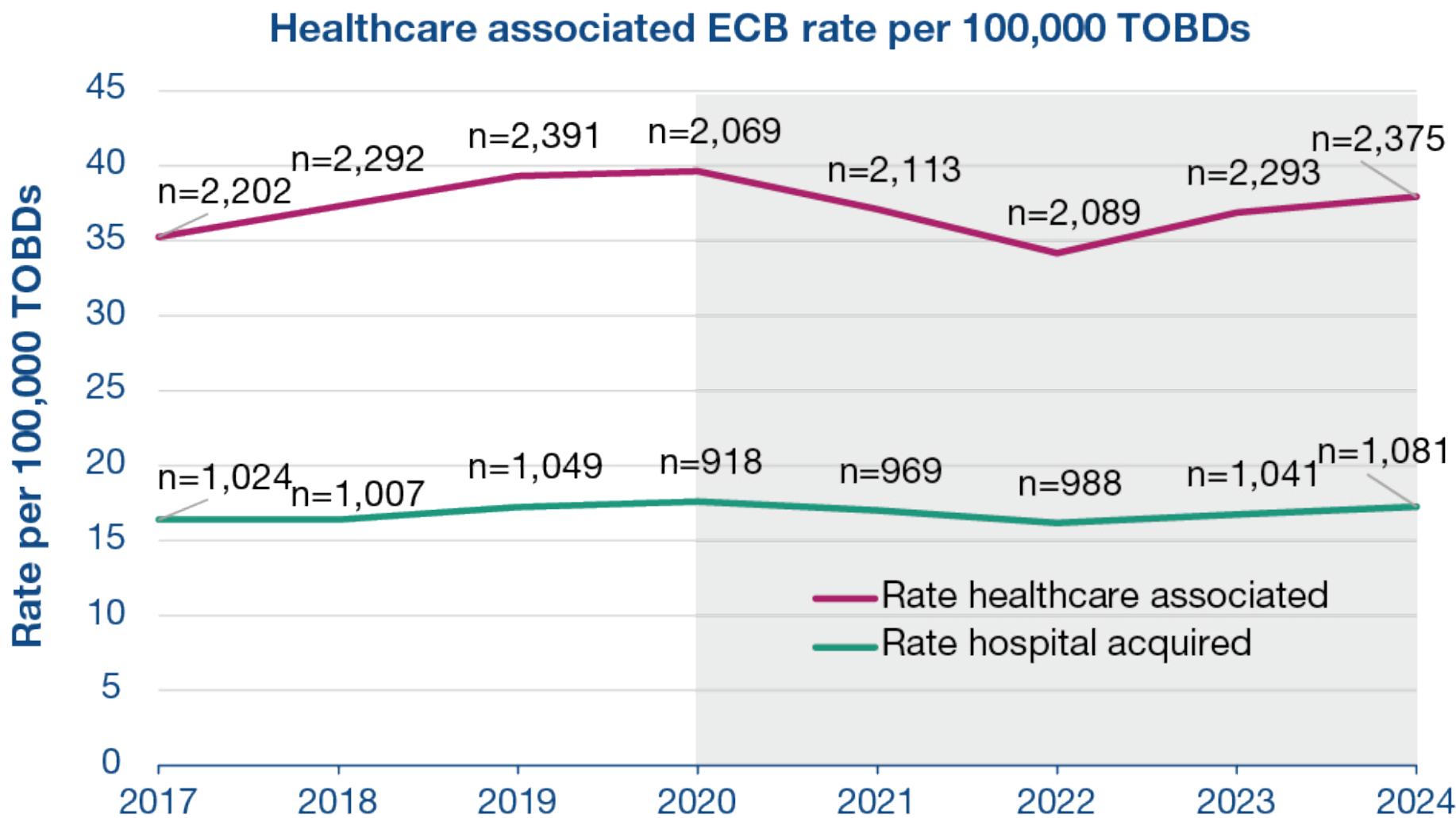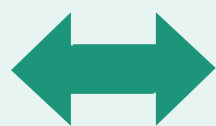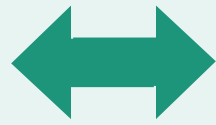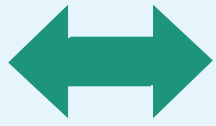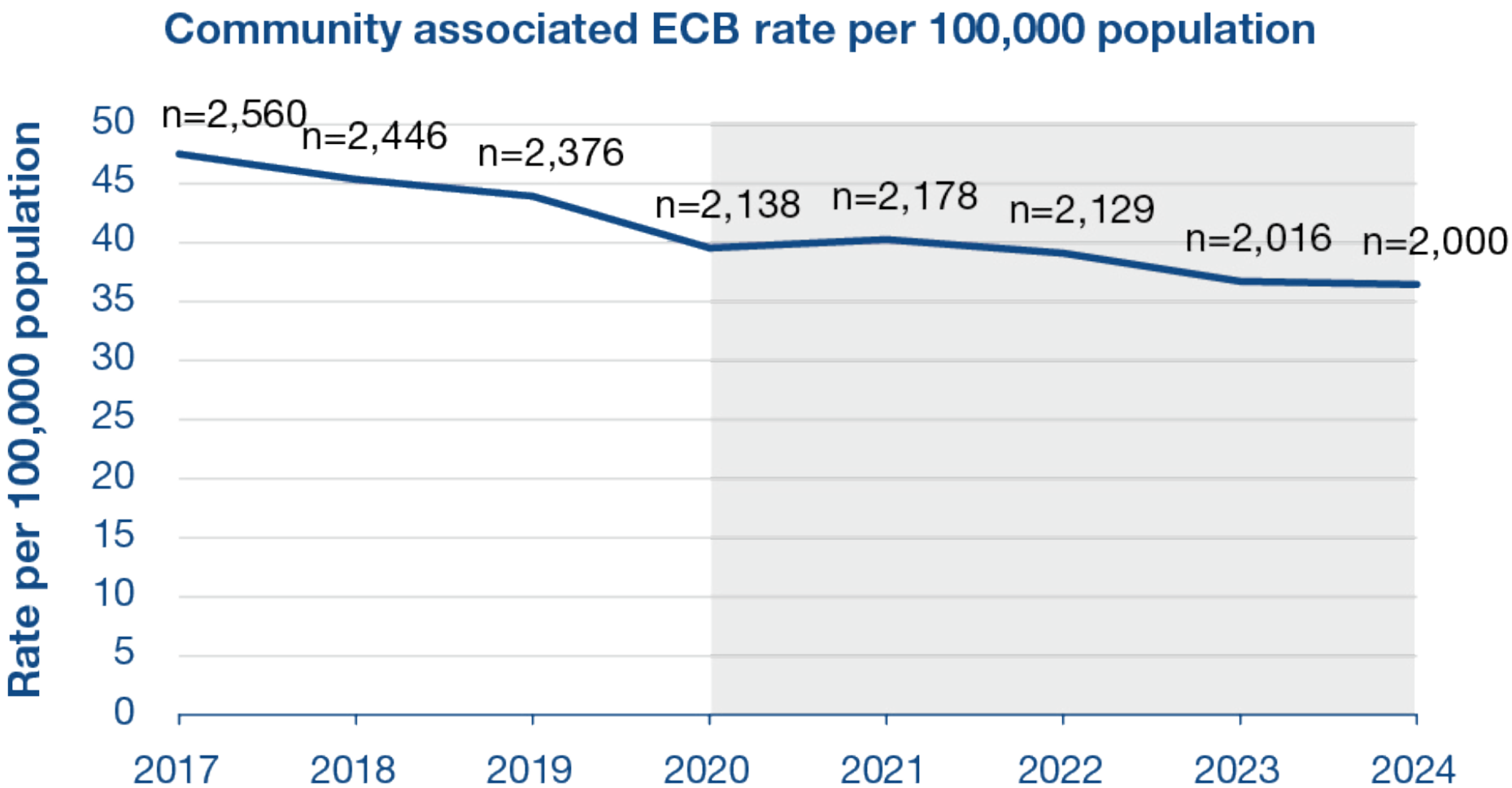The **five year trend** has **remained stable**.

Of all healthcare associated ECB cases, **1,081** were **hospital acquired infections**. The **annual incidence rate** was **17.3** per 100,000 bed days.

The **rate** has **remained unchanged** between **2023** and **2024**.
The **five year trend** has **remained stable**.

Healthcare associated ECB rate per 100,000 TOBDs

Rate per 100,000 TOBDs

- Rate healthcare associated
- Rate hospital acquired

n=2,202 n=2,292 n=2,391 n=2,069 n=2,113 n=2,089 n=2,293 n=2,375
n=1,024 n=1,007 n=1,049 n=918 n=969 n=988 n=1,041 n=1,081
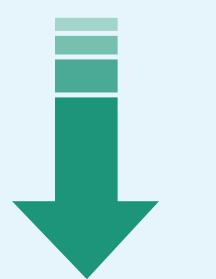
Community associated ECB

There were **2,000** cases of community associated ECB in **2024**.

The **annual incidence rate** was **36.4** per 100,000 population.

The **rate** has **remained unchanged** between **2023** and **2024**.

The **five year trend** has **decreased** with a **2.5%** average **decrease** each year.

Community associated ECB rate per 100,000 population

Rate per 100,000 population

n=2,560 n=2,446 n=2,376 n=2,138 n=2,178 n=2,129 n=2,016 n=2,000

Note: Grey shaded area highlights the period used to test for the five year linear trend. Data for eight years of the surveillance programme is available to aid interpretation. More information on data sources and methods is available in the metadata.
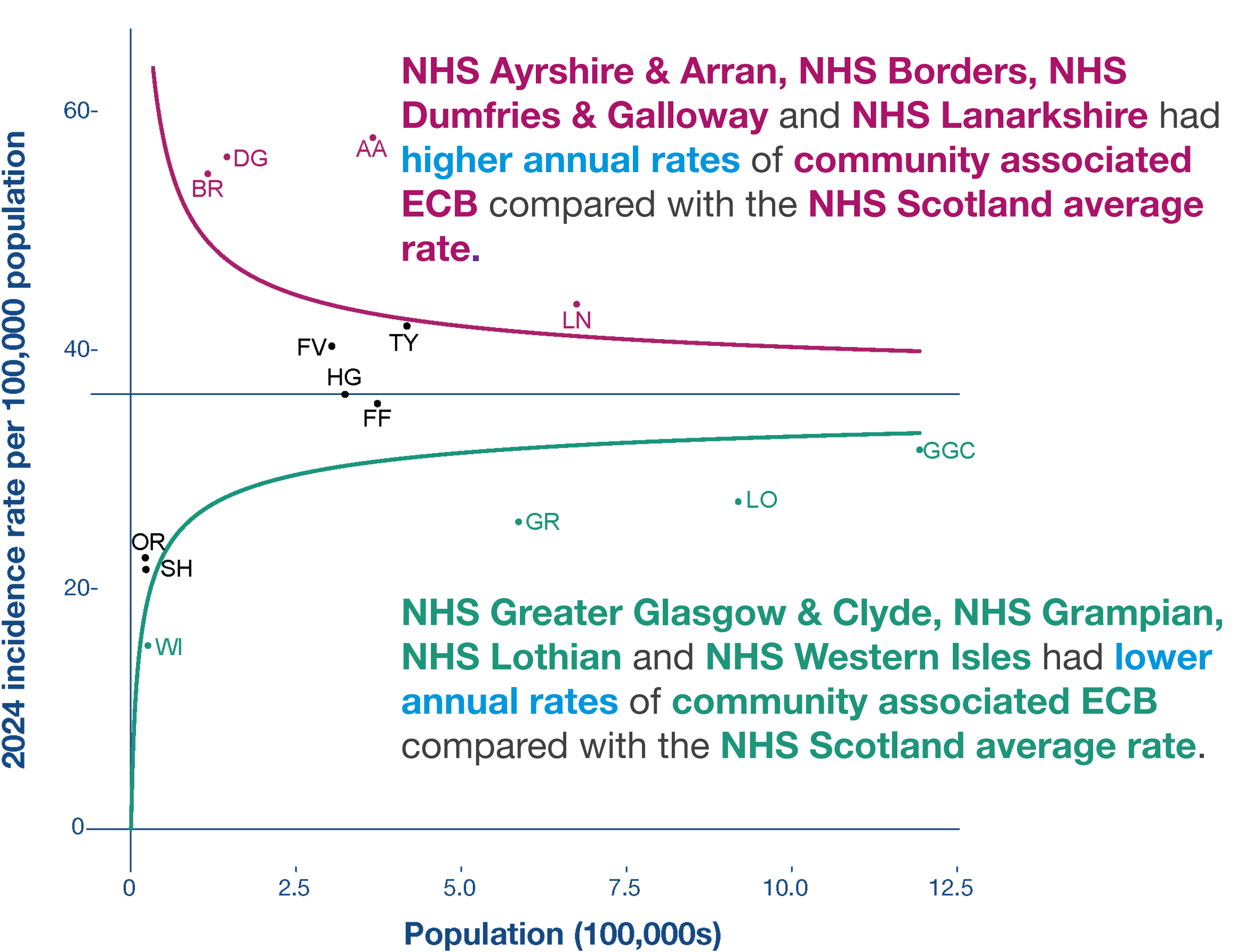
Variation by health board

Benchmarking data is essential to support local and national quality improvement initiatives. Annual **funnel plot analysis** is useful to demonstrate the **NHS Scotland boards** that are **higher or lower** than the **NHS Scotland annual rate**

NHS Scotland boards ECB healthcare associated infection funnel plot 2024
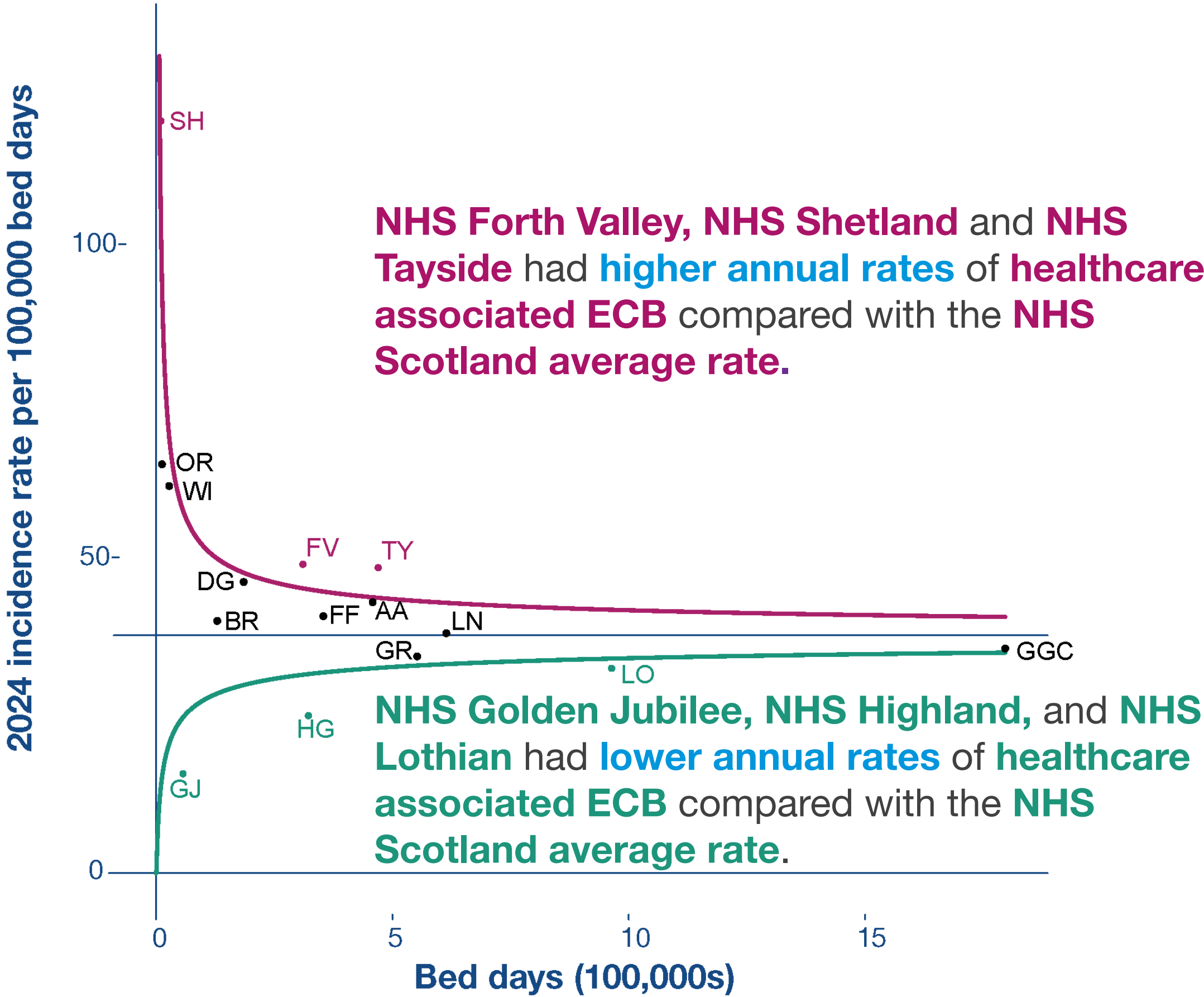
NHS Scotland boards ECB community associated infection funnel plot 2024

NHS Forth Valley, NHS Shetland and **NHS Tayside** had **higher annual rates** of **healthcare associated ECB** compared with the **NHS Scotland average rate.**

NHS Golden Jubilee, NHS Highland, and **NHS Lothian** had **lower annual rates** of **healthcare associated ECB** compared with the **NHS Scotland average rate**.

NHS Ayrshire & Arran, NHS Borders, NHS Dumfries & Galloway and **NHS Lanarkshire** had **higher annual rates** of **community associated ECB** compared with the **NHS Scotland average rate.**

NHS Greater Glasgow & Clyde, NHS Grampian, NHS Lothian and **NHS Western Isles** had **lower annual rates** of **community associated ECB** compared with the **NHS Scotland average rate.**

Note: NHS board rates are not adjusted for differences in the patient population. More information on data sources and methods is available in the metadata.

Quarterly data exceedance reporting

NHS boards are required to submit improvement plans in response to **higher than average quarterly rates** of **healthcare** or **community associated ECB**, as identified through the exception reporting process.

Four improvement plans were developed by NHS boards during **2024** in response to **higher than average quarterly rates** of **healthcare associated ECB**.
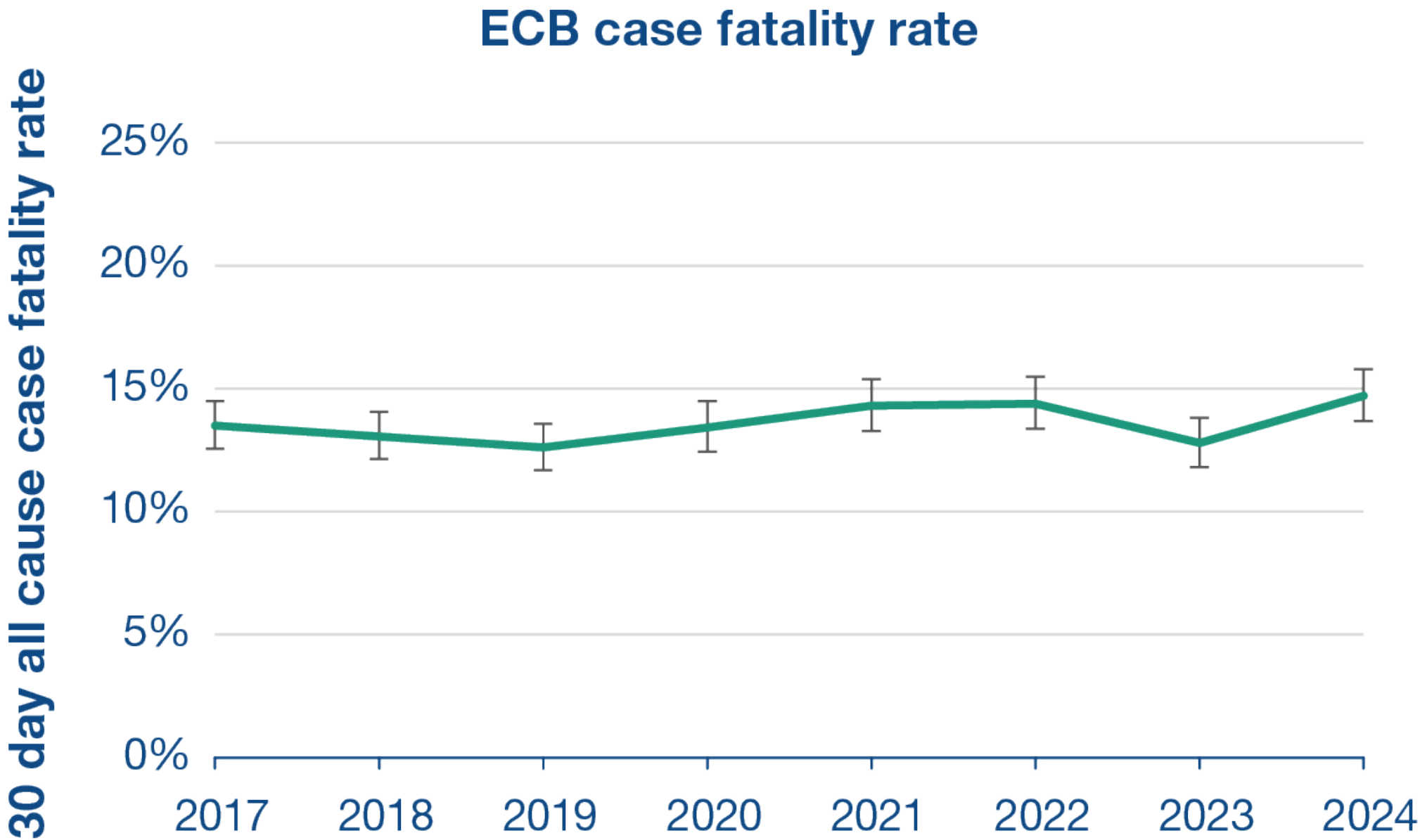
Five improvement plans were developed by NHS boards during **2024** in response to **higher than average quarterly rates** of **community associated ECB**.

For further information please see the quarterly epidemiological reports.

All cause case fatality

In **2024**, the **30 day all cause case fatality rate** for **ECB patients** was **14.7%**.

ECB case fatality rate

Note: Rates are not adjusted for differences in the patient population over time. More information on data sources and methods is available in the metadata.

Primary source

In **2024**, the **primary source** for **healthcare associated ECB** were known for **84.7%** of cases.

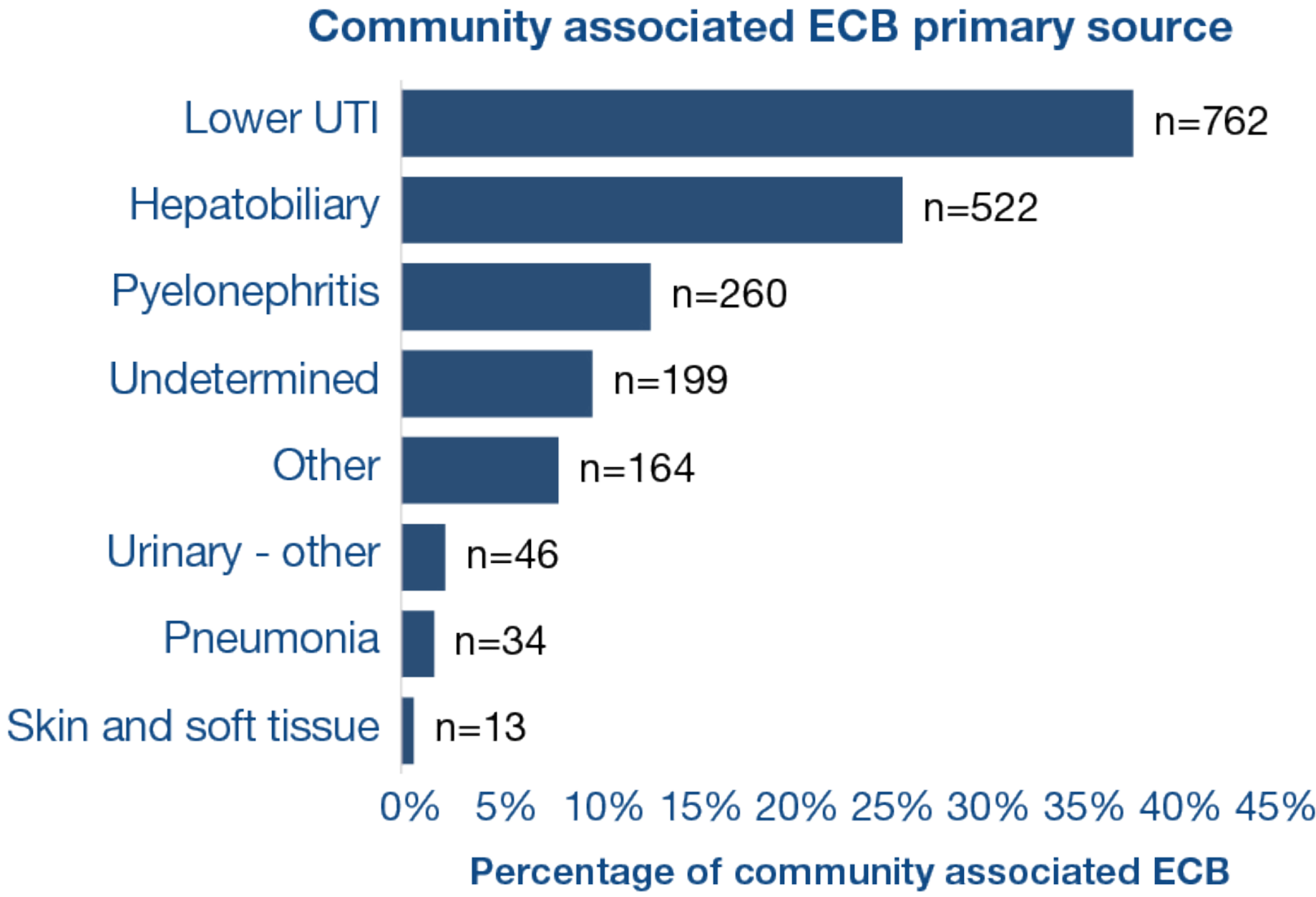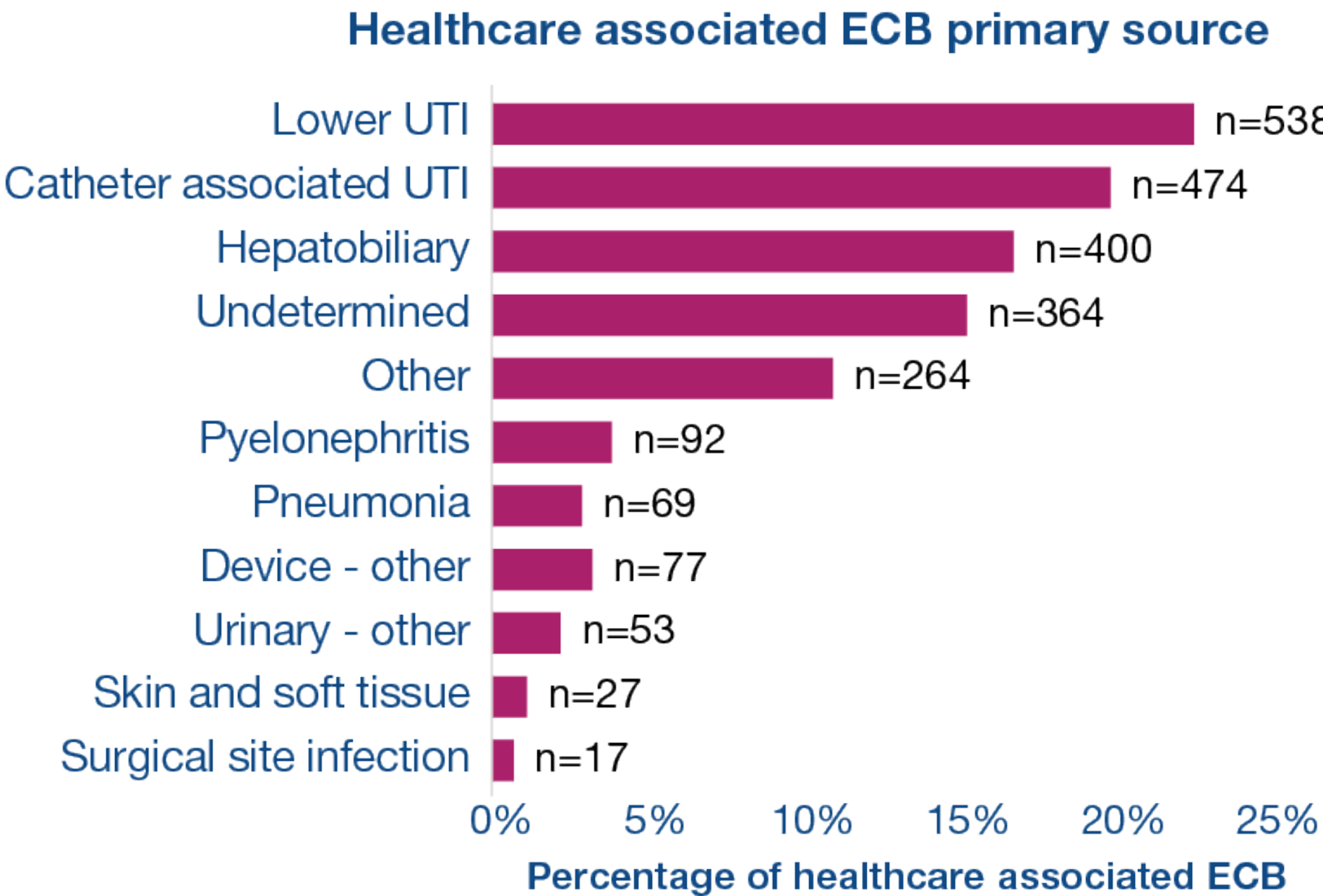The most common **primary sources** (as determined by the clinical team) include:

22.7% Lower urinary tract infection
20.0% Catheter associated urinary tract infection
16.8% Hepatobiliary infection

In **2024**, the **primary source** for **community associated ECB** were known for **90.0%** of cases.

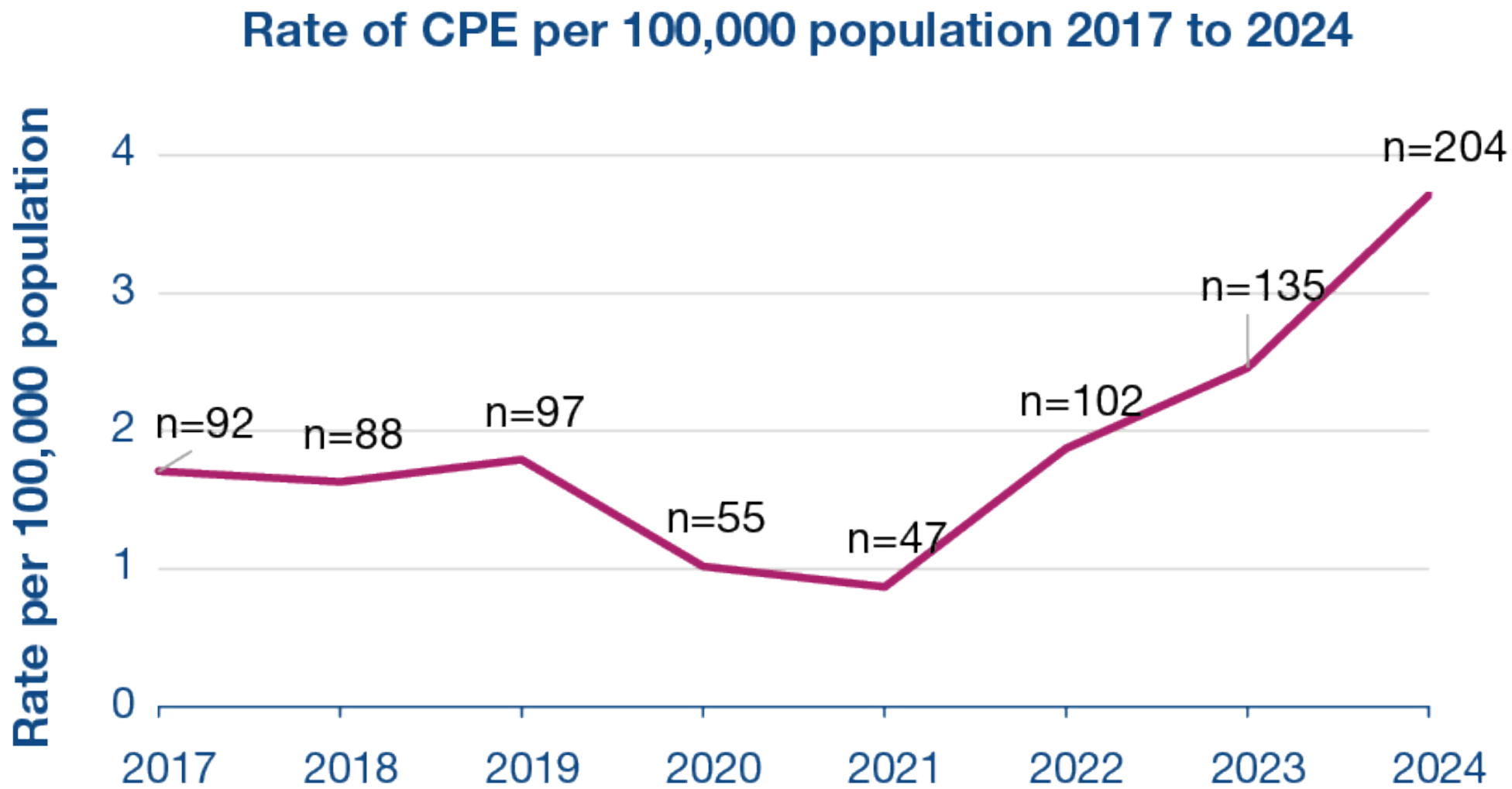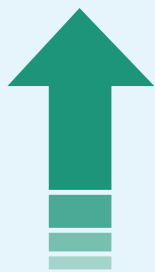The most common **primary sources** (as determined by the clinical team) include:

38.1% Lower urinary tract infection
26.1% Hepatobiliary infection
13.0% Pyelonephritis

Healthcare associated ECB primary source

Source	n
Lower UTI	n=538
Catheter associated UTI	n=474
Hepatobiliary	n=400
Undetermined	n=364
Other	n=264
Pyelonephritis	n=92
Pneumonia	n=69
Device - other	n=77
Urinary - other	n=53
Skin and soft tissue	n=27
Surgical site infection	n=17

Percentage of healthcare associated ECB

Community associated ECB primary source

Source	n
Lower UTI	n=762
Hepatobiliary	n=522
Pyelonephritis	n=260
Undetermined	n=199
Other	n=164
Urinary - other	n=46
Pneumonia	n=34
Skin and soft tissue	n=13

**Percentage of community associated ECB**

Carbapenemase-producing Enterobacterales

In **2024**, there were **204** cases of **carbapenemase-producing Enterobacterales (CPE)** reported in **Scotland**, compared to **135** in **2023**.

The **annual incidence rate** of **CPE** was **3.7** per 100,000 population.

There has been a **51.1% increase** in the **rate** between **2023** and **2024**.

Rate of CPE per 100,000 population 2017 to 2024

n=92, n=88, n=97, n=55, n=47, n=102, n=135, n=204

Years: 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024

Y-axis: Rate per 100,000 population (0 to 4)

Note: The COVID-19 pandemic, including international travel restrictions, may have influenced figures in 2020 and 2021. More information on data sources and methods is available in the metadata.
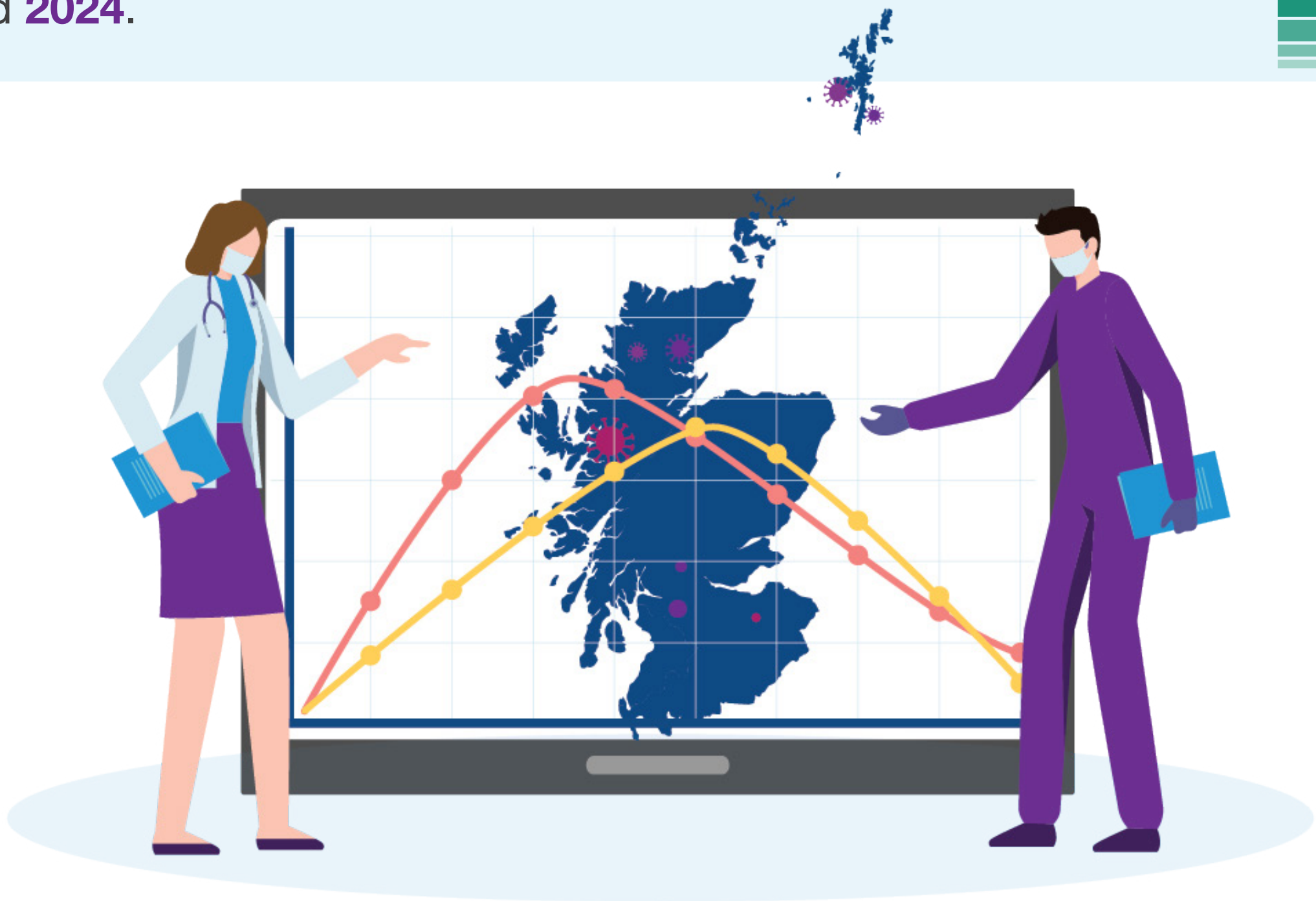
Further detail on antimicrobial use and antimicrobial resistance, including carbapenemase-producing organisms and CPE enzymes, will be published in the annual SONAAR report.
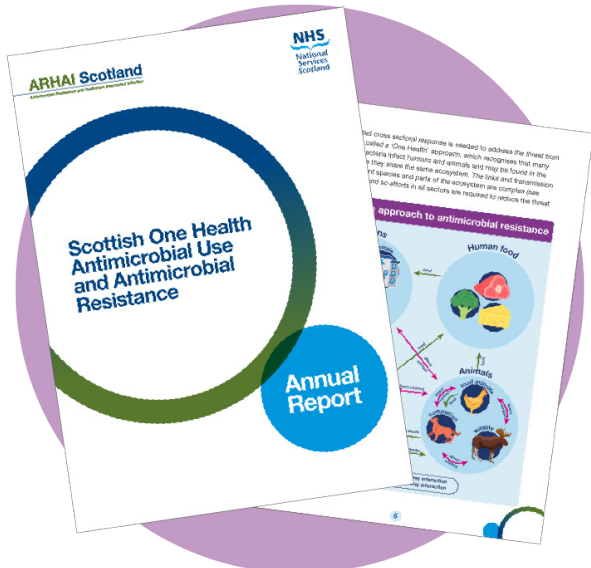
Multi-drug resistant organism admission screening

Hospital admission screening is key for the early identification and management of patients at high risk of carrying a multi-drug resistant organism, reducing onwards transmission in healthcare settings.

MRSA CRA screening

In **2024**, **80.3%** of patients audited underwent a **clinical risk assessment (CRA)** for meticillin-resistant _Staphylococcus aureus_ (MRSA).

Uptake of screening has **increased** by **2.3%** between **2023** and **2024**, however this **remains below** the **90%** Key Performance Indicator (KPI) target.

CPE CRA screening

In **2024**, **81.1%** of patients audited underwent a **clinical risk assessment (CRA)** for carbapenemase-producing Enterobacterales (CPE).

Uptake has **increased** by **3.6%** between **2023** and **2024**.

These MRSA and CPE CRA uptake data continue to be monitored by ARHAI Scotland and feedback is provided to NHS boards on a quarterly basis. Education and training materials are available on TURAS to support NHS staff in carrying out the two-step admission screening process.

MRSA CRA screening uptake 2015 to 2024

CRA screening uptake (%)

100% 90% 80% 70% 60% 50%

2015 2016 2017 2018 2019 2020 2021 2022 2023 2024

— Uptake
- - KPI Target

CPE CRA screening uptake 2019 to 2024

CRA screening uptake (%)

100% 90% 80% 70% 60% 50%

2019 2020 2021 2022 2023 2024

— Uptake

Screening

Note: More information on data sources and methods is available in the metadata.

Incidents and outbreaks

ARHAI Scotland supports local Infection Prevention and Control Teams (IPCTs) and Health Protection Teams (HPTs) across Scotland in preventing, preparing, and managing infection related incidents and outbreaks within health and social care settings. This is achieved through IPC guidance, educational resources and interactive dashboards. ARHAI Scotland also monitor incident and outbreak data reported by NHS Boards at a national level.

IPCTs and HPTs identify incidents, outbreaks and data exceedances, including decontamination incidents and near misses, in line with Chapter 3 of the National Infection Prevention and Control Manual (NIPCM), which are assessed using the Healthcare Infection Incident Assessment Tool (HIIAT). In collaboration with key stakeholders, work is underway to revise the HIIAT format to reduce potential variation in the assessment criteria, introduce a more structured risk assessment approach and ensure consistent reporting across Scotland.

HIIAT assessed incidents, outbreaks and data exceedances are reported in line with the NIPCM to ARHAI Scotland through the Outbreak Reporting Tool (ORT), which aims to facilitate the collation of epidemiological data and lessons learned which contribute to the development of national guidance and help inform local incident and outbreak management. The Healthcare Infection Incident and Outbreak Reporting Template (HIIORT) form is for any HIIAT Red, Amber or Green assessed incident/outbreak. In 2024, a new dedicated respiratory reporting form was rolled out for key respiratory pathogens (COVID-19, influenza and respiratory syncytial virus (RSV) only) to support ease of NHS Board reporting of incidents and outbreaks. This form is used when IPC measures align with the checklist and where ARHAI support is not requested; reports are collected and monitored internally.

In **2024**, there were **173 healthcare infection incidents** and **outbreaks** reported to ARHAI Scotland (excluding incidents and outbreaks where COVID-19, influenza, RSV or norovirus was the sole pathogen), with HIIATs categorised as **Red**, **Amber** or **Green**.

Of these 173 reports, there were:

11 red	23 amber	139 green

Of the **173 incidents and outbreaks**, **149** were **reported with one or more confirmed patient cases**.

52 incidents involved a single patient case.
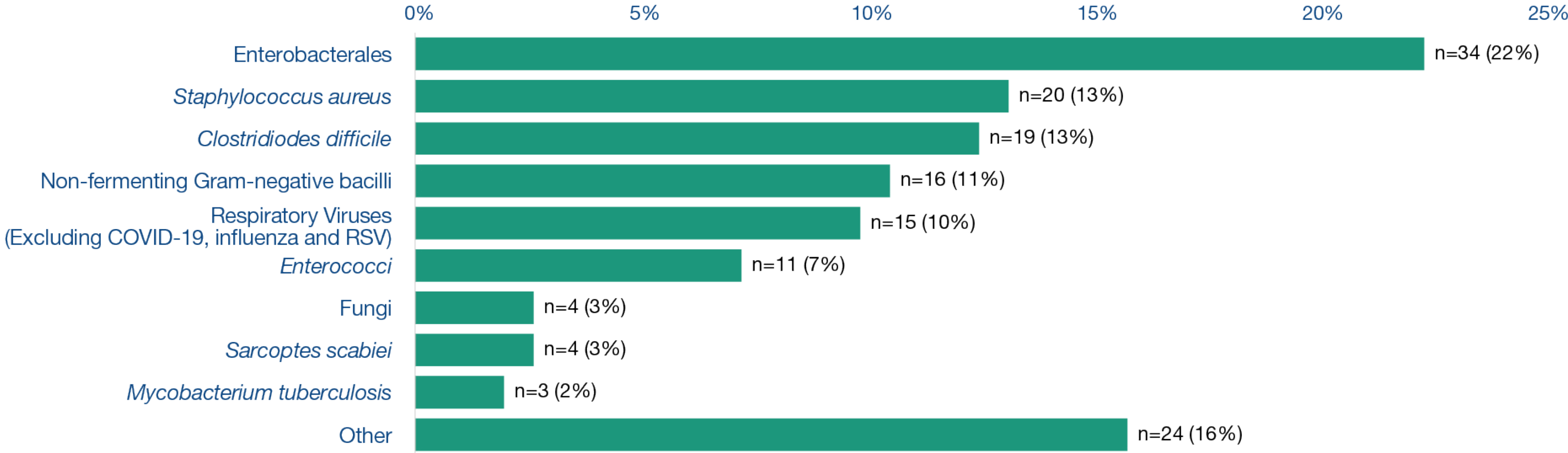**24** incidents involved no patient cases.

5 incidents stated two or more pathogens were involved.

10 incidents were decontamination or near miss with no identified pathogen and no patient cases.

Percentage of key organism types as reported from incidents and outbreaks with one or more patient cases

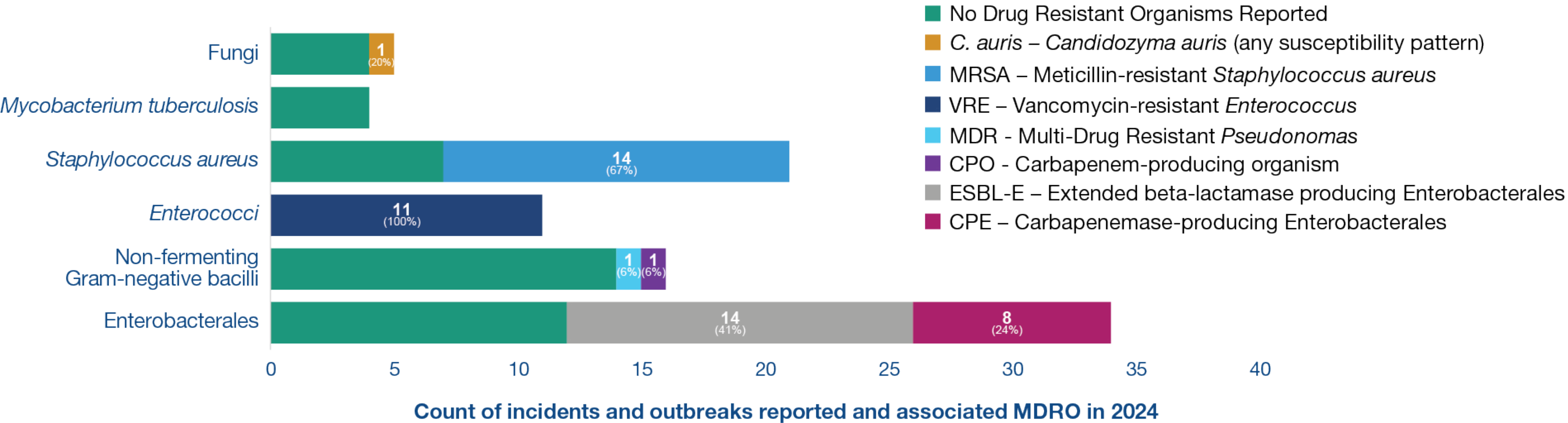| Organism	Percentage
Enterobacterales	n=34 (22%)
Staphylococcus aureus	n=20 (13%)
Clostridiodes difficile	n=19 (13%)
Non-fermenting Gram-negative bacilli	n=16 (11%)
Respiratory Viruses (Excluding COVID-19, influenza and RSV)	n=15 (10%)
Enterococci	n=11 (7%)
Fungi	n=4 (3%)
Sarcoptes scabiei	n=4 (3%)
Mycobacterium tuberculosis	n=3 (2%)
Other	n=24 (16%)

Note: Other includes: Gastroenteritis viruses (excluding norovirus), other Gram-negatives and other Gram-positives. Some incidents included multiple organisms so total percentages may not add up to 100%.

Incidents and outbreaks associated with UKHSA incidents

During 2024 ARHAI Scotland were members of two UK Health Security Agency led Incident Management Teams where NHS Scotland cases had been confirmed as part of the incident. In an outbreak of *Ralstonia picketii* linked to contaminated saline one NHS Scotland case was identified. Twelve *Burkholderia cenocepacia* cases from six NHS Scotland health boards were detected in an outbreak linked to contaminated Carbomer eye products. These incidents highlight the importance of reporting such organisms to enable detection of outbreaks linked to products which may span more than one health board or geographical area.

Incidents and outbreaks with multi-drug resistant organisms

NHS boards also notify ARHAI Scotland if causative pathogens are multi-drug resistant organisms (MDRO).

Legend:
- No Drug Resistant Organisms Reported
- *C. auris – Candidozyma auris* (any susceptibility pattern)
- MRSA – Meticillin-resistant *Staphylococcus aureus*
- VRE – Vancomycin-resistant *Enterococcus*
- MDR - Multi-Drug Resistant *Pseudonomas*
- CPO - Carbapenem-producing organism
- ESBL-E – Extended beta-lactamase producing Enterobacterales
- CPE – Carbapenemase-producing Enterobacterales

Count of incidents and outbreaks reported and associated MDRO in 2024

Note: Organisms reported as CPE are not counted as ESBL-E separately.

List of abbreviations and acronyms

Acronym	Definition
A&E	Accident and Emergency
ABHR	Alcohol-based hand rub
AMR	Antimicrobial resistance
ARHAI	Antimicrobial Resistance and Healthcare Associated Infections
ARI	Acute respiratory infections
AWaRE	Access, Watch and Reserve
C. auris	*Candidozyma auris*
C. difficile	*Clostridioides difficile*
CDI	*Clostridioides difficile* infection
CHIPCM	Care Home Infection Prevention and Control Manual
COVID-19	Coronavirus disease 2019
CPE	Carbapenemase-producing Enterobacterales
CRA	Clinical risk assessment

CPO	Carbapenemase-producing organisms
EBIS	Enteric Bacterial Infections Service
E. coli	*Escherichia coli*
ECB	*Escherichia coli* bacteraemia
ECOSS	Electronic Communication of Surveillance in Scotland
ESBL-E	Extended beta-lactamase producing Enterobacterales
GCU	Glasgow Caledonian University
HAI	Hospital acquired infection
HCAI	Healthcare associated infection
HCID	High consequence infectious disease
HIIAT	Healthcare Infection Incident Assessment Tool
HIIORT	Healthcare Infection, Incident and Outbreak Reporting Template
HPT	Health Protection Team
ICU	Intensive care unit

Acronym	Definition
IMT	Incident Management Team
IPC	Infection prevention and control
IPCT	Infection Prevention and Control Team
ISD	Information Services Division
KPI	Key Performance Indicator
KSAR	Key Stage Assurance Review
MDRO	Mult-drug resistant organisms
MLST	Multi-locus sequence typing
MRSA	Meticillin-resistant *Staphylococcus aureus*
MSSA	Meticillin-sensitive *Staphylococcus aureus*
NAP	National Action Plan
NDAP	NHS Scotland Design Assessment Process
NES	NHS Education for Scotland
NHS	National Health Service
NIPCM	National Infection Prevention and Control Manual

Acronym	Definition
NRS	National Records of Scotland
NSS	National Services Scotland
ORT	Outbreak Reporting Tool
PCR	Polymerase chain reaction
PHS	Public Health Scotland
PWID	People who inject drugs
RSV	Respiratory syncytial virus
RT	Ribotype
S. aureus	*Staphylococcus aureus*
SAB	*Staphylococcus aureus* bacteraemia
SAMRS	Scottish Antimicrobial Resistance Service
SMiRL	Scottish Microbiology Reference Laboratories
SICPs	Standard infection control precautions
SAPG	Scottish Antimicrobial Prescribing Group
SIMD	Scottish Index of Multiple Deprivation
SIPCEP	Scottish Infection Prevention and Control Education Pathway

Acronym	Definition
SMR	Scottish Morbidity Records
SONAAR	Scottish One Health Antimicrobial Use and Antimicrobial Resistance
SSI	Surgical site infection
TBPs	Transmission-based precautions
TOBD	Total occupied bed days
UK	United Kingdom
UKHSA	United Kingdom Health Security Agency
UTI	Urinary tract infection
VAD	Vascular access device
VRE	Vancomycin-resistant Enterococcus
WGS	Whole genome sequencing
WHO	World Health Organization

Appendix 1 – Publication metadata

Publication title

ARHAI Scotland 2024 Annual Report

Description

This release provides information on activity within Antimicrobial Resistance and Healthcare Associated Infection (ARHAI) Scotland for the period January to December 2024.

Theme

Healthcare associated infections in Scotland

Topic

Healthcare associated infections
Infection prevention and control

Format

Online resource (PDF)

Data source(s)

Infection prevention and control evidence and guidance: N/A

Reducing infection related risk in the healthcare built environment: N/A

Infection prevention and control workforce development: N/A

Antimicrobial use and antimicrobial resistance: N/A

Hospital activity and pressures:

Total occupied bed days: Public Health Scotland ISD(S)1.

Elective admissions data: Public Health Scotland, Acute hospital activity and NHS beds information.

Emergency admissions data: Public Health Scotland, Acute hospital activity and NHS bed information.

Delayed discharges data: Scottish Health and Social Care Open Data platform, Delayed discharges in NHS Scotland.

Accident & Emergency (A&E) waiting times data: Scottish Health and Social Care Open Data platform, Monthly A&E Activity and Waiting Times.

***Clostridioides difficile* infection:**

Case data and demographics: Electronic Communication of Surveillance in Scotland (ECOSS).

Data linkage source: general/acute inpatient and day case Scottish Morbidity Records (SMR01): Public Health Scotland.

Healthcare associated denominator: Public Health Scotland ISD(S)1 total occupied bed days.

Community associated denominator: National Records of Scotland (NRS) mid-year population estimates.

Case fatality data: NRS Deaths Data.

Molecular typing data: ECOSS, Enteric Bacterial Infections Service (EBIS SMiRL, Glasgow).

Health inequalities: Scottish Government Scottish Index of Multiple Deprivation (SIMD).

***Staphylococcus aureus* bacteraemia:**

Case data and demographics: ECOSS Enhanced Surveillance Web Tool.

Healthcare associated denominator: Public Health Scotland ISD(S)1 total occupied bed days.

Community associated denominator: National Records of Scotland (NRS) mid-year population estimates.

Case fatality data: NRS Deaths Data.

Health inequalities: Scottish Government Scottish Index of Multiple Deprivation (SIMD).

Gram-negative bacteraemia (*Klebsiella pneumoniae, Klebsiella oxytoca, Pseudomonas aeruginosa* and *Acinetobacter* species bacteraemia):

Case data and demographics: ECOSS.

Gram-negative bacteraemia (*Escherichia coli* bacteraemia):

Case data and demographics: ECOSS and ECOSS Enhanced Surveillance Web Tool.

Healthcare associated denominator: Public Health Scotland ISD(S)1 total occupied bed days.

Community associated denominator: NRS mid-year population estimates.

Case fatality data: NRS Deaths Data.

Scottish Government Scottish Index of Multiple Deprivation (SIMD)

Multi-drug resistant organism admission screening: National Multi-drug resistant organism (MDRO) Admission Screening Uptake Monitoring Tool.

Carbapenemase-producing Enterobacterales: ECOSS, Scottish Antimicrobial Resistance Service (SAMRS SMiRL, Glasgow).

Population denominator: NRS mid-year population estimates.

Incidents and outbreaks: Healthcare infection incidents and outbreaks reported to National Services Scotland (NSS) through the Healthcare Infection, Incident and Outbreak Reporting Template (HIIORT) reporting process and the ARHAI Scotland Outbreak Reporting Tool (ORT).

Date that data are acquired

Infection prevention and control evidence and guidance: N/A

Reducing infection related risk in the healthcare built environment: N/A

Infection prevention and control workforce development: N/A

Antimicrobial use and antimicrobial resistance: N/A

Hospital activity and pressures:

Total occupied bed days: 06 May 2025

Elective admissions: 27 May 2025

Emergency admissions: 27 May 2025

Delayed discharges: 20 May 2025

Accident & Emergency (A&E) waiting times: 19 May 2025

Clostridioides difficile **infection:**

Case data: 8 May 2025

Healthcare associated denominator: 06 May 2025

Community associated denominator: 07 March 2025

Health inequalities: 8 May 2025

Staphylococcus aureus **bacteraemia:**

Case data: 8 May 2025

Healthcare associated denominator: 06 May 2025

Community associated denominator: 07 March 2025

Health inequalities: 8 May 2025

Gram-negative bacteraemia (*Klebsiella pneumoniae, Klebsiella oxytoca, Pseudomonas aeruginosa* **and** *Acinetobacter* **species bacteraemia):**

Case data: 15 May 2025

Population denominator: 07 March 2025

Gram-negative bacteraemia (*Escherichia coli* **bacteraemia):**

Case data: 8 May 2025

Healthcare associated denominator: 06 May 2025

Community associated denominator: 07 March 2025

Health inequalities: 8 May 2025

Multi-drug resistant organism admission screening: 9 May 2025

Carbapenemase-producing Enterobacterales:

Case data: 15 May 2025

Population denominator: 07 March 2025

Incidents and outbreaks: 02 May 2025

Release date

14 October 2025

Frequency

Annual

Timeframe of data and timeliness

The latest iteration of data are to 31 December 2024, therefore ten months in arrears.

Continuity of data

Infection prevention and control evidence and guidance: N/A

Reducing infection related risk in the healthcare built environment: N/A

Infection prevention and control workforce development: N/A

Antimicrobial use and antimicrobial resistance: N/A

Hospital activity and pressures: Please see each data source for any relevant information.

***Clostridioides difficile* infection:** Changes in the hospital population and activity during the pandemic period may have affected the epidemiology of *Clostridioides difficile* infection and comparison of results should be interpreted with caution.

Due to a shortage of DNA polymerase in 2022 and early 2023, *Clostridioides difficile* ribotypes were inferred from whole genome sequencing (WGS) derived Multi-Locus Sequence Typing (MLST) in place of polymerase chain reaction (PCR) ribotyping. Ribotypes were inferred from the sequence type and therefore ribotypes belonging to the same sequence type have been grouped for analysis. PCR ribotyping was resumed in early 2023. Caution is advised in interpretation of the annual ribotype distributions due to the differences in typing methods.

***Staphylococcus aureus* bacteraemia:** Changes in the hospital population and activity during the pandemic period may have affected the epidemiology of *Staphylococcus aureus* infection and comparison of results should be interpreted with caution.

Gram-negative bacteraemia (*Klebsiella pneumoniae, Klebsiella oxytoca, Pseudomonas aeruginosa* and *Acinetobacter* species bacteraemia): Changes in the hospital population and activity during the pandemic period may have affected the epidemiology of Gram-negative bacteraemia and comparison of results should be interpreted with caution.

Gram-negative bacteraemia (*Escherichia coli* bacteraemia): Changes in the hospital population and activity during the pandemic period may have affected the epidemiology of Gram-negative bacteraemia and comparison of results should be interpreted with caution.

Multi-drug resistant organism admission screening: Changes in the hospital population and activity during the pandemic period may have affected screening uptake; results of the clinical risk assessment (CRA) screening audits for meticillin-resistant *Staphyloccocus aureus* (MRSA) and carbapenemase-producing Enterobacterales (CPE) should be interpreted with caution.

Carbapenemase-producing Enterobacterales: Changes in the hospital population and activity during the pandemic period, including international travel restrictions, may have affected the epidemiology of CPE and comparison of results should be interpreted with caution.

Incidents and outbreaks: Updates to the nationally agreed minimum list of alert organisms in 2024, as per the [Appendix 13 – NHS Scotland Minimum Alert organism and condition list](), and the launch of new content supporting the prevention and management of water related infection incidents and outbreaks within the NIPCM, may have affected the reporting of healthcare incidents and outbreaks, and mean results should be interpreted with caution.

Revisions statement

New for this report is the provision of ten years of incidence data starting 2015 for *Clostridioides difficile* infection and *Staphylococcus aureus* bacteraemia, to aid interpretation of trends. Data starting 2017 is provided for Gram-negative bacteraemia (including *Escherichia coli* bacteraemia), to align with the first complete year of data for the origin of infection field for this surveillance programme. Elsewhere in the report, where possible, data provision is extended beyond five years to aid interpretation of trends. Please see each data source for relevant information regarding the timeframes available.

These data are not subject to planned major revisions. However, our aim is to continually improve the interpretation of the data and therefore analysis methods are regularly reviewed and may be updated in the future.

Revisions relevant to this publication

Infection prevention and control evidence and guidance: N/A

Reducing infection related risk in the healthcare built environment: N/A

Infection prevention and control workforce development: N/A

Antimicrobial use and antimicrobial resistance: N/A

Hospital activity and pressures: Please see each data source for any relevant information.

***Clostridioides difficile* infection:** Details provided in quarterly epidemiological data publication.

Population denominators have been retrospectively updated from mid-2011 to mid-2022 to reflect revisions by National Records for Scotland (NRS), following Scotland's Census 2022. Population estimates for mid-2023 were revised following publication of the NRS mid-year population estimate for 2023.

***Staphylococcus aureus* bacteraemia:** Details provided in quarterly epidemiological data publication.

Population denominators have been retrospectively updated from mid-2011 to mid-2022 to reflect revisions by National Records for Scotland (NRS), following Scotland's Census 2022. Population estimates for mid-2023 were revised following publication of the NRS mid-year population estimate for 2023.

Gram-negative bacteraemia (*Klebsiella pneumoniae, Klebsiella oxytoca, Pseudomonas aeruginosa* and *Acinetobacter* species bacteraemia):

Population denominators have been retrospectively updated from mid-2011 to mid-2022 to reflect revisions by National Records for Scotland (NRS), following Scotland's Census 2022. Population estimates for mid-2023 were revised following publication of the NRS mid-year population estimate for 2023.

Gram-negative bacteraemia (*Escherichia coli* bacteraemia):

Details provided in quarterly epidemiological data publication.
Population denominators have been retrospectively updated from mid-2011 to mid-2022 to reflect revisions by National Records for Scotland (NRS), following Scotland's Census 2022. Population estimates for mid-2023 were revised following publication of the NRS mid-year population estimate for 2023.

Multi-drug resistant organism admission screening: None.

Carbapenemase-producing Enterobacterales: None.

Incidents and outbreaks: The UKHSA published updated guidance on the nomenclature of *Candida auris* in 2024, which was updated to *Candidozyma auris* to reflect its distinct genetic profile from other Candida species.

Concepts and definitions

Statistical significance:

Please note an increase or decrease stated in this report refers to a statistically significant change ($p < 0.05$), and where a trend is referred to as stable, or there has been no change, this means that there has been no significant increase or decrease.

Origin of infection:

Clostridioides difficile infection, *Staphylococcus aureus* bacteraemia and *Escherichia coli* bacteraemia: Cases are presented by origin of infection, where definitions are applied as per each surveillance protocol to classify cases as hospital acquired, healthcare associated, community associated or unknown. Please see the quarterly publications, corresponding methods & caveats document and individual surveillance protocols for CDI and SAB / ECB for full details.

Case fatality:

Clostridioides difficile infection, *Staphylococcus aureus* bacteraemia and *Escherichia coli* bacteraemia: The definition of 30 day all cause case fatality is any death occurring within 30 days of the first positive specimen date within each infection episode. Therefore, the data includes deaths where *Clostridioides difficile* infection, *Staphylococcus aureus* bacteraemia or *Escherichia coli* bacteraemia may not have been either the underlying or contributory cause of death. All cause case fatality depends solely on the number of deaths identified and is not subject to bias that may be introduced as a result of inaccuracies in completion of the death certificate or coding of the cause of death. If more than one episode occurs in the 30 days prior to death, only the latest episode will be counted as resulting in a death. Some cases may not be able to be linked to NRS death data due to missing or invalid Community Health Index (CHI) numbers.

Year-to-year comparisons:

The current calendar year 2024 is compared to the previous calendar year 2023 using two sided z-tests for proportions and rate ratio tests (using Poisson counts) for incidence rates. A resulting p-value of less than 0.05 was deemed statistically significant to determine an increase or decrease relative to the previous year.

Five-year trends:

Continuous numerical data, incidence rates and incidence proportions over the past five years are modelled using Gaussian regression, Poisson regression and binomial regression respectively. This is performed to determine the presence of a significant upwards or downwards linear trend in the changing continuous data / incidence rate / proportion, and the corresponding rate of change of the best-fit gradient over the past five years from 2020 to 2024.

Where a year-on-year increase or decrease has been reported, this represents a significant linear trend over the past five years.
Where no five year increases or decreases have been detected, these are reported as stable.

Where a change over the past five years has been detected, but the trend is not linear, a direct year-to-year comparison between the incidence rate in 2024 and the incidence rate in 2020 has been made.

Funnel plots:

Funnel plot analyses are used to determine if any NHS board's rate is significantly higher or lower than the NHS Scotland average rate. The incidence rates for each NHS board are plotted against NHS board size/ hospital activity, with 95% confidence intervals calculated from the NHS Scotland average. Any NHS board above the 95% confidence interval are deemed to be exceptions, and any NHS board below the 95% confidence interval are reported as lower than the NHS Scotland average rate.

Funnel plots are generated on a quarterly basis in the quarterly epidemiological reports; in this report the funnel plots incorporate the full year's data for 2024, and therefore as a result, some NHS boards may be above the 95% confidence interval upper limit in the annual funnel plot who may not have exceeded the quarterly funnel plots limits.

Infection prevention and control evidence and guidance: N/A

Reducing infection related risk in the healthcare built environment: N/A

Infection prevention and control workforce development: N/A

Antimicrobial use and antimicrobial resistance: N/A

Hospital activity and pressures: Total occupied bed days: Total number of occupied bed days for years 2015 - 2024, as per Public Health Scotland ISD(S)1.

Elective admissions data: Details are provided within Public Health Scotland Acute hospital activity and NHS beds information quarterly publication.

Emergency admissions data: Details are provided within Public Health Scotland Acute hospital activity and NHS beds information quarterly publication.

Delayed discharges data: Details are provided on the Scottish Health and Social Care Open Data platform. These data include the number of hospital bed days occupied by people aged 18 and over who were clinically ready for discharge (excluding NHS Golden Jubilee). Data are presented as a percentage of TOBDs, whereby a comparable number of total hospital occupied bed days are used which excludes TOBDs from NHS Golden Jubilee, paediatric specialties and TOBDs from children's hospitals.

A&E waiting times data: Details are provided within Scottish Health and Social Care Open Data platform.

Demographics: Details provided in surveillance protocol and quarterly publication.

Health inequalities: The SIMD is a relative measure of deprivation across 6,976 small areas (called data zones). The SIMD ranks data zones from most deprived (ranked 1) to least deprived (ranked 6,976). The areas have been divided into five quintiles with those in quintile 1 living in the most deprived areas and those in quintile 5 living in the least deprived areas. The SIMD identifies deprived areas, not deprived individuals, and is unadjusted for age and sex. Further details are provided in SIMD 2020.

***Clostridioides difficile* infection:** Details are provided in surveillance protocol and quarterly publication.

***Staphylococcus aureus* bacteraemia:** Details are provided in surveillance protocol and quarterly publication.

Gram-negative bacteraemia (*Klebsiella pneumoniae, Klebsiella oxytoca, Pseudomonas aeruginosa* and *Acinetobacter species* bacteraemia):

Gram-negative organisms including Enterobacterales and non-fermenters, cause serious infections including bacteraemia, pneumonia, meningitis, and surgical site infections (SSIs). Gram-negative bacteraemia is a public health and clinical concern because of:

1. The severity of infection, commonly occurring among vulnerable patients often at the extremes of life and/or with comorbidities.
2. The large number of cases of Gram-negative bacteraemia each year, and high prevalence of Gram-negative infections.
3. The association with receiving healthcare in community and healthcare settings.
4. Their ability to become resistant to multiple classes of antibiotics, limiting treatment options.

Further details provided in the SONAAR Annual Report.

Gram-negative bacteraemia (*Escherichia coli* bacteraemia): Details provided in surveillance protocol and quarterly publication.

Multi-drug resistant organism admission screening: Screening for MDRO on admission to hospital is a key intervention for early identification and management of patients who are colonised or infected, reducing the risk of introduction of MDRO into healthcare settings.

MRSA and CPE CRA screening policies are in place for all acute hospitals in Scotland. The two-stage screening process includes a CRA to identify patients at high risk of colonisation or infection with either MRSA or CPE, followed by microbiological testing as indicated by the CRA.

Uptake of the MRSA CRA has been a level 3 HCAI Key Performance Indicator (KPI) since 2013. The MRSA screening uptake monitoring tool was extended in 2018 to include assessment of CPE CRA uptake for the same patients included in the MRSA KPI audits.

Carbapenemase-producing Enterobacterales: CPE are bacteria that produce enzymes that inactivate carbapenems and other classes of antibiotics. Infections caused by CPE are difficult to treat and are associated with increased mortality.

A case of CPE is defined as one isolate per patient per enzyme and organism combination per year as confirmed by the Scottish Microbiology Reference Laboratory. Further details provided in the SONAAR Annual Report.

Incidents and outbreaks: Healthcare infection incidents and outbreaks reported to NSS. Healthcare associated infection incidents and outbreaks are defined within Chapter 3 of the National Infection Prevention and Control Manual.

Individual NHS boards report the MDRO status of organisms within relevant incidents & outbreaks. These are typically ascertained by local phenotypic susceptibility testing, reference laboratory phenotypic or genotypic testing or a combination. For more information see the Reference laboratory referral guide.

Relevance and key uses of the statistics

Infection prevention and control evidence and guidance: N/A

Reducing infection related risk in the healthcare built environment: N/A

Infection prevention and control workforce development: N/A

Antimicrobial use and antimicrobial resistance: Details provided in the SONAAR Annual Report.

Hospital activity and pressures: Figures provided are used for management information for resource planning, surveillance and research in NHS Scotland.

***Clostridioides difficile* infection:**

Case data: Details provided in surveillance protocol and quarterly publication.

Health inequalities: Please see data source for any relevant information.

***Staphylococcus aureus* bacteraemia:**

Case data: Details provided in surveillance protocol and quarterly publication.

Health inequalities: Please see data source for any relevant information.

Gram-negative bacteraemia (*Klebsiella pneumoniae, Klebsiella oxytoca, Pseudomonas aeruginosa* and *Acinetobacter* species bacteraemia): The outputs of the surveillance programme are intended to support the NHS boards in controlling and reducing the burden of Gram-negative bacteraemia.

Gram-negative bacteraemia (*Escherichia coli* bacteraemia):

Case data: Details provided in surveillance protocol and quarterly publication.

Health inequalities: Please see data source for any relevant information.

Multi-drug resistant organism admission screening: These audit data measure uptake of the two-stage admission screening process of CRA followed by microbiological testing of those considered to be at risk of carrying MRSA or CPE based on CRA response, in NHS Scotland as per policies. These audit data are collected to support the assurance element of quality improvement processes and gather intelligence to inform and target local interventions where CRA screening uptake is suboptimal. ARHAI Scotland provide enhanced feedback to NHS boards on a quarterly basis.

Carbapenemase-producing Enterobacterales: Details provided in the SONAAR Annual Report.

Incidents and outbreaks: To identify trends in organisms, types of infection, procedures, patient mix, or clinical specialties associated with healthcare infection incidents and outbreaks. This informs the production of guidance, tools or policy and assists in preparing for, preventing, detecting, and managing healthcare infection incidents and outbreaks.

Accuracy

Infection prevention and control evidence and guidance: N/A

Reducing infection related risk in the healthcare built environment: N/A

Infection prevention and control workforce development: N/A

Antimicrobial use and antimicrobial resistance: N/A

Hospital activity and pressures: Details available as per each data source.

***Clostridioides difficile* infection:**

Case data: Details provided in surveillance protocol and quarterly publication.

Health inequalities: Please see data source for any relevant information.

The snapshot programme aims to obtain a representative sample of isolates from CDI cases across all NHS boards in Scotland, however not all NHS boards are able to submit the required number of isolates as specified by the Snapshot protocol therefore the data should be interpreted with caution.

***Staphylococcus aureus* bacteraemia:**

Case data: Details provided in surveillance protocol and quarterly publication.

Health inequalities: Please see data source for any relevant information.

Gram-negative bacteraemia (*Klebsiella pneumoniae, Klebsiella oxytoca, Pseudomonas aeruginosa* and *Acinetobacter* species bacteraemia): Gram-negative bacteraemia data are the product of ECOSS. Participating laboratories routinely report all identifications of organisms, infection or microbiological intoxication and where possible the antimicrobial resistance data unless they are known to be of no clinical or public health importance. The collected data are used for the identification of single cases of severe disease, outbreaks, antimicrobial resistance patterns and longer-term trends in the incidence of laboratory reported infections, enhanced surveillance, health protection, analytical and statistical use.

Gram-negative bacteraemia (*Escherichia coli* bacteraemia):

Case data: Details provided in surveillance protocol and quarterly publication.

Health inequalities: Please see data source for any relevant information.

Multi-drug resistant organism admission screening: While audit data does not present the same robust scientific data as surveillance, it provides a nationally representative measure of CRA screening uptake and is valuable for identification of areas for targeted implementation of quality improvement measures. A minimum of 3,500 patients are audited annually for NHS Scotland in order to measure uptake with sufficient precision, with each NHS board auditing a representative number of patients.

For each eligible patient admitted during the audit period, data are collected for the most recent opportunity for the CRA to have been undertaken. It is acknowledged that all patients are eligible for CPE CRA admission screening though not all areas are included in the screening audit. These areas will not be represented in these data. Patients are selected for audit based on the Protocol for CRA MRSA Screening National Rollout in Scotland, with the exception of NHS Golden Jubilee from which only CPE CRA screening uptake audits are submitted (as all patients are screened for MRSA). In order to maximise the representativeness of the national KPI measure whilst ensuring flexibility at a local level, NHS boards are asked that data collection throughout the year should be spread as much as possible across; hospital, wards, high/low impact specialties, medical/surgical specialties, elective and emergency admissions.

Carbapenemase-producing Enterobacterales: Details provided in the SONAAR Annual Report.

Incidents and outbreaks: NSS are aware that the healthcare infection incident assessment tool (HIIAT) is subjective and there is variation in how NHS Scotland boards assess and therefore report healthcare infection incidents. The extent of variation in assessment and unreported incidents has not been fully quantified.

Completeness

Infection prevention and control evidence and guidance: N/A

Reducing infection related risk in the healthcare built environment: N/A

Infection prevention and control workforce development: N/A

Antimicrobial use and antimicrobial resistance: N/A

Hospital activity and pressures: Details available as per each data source.

Health inequalities: A total of 9 (0.6%) CDI cases, 64 (1.5%) ECB cases, and 68 (4.0%) SAB cases in 2024, were excluded from calculations due to missing data or where postcodes could not be linked.

***Clostridioides difficile* infection:** Details provided in quarterly publication.

The snapshot programme aims to obtain a representative sample of isolates from CDI cases across all NHS boards in Scotland, however not all NHS boards are able to submit the required number of isolates as specified by the Snapshot protocol therefore the data should be interpreted with caution.

Staphylococcus aureus **bacteraemia:** Details provided in [quarterly publication](#).

Gram-negative bacteraemia (*Klebsiella pneumoniae, Klebsiella oxytoca, Pseudomonas aeruginosa* and *Acinetobacter* species bacteraemia): All data for the reporting period have been included in the analysis.

Gram-negative bacteraemia (*Escherichia coli* bacteraemia): Details provided in [quarterly publication](#).

Multi-drug resistant organism admission screening: A minimum of 3,500 patients are audited annually for NHS Scotland in order to measure uptake with sufficient precision, with each NHS board auditing a representative number of patients. All NHS boards submitted at least their required minimum number of patients audited and all completed audits submitted data for the reporting period have been included in the analysis.

Carbapenemase-producing Enterobacterales: Details provided in the [SONAAR Annual Report](#).

Incidents and outbreaks: The incidents and outbreaks data presented in this report are based on submissions by NHS boards. Nationally, our understanding is based on what is reported to us by the NHS boards.

Comparability

Infection prevention and control evidence and guidance: N/A

Reducing infection related risk in the healthcare built environment: N/A

Infection prevention and control workforce development: N/A

Antimicrobial use and antimicrobial resistance: N/A

Hospital activity and pressures: Details available as per each data source.

***Clostridioides difficile* infection:** Details provided in [surveillance protocol and quarterly publication](#).

Staphylococcus aureus **bacteraemia:** Details provided in [surveillance protocol and quarterly publication](#).

Gram-negative bacteraemia (*Klebsiella pneumoniae, Klebsiella oxytoca, Pseudomonas aeruginosa* and *Acinetobacter* species bacteraemia): Details provided in the [SONAAR Annual Report](#).

Gram-negative bacteraemia (*Escherichia coli* bacteraemia): Details provided in [surveillance protocol and quarterly publication](#).

Multi-drug resistant organism admission screening: There are no comparable data on CRA screening uptake.

Carbapenemase-producing Enterobacterales: Details provided in the SONAAR Annual Report.

Incidents and outbreaks: Reporting of all HCAI outbreaks is not mandatory elsewhere in the UK and comparable data are not published.

Accessibility

It is the policy of NSS to make its website and products accessible according to published guidelines.

Coherence and clarity

Development of guidance: all National Infection Prevention and Control Manual (NIPCM) reviews and resources are produced using a defined process.

Value type and unit of measurement

Total occupied bed days per year.

Count of emergency admissions per quarter.

Count of elective admissions per quarter.

Percentage of total occupied bed days due to delayed discharges (%) = Number of bed days occupied by people aged 18 and over who were clinically ready for discharge (excluding NHS Golden Jubilee) / Total number of occupied bed days (excluding bed days from NHS Golden Jubilee and all paediatric specialties/children's hospitals) * 100. Percentage of A&E attendances seen within 4-hour target (%) = Total number of patients seen within 4 hours in A&E / Total number of patients who attended A&E * 100.

Healthcare associated and hospital acquired cases and incidence rates (per 100,000 total occupied bed days) for *Clostridioides difficile* infection, *Escherichia coli* bacteraemia and *Staphylococcus aureus* bacteraemia. Overall and community associated cases and incidence rates (per 100,000 population) for *Clostridioides difficile* infection, *Escherichia coli* bacteraemia and *Staphylococcus aureus* bacteraemia.

Percentage for SIMD quintiles of *Clostridioides difficile* infection, *Staphylococcus aureus* bacteraemia and *Escherichia coli* bacteraemia (%) = count of cases in SIMD quintile / total number of cases where SIMD quintile assigned * 100. Those with missing or where postcodes could not be linked excluded from total.

Percentage for demographics of *Clostridioides difficile* infection, *Staphylococcus aureus* bacteraemia and *Escherichia coli* bacteraemia (%) = count of cases in age-sex subgroup / total number of cases *100. Percentage for origin of infection category of *Clostridioides difficile* infection, *Staphylococcus aureus* bacteraemia and *Escherichia coli* bacteraemia (%) = count of healthcare associated or community associated cases / total number of cases *100.

30 day all cause case fatality rate for *Clostridioides difficile* infection, *Staphylococcus aureus* bacteraemia and *Escherichia coli* bacteraemia = count of cases with death occurring within 30 days of positive specimen date / total number of cases.

Percentage of *Clostridioides difficile* ribotypes (%) = count of each ribotype or ribotype group / total number of isolates submitted for typing. Percentage for primary source for *Staphylococcus aureus* bacteraemia (%) = count of case entry point / total number of cases.

Percentage for primary source for *Escherichia coli* bacteraemia (%) = count of case primary source / total number of cases.

MRSA Clinical Risk Assessment (CRA) Uptake (%) = number of patients where CRA undertaken / all patients in audit sample *100.

Carbapenemase-producing Enterobacterales (CPE) CRA Uptake (%) = number of patients where CRA undertaken / all patients in audit sample *100.

Count of carbapenemase-producing Enterobacterales per year. Incidence rate of carbapenemase-producing Enterobacterales per 100,000 population per year.

Total number of reported incidents and outbreaks.

Number of reported incidents and outbreaks by HIIAT category.

Number of reported incidents and outbreaks with one or more confirmed patient cases.

Number of reported incidents and outbreaks with a single patient case.

Number of reported incidents and outbreaks with no patient cases.

Number of reported incidents and outbreaks where two or more pathogens were reported.

Number of reported incidents and outbreaks with no identified pathogen and no patient cases.

Number and percentage of reported incidents and outbreaks from key organism types (%) = Number of reported incidents and outbreaks from a key organism type / Total number of reported incidents and outbreaks * 100. Note: some incidents and outbreaks included multiple organisms so total percentages may not add up to 100%.

Number and percentage of reported incidents and outbreaks from a key organism type where ARHAI has been notified of a multi-drug resistant organism (%) = Number of reported incidents and outbreaks from a key organism type where ARHAI has been notified of a multi-drug resistant organism / Number of reported incidents and outbreaks from corresponding key organism type * 100.

Disclosure

The PHS protocol on Statistical Disclosure Protocol is followed.

Official statistics accreditation

Not assessed

UK Statistics Authority assessment

Not assessed

Last published

15 October 2024

Next published

October 2026

Date of first publication

25 May 2015

Help email

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Data form completed

14 October 2025

Appendix 2 – Early access details

Pre-release access

Under terms of the 'Pre-Release Access to Official Statistics (Scotland) Order 2008', NSS is obliged to publish information on those receiving Pre-Release Access ('Pre-Release Access' refers to statistics in their final form prior to publication). The standard maximum Pre-Release Access is five working days. Shown below are details of those receiving standard Pre-Release Access.

Standard pre-release access

Scottish Government Health Department, NHS board Chief Executives, NHS board Communication leads.

Appendix 3 – NSS and official statistics

Our statistics comply with the Code of Practice for Statistics in terms of trustworthiness, high quality and public value. This also means that we keep data secure at all stages, through collection, processing, analysis and output production, and adhere to the 'five safes'.

Alternative formats

This publication can be made available in large print, Braille (English only), audio tape and different languages.
Please contact nss.equalitydiversity@nhs.scot for further information.

This report was designed by NHS National Services Scotland's Creative Services team.
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