# agenda

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| **Title of Meeting** | 119th Meeting of the Public Health Agency Board |
| **Date** | 20 February 2020 at 1.30pm |
| **Venue** | Fifth Floor Meeting Room, 12/22 Linenhall Street, Belfast |

## standing items

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|---|---|---|---|
| 1<br>1.30 | Welcome and apologies | | Chair |
| 2<br>1.30 | Declaration of Interests | | Chair |
| 3<br>1.30 | Minutes of Previous Meeting held on 23 January 2020 | | Chair |
| 4<br>1.30 | Matters Arising | | Chair |
| 5<br>1.35 | Chair's Business | | Chair |
| 6<br>1.40 | Chief Executive's Business | | Chief Executive |
| 7<br>1.50 | Finance Report | **PHA/01/02/20** | Mr Cummings |

## items for noting

| | | | |
|---|---|---|---|
| 8<br>2.00 | Surveillance of Antimicrobial Use and Resistance in Northern Ireland, Annual Report, 2018 | **PHA/02/02/20** | Dr Mairs |
| 9<br>2.20 | Family Nurse Partnership Reports | **PHA/03/02/20** | Mr Morton |

## closing items

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| 10<br>2.45 | Any Other Business | | |

11 Details of next meeting:

*Thursday 19 March 2020 at 1.30pm*

*Fifth Floor Meeting Room, 12/22 Linenhall Street, Belfast, BT2 8BS*

HSC Public Health Agency

# minutes

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| **Title of Meeting** | 118th Meeting of the Public Health Agency Board |
| **Date** | 23 January 2020 at 1.30pm |
| **Venue** | Fifth Floor Meeting Room, 12/22 Linenhall Street, Belfast |

**Present**

| | | |
|---|---|---|
| Mr Andrew Dougal | - | Chair |
| Mrs Valerie Watts | - | Interim Chief Executive |
| Mr Edmond McClean | - | Interim Deputy Chief Executive / Director of Operations |
| Dr Adrian Mairs | - | Acting Director of Public Health |
| Mr Rodney Morton | - | Director of Nursing and Allied Health Professionals |
| Alderman William Ashe | - | Non-Executive Director |
| Mr John-Patrick Clayton | - | Non-Executive Director |
| Mr Leslie Drew | - | Non-Executive Director |
| Ms Deepa Mann-Kler | - | Non-Executive Director |
| Alderman Paul Porter | - | Non-Executive Director |
| Professor Nichola Rooney | - | Non-Executive Director |
| Mr Joseph Stewart | - | Non-Executive Director |

**In Attendance**

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|---|---|---|
| Mr Paul Cummings | - | Director of Finance, HSCB |
| Mr Robert Graham | - | Secretariat |
| Ms Jenny Redman | - | Boardroom Apprentice |

**Apologies**

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| Dr Aideen Keaney | - | Director of Quality Improvement |
| Ms Marie Roulston | - | Director of Social Care and Children, HSCB |

**1/20** **Item 1 – Welcome and Apologies**

1/20.1 The Chair welcomed everyone to the meeting. Apologies were noted from Ms Marie Roulston.

**2/20** **Item 2 – Declaration of Interests**

2/20.1 The Chair asked if anyone had interests to declare relevant to any items on the agenda. No interests were declared.

**3/20** **Item 3 – Minutes of previous meeting held on 5 December 2019**

3/20.1 The minutes of the previous meeting, held on 5 December 2019, were approved as an accurate record of that meeting.

**4/20** **Item 4 – Matters Arising**

4/20.1 There were no matters arising.

**5/20** **Item 5 – Chair's Business**

5/20.1 The Chair advised members that the next meeting of the UK Public Health Network will take place in Belfast on Tuesday 12 May. He agreed to forward to members some further information regarding some of the issues to be discussed at the meeting.

5/20.2 The Chair informed members that following the demonstration at the last meeting he had received correspondence from Participation and the Practice of Rights (PPR) regarding suicide. Mr Stewart commented that some of the issues raised within the letter were outwith the remit of PHA. Mr Clayton said that the letter highlighted some challenges and said that PHA should seek to further engage with them. The Interim Chief Executive **agreed** that she would, with inputs from senior officers, send a response on behalf of the PHA Board.

5/20.3 The Interim Chief Executive said that the target for Northern Ireland should be Zero Suicide and she said that at this week's senior management team meeting there had been a presentation on the Zero Suicide initiative. Alderman Ashe said that it was important that people who need help can access it highlighting the issue where people presenting at Emergency Departments under the influence of drugs or alcohol may be turned away. Dr Mairs advised that there are pilot de-escalation initiatives in both the Belfast and South Eastern Trusts, but Alderman Ashe said that there are many examples of individuals falling through the system.

5/20.4 Ms Mann-Kler queried whether there was an opportunity with the Assembly being back in place, that PHA can ensure the issue of suicide is approached in the most strategic way possible, working across many Departments. Mr McClean suggested that it may be useful for members to receive an update on what is happening with regard to Protect Life 2 in the PHA and across the HSC, and the nature and extent of the services being provided. Dr Mairs said that there is a range of services for people in distress, but it is a very complex picture and there is a need for more joined up working.

5/20.5 Professor Rooney said that suicide is not solely a health issue, and that a more strategic approach is needed. Dr Mairs agreed saying by the time individuals reach de-escalation services, it may already be too late. Alderman Porter added that people may present to HSC services with

suicide risk issues, but have to wait too long to access services. He noted that other countries, where there are higher rates of deprivation, have lower suicide rates than Northern Ireland.

5/20.6 Mr Morton said that there is a need to address the issue of people being turned away from Emergency Departments. Professor Rooney said these individuals are advised to attend addiction services before they can attend mental health services. Mr Morton reiterated that this needs to be reviewed.

5/20.7 The Chair gave an overview of the Four Nations Committee meeting that took place in Glasgow on 17 January. He said that Professor Maggie Rae, incoming President of the Faculty, had delivered a presentation on the Faculty of Public Health's new strategy.

**6/20 Item 6 – Chief Executive's Business**

6/20.1 The Interim Chief Executive advised members that she, along with the Chair, had attended the PHA's Accountability Review meeting with the Permanent Secretary and the Chief Medical Officer on 10 January. She said that there was a particular focus on staffing issues and that she was able to provide an update on the progress PHA was making, particularly with regard to the filling of public health consultant vacancies.

6/20.2 The Interim Chief Executive advised members that an interim solution has been agreed whereby the PHA and the Northern Ireland Medical and Dental Training Agency (NIMDTA) can enter a co-operative relationship for the purpose of extending the existing medical specialty training programme to those from backgrounds other than medicine. She said that this agreement will last for 2 years in the first instance and will also future public health training posts to be open to both medical and non-medical graduates.

6/20.3 The Interim Chief Executive said that NIMDTA also intends to develop a new speciality programme in dental public health, and that Dr Denise O'Hagan will establish this new programme.

6/20.4 The Interim Chief Executive confirmed to members that Professor Hugo van Woerden will be taking up post as Director of Public Health at the beginning of March 2020. She again expressed her thanks to Dr Adrian Mairs for covering the post on an interim basis.

6/20.5 The Interim Chief Executive informed members that PHA has launched a video on social media to raise awareness about Type One Diabetes in children. She explained that Type 1 diabetes cannot be prevented and occurs when the pancreas is no longer able to produce insulin. She added that it is the most common type of diabetes in children and young adults, and that every year between 100 and 130 children develop type 1 diabetes in Northern Ireland. She shared with members the video which features the PHA's Amanda O'Neill and her son Caolan. She said

that the video has been on Facebook for only a few days and has already received more than 62,000 hits. She added that PHA has begun using more video case studies as they are reaching audiences it struggled to reach with more traditional PR methods.

6/20.6 Ms Mann-Kler commended the reach and suggested that if there are any comments on the video they should be analysed to understand how far the video has reached.

**7/20 Item 7 – Finance Report (PHA/01/01/20)**

7/20.1 Mr Cummings explained to members that although PHA has a year to date surplus of £2.9m this has to be set in the context of the overall HSC position where funding is required to cover the costs of any Agenda for Change pay deal. He advised members that correspondence had been issued by the Department requesting that it be notified of any slippage and he was confident that the Department will seek the return of funding non-recurrently to cover current HSC pressures.

7/20.2 Mr Drew asked how the £2.9m surplus would have been allocated. Mr McClean explained that it would have covered a range of both Screening and Health Improvement initiatives. He said that some of the funding would have gone to non-statutory providers to cover a range of areas of priority to the PHA. Alderman Porter suggested that when PHA returns any funding it should state how the funding would have been utilised. Mr Clayton asked how much of the £2.9m will be the final year-end surplus. Mr Cummings said that the spend towards the year-end will see the surplus reduce, but he anticipated that at least £1m will be returned.

7/20.3 Members noted the Finance Report.

**8/20 Item 8 – Update from Chair of Governance and Audit Committee (PHA/02/01/20)**

8/20.1 Mr Drew began his update by referring to the approved minutes of the Governance and Audit Committee meeting on 3 October. He explained to members that the one key finding relating to the Lifeline audit referred to KPIs regarding performance management, the issue being not that calls weren't being answered quickly enough, but that there was no measurement in place.

8/20.2 Mr Drew advised that the Committee met on 5 December and that there will be an update on the Family Nurse Partnership at a future Board meeting. He noted that the Northern Ireland Ambulance Service had completed its PPI self-assessment, and that an audit on risk management has been deferred.

8/20.3 Mr Drew said that he had received the BSO Annual Assurance letter and that there remained issues in regard to payroll, although there has been

good progress in implementing some of the previous audit recommendations.

8/20.4 Mr Drew advised that the Committee had considered the latest version of the Corporate Risk Register, and that one new risk had been added relating to industrial action. He added that an update on fraud had been received and that there were no new cases. He also said that the main issue emanating from the latest Information Governance action plan related to the uptake of mandatory training, but that measures were being taken to address this. Finally, he said that the latest report on Direct Award Contracts showed that there had been a slight increase in the number of these, but this was due to additional initiatives through Transformation funding.

8/20.5 The Board noted the update from the Chair of the Governance and Audit Committee.

**9/20 Item 9 - Review of PHA Standing Orders, Standing Financial Instructions and Scheme of Delegated Authority (PHA/03/01/20)**

9/20.1 Mr McClean advised that the Standing Orders, Standing Financial Instructions and Scheme of Delegated Authority had been reviewed and updated, with the key updates relating to the constitution of the Agency Management Team with the appointment of a Director of Quality Assurance, and the change in terminology from Single Tender Actions to Direct Award Contracts.

9/20.2 The Board **approved** the PHA Standing Orders, Standing Financial Instructions and Scheme of Delegated Authority.

**10/20 Item 10 - Business Continuity Management Revised Plan and Policy (PHA/04/01/20)**

10/20.1 Mr McClean said that the PHA Business Continuity Plan had been revised following a "walk through" of the Plan which had taken place last year following a requirement by the Department of Health to provide an assurance that all Plans were fit for purpose in the event of a No Deal EU Exit. He said that a number of adjustments had been made and that the Plan will be continually kept under review.

10/20.2 The Board **approved** the Business Continuity Management Plan and Policy.

**11/20 Item 11 - Update on Personal and Public Involvement (PHA/05/01/20)**

*Mr Martin Quinn, Ms Bronach McMonagle and Ms Torie Tennant joined the meeting for this item*

11/20.1 Mr Morton introduced the Report and said that it was good to see strides

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| | being made in terms of service users being involved in decision making. He said that the Report also gave an update on a range of Transformation programmes and also the development of a remuneration policy that properly recognises those with lived experience. |
| 11/20.2 | Mr Quinn informed members that PHA had been able to access up to £500k of Transformation funding which he said stimulated a lot of PPI-related activity. He said that he would wish to bring a fuller report on all of the work carried out to a future meeting. He explained that there were now Involvement officers within each Trust and he said that there was beginning to be a change in attitude towards PPI. |
| 11/20.3 | Mr Quinn advised that UK-wide standards on involvement in research were recently launched as there has been great interest in the research community regarding these. He added that PHA continues to provide a range of professional advice and guidance and is also delivering a training programme. He highlighted the Engage website and said that it has had more than 5,000 visitors. |
| 11/20.4 | Ms McMonagle gave members an overview of the recent Involve Fest event which took place in November. She said that it was a week-long celebration with over 60 events and 56 different organisations being involved, the highlight of which was a one-day conference hosted by Paul Clark. She explained that there were four objectives for the conference. She invited Ms Tennant to give her observations on the event. |
| 11/20.5 | Ms Tennant said that she felt involved in the event from the start and that as a service user her views were taken into account. She said that she got a lot out of the event and that it was a success. |
| 11/20.6 | The Chair said that he had attended the event and noted the commitment and enthusiasm of all in attendance and he offered his congratulations to those involved in the planning. |
| 11/20.7 | Ms Mann-Kler thanked the team for their presentation and asked what key outcomes they had been seeking from the Involve Fest conference. Ms McMonagle said that she was hoping that this would become an annual event and she said that everyone involved wanted to make it as meaningful as possible. In terms of outcomes, she highlighted awareness raising and getting people to become involved in co-production and co-design. Ms Tennant said that involvement can take all forms and that instead of talking about PPI, we should talk about involvement. Mr Quinn said that the people involved in the planning felt motivated because they could see their involvement being recognised. He said that a Post Project Evaluation will be written. He added that it was important to maintain the momentum gathered from the event. |
| 11/20.8 | Mr Morton said that Mr Quinn and his team are currently working on an |

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| | outcomes framework which will clearly show that involvement does make a difference. |
| 11/20.9 | Mr Clayton commended the work being done, but noted that the input of staff is equally important because there is a perception that PPI is only about service users and carers. Mr Quinn said that the contribution of staff is beginning to be recognised and that staff want to be involved. Ms McGonagle said that in terms of training, Ulster University is looking at developing training in PPI for AHPs |
| 11/20.10 | Ms Tennant noted that people can become involved in PPI if they wish to become involved. She said that she had become involved through her work with a charity. |
| 11/20.11 | The Chair thanked Mr Quinn, Ms McMonagle and Ms Tennant for their presentation. |
| 11/20.12 | The Board noted the update on Personal and Public Involvement. |
| **12/20** | **Item 12 - Epidemiology of Tuberculosis in Northern Ireland Annual Surveillance Report 2018 (PHA/06/01/20)**<br><br>*Mr Mark O'Doherty and Ms Emma Dickson joined the meeting for this item.* |
| 12/20.1 | Dr Mairs introduced the Report saying that although the number of cases of tuberculosis is relatively low, it remains an important issue for PHA, both in terms of the number of cases and the follow up treatment. He invited Mr O'Doherty to present the Report. |
| 12/20.2 | Mr O'Doherty advised that the rates of tuberculosis in Northern Ireland are low with a rate of 3 per 100,000. He said that as the numbers are so low, a 3-year moving average is used to monitor trends. Of the cases recorded, he said that 57% were non-UK nationals. He added that the rates are higher in males in the working population and people over the age of 65. |
| 12/20.3 | Mr O'Doherty advised that PHA pays particular attention to cases of pulmonary tuberculosis and that 70% of cases in Northern Ireland had a pulmonary component. He said that among Trusts, the highest levels are in the Southern Trust area, due to the high immigrant workforce. He added that the Belfast Trust has seen a downward trend in cases. |
| 12/20.4 | Mr O'Doherty explained that when a laboratory test is carried out to confirm a pulmonary case there is an 80% target for having a culture confirmed but Northern Ireland is currently sitting at 76%. In terms of resistance to drugs, he advised that Northern Ireland still has a low resistance to frontline drugs. |
| 12/20.5 | Mr O'Doherty said that of the 70 notified cases of tuberculosis in 2017, |

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| | PHA had received follow up on 64 of these cases, and that 78% had completed their treatment and in 13% of cases the patient either died or their treatment was extended. |
| 12/20.6 | Mr O'Doherty advised that there is an action plan which is focusing specifically on the Belfast and Southern Trusts to reduce the incidence of latent tuberculosis. |
| 12/20.7 | Alderman Porter asked if the countries whose immigrants are more likely to have tuberculosis are identified. Mr O'Doherty said that as the number of cases is low this could make individuals identifiable. |
| 12/20.8 | Mr Clayton suggested that within the Southern Trust area, there are community groups who could be approached and he suggested STEP in Dungannon. He said that people may be reluctant to speak to their employers but may approach a local community group to seek advice. Mr Morton also suggested the Homeless Inclusion Hub. |
| 12/20.9 | The Chair thanked Mr O'Doherty and Ms Dickson for their attendance at the meeting. |
| 12/20.10 | The Board noted the Epidemiology of Tuberculosis in Northern Ireland Annual Surveillance Report 2018. |
| **13/20** | **Item 13 – Any Other Business** |
| 13/20.1 | There was no other business. |
| **14/20** | **Item 14 – Details of Next Meeting** |
| | *Thursday 20 February 2020 at 1:30pm* |
| | *Fifth Floor Meeting Room, 12/22 Linenhall Street, Belfast, BT2 8BS* |
| | Signed by Chair: |
| | Date: |

# Public Health Agency

## Finance Report

## 2019-20

### Month 9 - December 2019

# PHA Financial Report - Executive Summary

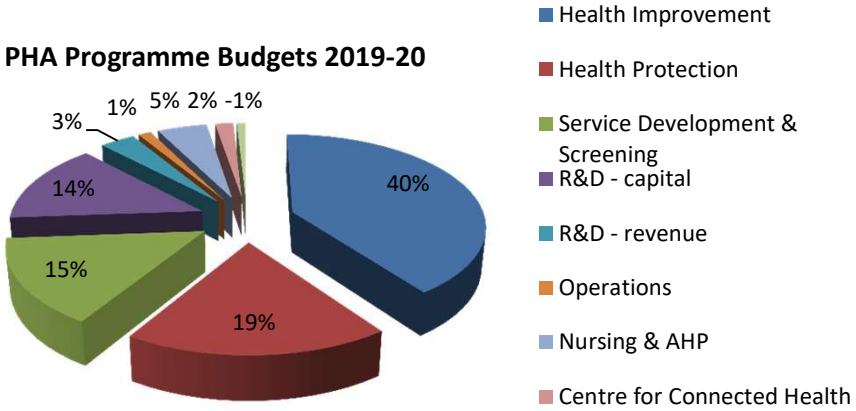
## Year to Date Financial Position (page 2)

At the end of month 9 PHA is reporting an underspend (£1.1m) against its profiled budget. This underspend is primarily the result of year-to-date underspends on Administration budgets due to vacant posts (see page 5).

Budget managers continue to be encouraged to closely review their profiles and financial positions to ensure the PHA meets its breakeven obligations at year-end.

## Programme Budgets (pages 3&4)

The chart below illustrates how the Programme budget is broken down across the main areas of expenditure.

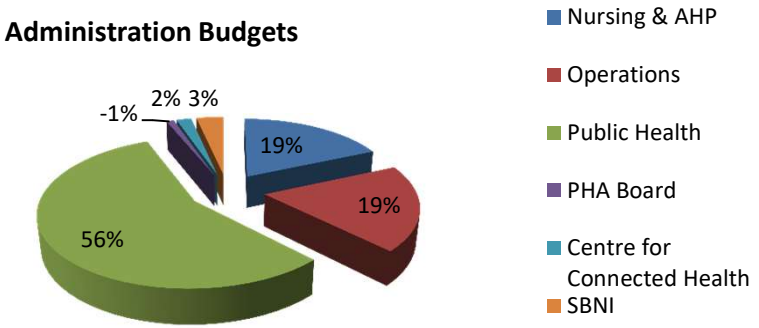



## Administration Budgets (page 5)

Approximately half of the Administration budget relates to the Directorate of Public Health, as shown in the chart below.

A significant number of vacant posts remain within PHA, and this is creating slippage on the Administration budget.

Management is proactively working to fill vacant posts and to ensure business needs continue to be met.




## Full Year Forecast Position & Risks (page 2)

PHA is currently forecasting a breakeven position for the full year. Slippage is expected to arise from Administration budgets in particular, however management expect this to be used to fund a range of in-year pressures and initiatives. Ringfenced funds, including Confidence and Supply Transformation Funds, are being monitored closely to ensure full spend by year end.

# Public Health Agency
## 2019-20 Summary Position - December 2019

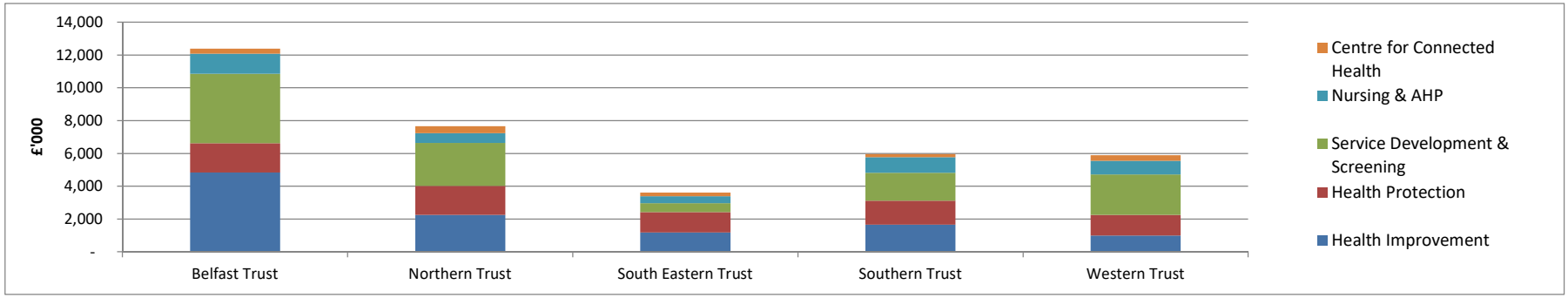
| | Annual Budget | | | | | Year to Date | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Programme | | Ringfenced | Mgt & | Total | Programme | | Ringfenced | Mgt & | Total |
| | Trust | PHA Direct | Trust & Direct | Admin | | Trust | PHA Direct | Trust & Direct | Admin | |
| | £'000 | £'000 | £'000 | £'000 | £'000 | £'000 | £'000 | £'000 | £'000 | £'000 |
| **Available Resources** | | | | | | | | | | |
| Departmental Revenue Allocation | 35,657 | 43,424 | 9,774 | 20,345 | **109,198** | 26,743 | 28,732 | 6,613 | 15,229 | **77,317** |
| Assumed Retraction | | | | | **-** | | | | | **-** |
| Revenue Income from Other Sources | - | 91 | - | 695 | **786** | - | 91 | - | 523 | **614** |
| **Total Available Resources** | 35,657 | 43,516 | 9,774 | 21,040 | **109,987** | 26,743 | 28,822 | 6,613 | 15,752 | **77,930** |
| **Expenditure** | | | | | | | | | | |
| Trusts | 35,657 | - | 4,642 | - | **40,299** | 26,743 | - | 3,482 | - | **30,225** |
| PHA Direct Programme * | - | 44,231 | 5,132 | - | **49,363** | - | 28,642 | 3,085 | - | **31,727** |
| PHA Administration | - | - | - | 20,325 | **20,325** | - | - | | 14,842 | **14,842** |
| **Total Proposed Budgets** | 35,657 | 44,231 | 9,774 | 20,325 | **109,987** | 26,743 | 28,642 | 6,568 | 14,842 | **76,795** |
| **Surplus/(Deficit) - Revenue** | - | (715) | - | 715 | - | - | 181 | 45 | 910 | **1,136** |
| ***Cumulative variance (%)*** | | | | | | ***0.00%*** | ***0.63%*** | ***0.68%*** | ***5.78%*** | ***1.46%*** |

The year to date financial position for the PHA shows an underspend of £0.9m, which consists primarily of year-to-date overspends on PHA Direct budgets (page 4) and easements in Administration budgets (see page 5).

The current year-end breakeven forecast is predicated on the in-year delivery of non-recurrent programmes in line with PHA priorities. This expenditure will balance out the forecast surplus in the administration budget, and ensure the organisation achieves its breakeven obligation.

** PHA Direct Programme includes amounts which may transfer to Trusts later in the year*

# Programme Expenditure with Trusts




| Current Trust RRLs | Belfast Trust £'000 | Northern Trust £'000 | South Eastern Trust £'000 | Southern Trust £'000 | Western Trust £'000 | NIAS Trust £'000 | NIMDTA Trust £'000 | Total Planned Expenditure £'000 | YTD Budget £'000 | YTD Expenditure £'000 | YTD Surplus / (Deficit) £'000 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Health Improvement | 4,838 | 2,248 | 1,184 | 1,650 | 992 | - | - | **10,912** | 8,184 | 8,184 | - |
| Health Protection | 1,784 | 1,769 | 1,242 | 1,475 | 1,267 | - | - | **7,538** | 5,653 | 5,653 | - |
| Service Development & Screening | 4,229 | 2,618 | 538 | 1,698 | 2,457 | - | - | **11,538** | 8,654 | 8,654 | - |
| Nursing & AHP | 1,226 | 596 | 431 | 958 | 840 | - | - | **4,051** | 3,039 | 3,039 | - |
| Centre for Connected Health | 317 | 431 | 214 | 174 | 335 | - | - | **1,470** | 1,103 | 1,103 | - |
| Other | 39 | 30 | 28 | 28 | 22 | - | - | **147** | 110 | 110 | - |
| **Total current RRLs** | **12,433** | **7,692** | **3,637** | **5,982** | **5,913** | **-** | **-** | **35,657** | **26,743** | **26,743** | **0** |
| ***Cumulative variance (%)*** | | | | | | | | | | | ***0.00%*** |

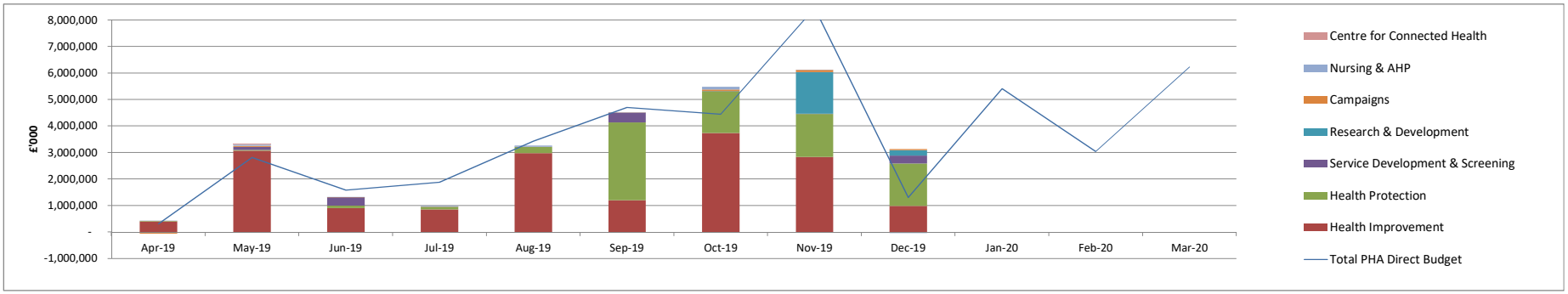
| | Belfast Trust £'000 | Northern Trust £'000 | South Eastern £'000 | Southern Trust £'000 | Western Trust £'000 | NIAS Trust £'000 | NIMDTA Trust £'000 | Total Planned Expenditure £'000 | YTD Budget £'000 | YTD Expenditure £'000 | YTD Surplus / £'000 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ringfenced** | **1,014** | **1,226** | **762** | **734** | **814** | **93** | **-** | **4,643** | **3,482** | **3,482** | **-** |
| | | | | | | | | | | | ***0.00%*** |

The above table shows the current Trust allocations split by budget area. Budgets have been realigned in October and a breakeven position is shown for the year to date as funds previously held against PHA Direct budget have now been issued to Trusts.

The Other line relates to general allocations to Trusts for items such as the Apprenticeship Levy and Inflation.

Ringfenced funds allocated to Trusts have been assumed at breakeven.

# PHA Direct Programme Expenditure




| | Apr-19 £'000 | May-19 £'000 | Jun-19 £'000 | Jul-19 £'000 | Aug-19 £'000 | Sep-19 £'000 | Oct-19 £'000 | Nov-19 £'000 | Dec-19 £'000 | Jan-20 £'000 | Feb-20 £'000 | Mar-20 £'000 | Total £'000 | YTD Budget £'000 | YTD Spend £'000 | Variance £'000 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Profiled Budget** | | | | | | | | | | | | | | | | | |
| Health Improvement | 149 | 2,369 | 963 | 1,972 | 3,013 | 1,063 | 3,068 | 4,752 | 202 | 3,415 | 2,131 | 3,583 | **26,680** | 17,551 | 16,893 | 658 | *3.8%* |
| Health Protection | 38 | 353 | 79 | - 249 | 164 | 3,084 | 1,376 | 1,915 | 783 | 353 | 267 | 1,961 | **10,123** | 7,543 | 8,220 | (678) | *-9.0%* |
| Service Development & Screening | 2 | 65 | 517 | 112 | 132 | 527 | - 22 | 129 | 289 | 44 | 226 | 560 | **2,583** | 1,753 | 1,407 | 346 | *19.7%* |
| Research & Development | - | - | - | - | - | - | - | 1,563 | - | 1,483 | - | 165 | **3,211** | 1,563 | 1,769 | (206) | *0.0%* |
| Campaigns | 23 | 23 | 23 | 23 | 23 | 23 | - 84 | 47 | 31 | 102 | 685 | 256 | **1,177** | 134 | 185 | (51) | *-38.1%* |
| Nursing & AHP | - | - | - | 1 | 101 | - | 107 | 44 | 1 | 17 | 5 | 230 | **506** | 254 | 218 | 36 | *100.0%* |
| Safeguarding Board | - | - | - | - | - | - | - | - | - | - | - | - | **-** | - | - | - | *0.0%* |
| Centre for Connected Health | - | - | - | 25 | - | - | - | - | - | - | - 272 | 446 | **199** | 25 | 25 | - | *100.0%* |
| Other | - | - | - | - | - | - | - | - | - | - | - | (965) | **(965)** | - | (75) | 75 | *100.0%* |
| **Total PHA Direct Budget** | **212** | **2,810** | **1,583** | **1,885** | **3,433** | **4,698** | **4,445** | **8,451** | **1,306** | **5,414** | **3,041** | **6,236** | **43,515** | **28,823** | **28,642** | **181** | |
| ***Cumulative variance (%)*** | | | | | | | | | | | | | | | | ***0.63%*** | |
| **Actual Expenditure** | **265** | **3,398** | **1,365** | **1,011** | **3,302** | **4,497** | **5,500** | **6,171** | **3,134** | **-** | **-** | **-** | **28,642** | | | | |
| **Variance** | **(52)** | **(588)** | **218** | **874** | **131** | **200** | **(1,055)** | **2,281** | **(1,828)** | | | | **181** | | | | |

| **Ringfenced Budgets** | Apr-19 £'000 | May-19 £'000 | Jun-19 £'000 | Jul-19 £'000 | Aug-19 £'000 | Sep-19 £'000 | Oct-19 £'000 | Nov-19 £'000 | Dec-19 £'000 | Jan-20 £'000 | Feb-20 £'000 | Mar-20 £'000 | Total £'000 | YTD Budget £'000 | YTD Spend £'000 | Variance £'000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Profiled Ringfenced PHA Direct Budget | - | - | 572 | 331 | 397 | 253 | 604 | 793 | 181 | - | - | - | **3,130** | **3,130** | **3,085** | **47** |
| | | | | | | | | | | | | | | | | ***1.50%*** |
| Actual Expenditure | (38) | 461 | 134 | 364 | 405 | 182 | 540 | 768 | 268 | - | - | - | **3,085** | | | |
| **Variance** | **38** | **(461)** | **437** | **(33)** | **(8)** | **71** | **64** | **25** | **(87)** | **-** | **-** | **-** | **47** | | | |

The year-to-date position shows a £0.3m deficit, which is mainly due to expenditure being paid in front of profile in October on a number of Health Improvement and Service Development & Screening budgets.

The budgets and profiles are shown after adjusting for retractions and new allocations from DoH.

In 2019/20 an amount of £1.9m has been recurrently removed from the programme budgets. This consists of £1m of savings initially allocated against the administration budget (£0.5m in each of the two years 18/19 and 19/20) and a further £0.9m 2018/19 programme savings target, achieved non-recurrently last year and now applied recurrently. DoH have given the PHA permission to vire the £1m administration savings against programme budgets. In effecting this reduction the PHA continues to seek to protect, where possible, core programmes that are central to PHA and Departmental priorities. In addition the organisation will utilise on an in-year basis the surplus which is forecast to arise in the administration budget to further address programme priorities.

# PHA Administration

## 2019-20 Directorate Budgets

| | Nursing & AHP £'000 | Operations £'000 | Public Health £'000 | PHA Board £'000 | Centre for Connected Health £'000 | SBNI £'000 | Total £'000 |
|---|---|---|---|---|---|---|---|
| **Annual Budget** | | | | | | | |
| Salaries | 3,784 | 2,727 | 11,657 | 243 | 339 | 444 | **19,195** |
| Goods & Services | 172 | 1,359 | 412 | (447) | 58 | 291 | **1,845** |
| **Total Budget** | **3,956** | **4,087** | **12,069** | **(204)** | **397** | **735** | **21,040** |
| **Budget profiled to date** | | | | | | | |
| Salaries | 2,827 | 2,056 | 8,736 | 182 | 255 | 333 | **14,389** |
| Goods & Services | 130 | 1,020 | 303 | (348) | 43 | 215 | **1,363** |
| **Total** | **2,958** | **3,075** | **9,039** | **(166)** | **298** | **548** | **15,752** |
| **Actual expenditure to date** | | | | | | | |
| Salaries | 2,559 | 1,941 | 8,231 | 81 | 270 | 330 | **13,411** |
| Goods & Services | 183 | 838 | 310 | (44) | 22 | 122 | **1,431** |
| **Total** | **2,742** | **2,779** | **8,540** | **37** | **292** | **452** | **14,842** |
| **Surplus/(Deficit) to date** | | | | | | | |
| Salaries | 268 | 115 | 506 | 101 | (15) | 3 | **978** |
| Goods & Services | (53) | 181 | (7) | (304) | 22 | 93 | **(68)** |
| **Surplus/(Deficit)** | **216** | **296** | **499** | **(203)** | **6** | **96** | **910** |
| ***Cumulative variance (%)*** | *7.29%* | *9.64%* | *5.52%* | *122.43%* | *2.10%* | *17.52%* | ***5.78%*** |

PHA's administration budget is showing a year to date surplus, which has been generated by a number of long standing vacancies. Although efforts continue to fill vacant posts as far as possible, this has proved to be challenging, and the surplus on the salaries budget continues to be high. In it's opening allocation letter, DoH required PHA to meet the cost of the first 1% of the 2019-20 pay award, so the impact of this is expected to reduce the year end surplus to around £0.7m.

Senior management continue to monitor the position closely in the context of the PHA's obligation to achieve a breakeven position for the financial year. SBNI budget is ringfenced and any underspend will be returned to DoH prior to year end.

December 2019

# Public Health Agency
## 2019-20 Capital Position

| | Annual Budget | | | | Year to Date | | | |
|---|---|---|---|---|---|---|---|---|
| | Programme | | Mgt & Admin | | Programme | | Mgt & Admin | |
| | Trust £'000 | PHA Direct £'000 | £'000 | Total £'000 | Trust £'000 | PHA Direct £'000 | £'000 | Total £'000 |
| **Available Resources** | | | | | | | | |
| Capital Grant Allocation & Income | 7,461 | 5,697 | - | **13,158** | 5,489 | 3,400 | - | **8,889** |
| **Expenditure** | | | | | | | | |
| Capital Expenditure - Trusts | 7,461 | | | **7,461** | 5,489 | | | **5,489** |
| Capital Expenditure - PHA Direct | | 5,697 | | **5,697** | | 2,215 | | **2,215** |
| | 7,461 | 5,697 | - | **13,158** | 5,489 | 2,215 | - | **7,704** |
| **Surplus/(Deficit) - Capital** | - | - | - | - | - | **1,185** | - | **1,185** |
| ***Cumulative variance (%)*** | | | | | | | | |

PHA has received a Capital budget of £13.1m including income in 2019-20, most of which relates to Research & Development projects in Trusts and other organisations. Expenditure of £5.4m is shown for the year to date, and a breakeven position is anticipated for the full year.

# PHA Prompt Payment

## Prompt Payment Statistics

| | December 2019 Value | December 2019 Volume | Cumulative position as at 31 December 2019 Value | Cumulative position as at 31 December 2019 Volume |
|---|---|---|---|---|
| Total bills paid (relating to Prompt Payment target) | £6,842,847 | 562 | £43,320,003 | 5,030 |
| Total bills paid on time (within 30 days or under other agreed terms) | £6,788,575 | 541 | £42,513,457 | 4,717 |
| **Percentage of bills paid on time** | **99.2%** | **96.3%** | **98.1%** | **93.8%** |

Prompt Payment performance for the year to date shows that on value the PHA is achieving its 30 day target of 95.0%, although performance on volume is below target cumulatively in December. Overall PHA is making progress on ensuring invoices are processed promptly, and efforts to maintain this good performance will continue for the remainder of the year.

The 10 day prompt payment performance remained strong at 93.6% by value for the year to date, which significantly exceeds the 10 day DoH target for 2019-20 of 60%.

HSC Public Health Agency

**item 8**

| | |
|---|---|
| **Title of Meeting** | PHA Board Meeting |
| **Date** | 20 February 2020 |
| **Title of paper** | Surveillance of Antimicrobial Use and Resistance in Northern Ireland Annual Report 2018 |
| **Reference** | PHA/02/02/20 |
| **Prepared by** | Miss Danielle McMichael, Mr Chris Nugent, Dr Lynsey Patterson and Dr Muhammad Sartaj |
| **Lead Director** | Dr Adrian Mairs |
| **Recommendation** | For **Approval** ☐ For **Noting** ☒ |

## 1 Purpose

This is the third annual report in Northern Ireland describing trends for key organisms, including important gram-negative bacteraemias, antibiotic resistance and antimicrobial consumption. The report describes epidemiological trends for the years 2009-2018.

The report is being presented to the PHA Board for noting prior to publication in the public domain.

## 2 Background Information

The PHA is required to produce this report as a deliverable under the Regional Healthcare Associated Infections and Antimicrobial Stewardship Improvement Board currently chaired by the PHA.

The information produced in this report is based on information derived from data submitted by Health and Social Care Trust microbiology and pharmacy staff.

## 3 Key Issues

The first section of the report describes trends in antibiotic resistance in Northern Ireland and the second section describes the trends in antibiotic consumption in Northern Ireland.

Some of the key findings of the report are as follows:

- *E. coli* bloodstream infection cases have decreased from **1703** cases in 2017 to **1675** in 2018.
- *K. pneumoniae* bloodstream infection cases have decreased from **256** in 2017 to **238** in 2018.
- *E.coli* resistance to Piperacillin-tazobactam has decreased from **17.7%** in 2017 to **15.9**% in 2018.
- *K. pneumoniae* resistance to Piperacillin-tazobactam has increased from **24.2%** in 2017 to **26.8%** in 2018.
- The total consumption of antibiotics decreased from **29.33** DDD per 1000 inhabitants per day in 2017 to **28.5** DDD per 1000 inhabitants per day in 2018 (*using the new 2019 WHO DDDs).*
- Antibiotic prescribing in primary care (as % of total) decreased from **81.3%** in 2017 to **80.4**% in 2018.
- Out of hours prescribing accounted for **1.4%** in 2017 and 2018.
- Antibiotic prescribing in secondary care (as % of total) increased from **12.8%** in 2017 to **13.7%** in 2018.
- Antibiotic consumption in dental care was introduced into the report this year and accounted for **4.5%** of antibiotic prescribing in 2017 and 2018.

## 4 Next Steps

Please see below a summary of key work that will continue into 2020-21 and beyond. For further details please see the full report.

### Surveillance and Epidemiological Work

- Continue to monitor progress towards the reduction of healthcare associated gram-negative bacteraemias.
- Continue to monitor trends in antibiotic prescribing across primary and secondary care and explore opportunities to improve benchmarking and quality improvement.

### Engagement with the Public and HSC Colleagues

- PHA will continue to engage in public awareness activities during the European Antibiotic Awareness Day (EEAD) and World Antibiotic Awareness Week (WAAW).
- The PHA will continue to support HSCB Pharmacy colleagues to promote antibiotic guardianship.
- Further E-Bug training workshops delivered to primary school teachers and other settings as appropriate.

**Changing Prescribing Behaviour**

- Work will continue on a study to understand the factors affecting primary care antibiotic prescribing.
- Repeat of an intervention aimed at the top 20% antibiotic prescribing practices in NI, whereby each GP will receive a brief letter from the Chief Medical Officer highlighting the outlying nature of the practice and encouraging simple measures to counteract it.

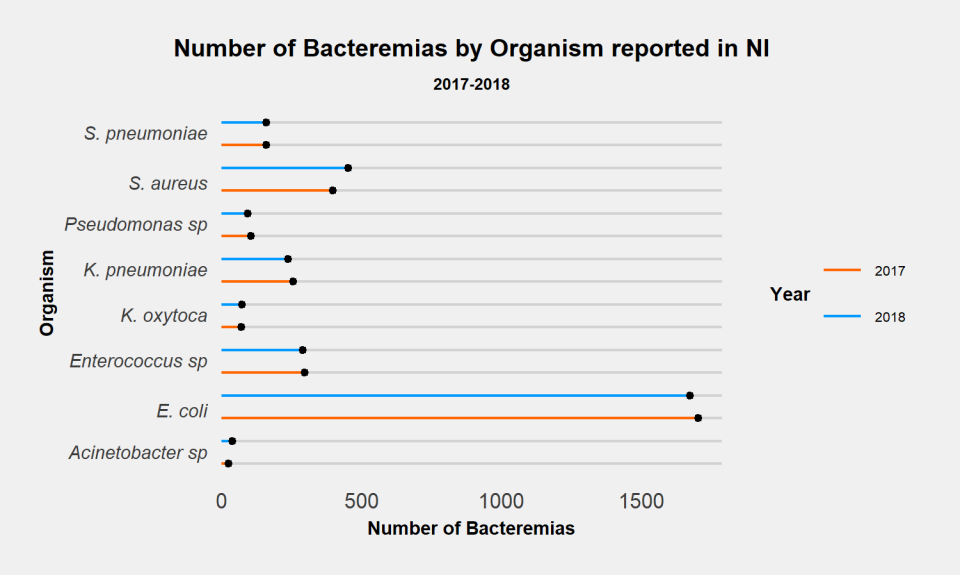
HSC Public Health Agency

# Surveillance of Antimicrobial Use and Resistance in Northern Ireland, Annual Report, 2019

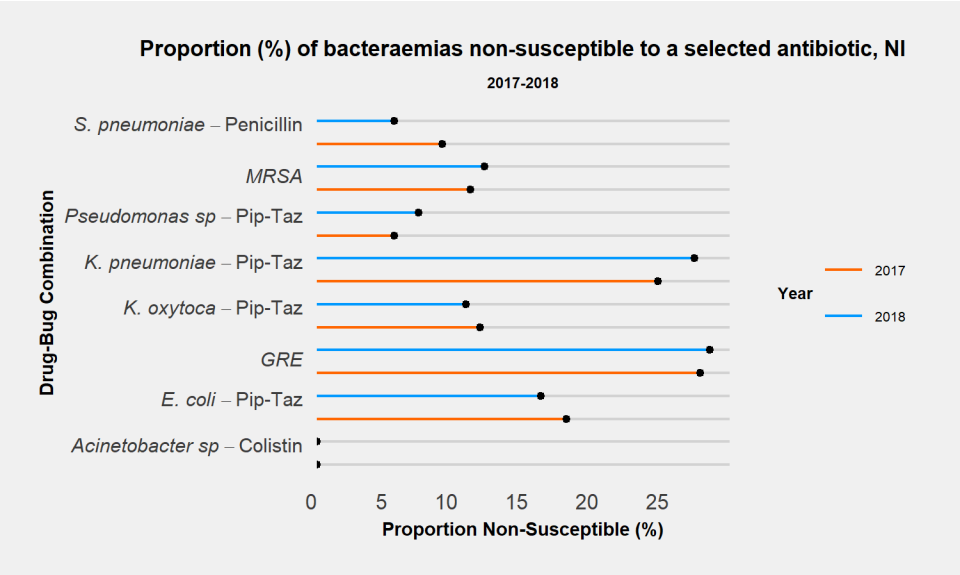
# Contents

# Executive summary

## Antimicrobial Resistance



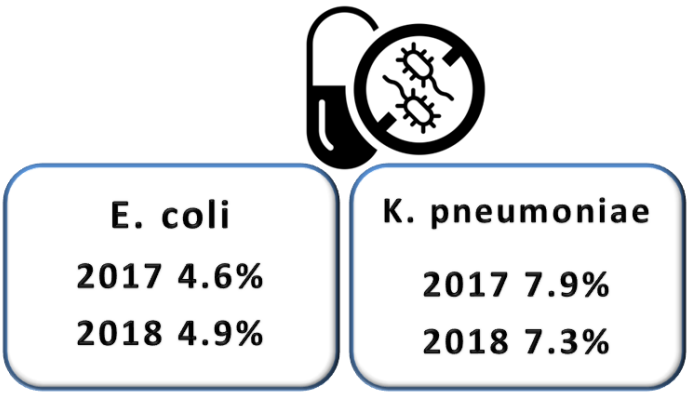

*E. coli* was the most commonly reported cause of bloodstream infection (bacteraemia) of the key selected organisms, accounting for more than 55% of those reported in 2018. Reports of bacteraemias caused by *E. coli* have however decreased over the past couple of years. Bloodstream infections caused by *S. aureus*, *K. oxytoca* and *Acinetobacter* have increased.



*S. aureus* resistance to Meticillin (MRSA) has slightly increased in 2018 (10.9% to 11.9%). The proportion of *K. pneumoniae* and *Pseudomonas sp* resistant to pip-taz has increased between 2017 and 2018, however there was a decrease in the proportion of *E. coli* and *K. oxytoca* resistant to pip-taz (17.7% to 15.9% and 11.6% to 10.6%, respectively). During 2017 to 2018, there was an decrease in the proportion of *S. pneumoniae* resistant to penicillin (8.9% to 5.5%). The proportion of Glycopeptide Resistant Enterococcus (GRE) remained relatively stable between 2017 and 2018 (27.2% to 27.9%). There were no *Acinetobacter sp* isolates tested against colistin in 2018. Further information is contained within the results section of the report.

**Multi-Drug Resistance**

Multi-drug resistance has remained relatively stable in the selected organisms and drug combinations between 2017 and 2018.



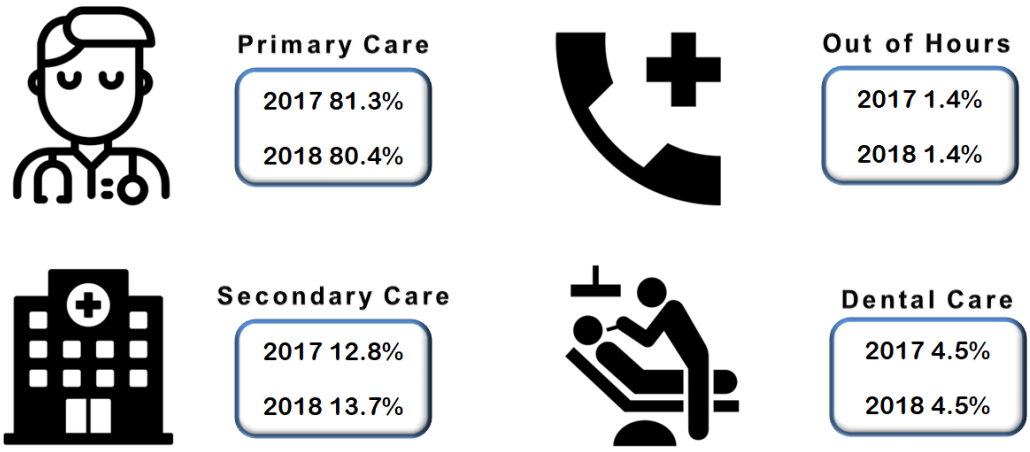
### Carbapenemase Producing Enterobacteriaceae


### Antibiotic Resistance to Neisseria Gonorrhoeae

In 2018, 30 *N. gonorrohoeae* isolates were cultured and sent to Public Health England for inclusion in EuroGASP, bringing the total number of isolates submitted to EuroGASP by NI since 2015 to 99. In 2018 two isolates were resistant to azithromycin, and one was resistant to ceftriaxone (6.7% and 3.3% respectively).

**Antimicrobial Consumption**

*Proportion of Total Consumption by Setting*




Total consumption of antibiotics decreased in 2018 from 29.33 to 28.5 per 1000 inhabitants per day. The overall decrease was mainly accounted for by a decrease in primary care prescribing (23.84 per to 22.91 per 1000 inhabitants per day 2017 to 2018 respectively). Prescribing from out-of-hours remained stable in 2018 at 0.4 per 1000 inhabitants per day. This year for the first time, dental prescribing was identified as an individual setting. Consumption of antibiotics in dental care accounted for ~5% of total antibiotic consumption.

### Antimicrobial Consumption by Class

| Class | Rate 2014 | Trend | Rate 2017 | Rate 2018 | Change 2017- 18 |
|---|---|---|---|---|---|
| Anti-folate agents | 2.95 | | 2.81 | 2.67 | ↓ |
| Aminoglycosides | 0.15 | | 0.17 | 0.17 | → |
| Glycopeptides and Daptomycin | 0.15 | | 0.18 | 0.18 | → |
| Penicillins | 11.23 | | 10.81 | 10.56 | ↓ |
| Carbapenems | 0.07 | | 0.06 | 0.06 | → |
| Quinolones | 0.72 | | 0.69 | 0.66 | ↓ |
| Cephalosporins | 0.58 | | 0.53 | 0.51 | ↓ |
| Penicillin/beta lactamase inhibitor combinations | 2.12 | | 1.93 | 1.84 | ↓ |
| Macrolides | 4.23 | | 3.95 | 3.72 | ↓ |
| Tetracyclines and related drugs | 6.96 | | 7.44 | 7.36 | ↓ |

Antibiotic prescribing in secondary care has slightly increased from 3.75 per 1000 inhabitants per day during 2017 to 3.91 per 1000 inhabitants per day in 2018. During 2018, the most frequently used antibiotics in both primary and secondary care in NI were penicillins (38.7% and 27% respectively), followed by tetracyclines and related drugs (27.8% and 13.4%) and macrolides (13.6% and 9.6%). Consumption of carbapenems has remained low and stable from 2015-2018 at 0.06 DDD per 1000 inhabitants per day. Penicillin/beta lactamase inhibitor combinations have been steadily decreasing from 2014 to 2018 (2.12 DDD per 1000 inhabitants per day in 2014 to 1.84 DDD per 1000 inhabitants per day in 2018) while consumption of piperacillin/tazobactam has remaining relatively stable.

### WHO AWaRe Categories

**WHO AWaRe Categories**

**(Proportion (%) DDDs per 1000 inhabitants)**

| Year | Access | Watch | Reserve | Unknown |
|---|---|---|---|---|
| 2014 | 63.0% | 36.8% | 0.76% | 0.06% |
| 2015 | 63.9% | 35.3% | 0.72% | 0.06% |
| 2016 | 64.6% | 34.6% | 0.71% | 0.06% |
| 2017 | 64.8% | 34.3% | 0.78% | 0.09% |
| 2018 | 65.5% | 33.6% | 0.82% | 0.13% |

The World Health Organization (WHO) classifies antibiotics into three stewardship categories; Access, Watch and Reserve. The proportion of antibiotic consumption within

the Access category has increased, while the proportion of consumption has decreased within the Watch category between 2014 and 2018, this is an encouraging trend. The proportion of Reserve and antibiotics not categorised (unknown) have remained relatively stable between 2014 and 2018.

**Engagement Activities & Future Work**


During 2018 PHA engaged in a number of activities aimed at sharing key messages around antibiotic resistance with the public and HSC colleagues including supporting the antibiotic guardian awareness campaign and delivering E-bug training workshops in schools. Activities to reduce antibiotic consumption in 2018 included; TARGET toolkit workshops for healthcare staff, collaborative work on a systematic review of behavioural interventions to reduce prescribing and evaluation of a pilot point-of-care CRP testing for respiratory infections in primary care. Future work for 2019 and beyond includes: assessing the impact of the burden of AMR, conducting a study to understand the factors affecting primary care antibiotic prescribing and further engagement with the public and members of HSCNI including attending large-scale public events to promote the antibiotic guardian campaign and further roll-out of E-bug training workshops.

**Authors**

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**Acknowledgements**

The information produced in this report is based on information derived from data submitted by Health and Social Care Trust microbiology and pharmacy staff, and we thank them for the time and effort involved in producing these data.

We also thank David Farren, Derek Fairley and Sara Hedderwick for their input into the original design of this report.

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**Date generated: 13/02/2020**

# Background

Antibiotics have been one of the most important life-saving medical developments of the last century. However, they are not effective against all types of bacteria (so-called intrinsic resistance). In addition, some bacteria can develop tolerance to certain antibiotics or develop ways to break them down (so-called extrinsic resistance). In either case, if these go on to cause an infection it can be much more difficult to treat resistant bacteria. If the use of antibiotics remains unchecked, common infections will become more dangerous, and surgical procedures where antibiotics are used will become more difficult to perform safely. Antimicrobial-resistant infections already cause illness and death in patients, and also disrupt care in hospitals. Reducing the use of antibiotics where they are not necessary will help keep antibiotics working in the future. In recognition of this, the NI Department of Health (then the Department of Health, Social Services and Public Safety) published a five year Strategy for Tackling Antimicrobial Resistance (STAR 2012-2017) in 2012[1]. One of the key objectives of STAR was "to establish and maintain systems to monitor antimicrobial usage and surveillance of resistance". This report is a product of the systems that have been established in response to this goal.

In 2019 NI Department of Health, the Department of Agriculture, Environment and Rural Affairs, and the Food Standards Agency in conjunction with professionals in associated agencies have published an updated five-year action plan, developed in a whole system type approach to continue to tackle antimicrobial resistance (ONE HEALTH 2019-2024) [2]. The tasks of preventing and reducing antimicrobial resistant infections, and reducing antimicrobial consumption in Northern Ireland are led by the Strategic Antimicrobial Resistance and Healthcare-associated Infection (SAMRHAI) group, which includes representatives responsible for animal and environmental as well as human health. For translating policy and strategy into action for human health, the Public Health Agency leads a multi-agency group, the Healthcare-associated Infection and Antimicrobial Stewardship Improvement Board, which has a number of themed subgroups that are responsible for regional efforts to reduce harm from antimicrobial use and resistance in different settings.

This report is issued under the auspices of the Improvement Board and is divided into two major sections. The first describes trends in antibiotic resistance in Northern Ireland. Selected combinations of bacteria and antibiotics in line with those identified as key indicators as part of the UK Antimicrobial Resistance strategy [2] were chosen. In addition, bacteria-antibiotic combinations included in the English surveillance programme for antimicrobial utilisation and resistance (ESPAUR) report [3] were also chosen.

The second section describes the trends in antibiotic consumption in Northern Ireland. Antibiotic consumption is the key driver for the emergence of resistance in healthcare. Antibiotics are prescribed across a range of settings including primary care (GP), secondary care (hospitals) and by dentists. In this report, information from primary and secondary care, out-of-hours services and dental care are provided.

The aim of the report is to describe trends in antimicrobial resistance and antibiotic consumption in Northern Ireland. As surveillance data is 'information for action', this report will inform and drive best practice in antimicrobial prescribing.

# Method

## Antibiotic resistance

### Data sources

Testing for bacteria in human specimens and their susceptibility to antibiotics is conducted in the laboratories of the five Health and Social Care Trusts in Northern Ireland. Infections that meet certain criteria, usually the most severe that occur in the blood (bacteraemias), are reported voluntarily to the Public Health Agency's CoSurv Information System directly from each Trust's laboratory. The resistance data included in this report includes selected bacteraemias that were reported to the PHA between 2009 - 2018 (presented by calendar year).

Detections of carbapenemase-producing organisms (CPOs) are reported to the PHA as part of a voluntary reporting service. In cases where a microbiology laboratory suspects a CPO, the specimen is submitted to Public Health England's (PHE) Antimicrobial Resistance and Healthcare Associated Infections (AMRHAI) reference unit for investigation. Most recently, some health and social care trusts have developed the capacity to perform this function locally. For the purposes of this report however, the focus will be on carbapenemase-producing enterobacteriaceae (CPE) only.

### Definitions

The term "antimicrobial" refers to drugs used to treat infections caused by a range of microbes including; bacteria, viruses, fungi and parasites. While this term is used throughout the report, the data presented only reflects antibiotics which are utilised to treat bacterial infections.

Hospital microbiology laboratories report antimicrobial susceptibility test results "susceptible", "intermediate" or "resistant". For the purpose of this report, antibiotic susceptibility test results reported as "intermediate" or "resistant" were combined and presented as "non-susceptible". The terms "non-susceptible" and "resistant" are used interchangably throughout the report when refering to "intermediate" or "resistant" antibiotic susceptibility tests. For analysis of resistance to more than one antibiotic, multidrug resistance (MDR) was defined as acquired non-susceptibility to at least one agent in three or more antimicrobial classes.

## Antibiotic consumption

### Data sources

Consumption data for primary and secondary care was obtained using the data submitted to the European Antimicrobial Consumption Surveillance Network (ESAC-Net). The primary care antimicrobial consumption data were extracted from the Electronic Prescribing Database by the Health and Social Care Board. The data includes all Health and Social Care, general practitioner prescribing in practices and out-of-hours centres; all nurse, pharmacy and allied health professional HSC prescribing; and dental prescribing. The secondary care antimicrobial consumption data were extracted by each Trust's JAC Medicines Management System and aggregated for all five Trusts to give Northern Ireland totals. It was not possible to analyse at the level of inpatient or outpatient. The data for both settings are available from 2014 - 2018 and are presented by calendar year.

Data from Out-of-Hours settings was extracted from two sources; the JAC Medicines Management System and a private pharmaceutical company responsible for over-labelling of antibiotic packs.

### Definitions

The classification of antibiotic used is based on the anatomical therapeutic chemical (ATC) classification system, using the WHO defined daily doses (DDD) for each drug and where grouped, this has been done according to Kucer's "The Use of Antibiotics" (6th edition)[4]. The data for both settings in this report include ATC classification groups J01, A07 and P01, please refer to Appendix 2 for specific inclusions.

### Denominator

Mid-year population estimates for 2014-2018 were obtained from the Northern Ireland Statistics and Research Agency (NISRA) and used to express DDD's per 1,000 inhabitants per day. Hospital activity and occupancy statistics were obtained from data published by the Department of Health.

# Results

## Antibiotic resistance

### *E. coli* bacteraemia

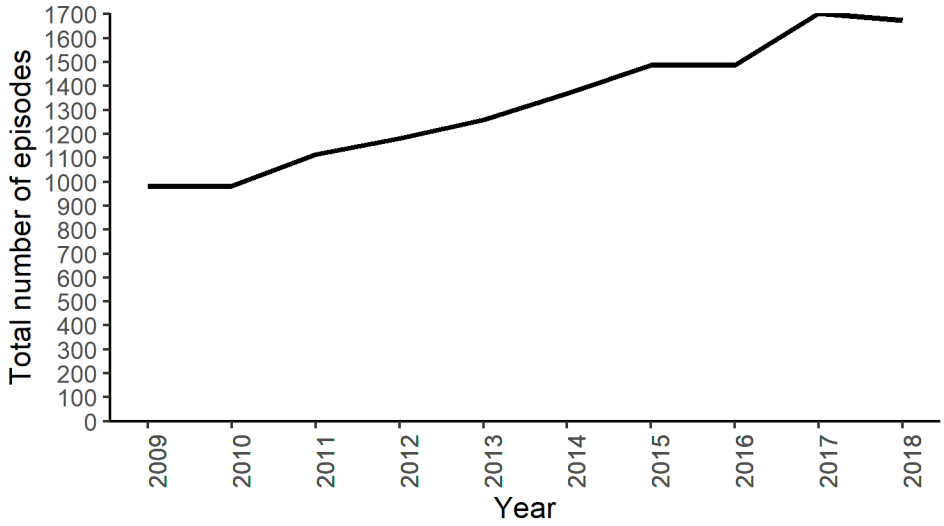



Figure 1: The number of *E. coli* bacteraemias reported to the Public Health Agency, 2009 - 2018

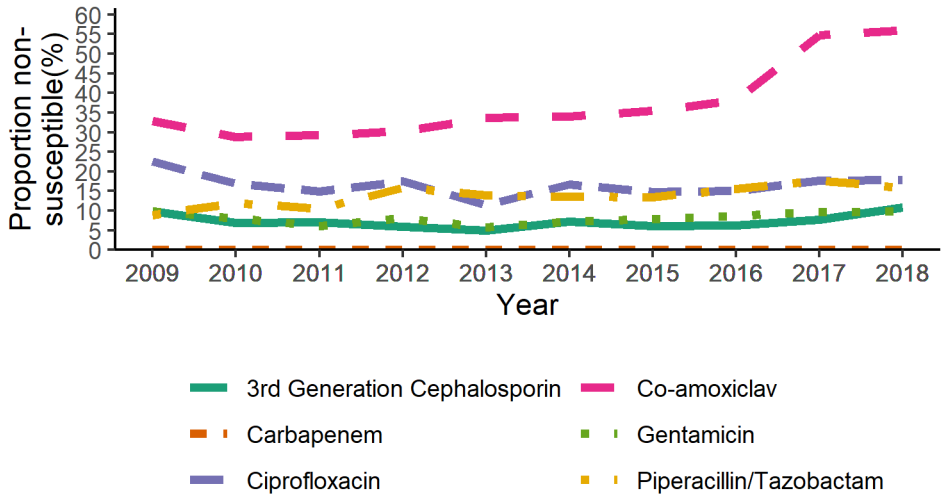



Figure 2: The proportion of *E. coli* bacteraemias resistant to selected antibiotics in NI, 2009 - 2018

The number of *E. coli* bacteraemias has decreased from 1703 in 2017 to 1675 cases in 2018 (Figure 1). The proportion of isolates tested against key antibiotics during 2018 is shown in Appendix 3.

The overall proportion of *E. coli* bacteraemias resistant to selected antibiotics from 2017 to 2018 has remained stable (19.2%). Non-suseptibility to co-amoxiclav and third generation cephalosporins has increased between 2017 and 2018 (54.7% to 55.9% and 7.7% to 10.8% respectively). Meanwhile non-suseptibility to piperacillin/tazobactam has decreased over the time period (17.7% to 15.9%). The proportion of isolates resistant to gentamicin and ciprofloxacin has remained relatively stable from 2017 - 2018 (9.6% and 9.8% to 17.7% to 17.9% respectively). There were no *E. coli* isolates resistant to carbapenems detected from 2017 to 2018 (Figure 2).

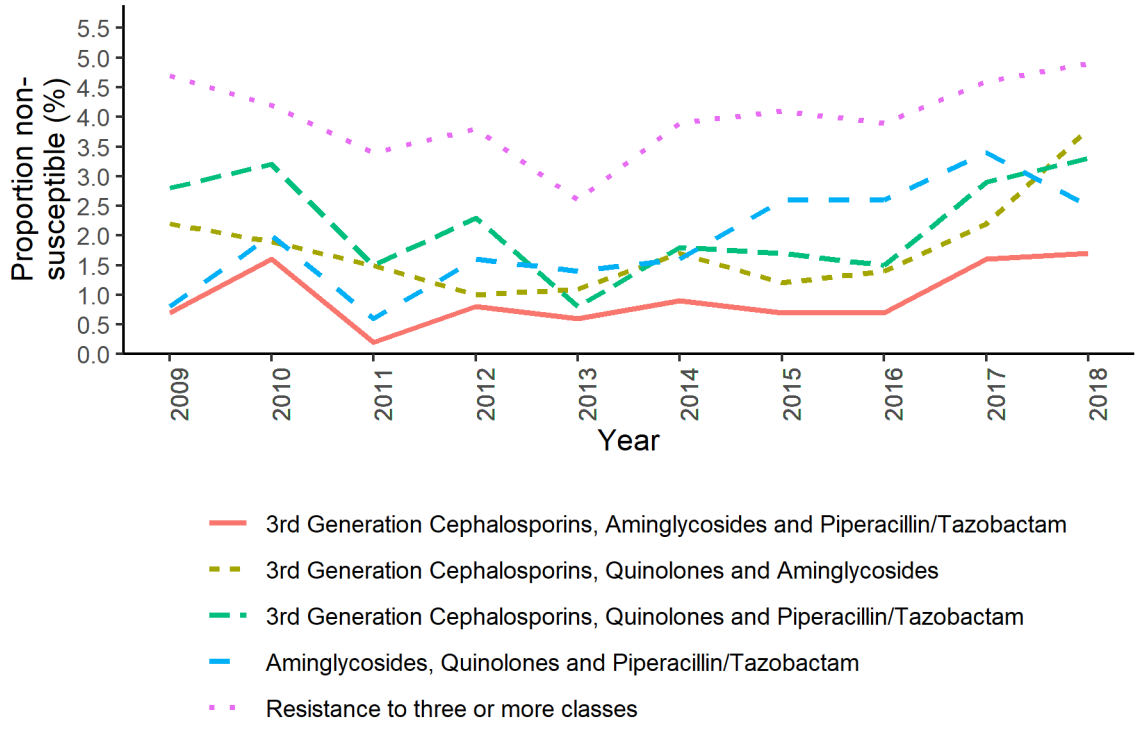



Figure 3: The proportion of *E. coli* bacteraemias reported to the Public Health Agency with multi-drug resistance, 2009 -2018

The proportion of *E. coli* bacteraemias showing multi-resistance remained relatively stable between 2017 to 2018 (4.6% to 4.9%). Within the combination of antibiotic classes, the highest proportion of non-suseptibility in 2018 was in 3rd generation cephalosporins, quinolones and aminglycosides (3.8%), there was a slight increase in comparison to 2017 (2.2%). The lowest proportion in 2018 was observed for third-generation cephalosporins, aminoglycosides and piperacillin/tazobactam (1.7%), again remaining relatively stable in comparison to 2017 (1.6%) (Figure 3).

### ***K. pneumoniae* bacteraemia**

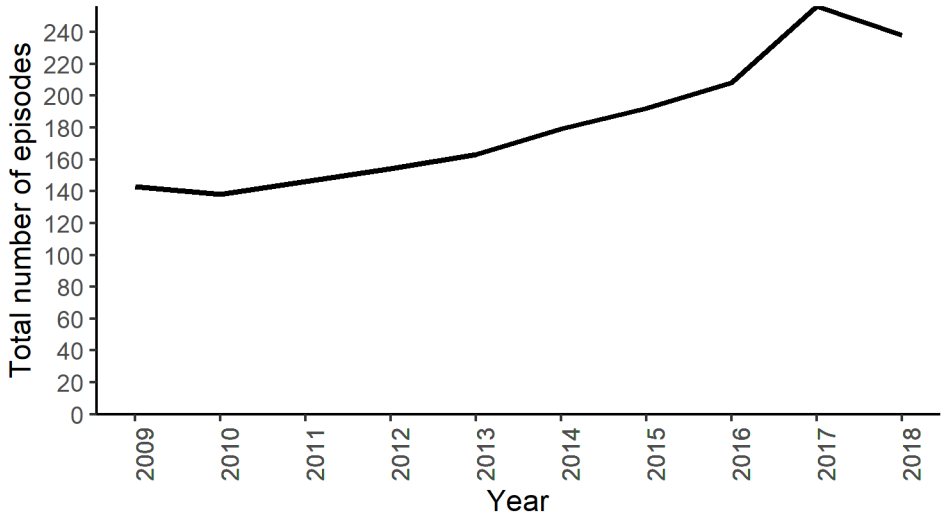
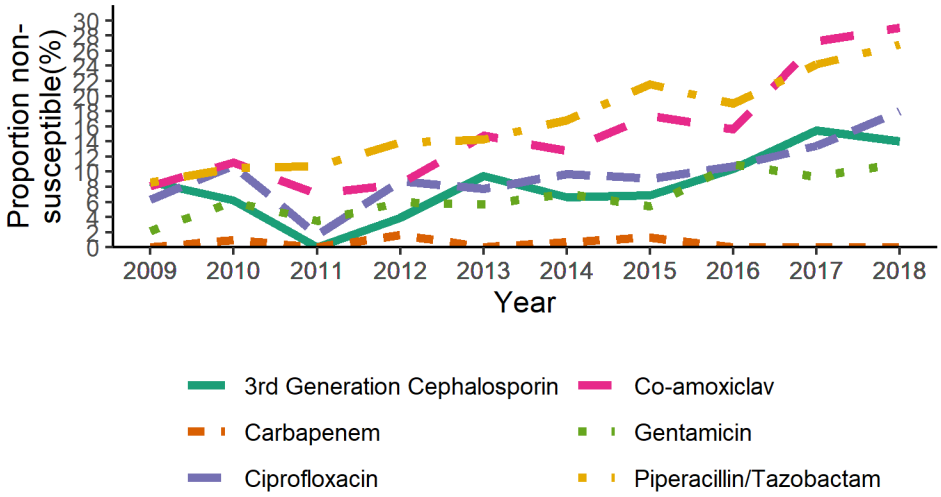



Figure 4: The number of *K. pneumoniae* bacteraemias reported to the Public Health Agency, 2009 -2018



The number of *K. pneumoniae* bacteraemias has decreased from 256 cases in 2017 to 238 cases in 2018 (Figure 4). The proportion of isolates tested against key antibiotics during 2018 is shown in Appendix 3.

The overall proportion of *K. pneumoniae* bacteraemias resistant to selected antibiotics has increased from 2017 to 2018 (14.8% to 16.5%). In relation to selected antibiotics the following have increased from 2017 to 2018; ciprofloxacin (13.5% to 18%); gentamicin (9.4% to 11.1%); co-amoxiclav (27.2% to 29.1%) and piperacillin/tazobactam (24.2% to 26.8%). However resistance to cephalosporins decreased over the time period (15.5% to 14%). There were no isolates resistant to carbapenems detected from 2017 and 2018, with detections remaining sporadic between 2009 and 2018 (**??**).

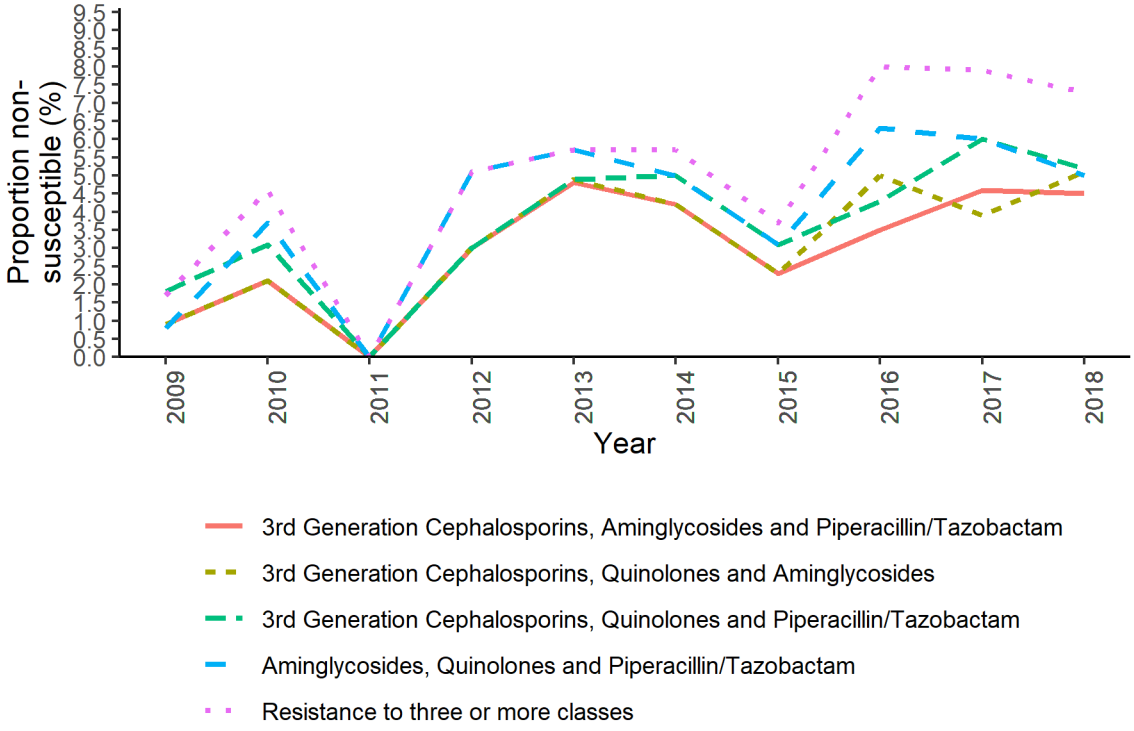



Figure 5: The proportion of *K.pneumoniae* bacteraemias reported to the Public Health Agency with multi-drug resistance, 2009 -2018

The proportion of *K. pneumoniae* bacteraemias showing multi-resistance remained relatively stable within the named antibiotic combinations from 2017 to 2018 (7.9% to 7.3%). Within the named combinations of antibiotic classes, the highest proportion of resistance was observed in third generation cephalosporins, quinolones and piperacillin/tazobactam (5.2%). The lowest was observed in third generation cephalosporins, aminglycosides and

piperacillin/Tazobactam, which remained relatively stable in comparison to 2017 (4.6% to 4.5%)(Figure 5).

### *K. oxytoca* bacteraemia

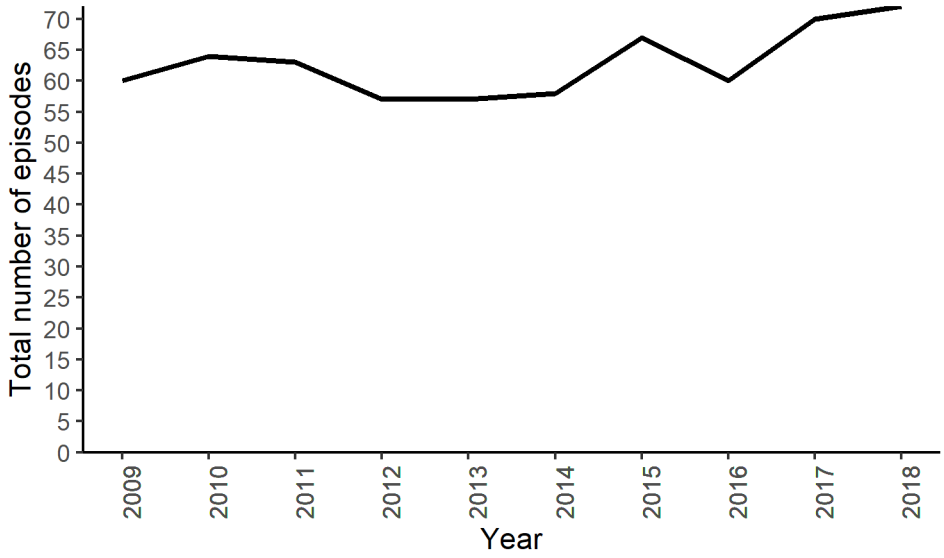
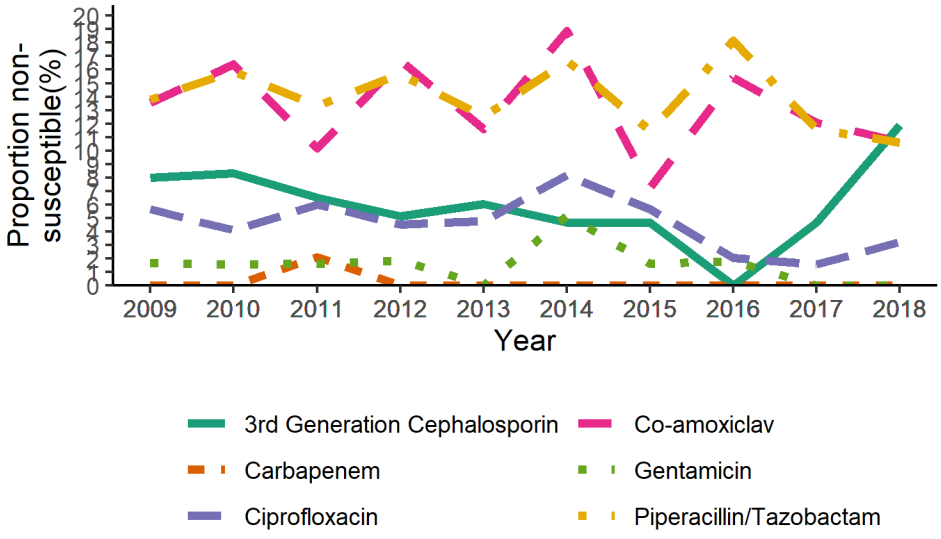



Figure 6: The number of *K. oxytoca* bacteraemias reported to the Public Health Agency, 2009 -2018



The number of *K. oxytoca* bacteraemias has increased slightly from 70 cases in 2017 to 72 cases in 2018 (Figure 6). The proportion of isolates tested against key antibiotics during 2018 is shown in Appendix 3.

The overall proportion of *K. oxytoca* bacteraemias resistant to selected antibiotics over the period has increased slightly from 2017 to 2018 (4.9% to 5.7% repectively). Within the combination of antibiotic classes- when comparing 2017 to 2018- an increase in resistance was observed for; third generation cephalosporins (4.7% to 11.9%) and ciprofloxacin (1.6% to 3.2%). There was a decrease in the proportion of isolates resistant for both co-amoxiclav (12.1% to 10.7%) and piperacillin/tazobactam (11.6% to 10.6%). There was no resistance to carbapenems or gentamicin detected over the period. **??**).

**Pseudomonas species bacteraemia**

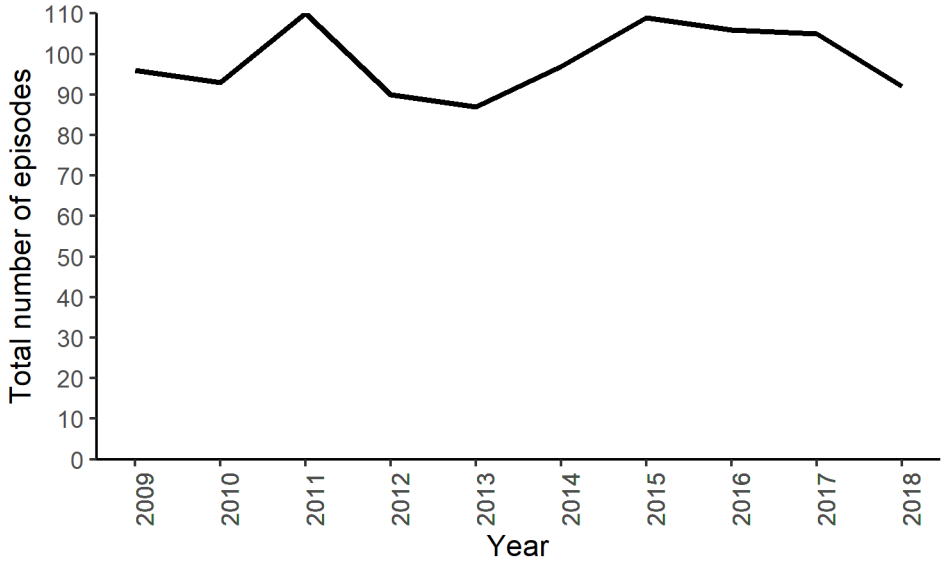
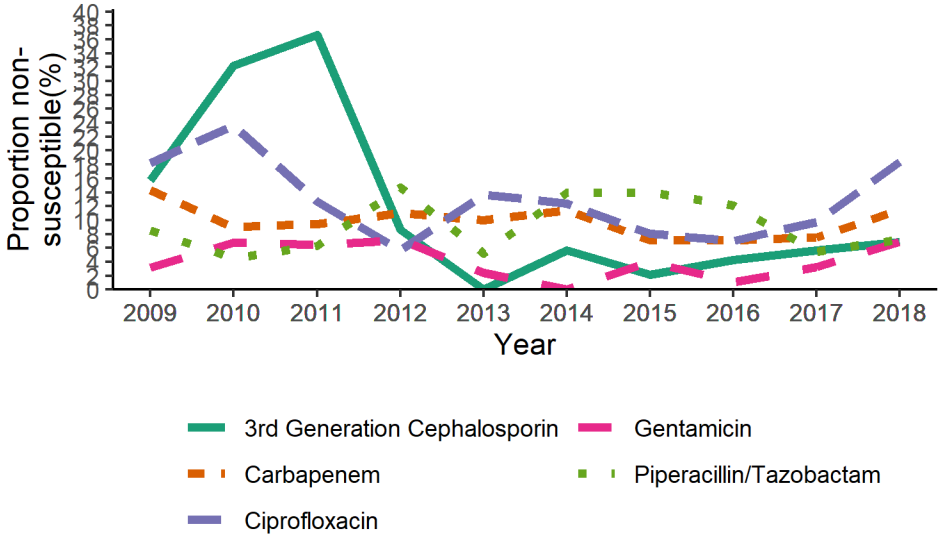



Figure 7: The number of Pseudomonas species bacteraemias reported to the Public Health Agency, 2009 - 2018



The number of *Pseudomonas species* bacteremias has decreased from 105 cases in 2017 to 92 cases in 2018 (Figure 7). The proportion of isolates tested against key antibiotics during 2018 is shown in Appendix 3.

The overall proportion of *Pseudomonas species* bacteraemias resistant to selected antibiotics has increased from 2017 to 2018 (6.3% to 10.2% respectively). Within the selected antibiotic classes increases were observed for pipercillin/tazobactam (5.5% to 7.2%), third generation cephalosporins (5.6% to 6.9%), carbapenems (7.5% to 11.5%) and gentamicin (3.2% to 6.9%). The proportion of *pseudomonas* bacteremias resistant to ciprofloxacin has almost doubled from 2017 to 2018 (9.7% to 18.4% respectively) (**??**).

### *S. aureus* bacteraemia

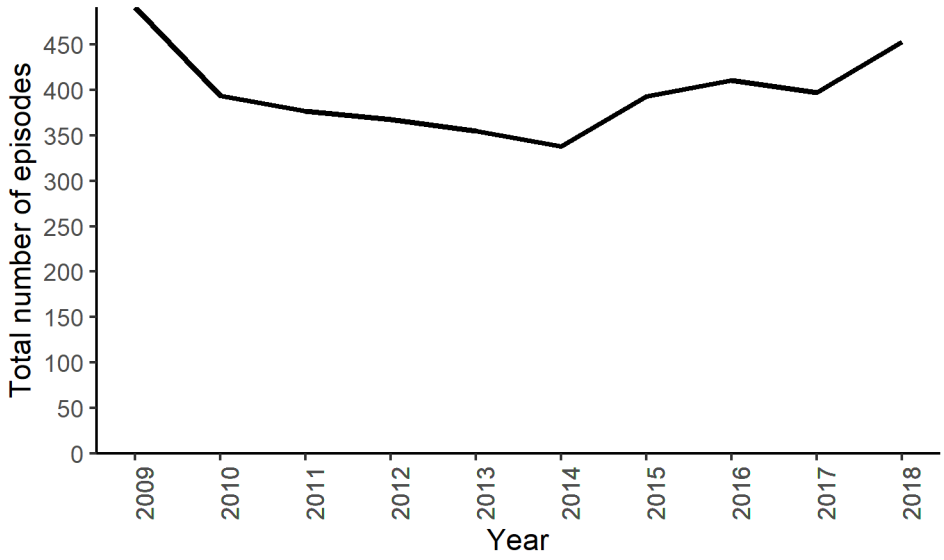
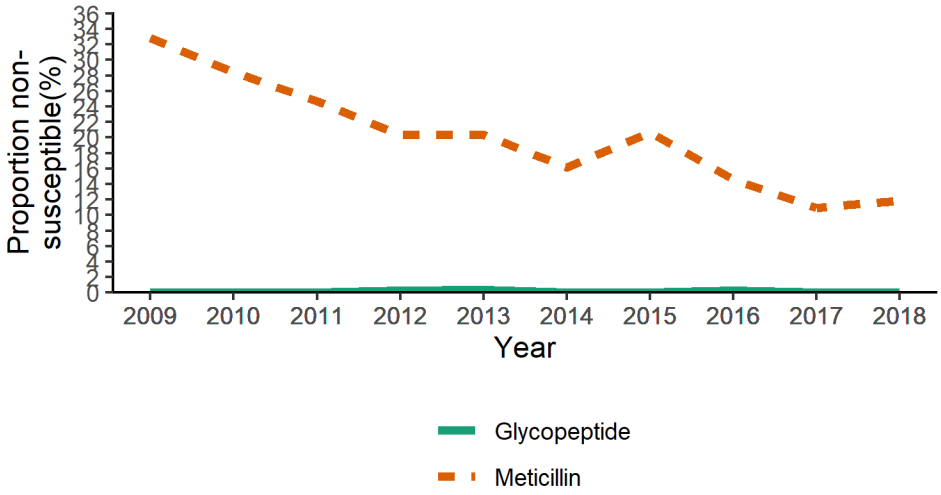



Figure 8: The number of *S. aureus* bacteraemias reported to the Public Health Agency, 2009 - 2018



The number of *S. aureus* bacteraemias increased from 397 in 2017 to 453 in 2018 (Figure 8). The proportion of isolates tested against key antibiotics during 2018 is shown in Appendix 3. The proportion of *S. aureus* that are resistant to meticillin (MRSA) has been decreasing over the last 5 years, with a low of 10.9% in 2017. However a slight increase was observed between 2017 and 2018 (10.9% to 11.9%). There was no resistance to glycopeptides (eg. Vancomycin or Teicoplanin) dectected during the period (**??**).

**Enterococcus species bacteraemia**

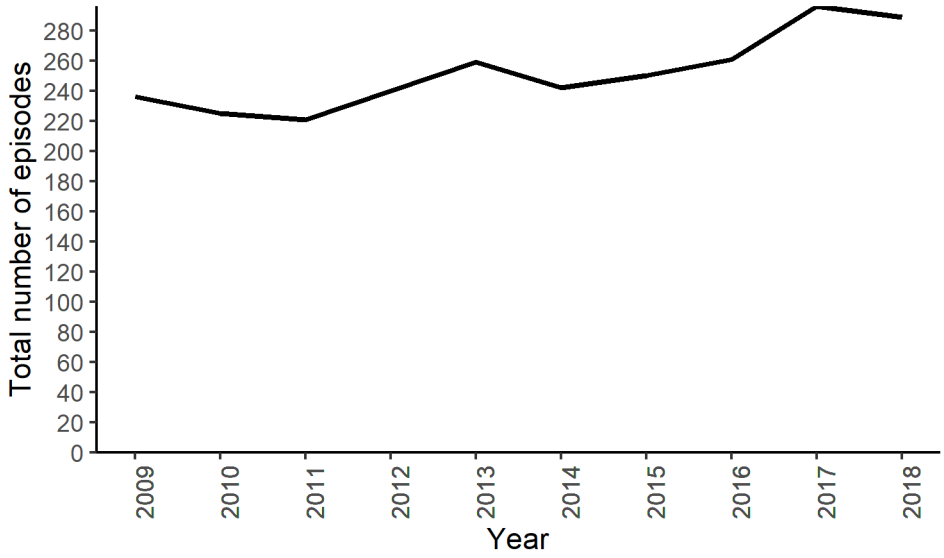
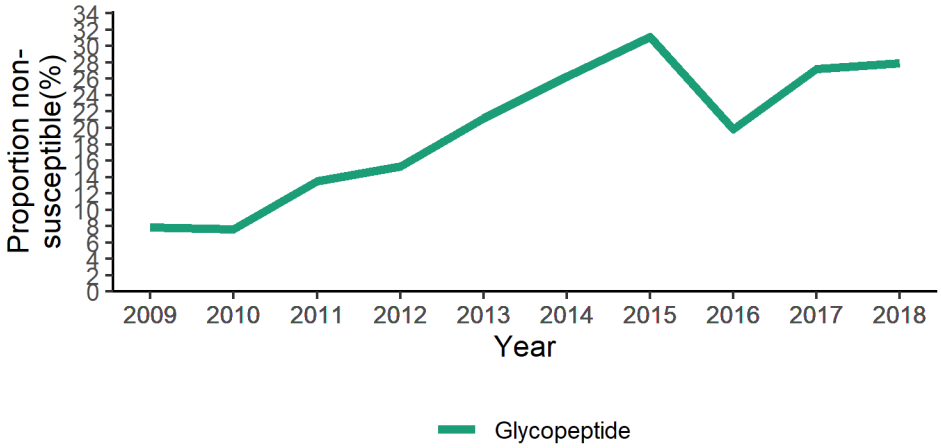



Figure 9: The number of Enterococcus species bacteraemias reported to the Public Health Agency, 2009 -2018



The number of *Enterococcus species* bacteraemias has decreased slightly from 296 cases in 2017 to 289 in 2018 (Figure 9). The proportion of *Enterococcus species* bacteraemias resistant to glycopeptides remained relatively stable during 2017 to 2018 (27.2% to 27.9%) (**??**).

### ***S. pneumoniae*** **bacteraemia**

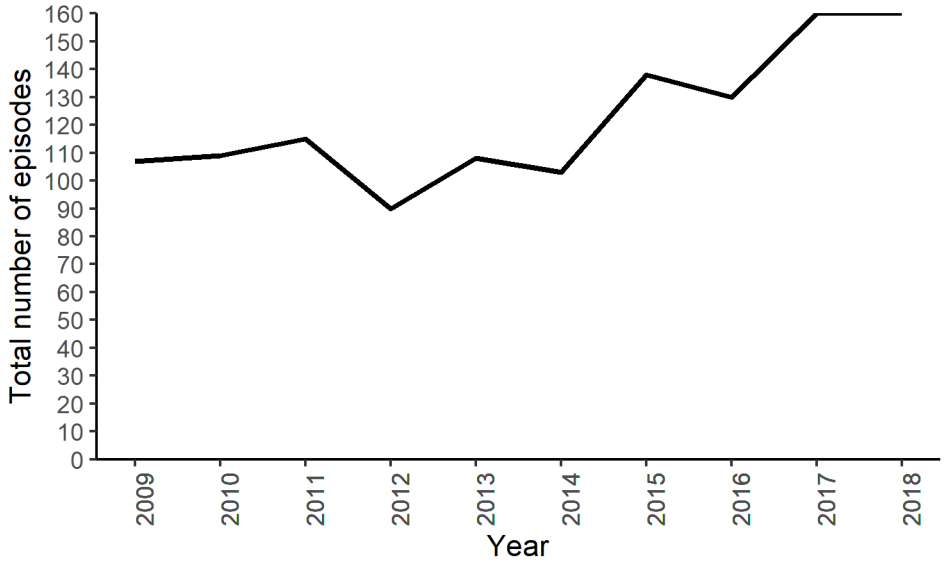
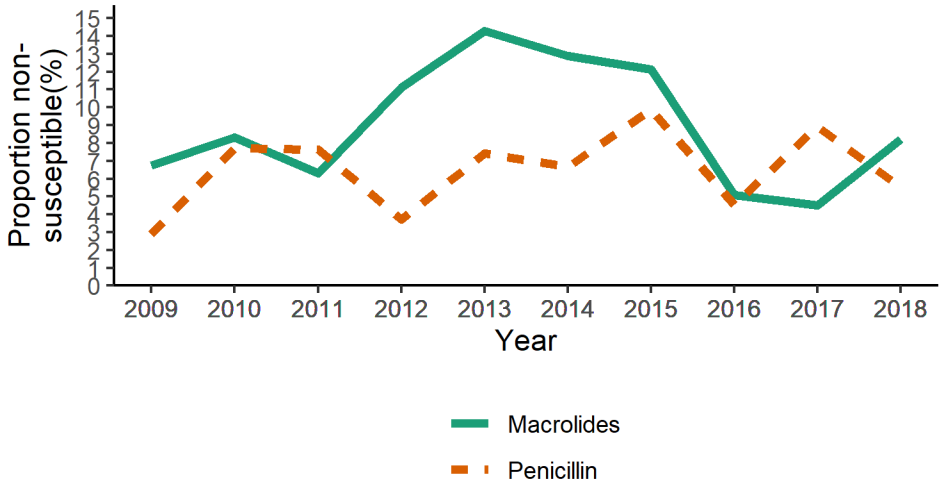



Figure 10: The number of *S. pneumoniae* bacteraemias reported to the Public Health Agency, 2009 -2018



The number of *S. pneumoniae* bacteraemias has remained stable from 2017 to 2018 (160 cases) (Figure 10). The proportion of isolates tested against key antibiotics during 2018 is shown in Appendix 3. While the proportion of *S. pneumoniae* resistant to macrolides has almost doubled during 2017 to 2018 (4.5% to 8.2%). The proportion non-suseptible to penicillin has decreased (8.9% to 5.5%) (**??**).

**Acinetobacter species bacteraemia**

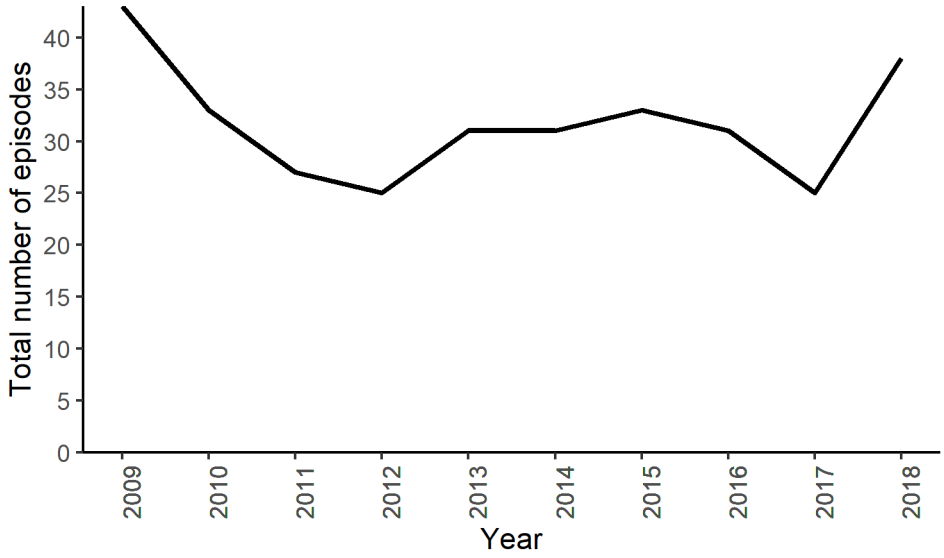
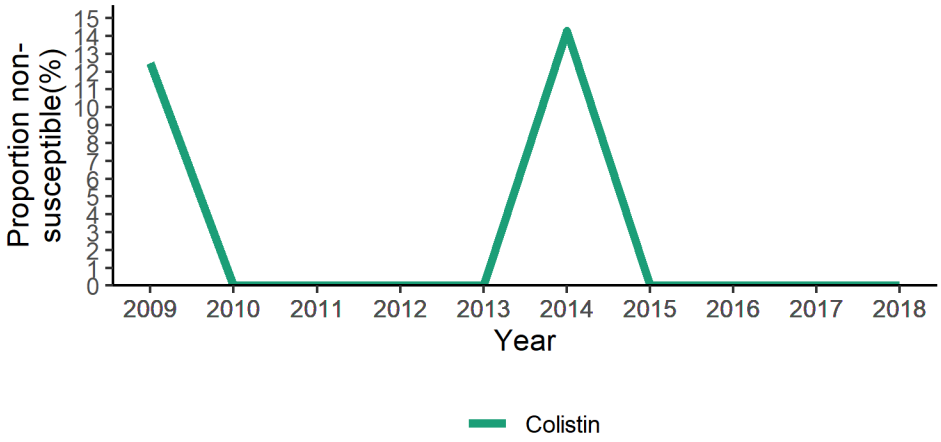



Figure 11: The number of Acinetobacter species bacteraemias reported to the Public Health Agency, 2009 - 2018



The number of *Acinetobacter species* bacteraemias increased from 25 cases in 2017 to 38 cases in 2018 (Figure 11). During 2017, one isolate was tested against colistin, while there were no tests against colistin in 2018. Resistance to colistin among *Acinetobacter species* has remained at zero (**??**).

## Carbapenamase- Producing Enterobacteriaceae

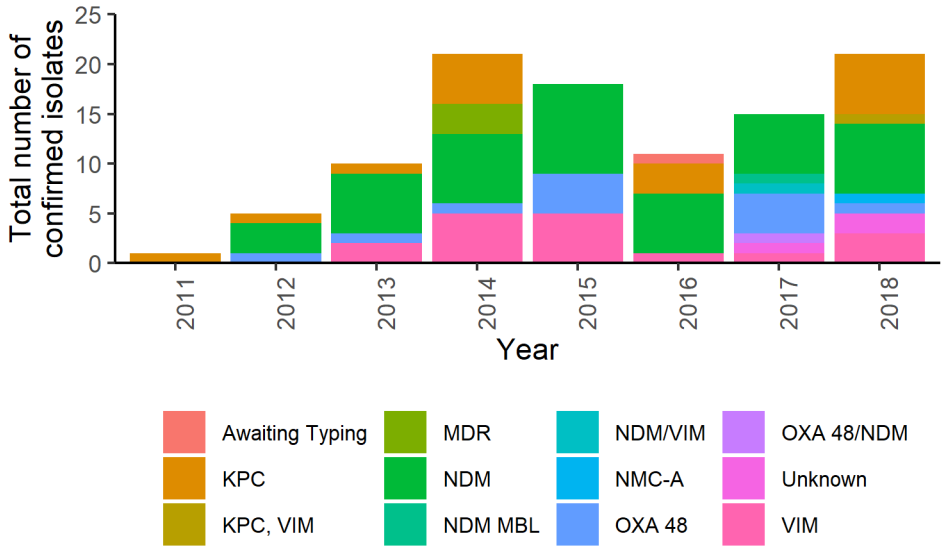
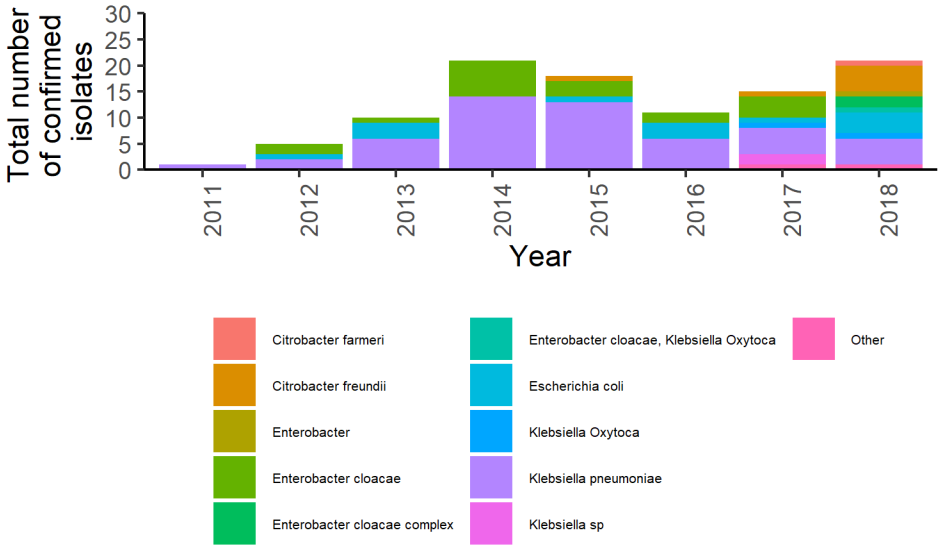



Figure 12: Carbapenamase activity among CPE confirmed isolates, 2011 - 2018



The number of CPE voluntarily reported to the PHA increased from 15 episodes in 2017 to 21 episodes during 2018 (Figure 12). New Delhi Metallo-Beta-lactamase (NDM) was the most common reported resistance mechanism from 2017 to 2018 (7 episodes) (Figure 12). The most commonly reported CPE between 2017 and 2018 was *Citrobacter freundii* and *Klebsiella pneumoniae* (5 episodes, respectively) (**??**).

**Antibiotic resistance in *Neisseria gonorrhoeae***

Gonorrhoea has been identified as at risk of becoming an untreatable disease due to the emergence of antimicrobial resistance to successive standard treatments. This has necessitated changes to recommended antibiotic prescribing. In the UK, current recommended treatment guidelines include ceftriaxone with azithromycin, along with routine test of cure [5]. Third-generation cephalosporins are the last remaining effective antibiotics but reports of treatment failures and increasing minimum inhibitory concentrations (MIC) levels have raised concerns that they will no longer be a suitable treatment option [6]. Since 2015, NI has participated in the European Gonococcal Antimicrobial Surveillance Programme (Euro-GASP) [7] through the Royal Victoria Hospital, Belfast. This GUM clinic captured 61% of all gonorrhoea diagnoses made during 2017. In 2017, gonorrhoea diagnoses accounted for 12% (679/5,728) of all new STI diagnoses made in NI GUM clinics. In 2018, 30 N. gonorrohoeae isolates were cultured and sent to Public Health England for inclusion in EuroGASP, bringing the total number of isolates submitted to EuroGASP by NI since 2015 to 99.

Over the period 2015 to 2018, isolates submitted to the EuroGASP programme have displayed similar resistance patterns to isolates from the rest of the UK, with 9.1% resistant to azithromycin and 0% resistant to ceftriaxone. In 2018 two (6.7%) isolates were resistant to azithromycin, and none were resistant to ceftriaxone. The full report for this surveillance programme will be published on the PHA website.

## Antibiotic consumption

### Rates of antibiotic consumption by healthcare setting

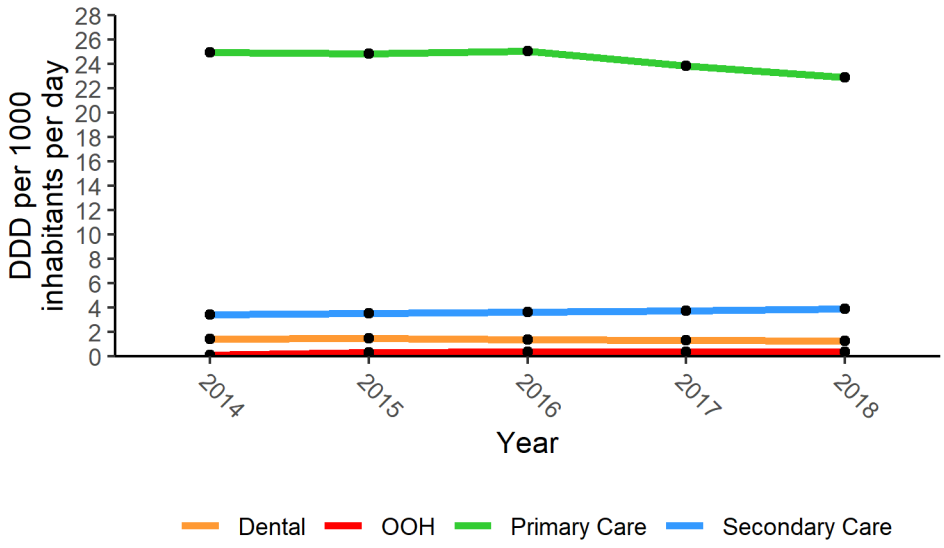



Figure 13: Total antibiotic consumption, expressed as DDD per 1000 inhabitants per day, NI, 2014-2018

### Note: The use of new 2019 DDDs

The total consumption of antibiotics decreased from 29.33 per 1000 inhabitants per day in 2017 to 28.5 per 1000 inhabitants per day in 2018. The majority of antibiotic consumption in 2018took place in the primary care setting (80.4%) while the proportion of total antibiotic consumption accounted for by out-of-hours and dental settings remained relatively low and stable across the reporting period as a whole (0.4% and 4.8% in 2014, to 1.4% and 4.5 % in 2018, respectively). The proportion of total antibiotic consumption accounted for by secondary care increased slightly from 11.4% in 2017 to 13.7% in 2018 (Figure 13).

The proportion of antibiotic consumption accounted for by primary care has however decreased between 2017 and 2018 (from 81.3% to 80.4%). Similarly, the overall rate of prescribing in primary care has decreased from 23.84 per 1000 inhabitants per day in 2017 to 22.91 per 1000 inhabitants per day in 2018. The rate of antibiotic consumption in secondary care has increased slightly (3.75 per 1000 inhabitants per day during 2017 to 3.91 per 1000 inhabitants per day in 2018), while the rate of prescribing in out-of-hours and dental settings remained relatively stable (0.4 and 1.33 in 2017 to 0.4 and 1.27 per 1000 inhabitants per day in 2018, respectively).

**Rates of antibiotic consumption in Secondary care**

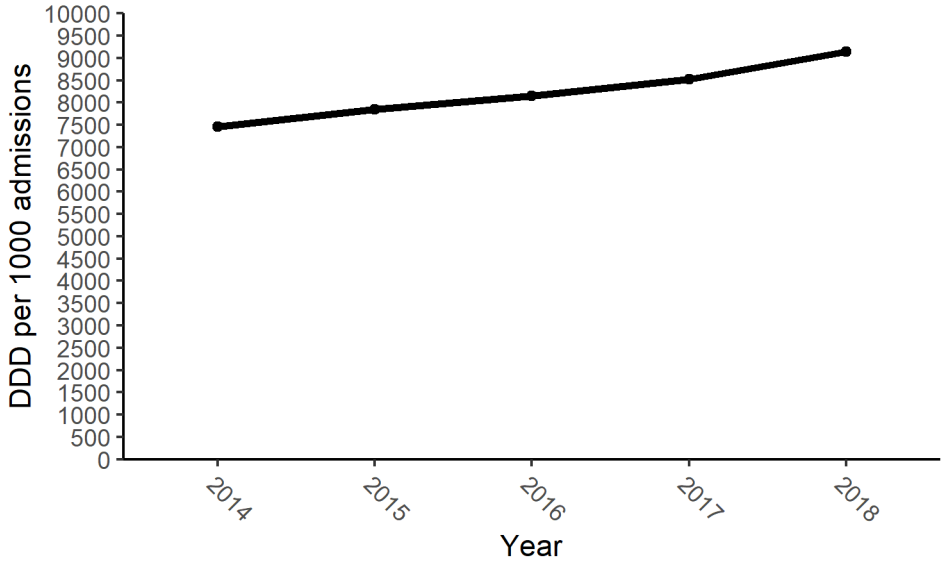



Figure 14: Total antibiotic consumption, expressed as DDD per 1000 admissions, NI, 2014-2018

There has been a gradual year on year increase in the rate of secondary care antibiotic consumption expressed as DDD per 1000 admissions, with rates of antibiotic consumption in secondary care increasing from 8526 in 2017 to 9138 DDD per 1000 admissions in 2018 (Figure 14).

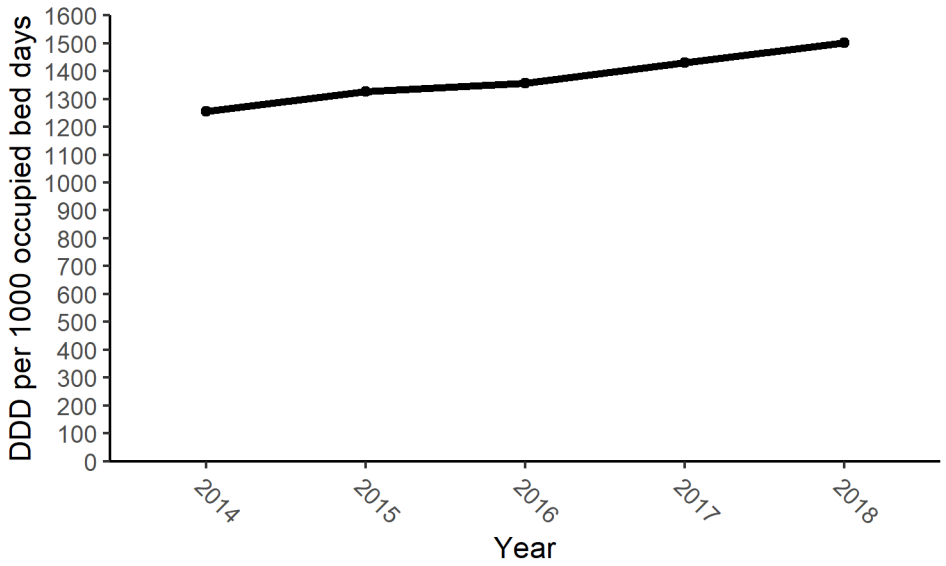
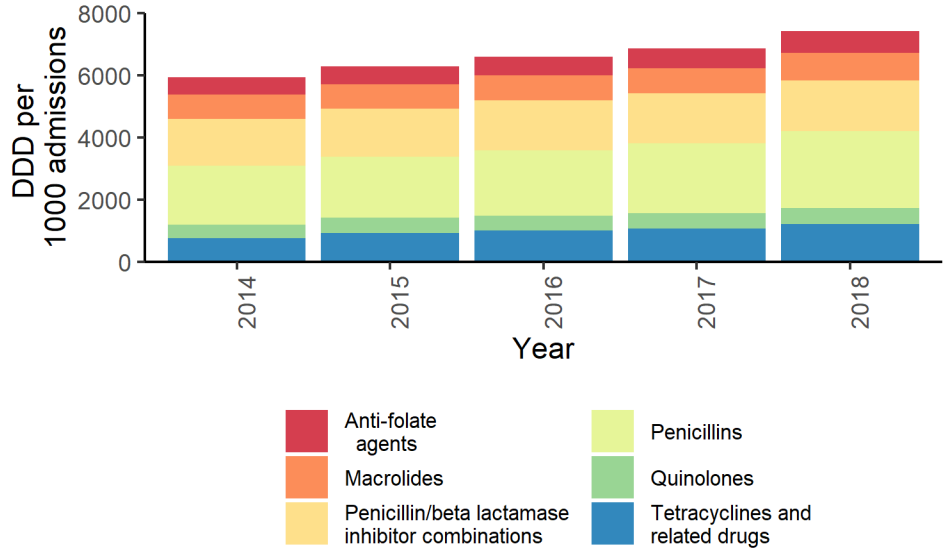


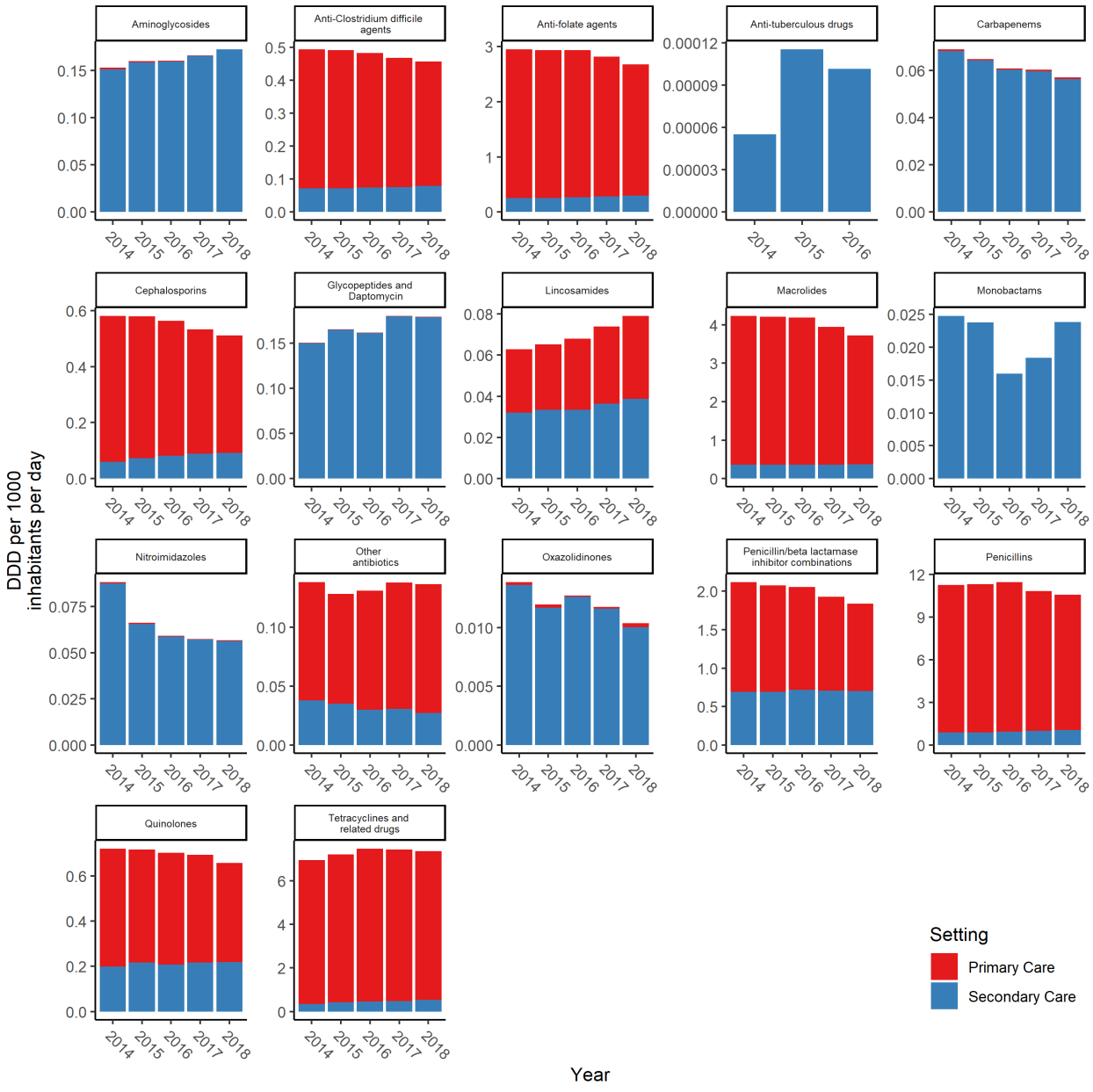

Figure 15: Total antibiotic consumption, expressed as DDD per 1000 occupied bed days, NI, 2014-2018

The rate of secondary care antibiotic consumption per 1000 occupied bed days has been gradually increasing. The rate of antibiotic consumption per 1000 occupied bed days increased from 1431 in 2017 to 1502 DDD per 1000 occupied beddays in 2018 (Figure 15).



This figure shows the top 6 key agents prescribed in secondary care. In 2018, the highest rates of antibiotic consumption were for penicillins, which increased from 2248 in 2017 to 2469 DDD per 1000 admissions in 2018. Penicillin/beta lactamase inhibitor combinations have increased from 1605 to 1642 DDD per 1000 admissions and tetracyclines and related drugs have also increased from 1081 in 2017 to 1223 DDD per 1000 admissions in 2018 (**??**).

## Antibiotic consumption by key agents




*Note*: differing scales on y-axis

During 2018, the most frequently used antibiotics in both primary and secondary care in NI were penicillins (38.7% and 27% respectively), tetracyclines and related drugs (27.8% and 13.4% respectively) and macrolides (13.6% and 9.6% respectively) (**??**).

## Antibiotic consumption by class and individual antibiotics

### Penicillins

| Year | Class | DDD | Population | rate |
|---|---|---|---|---|
| 2014 | Penicillins | 7546729 | 1840498 | 11.23 |
| 2015 | Penicillins | 7647854 | 1851621 | 11.32 |
| 2016 | Penicillins | 7775285 | 1862137 | 11.44 |
| 2017 | Penicillins | 7381358 | 1870834 | 10.81 |
| 2018 | Penicillins | 7252387 | 1881641 | 10.56 |

Table: Total rate of Penicillins DDD per 1000 inhabitants per day, NI, 2014-2018.

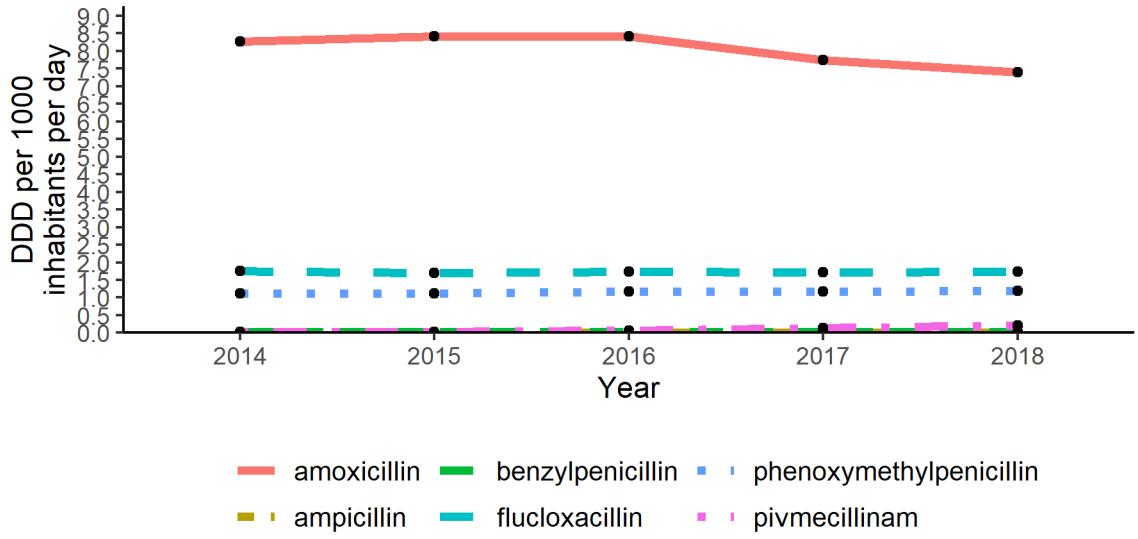



Figure 16: Consumption of most commonly used penicillins expressed per 1000 inhabitants per day, NI, 2014 -2018

The figure represents the top six antimicrobial agents used in the Penicillins class. Penicillins accounted for 37.1% of total antibiotic consumption in 2018. The rate of penicillin consumption has slightly decreased from 10.81 in 2017 to 10.56 per 1000 inhabitants per day in 2018. The highest rate was for amoxicillin, which has remained relatively stable between 2017 and 2018 (7.39 DDD per 1000 inhabitants per day in 2018) (Figure 16).

### Cephalosporins

| Year | Class | DDD | Population | rate |
|---|---|---|---|---|
| 2014 | Cephalosporins | 390760 | 1840498 | 0.58 |
| 2015 | Cephalosporins | 391763 | 1851621 | 0.58 |
| 2016 | Cephalosporins | 382856 | 1862137 | 0.56 |
| 2017 | Cephalosporins | 363775 | 1870834 | 0.53 |
| 2018 | Cephalosporins | 351269 | 1881641 | 0.51 |

Table: Total rate of Cephalosporins DDD per 1000 inhabitants per day, NI, 2014-2018.

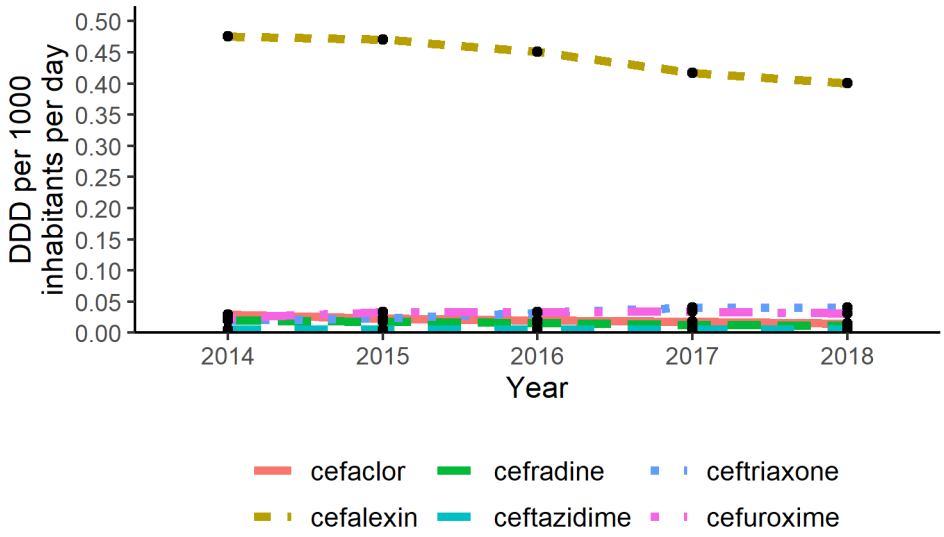



Figure 17: Consumption of most commonly used cephalosporins expressed per 1000 inhabitants per day, NI, 2014 -2018

The figure represents the top six agents used in the Cephalosporins class. In 2018 the overall rate of cephalosporin consumption decreased slightly from 0.53 DDD per 1000 inhabitants per day in 2017 to 0.51 DDD per 1000 inhabitants per day in 2018. The highest rate was for cefalexin, which has decreased slightly between 2017 and 2018 (0.42 DDD per 1000 inhabitants per day to 0.4 DDD per 1000 inhabitants per day) (Figure 17).

### Tetracyclines and related drugs

| Year | Class | DDD | Population | rate |
|---|---|---|---|---|
| 2014 | Tetracyclines and related drugs | 4675462 | 1840498 | 6.96 |
| 2015 | Tetracyclines and related drugs | 4874348 | 1851621 | 7.21 |
| 2016 | Tetracyclines and related drugs | 5085295 | 1862137 | 7.48 |
| 2017 | Tetracyclines and related drugs | 5077903 | 1870834 | 7.44 |
| 2018 | Tetracyclines and related drugs | 5057579 | 1881641 | 7.36 |

Table: Total rate of tetracyclines and related drugs consumption expressed as DDD per 1000 inhabitants per day, NI, 2014-2018.

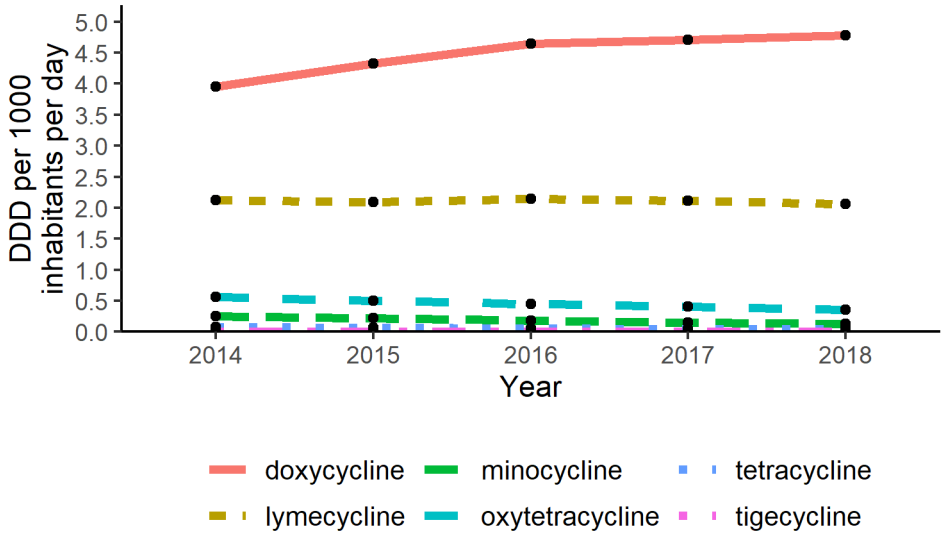



Figure 18: Consumption of most commonly used tetracyclines and related drugs[2] expressed per 1000 inhabitants per day, NI, 2014 -2018

The figure represents the top six agents used in the tetracyclines and related drugs class. Tetracyclines and related drugs accounted for 25.8% of total antibiotic consumption in 2018. The consumption rate of tetracyclines and related drugs has decreased between 2017 to 2018 from 7.44 to 7.36 DDD per 1000 inhabitants per day, respectively. The highest rate was for doxycycline, the rate of which has increased slightly between 2017 and 2018 (4.71 to 4.78 DDD per 1000 inhabitants per day) (Figure 18).

[2]While demeclocycline and lymecycline are not primarily used for their antimicrobial effects they have been included as they can still be considered drivers of resistance.

### Quinolones

| Year | Class | DDD | Population | rate |
|---|---|---|---|---|
| 2014 | Quinolones | 483785 | 1840498 | 0.72 |
| 2015 | Quinolones | 483988 | 1851621 | 0.72 |
| 2016 | Quinolones | 477462 | 1862137 | 0.70 |
| 2017 | Quinolones | 472919 | 1870834 | 0.69 |
| 2018 | Quinolones | 451703 | 1881641 | 0.66 |

Table: Total rate of Quinolones consumption expressed as DDD per 1000 inhabitants per day, NI, 2014-2018.

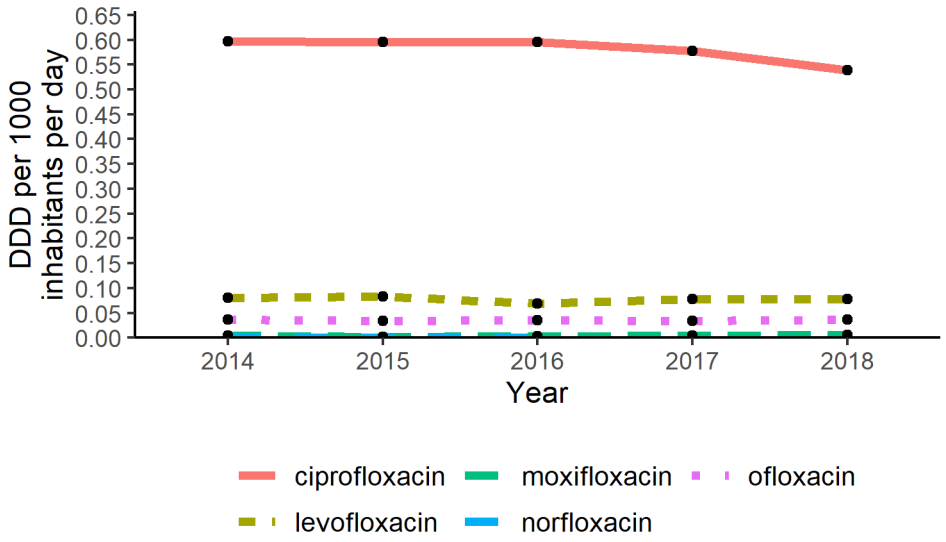



Figure 19: Consumption of most commonly used quinolones expressed per 1000 inhabitants per day, NI, 2014 -2018

The rate of Quinolones consumption has decreased slightly from 0.69 DDD per 1000 inhabitants per day in 2017 to 0.66 DDD per 1000 inhabitants per day in 2018. The highest rate was for ciprofloxacin, the rate of which has decrease slightly between 2017 and 2018 (0.54 to 0.58 DDD per 1000 inhabitants per day) (Figure 19).

**Macrolides**

| Year | Class | DDD | Population | rate |
|---|---|---|---|---|
| 2014 | Macrolides | 2844119 | 1840498 | 4.23 |
| 2015 | Macrolides | 2844317 | 1851621 | 4.21 |
| 2016 | Macrolides | 2843917 | 1862137 | 4.18 |
| 2017 | Macrolides | 2695669 | 1870834 | 3.95 |
| 2018 | Macrolides | 2554082 | 1881641 | 3.72 |

Table: Total rate of Macrolides consumption expressed as DDD per 1000 inhabitants per day, NI, 2014-2018.

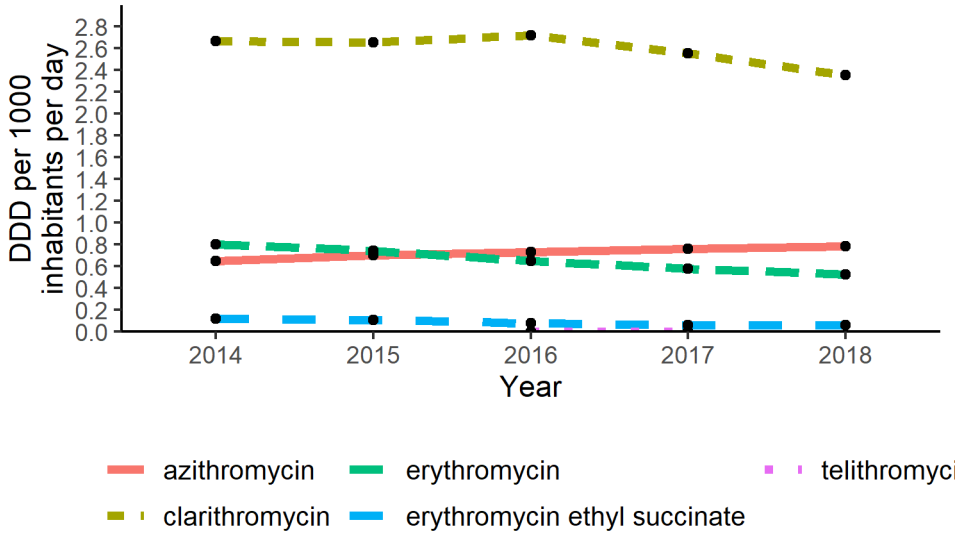



Figure 20: Consumption of most commonly used macrolides expressed per 1000 inhabitants per day, NI, 2014 -2018

Macrolides accounted for 13.1% of total antibiotic consumption in 2018. The rate of Macrolides consumption has decreased from 3.95 DDD per 1000 inhabitants per day in 2017 to 3.72 DDD per 1000 inhabitants per day in 2018. The highest rate was for clarithromycin which decreased from 2.55 DDD per 1000 inhabitants per day in 2017 to 2.35 DDD per 1000 inhabitants per day in 2018 (Figure 20).

### Carbapenems

| Year | Class | DDD | Population | rate |
|---|---|---|---|---|
| 2014 | Carbapenems | 46292 | 1840498 | 0.07 |
| 2015 | Carbapenems | 43779 | 1851621 | 0.06 |
| 2016 | Carbapenems | 41383 | 1862137 | 0.06 |
| 2017 | Carbapenems | 41207 | 1870834 | 0.06 |
| 2018 | Carbapenems | 39126 | 1881641 | 0.06 |

Table: Total rate of Carbapenems consumption expressed as DDD per 1000 inhabitants per day, NI, 2014-2018.

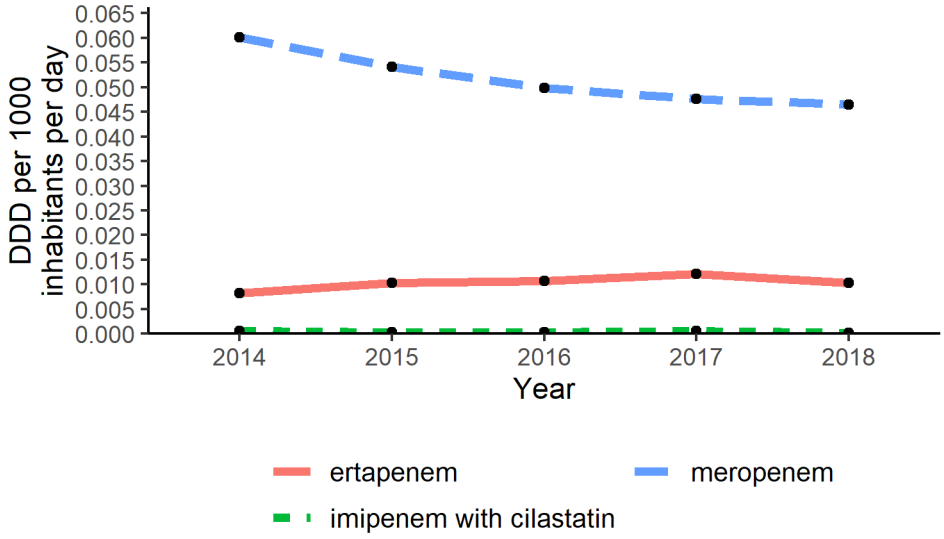



Figure 21: Consumption of most commonly used carbapenems expressed per 1000 inhabitants per day, NI, 2014 -2018

The rate of Carbapenems consumption has remained stable from 2017 to 2018 at 0.06 DDD per 1000 inhabitants per day, respectively. The highest rate was for meropenem, which has remained stable between 2017 and 2018 at 0.05 DDD per 1000 inhabitants per day (Figure 21).

### Penicillin/beta lactamase inhibitor combinations

| Year | Class | DDD | Population | rate |
|---|---|---|---|---|
| 2014 | Penicillin/beta lactamase inhibitor combinations | 1421704 | 1840498 | 2.12 |
| 2015 | Penicillin/beta lactamase inhibitor combinations | 1403783 | 1851621 | 2.08 |
| 2016 | Penicillin/beta lactamase inhibitor combinations | 1395671 | 1862137 | 2.05 |
| 2017 | Penicillin/beta lactamase inhibitor combinations | 1316396 | 1870834 | 1.93 |
| 2018 | Penicillin/beta lactamase inhibitor combinations | 1262664 | 1881641 | 1.84 |

Table: Total rate of Penicillin/beta lactamase inhibitor combinations consumption expressed as DDD per 1000 inhabitants per day, NI, 2014-2018.

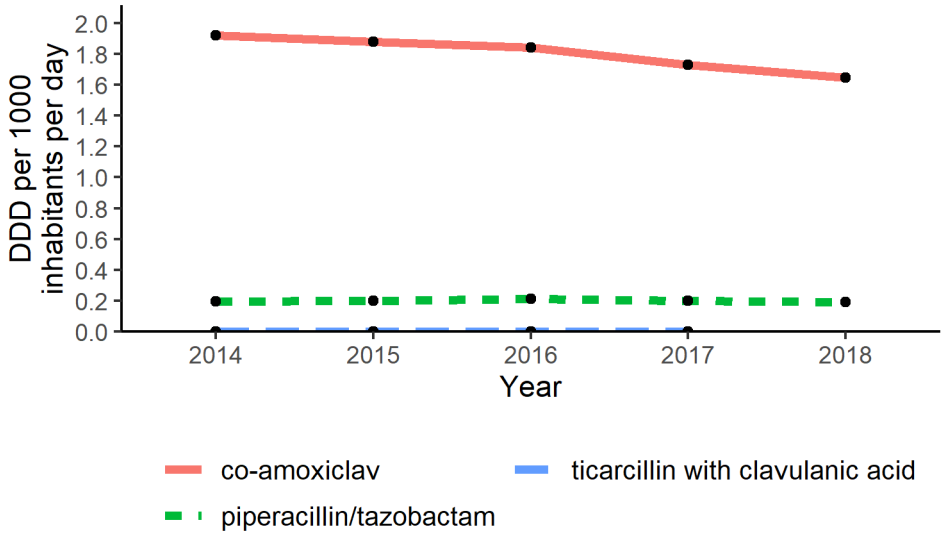



Figure 22: Consumption of most commonly used Penicillin/beta lactamase inhibitor combinations expressed per 1000 inhabitants per day, NI, 2014 -2018

The rate of consumption of Penicillin/beta lactamase inhibitor combinations has decreased from 1.93 DDD per 1000 inhabitants per day in 2017 to 1.84 DDD per 1000 inhabitants per day in 2018. The highest rate was for co-amoxiclav which has continued to decrease from 2017 to 2018 (1.73 to 1.65 DDD per 1000 inhabitants per day). The use of piperacillin/tazobactam decreased slightly from 0.2 DDD per 1000 inhabitants per day in 2017 to 0.19 DDD per 1000 inhabitants per day in 2018 (Figure 22).

### Glycopeptides and daptomycin

| Year | Class | DDD | Population | rate |
|---|---|---|---|---|
| 2014 | Glycopeptides and Daptomycin | 101103 | 1840498 | 0.15 |
| 2015 | Glycopeptides and Daptomycin | 111767 | 1851621 | 0.17 |
| 2016 | Glycopeptides and Daptomycin | 110029 | 1862137 | 0.16 |
| 2017 | Glycopeptides and Daptomycin | 123197 | 1870834 | 0.18 |
| 2018 | Glycopeptides and Daptomycin | 123184 | 1881641 | 0.18 |

Table: Total rate of glycopeptides and daptomycin consumption expressed as DDD per 1000 inhabitants per day, NI, 2014-2018.

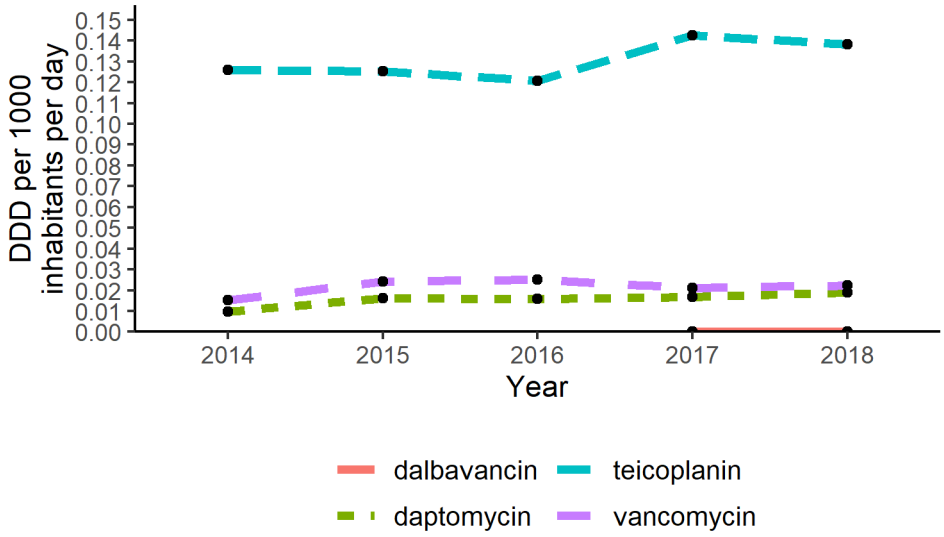



Figure 23: Consumption of most commonly used glycopeptides and daptomycin expressed per 1000 inhabitants per day, NI, 2014 -2018

The rate of glycopeptide and daptomycin consumption has remained stable from 2017 to 2018 at 0.18 DDD per 1000 inhabitants per day. The highest rate was for teicoplanin which has remained stable between 2017 and 2018 (0.14 DDD per 1000 inhabitants per day (Figure 23).

**Anti-folate agents**

| Year | Class | DDD | Population | rate |
|---|---|---|---|---|
| 2014 | Anti-folate agents | 1980783 | 1840498 | 2.95 |
| 2015 | Anti-folate agents | 1983958 | 1851621 | 2.94 |
| 2016 | Anti-folate agents | 1995202 | 1862137 | 2.94 |
| 2017 | Anti-folate agents | 1920030 | 1870834 | 2.81 |
| 2018 | Anti-folate agents | 1836423 | 1881641 | 2.67 |

Table: Total rate of Anti-folate agents consumption expressed as DDD per 1000 inhabitants per day, NI, 2014-2018.

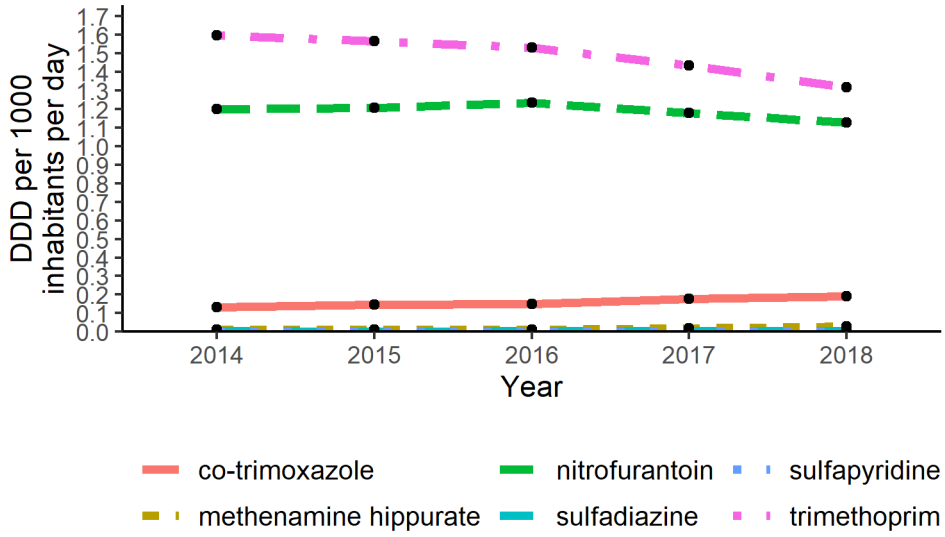



Figure 24: Consumption of most commonly used anti-folate agents expressed per 1000 inhabitants per day, NI, 2014 -2018

Anti-folate agents accounted for 9.4% of total antibiotic consumption in 2018. The rate of consumption of Anti-folate agents slightly decreased from 2.81 DDD per 1000 inhabitants per day in 2017 to 2.67 DDD per 1000 inhabitants per day in 2018. The highest rate was for trimethoprim which also decreased slightly from 1.43 in 2017 to 1.32 DDD per 1000 inhabitants per day in 2018 (Figure 24).

## Antibiotic consumption of key agents by healthcare setting

### Trimethoprim

| Year | Antibiotic | DDD | Population | rate |
|---|---|---|---|---|
| 2014 | trimethoprim | 1073366 | 1840498 | 1.60 |
| 2015 | trimethoprim | 1059077 | 1851621 | 1.57 |
| 2016 | trimethoprim | 1041351 | 1862137 | 1.53 |
| 2017 | trimethoprim | 978456 | 1870834 | 1.43 |
| 2018 | trimethoprim | 904666 | 1881641 | 1.32 |

Table: Total rate of trimethoprim consumption expressed as DDD per 1000 inhabitants per day, NI, 2014-2018.

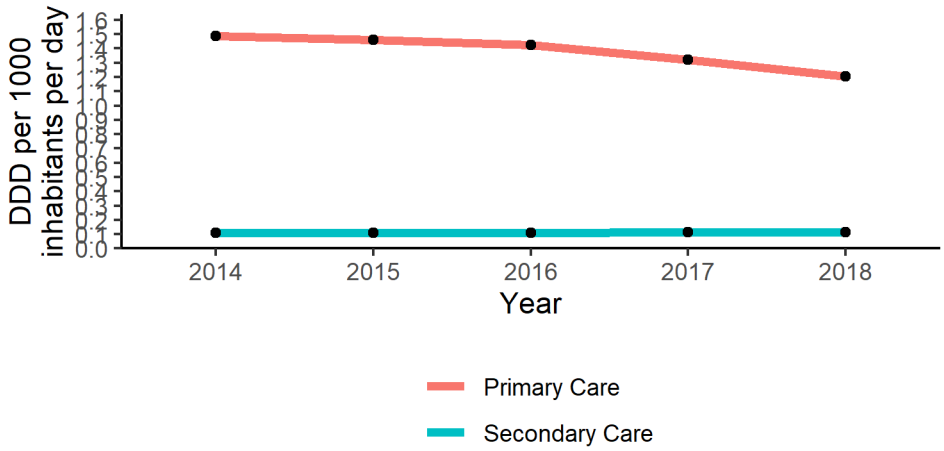



Figure 25: Consumption of trimethoprim by prescriber location expressed per 1000 inhabitants per day, NI, 2014 -2018

The rate of trimethoprim consumption has continued to decrease from 1.43 DDD per 1000 inhabitants per day in 2017 to 1.32 DDD per 1000 inhabitants per day in 2018. The rate of trimethopim consumption in primary care has decreased between 2017 to 2018 (1.32 to 1.2 DDD per 1000 inhabitants per day) with no change in secondary care, remaining stable at 0.11 DDD per 1000 inhabitants per day (Figure 25).

**Nitrofurantoin**

| Year | Antibiotic | DDD | Population | rate |
|---|---|---|---|---|
| 2014 | nitrofurantoin | 806022 | 1840498 | 1.20 |
| 2015 | nitrofurantoin | 815244 | 1851621 | 1.21 |
| 2016 | nitrofurantoin | 838475 | 1862137 | 1.23 |
| 2017 | nitrofurantoin | 803820 | 1870834 | 1.18 |
| 2018 | nitrofurantoin | 774974 | 1881641 | 1.13 |

Table: Total rate of nitrofurantoin consumption expressed as DDD per 1000 inhabitants per day, NI, 2014-2018.

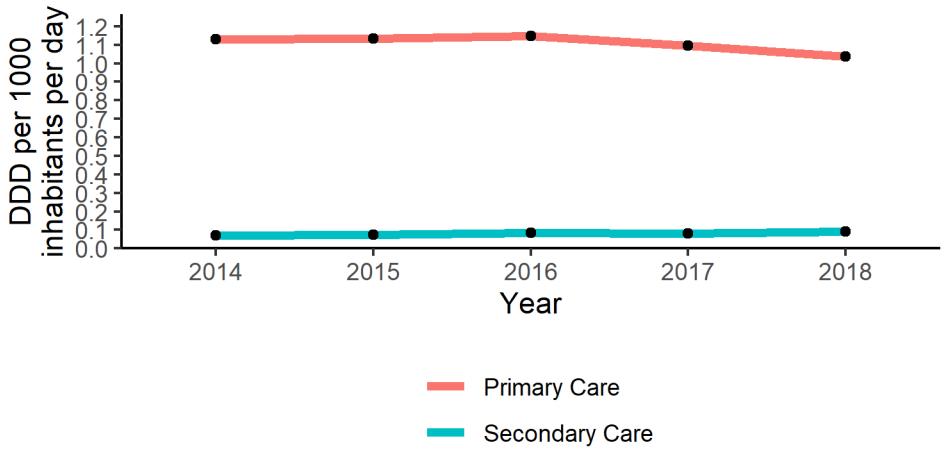



Figure 26: Consumption of nitrofurantoin by prescriber location expressed per 1000 inhabitants per day, NI, 2014 -2018

The rate of nitrofurantoin consumption decreased slightly between 2017 to 2018 from 1.18 DDD per 1000 inhabitants per day in 2017 to 1.13 DDD per 1000 inhabitants per day in 2018. Rates in primary care have slightly decreased from 1.09 DDD per 1000 inhabitants per day in 2017 to 1.04 DDD per 1000 inhabitants per day in 2018. The rate of consumption in secondary care has increased slightly from 0.08 DDD per 1000 inhabitants per day in 2017 to 0.09 DDD per 1000 inhabitants per day in 2018 (Figure 26).

**Aminoglycosides**

| Year | Class | DDD | Population | rate |
|---|---|---|---|---|
| 2014 | Aminoglycosides | 102531 | 1840498 | 0.15 |
| 2015 | Aminoglycosides | 107798 | 1851621 | 0.16 |
| 2016 | Aminoglycosides | 108891 | 1862137 | 0.16 |
| 2017 | Aminoglycosides | 113206 | 1870834 | 0.17 |
| 2018 | Aminoglycosides | 118259 | 1881641 | 0.17 |

Table: Total rate of Aminoglycosides consumption expressed as DDD per 1000 inhabitants per day, NI, 2014-2018.

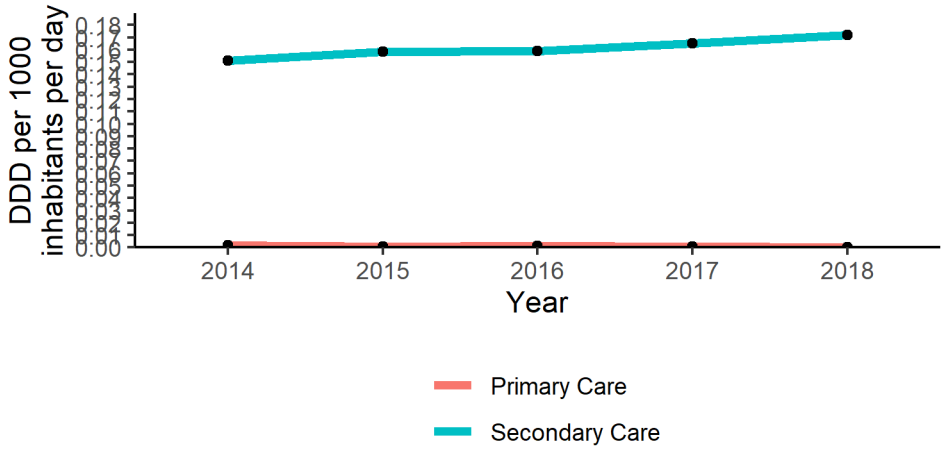



Figure 27: Consumption of aminoglycosides by prescriber location expressed per 1000 inhabitants per day, NI, 2014 -2018

The overall consumption rate of Aminoglycosides remained stable from 2017 to 2018 at 0.17 DDD per 1000 inhabitants per day. The rate of consumption in both primary and secondary care also remained stable at 0 and 0.17 DDD per 1000 inhabitants per day, respectively (Figure 27).

**Glycopeptides and daptomycin**

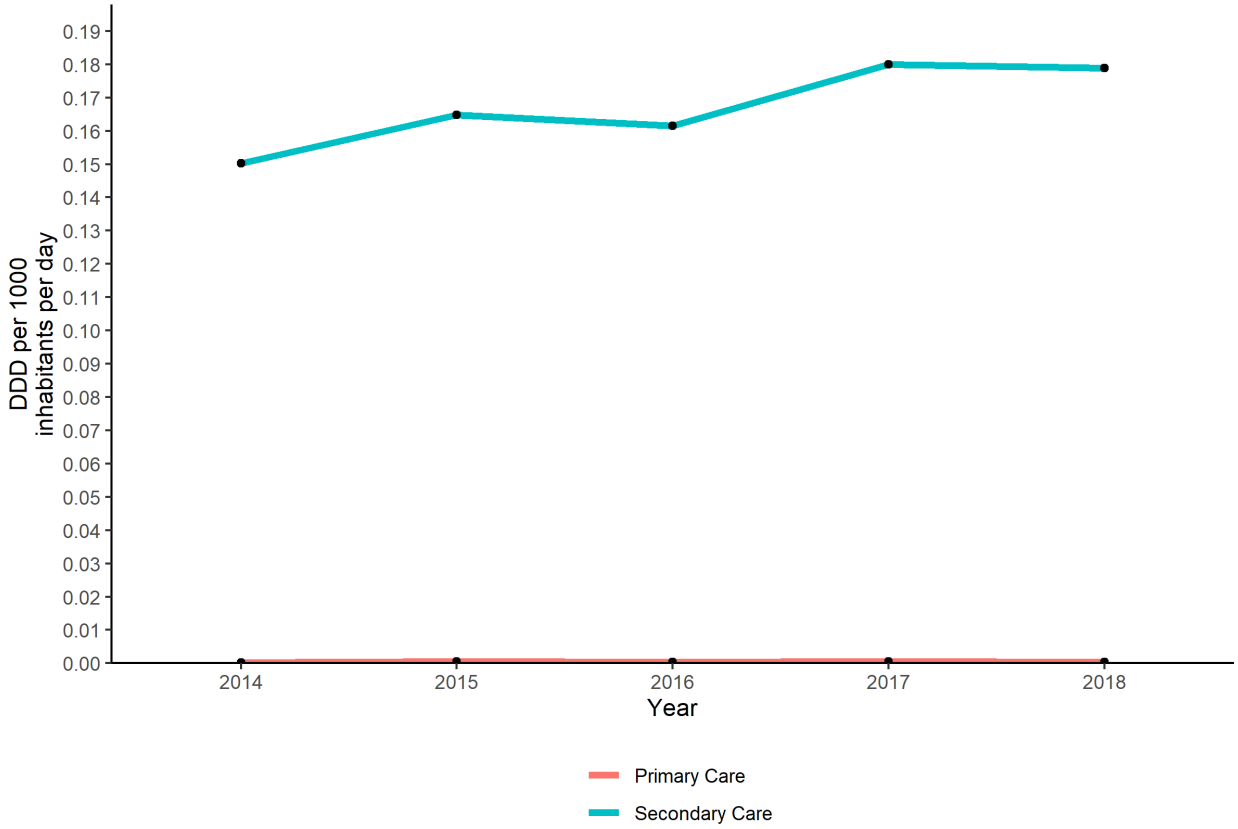



Figure 28: Consumption of glycopeptide and daptomycin by prescriber location expressed per 1000 inhabitants per day, NI, 2014 -2018

The total consumption rate of glycopeptides and daptomycin has remained stable in both primary and secondary care from 2017 to 2018. The rate of consumption in primary care remained at 0 DDD per 1000 inhabitants per day, with the rate in secondary care remaining at 0.18 DDD per 1000 inhabitants per day. *Please note DDDs in primary care are not absolute zero* (Figure 28).

**Colistin**

| Year | Antibiotic | DDD | Population | rate |
|---|---|---|---|---|
| 2014 | colistin | 60158 | 1840498 | 0.09 |
| 2015 | colistin | 55889 | 1851621 | 0.08 |
| 2016 | colistin | 62217 | 1862137 | 0.09 |
| 2017 | colistin | 68209 | 1870834 | 0.10 |
| 2018 | colistin | 70760 | 1881641 | 0.10 |

Table: Total rate of colistin consumption expressed as DDD per 1000 inhabitants per day, NI, 2014-2018.

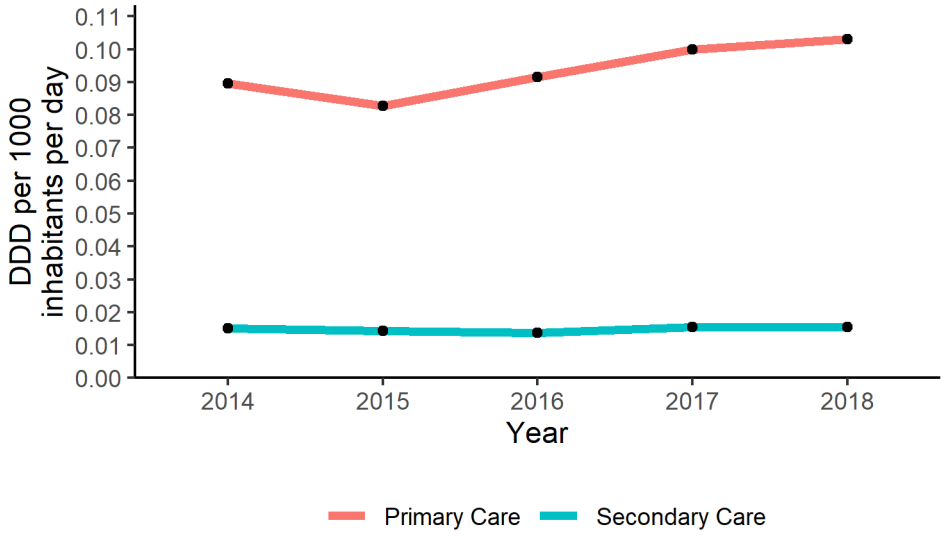



Figure 29: Consumption of colistin by prescriber location expressed per 1000 inhabitants per day, NI, 2014 -2018

The rate of colistin consumption remained stable from 2017 to 2018 at 0.1 DDD per 1000 inhabitants per day. Rates of consumption from 2017 to 2018 remained stable in both primary care (0.1 DDD per 1000 inhabitants per day) and secondary care (0.02 DDD per 1000 inhabitants per day) (Figure 29).

**Antibiotic consumption by WHO AWaRe Category**

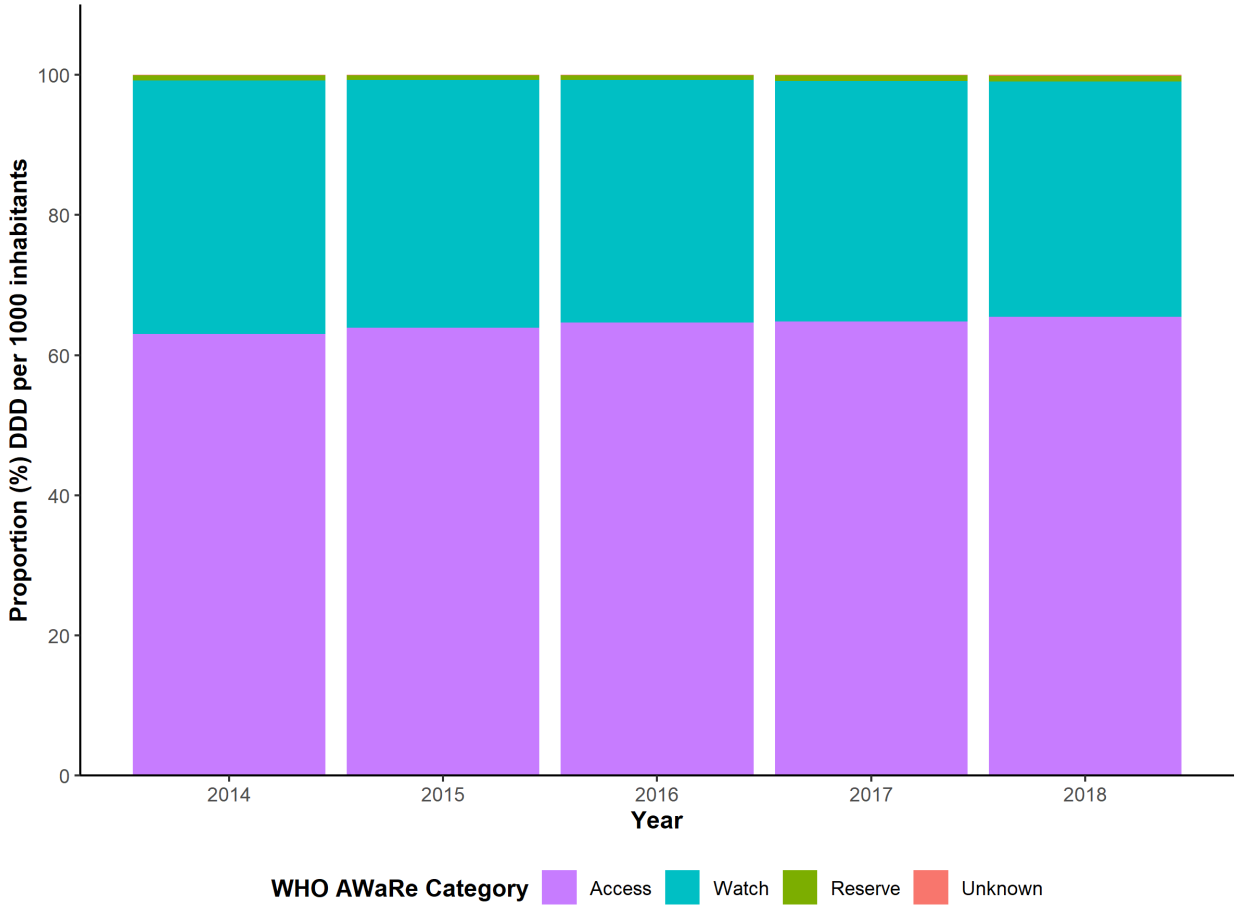



Figure 30: Proportion of DDDs per 1000 inhabitants by WHO AWaRe category, NI, 2014 -2018

The World Health Organization (WHO) classifies antibiotics into three stewardship groups- the AWaRe categories; Access, Watch and Reserve. Antibiotics in the Access group include antibiotics which can be utilised for a range of common susceptible pathogens and have a lower potential for resistance. The Watch group contains those which have an increased potential of resistance and should be used in a restricted manner and includes most high priority agents. The Reserve group contains antibiotics which are to be treated as 'last resort' when other treatments have failed or there are no alternatives available. This is the first year in which WHO AWaRe Categories have been included in this report.

The highest proportion of antibiotic consumption occurred within the Access category, which increased across the reporting period 2014 - 2018 (63.01 % to 65.49 %). The proportion of consumption accounted for by antibiotics from the Watch group has decreased from 36.17% in 2014 to 33.56% in 2018. Consumption within the Reserve category has remained relatively stable between 2014 and 2018 (0.76% to 0.82%). Antibiotics which not assigned to any of the AWaRe categories- denoted here as 'unknown'- accounted for less than 1% of total consumption in each year between 2014 and 2018 (Figure 30).

## Engagement activities

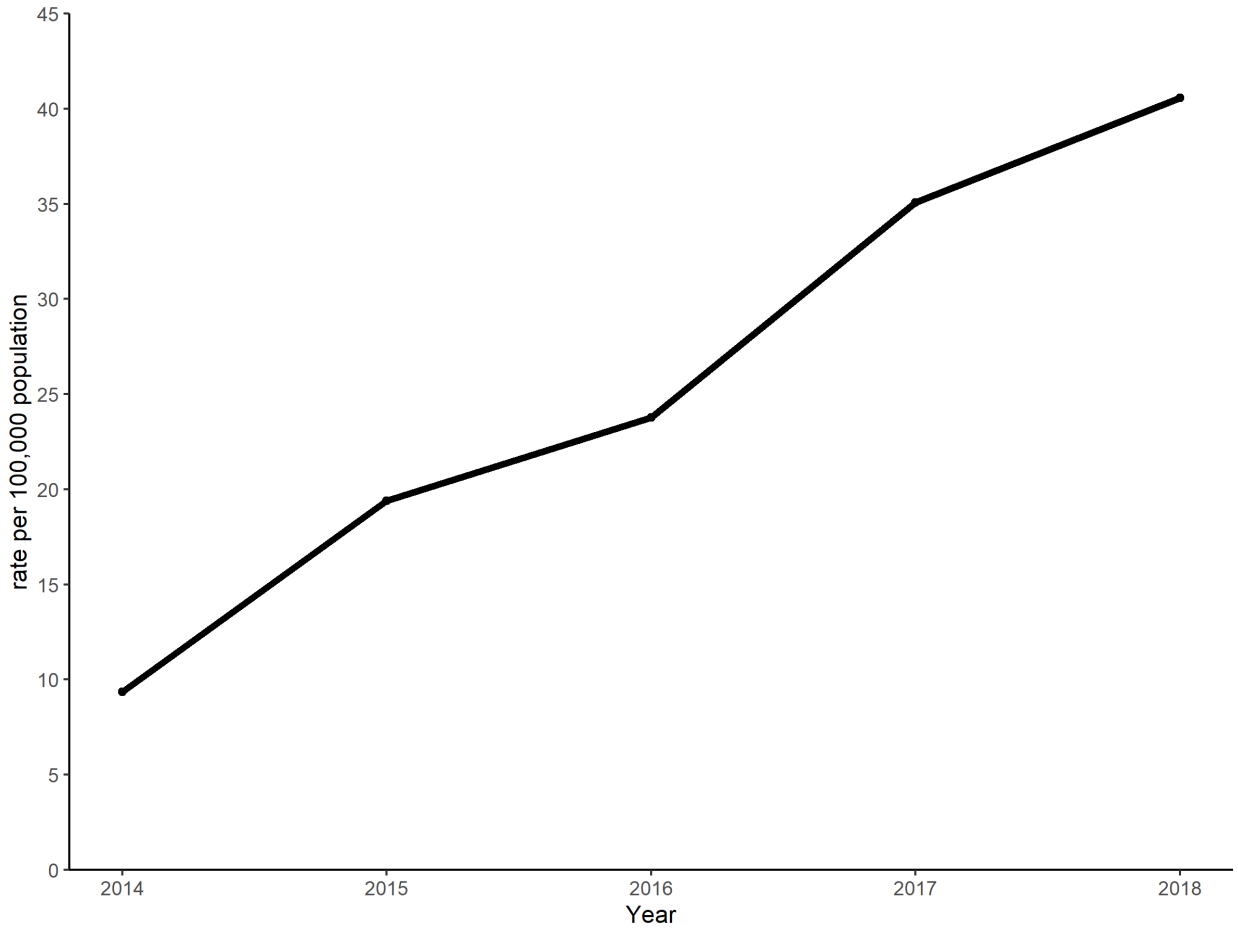
### Public Engagement

The Public Health Agency (PHA) engaged in several communications projects during 2018 with the aim of sharing key messages surrounding antibiotic resistance with the public. These messages highlighted simple steps that individuals can make to keep antibiotics working and called the public to action by encouraging them to become 'Antibiotic Guardians'. Key messages were communicated using several methods including a mass media campaign and public engagement events. A focus was also made on educating children on microbes, how infections are spread and how this can be prevented.

Highlights of this work include the following:

- PHA ran a mass media campaign across Northern Ireland entitled 'Keep Antibiotics Working' during December 2018 which will continue into 2019. The evaluation of this will commence later in 2019 however preliminary findings have been positive and include increased campaign awareness, resonation of key messages and positive impact on intended behaviours amongst the public.
- Ongoing significant press and social media activity is planned and implemented specifically around World Antibiotic Awareness Week. These included an animation to inform the public on the threat of AMR, and the actions they can take to keep antibiotics working; videos of professionals including medics, pharmacists and scientists explaining the threat of AMR; and a series of antibiotic mythbusters. The issue was highlighted on news bulletins on several local radio stations.
- 100 primary and post-primary teachers in Northern Ireland have attended an e-Bug training workshop. This is a free NICE endorsed educational resource for classrooms that helps teachers educate their pupils on microbes, their spread, treatment and prevention of infection.

**Antibiotic guardians**




There were more than one hundred new antibiotic guardians registered in Northern Ireland during 2018. To the end of 2018 there was a total of 759 individuals registered as antibiotic guardians (41 individuals per 100,000 population).

**Changing prescribing behaviour**

Complementary to our public engagement and education campaigns is a programme of work to help change prescribing behaviour. Safely reducing antibiotic use is a complex challenge that will require an understanding of the capacity, opportunity and motivation of prescribers to decide when not to prescribe antibiotics.

Initiatives to reduce antimicrobial consumption during 2018 included:

- Publication in March 2018 of the results of a survey with GPs about the factors that influence their antibiotic prescribing decisions and with stakeholders about their current understanding of the problem and ideas for solutions (https://www.finance-ni.gov.uk/sites/default/files/publications/%5Bcurrent-domain%3Amachine-name%5D/antibiotic-prescribing-in-primary-care-final-version.pdf).
- TARGET toolkit workshops for GPs were delivered throughout Northern Ireland during the year.
- Collaborative work on a systematic review of behavioural science interventions for antimicrobial stewardship continued between the Innovation Lab and PHA.
- Evaluation of a pilot point-of-care CRP testing for respiratory infections in primary care was undertaken, with results due in 2019.

## Future Work

Much of the current work undertaken will continue into 2019/20 and beyond. Engaging with the public to promote responsible use of antibiotics will remain a priority, as will endeavours to safely reduce the use of antibiotics. The following work is planned for delivery in 2019/20:

### Surveillance and Epidemiological Work

- Continue to monitor the progress of the national ambition to reduce healthcare-associated Gram-negative bacteraemias and assess the impact on the burden of AMR in terms of the numbers of resistant infections.
- Further improve our understanding of the epidemiology and incidence of antibiotic-resistant infections with a view to improving their management and prevent onward transmission.
- Standardise the approach to investigation and treatment of suspected urinary tract infection in care homes in Northern Ireland.
- Continue to monitor trends in antibiotic prescribing across primary and secondary care and explore opportunities to improve benchmarking and quality improvement.
- Continue to develop, pilot and validate a tool to assess appropriateness of antibiotic prescriptions in acute hospitals and facilitate data collection and analysis of data
- Work closely with stakeholders to focus and further improve dental prescribing across Northern Ireland.

### Engagement with the Public and HSC Colleagues

- PHA will continue to host a stand at the Balmoral Show. The stand will encourage the public to play their part in helping to keep antibiotics working. A range of interactive activities from e-Bug(http://www.e-bug.eu/) will be used to educate children about microbes, how they spread to others and what they can do to stop infections spreading. The stand will also be used to encourage members of the public to sign up to become antibiotic guardians.

- PHA will plan and facilitate an Infection Prevention and Control (IPC) study day and a HCAI (Healthcare Associated Infections) symposium to engage with colleagues across HSCNI to share best practice around reducing infections and antibiotic stewardship.
- PHA continue to engage in public awareness activities during the European Antibiotic Awareness Day (EEAD) and World Antibiotic Awareness Week (WAAW). Daily social media posts will be shared on PHA accounts (Facebook, Twitter, and Instagram) and partner organisations will be tagged so that resources can be shared on social media platforms. The social media posts will feature a range of existing content including animations, videos and myth-buster graphics.
- New video projects are also being planned for release. This includes a video to highlight the GP perspective regarding antibiotic prescribing and explain why a GP might not prescribe an antibiotic even if they are asked to. This will highlight key messages surrounding antibiotic resistance as well as common illnesses that usually do not require an antibiotic. similarly other videos will highlight simple steps that individuals can make to help keep antibiotics working. All communications materials will be uploaded to the PHA website to improve accessibility for partner organisations who may wish to download and use these resources for their own public facing media platforms.
- The PHA will continue to support HSCB Pharmacy colleagues to promote antibiotic guardianship by helping to organise and host stands on EAAD in PHA offices. Staff across Pharmacy and Health Protection will be available to speak to PHA employees about the key messages surrounding antibiotic resistance and correct antibiotic use. This opportunity will be used to encourage staff to become Antibiotic Guardians.
- Further E-Bug training workshops delivered to primary school teachers and other settings as appropriate.
- Public Health Agency in collaboration with Public Health England (PHE) will lead on the development of an Antibiotic Guardian badge programme for youth groups across the UK. This programme aims to educate children on how to prevent infections and to be more aware of antibiotics and antibiotic resistance. It includes interactive e-Bug activities and the development of a pledge to become an Antibiotic Guardian to protect antibiotics for the future. PHA plan to hold exploratory discussions with local youth organisations to raise awareness and interest in the badge in Northern Ireland.

- Lead and coordinate efforts in undergraduate and postgraduate training, continuing professional development, and staff training related to Antimicrobial Stewardship, Antimicrobial Resistance and IPC

**Changing Prescribing Behaviour**

- Work will continue on a study to understand the factors affecting primary care antibiotic prescribing.
- TARGET Toolkit workshops for healthcare staff will continue to be delivered during the year.
- Collaborative work on a systematic review of behavioural science interventions for antimicrobial stewardship will continue between the Innovation Lab and PHA.
- A pilot will be developed for implementation in Community Pharmacy looking at Point of Care testing in lower respiratory tract infection CRP as a means of reducing inappropriate GP presentations.
- GP practices will be visited and encouraged to address antibiotic prescribing as a key action point for 2019, as part of their annual meeting with a HSCB pharmacy adviser.
- Repeat of an intervention aimed at the top 20% antibiotic prescribing practices in NI, whereby each GP will receive a brief letter from the Chief Medical Officer highlighting the outlying nature of the practice and encouraging simple measures to counteract it.

# Discussion

This is the third report of antimicrobial resistance and antimicrobial consumption in Northern Ireland. As with previous reports, we have aimed to keep the content generally comparable with the ESPAUR report for England [3]. In future reports, we aim to be able to access, analyse and report more detailed information about antimicrobial use and resistance in specific healthcare settings.

## Antimicrobial resistance

The focus for the antimicrobial resistance section was the organism-antibiotic combinations that were identified as part of the UK AMR strategy [8]. The data for this report has been extracted from the regional laboratory system. *Staphylococcus aureus* and Gram negative bloodstream infections including; *E.coli*, *K. pneumoniae* and *Pseudomonas sp.* are subject to mandatory surveillance.

*E. coli* and *K. pneumoniae* bloodstream infections have been targeted as part of the UK governments ambition to reduce healthcare-associated gram-negative bloodstream infections by 50% by 2020. In order to reduce the number of these infections, local teams will need timely information about the characteristics of the patients who are affected, the risk factors that contributed to the infection and which healthcare settings were responsible. In recognition of this, mandatory surveillance of gram-negative bloodstream infections was introduced in April 2018. These new data are an important source of business intelligence for Health and Social Care Trusts as they aim to improve the quality and safety of the care that they provide. The success of this new programme will require Trusts to take steps to implement new data collection arrangements quickly for the benefit of their patients.

During 2017 and 2018 the number of *E. coli*; *K. pneumoniae*, *Pseudomonas* and *Enterococcus* bacteremias have decreased. While *S. aureus*, *K. oxytoca* and *Acinetobacter* bacteremias have increased. *S. pneumoniae* remained stable over the annum.

Antimicrobial resistance in most of the selected organisms has remained relatively stable since 2009, with increases noted in both *E. coli* and *K. pneumoniae* resistance to co-amoxiclav and glycopeptide resistant enterococci. During 2017 to 2018 the number of *E. coli* and *K. pneumoniae* isolates non-suseptible to selected antibiotics has increased, while glycopeptide-resistant enterococci has remained stable. The number of Carbapenem- Producing Enterobacteriaceae (CPE) reported to the PHA have increased further in 2018 after declining from 2014-2016. This likely reflects the voluntary nature

of reporting (case ascertainment) as well as local developments in the ability to test for CPE. Comparable data for England is available in their 2018 ESPAUR report. While the proportion of isolates that are resistant to key antibiotics has not changed very much over time, the absolute number of resistant infections has increased because of the overall rising number of infections. As antimicrobial resistance is a transmissible global problem, PHA will continue to collaborate with Public Health England and the Scottish, Welsh and Irish public health organisations, to contribute to the European Antimicrobial Resistance Surveillance Network (EARS-Net) and the World Health Organisation's Global Antimicrobial Resistance Surveillance System (GLASS). This will ensure standardised information on antimicrobial resistance is available to inform comparisons and drive improvement.

## Antibiotic consumption

It is important to note that in England, hospitals usually dispense outpatient medications, whereas in Northern Ireland these are usually prescribed by general practitioners at the request of secondary care specialists. A significant proportion of outpatient prescribing is therefore counted under primary care in Northern Ireland as opposed to secondary care in England. There is currently no way of separating these prescriptions from the rest of primary care prescribing in Northern Ireland. In England, outpatient prescribing accounts for 7.5% of secondary care antimicrobial prescribing [3].

Total antibiotic consumption in Northern Ireland has continued to decline in 2018 to 28.5 DDD per 1,000 inhabitants, after remaining largely unchanged between 2014 and 2016. Antibiotic consumption in primary care has decreased in recent years, meanwhile secondary care has fairly stable since 2014. Despite this, the rate of antimicrobial consumption in secondary care per admission and per occupied bed day has continued to steadily increase, perhaps suggesting that the case-mix of hospital inpatients has become more severe over time.

This relative stasis is in contrast with the situation in England, where antibiotic consumption has continued to fall, and was measured at 18.2 DDD per 1,000 inhabitants per day in 2018. By this measure, Northern Ireland's total antibiotic consumption is 57% higher than that of England. Penicillins, tetracyclines and macrolides were the most commonly prescribed antibiotics in both settings. There has been a slight increase in penicillin consumption in secondary care while tetracyclines have shown a slight increase over time in both settings, however macrolide consumption in primary care has slightly declined. The use of carbapenems, and meropenem in particular have also declined over time in Northern Ireland, which is an encouraging trend. Use of co-amoxiclav also fell further in 2018, and trimethoprim use fell slightly.

In general, however, comparison with antimicrobial use in England continues to highlight substantially higher use in Northern Ireland. Piperacillin/tazobactam consumption remained relatively stable in 2018 at 0.19 DDD per 1,000 inhabitants per day, which is more than three times the rate in England (0.069 DDD per 1,000 inhabitants per day). It should be noted however, the 2017 decrease in piperacillin/tazobactam use in England was partly due to an international supply shortage with an increase in the use of alternative antibiotics as a result. Piperacillin/tazobactam use in England increased by 6.4% between 2017 and 2018. The rate of cephalosporin use was steady at 0.51 DDD per 1,000 inhabitants per day, which is approximately 1.5 times the English rate of 0.32 DDD per

1,000 inhabitants per day. The use of tetracyclines, particularly doxycycline, decreased slightly in 2018 in Northern Ireland to 7.36 DDD per 1,000 inhabitants per day, which was much higher than the English rate of 4.59 DDD per 1,000 inhabitants per day. The use of quinolones and macrolides has remained unchanged over the last 3 years in Northern Ireland, during which time macrolide use has decreased in England, but quinolone use has slightly increased.

Colistin is an antibiotic of last resort that is used for multidrug-resistant infections and also as an inhaled therapy for people with cystic fibrosis. Colistin consumption in Northern Ireland has been steady since 2014, but rates are higher than in England (0.10 DDD per 1,000 inhabitants per day in 2018 in NI and 0.039 DDD per 1,000 inhabitants per day in 2018 in England).

This is the first year in which WHO AWaRe categories have been included in the report. The general trend of consumption across the categories is encouraging, with antibiotics from the Access category consistently accounting for approximately two thirds of total consumption per year between 2014 and 2018. This reflects the good work being carried out in local healthcare trusts and in general practice to promote appropriate use of antibiotics. Additionally, the proportion of consumption from the Access category has increased over time while usage from the Watch category has decreased, these are positive trends which will hopefully continue to reduce the risk of resistance.

The amount of antimicrobial use in Northern Ireland still however remains markedly higher than England. Understanding the reasons for the difference is a complex. Most antibiotics were prescribed in the primary care setting. In order to understand and address the factors that lead to antibiotic consumption, there is a need for further work to understand the behaviour of both prescribers and those who are being prescribed with a view to develop intervention. During 2018 the PHA collaborated with the Health and Social Care Board, the Innovation Lab at the Department of Finance and other primary care stakeholders to fill this information gap, producing a report of their findings. In the secondary care setting, investigating the reasons for differences is vastly more difficult because antimicrobial consumption is measured at ward level, not at patient level. Health and Social Care Northern Ireland has committed to developing a new electronic health care record ("Encompass"), which will ultimately include electronic prescribing, which will provide a rich source of information about the factors influencing antimicrobial consumption.

To engage with professionals and the public, the PHA is encouraging they sign up to the Antibiotic Guardian pledge. In 2018, 103 public and professionals successfully signed up to be Antibiotic Guardians. However, as public and professional interest in antimicrobial

resistance is increasing and with a number of projects in place for the coming year, it is hoped there will be further increase in the number of those who sign up.

# Appendix 1: AMR surveillance categories

| Antibiotic surveillance group | Individual antibiotic name |
|---|---|
| 3rd Generation Cephalosporin | cefotaxime |
| 3rd Generation Cephalosporin | claforan |
| 3rd Generation Cephalosporin | ceftazidime |
| 3rd Generation Cephalosporin | fortum |
| 3rd Generation Cephalosporin | cefpodoxime |
| 3rd Generation Cephalosporin | ceftizoxime |
| 3rd Generation Cephalosporin | ceftriaxone |
| Carbapenem | meronem |
| Carbapenem | meropenem |
| Carbapenem | imipenem |
| Carbapenem | ertapenem |
| Ciprofloxacin | ciprofloxacin |
| Ciprofloxacin | low level ciprofloxacin |
| Ciprofloxacin | ciproxin |
| Co-amoxiclav | co-amoxiclav |
| Co-amoxiclav | amoxicillin/clavulanate |
| Co-amoxiclav | augmentin |
| Colistin | colistin |
| Colistin | colomycin |
| Gentamicin | gentamicin |
| Gentamicin | lugacin |
| Gentamicin | cidomycin |
| Gentamicin | genticin |
| Gentamicin | garamycin |
| Gentamicin | high_level gentamicin |
| Glycopeptide | vancocin |
| Glycopeptide | vancomycin |
| Glycopeptide | teicoplanin |
| Macrolides | clarithromycin |
| Macrolides | erythromycin |
| Macrolides | azithromycin |
| Macrolides | erythrocin |
| Macrolides | erythromid |
| Methicillin | cefoxitin |
| Methicillin | flucloxacillin |
| Methicillin | floxapen |
| Methicillin | oxacillin |
| Methicillin | meticillin |
| Methicillin | celbenin |
| Methicillin | cloxacillin |
| Methicillin | orbenin |
| Penicillin | apsin |
| Penicillin | benzylpenicillin |

*(continued)*

| Antibiotic surveillance group | Individual antibiotic name |
|---|---|
| Penicillin | phenoxymethylpenicillin |
| Penicillin | penicillin |
| Penicillin | penidural |
| Piperacillin/Tazobactam | tazocin |
| Piperacillin/Tazobactam | piperacillin/tazobactam |

Table: Antibiotic names (trade and generic) and assigned surveillance group for the antimicrobial resistance data

# Appendix 2: AMC data categories

| Antibiotic surveillance group | Individual antibiotic name | ATC codes |
|---|---|---|
| Aminoglycosides | tobramycin | J01GB01 |
| Aminoglycosides | gentamicin | J01GB03 |
| Aminoglycosides | neomycin | J01GB05 |
| Aminoglycosides | amikacin | J01GB06 |
| Anti-Clostridium difficile agents | vancomycin | A07AA09 |
| Anti-Clostridium difficile agents | fidaxomicin | A07AA12 |
| Anti-Clostridium difficile agents | metronidazole | G01AF01 |
| Anti-Clostridium difficile agents | metronidazole | P01AB01 |
| Anti-folate agents | trimethoprim | J01EA01 |
| Anti-folate agents | sulfapyridine | J01EB04 |
| Anti-folate agents | sulfadiazine | J01EC02 |
| Anti-folate agents | sulphamethoxypyridazine | J01ED05 |
| Anti-folate agents | co-trimoxazole | J01EE01 |
| Anti-folate agents | nitrofurantoin | J01XE01 |
| Anti-folate agents | methenamine | J01XX05 |
| Anti-tuberculous drugs | streptomycin | J01GA01 |
| Carbapenems | meropenem | J01DH02 |
| Carbapenems | ertapenem | J01DH03 |
| Carbapenems | imipenem with cilastatin | J01DH51 |
| Cephalosporins | cefalexin | J01DB01 |
| Cephalosporins | cefazolin | J01DB04 |
| Cephalosporins | cefadroxil | J01DB05 |
| Cephalosporins | cefradine | J01DB09 |
| Cephalosporins | cefoxitin | J01DC01 |
| Cephalosporins | cefuroxime | J01DC02 |
| Cephalosporins | cefaclor | J01DC04 |
| Cephalosporins | cefotaxime | J01DD01 |
| Cephalosporins | ceftazidime | J01DD02 |
| Cephalosporins | ceftriaxone | J01DD04 |
| Cephalosporins | cefixime | J01DD08 |
| Cephalosporins | cefpodoxime | J01DD13 |
| Cephalosporins | ceftazidime_with_avibactam | J01DD52 |
| Cephalosporins | ceftaroline | J01DI02 |
| Glycopeptides and Daptomycin | vancomycin | J01XA01 |
| Glycopeptides and Daptomycin | teicoplanin | J01XA02 |
| Glycopeptides and Daptomycin | dalbavancin | J01XA04 |
| Glycopeptides and Daptomycin | daptomycin | J01XX09 |
| Lincosamides | clindamycin | J01FF01 |
| Macrolides | erythromycin | J01FA01 |
| Macrolides | clarithromycin | J01FA09 |
| Macrolides | azithromycin | J01FA10 |
| Macrolides | telithromycin | J01FA15 |
| Monobactams | aztreonam | J01DF01 |

*(continued)*

| Antibiotic surveillance group | Individual antibiotic name | ATC codes |
|---|---|---|
| Nitroimidazoles | metronidazole | J01XD01 |
| Nitroimidazoles | tinidazole | P01AB02 |
| Other antibiotics | chloramphenicol | J01BA01 |
| Other antibiotics | quinupristin | J01FG02 |
| Other antibiotics | colistin | J01XB01 |
| Other antibiotics | fucidic_acid | J01XC01 |
| Other antibiotics | fosfomycin | J01XX01 |
| Oxazolidinones | linezolid | J01XX08 |
| Oxazolidinones | tedizolid | J01XX11 |
| Penicillins | ampicillin | J01CA01 |
| Penicillins | amoxicillin | J01CA04 |
| Penicillins | pivmecillinam | J01CA08 |
| Penicillins | temocillin | J01CA17 |
| Penicillins | co-fluampicil | J01CA51 |
| Penicillins | benzylpenicillin | J01CE01 |
| Penicillins | phenoxymethylpenicillin | J01CE02 |
| Penicillins | benzathine-benzylpenicillin | J01CE08 |
| Penicillins | procaine | J01CE09 |
| Penicillins | flucloxacillin | J01CF05 |
| Penicillins | co-fluampicil | J01CR50 |
| Penicillins with beta lactamase inhibitors | co-amoxiclav | J01CR02 |
| Penicillins with beta lactamase inhibitors | ticarcillin with clavulanic_acid | J01CR03 |
| Penicillins with beta lactamase inhibitors | piperacillin/tazobactam | J01CR05 |
| Quinolones | ofloxacin | J01MA01 |
| Quinolones | ciprofloxacin | J01MA02 |
| Quinolones | norfloxacin | J01MA06 |
| Quinolones | levofloxacin | J01MA12 |
| Quinolones | moxifloxacin | J01MA14 |
| Tetracyclines and related drugs | doxycycline | J01AA02 |
| Tetracyclines and related drugs | lymecycline | J01AA04 |
| Tetracyclines and related drugs | oxytetracycline | J01AA06 |
| Tetracyclines and related drugs | tetracycline | J01AA07 |
| Tetracyclines and related drugs | minocycline | J01AA08 |
| Tetracyclines and related drugs | tigecycline | J01AA12 |

Table: Antibiotic names, ATC codes and assigned surveillance group for the antimicrobial consumption data

# Appendix 3: Testing data

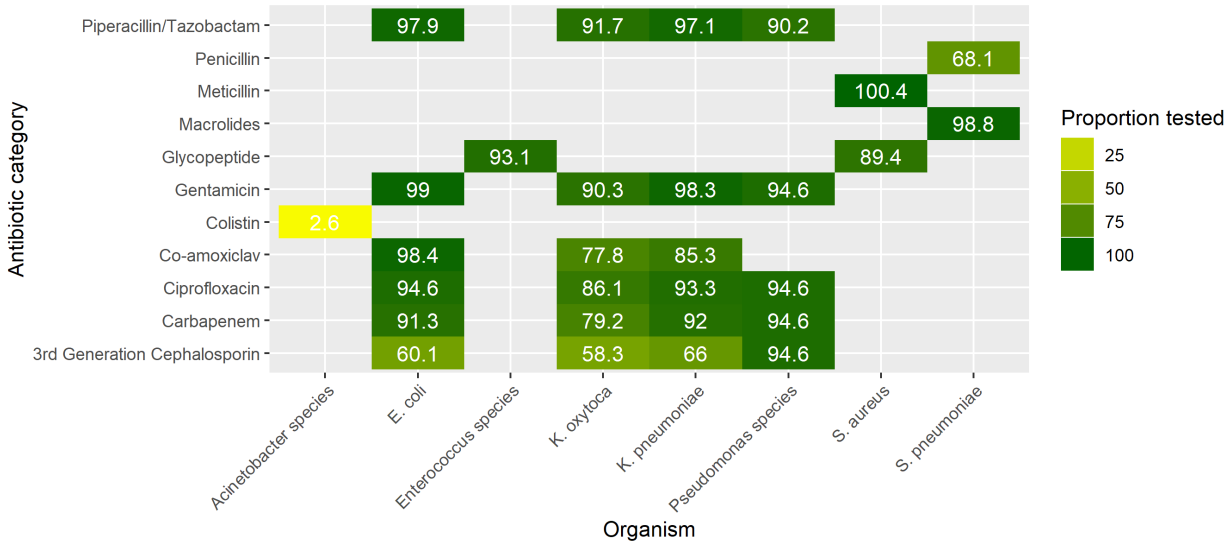



Figure 31: The proportion of key bacteraemias where selected antibiotic susceptibility results were reported to the PHA

# Appendix 4: Drug/bug combinations monitored

| Bacteria | Antibiotics |
|---|---|
| Escherichia coli | Third-generation cephalosporins, carbapenems, co-amoxiclav, ciprofloxacin, gentamicin, piperacillin/tazobactam |
| Klebsiella pneumoniae | Third-generation cephalosporins, carbapenems, co-amoxiclav, ciprofloxacin, gentamicin, piperacillin/tazobactam |
| Pseudomonas species | Third-generation cephalosporins, carbapenems, ciprofloxacin, gentamicin, piperacillin/tazobactam |
| Staphylococcus aureus | Glycopeptide, meticillin |
| Enterococcus species | Glycopeptide |
| Streptococcus pneumoniae | Macrolides, penicillin |
| Acinetobacter species | Colistin |

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HSC Public Health Agency

**item 9**

| | |
|---|---|
| **Title of Meeting** | PHA Board Meeting |
| **Date** | 20 February 2020 |
| **Title of paper** | Family Nurse Partnership Reports |
| **Reference** | PHA/03/02/20 |
| **Prepared by** | Deirdre Webb |
| **Lead Director** | Rodney Morton |
| **Recommendation** | For **Approval** ☐ For **Noting** ☒ |

## 1 Purpose

The purpose of this paper is to provide an update on the Family Nurse Partnership programme and to present the 2017 and 2018 reports for noting.

## 2 Background Information

The Family Nurse Partnership Programme falls under objective 1 of the PHA Corporate Plan, “All children and young people have the best start in life”.

## 3 Key Issues

Challenges around the recruitment of young mothers.

Increasing complexity of families in programme.

Security of funding for sustainability of transformational posts.

Ambitions for the programme.

## 4 Next Steps

The next Report will be brought to the Board annually to share the outcomes of the programme.