


Point prevalence audit surveys of respiratory tract infection consultations and antibiotic prescribing in primary care before and during the COVID-19 pandemic in Ireland

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Background: Respiratory tract infections (RTIs) are the most common reason for prescribing antibiotics in general practice. The COVID-19 pandemic has impacted on antibiotic prescribing and delivery of primary care in Ireland.

Objectives: To assess the quality of antibiotic prescribing, the impact of the COVID-19 pandemic and identify opportunities for antimicrobial stewardship (AMS) in Ireland.

Methods: Point prevalence audit surveys for RTI consultations were conducted as part of a European study at three time periods: January–February 2020, March–May 2020 and March–May 2021. Antibiotic prescribing was assessed and comparisons made between the three time periods.

Results: In total, 765 consultations were recorded, which were mainly face to face before the pandemic, but changed to predominantly remote consultations during the pandemic surveys in 2020 and 2021 (82% and 75%). Antibiotics were prescribed in 54% of RTI consultations before the pandemic. During pandemic surveys, this dropped to 23% in 2020 and 21% in 2021. There was a decrease in prescribing of Red (reserve) agents in 2021. Assessment against indication-specific quality indicators showed a high proportion of consultations for bronchitis and tonsillitis resulting in an antibiotic prescription (67% and 85%). Point-of-care testing (POCT) to aid diagnosis of RTIs were utilized in less than 1% of consultations.

Conclusions: During the COVID-19 pandemic, there was a reduction in antibiotic prescribing. Opportunities identified to support AMS in primary care in Ireland are targeted initiatives to reduce antibiotic prescribing for bronchitis and tonsillitis and introducing POCT to support appropriate antibiotic prescribing.

Introduction

Antimicrobial resistance (AMR) remains a serious public health threat globally.¹ High antibiotic consumption induces AMR.^{2,3} Antibiotic consumption in primary care in Ireland is higher than in many European countries.⁴ Respiratory tract infections (RTIs) are the most common indication for antibiotic use in primary care, accounting for up to 65% of antibiotic prescriptions in GP practices in Ireland.⁵ Overprescribing of antibiotics for RTIs is well described internationally and in Ireland.^{6–11} Viral pathogens are common in RTIs,¹² and a clear diagnosis of a bacterial infection where antibiotics could be of benefit is a

challenge. Point-of care testing (POCT) can be utilized to identify viruses and indicate illness severity, with potential to reduce antibiotic prescribing.^{13–17}

The COVID-19 pandemic had implications for antibiotic prescribing. Restrictions reduced transmission of respiratory pathogens (e.g. influenza)¹⁸ and overall reductions in antibiotic prescribing in primary care were reported.^{19–23} Total antibiotic prescribing in primary care in Ireland at the start of the COVID-19 pandemic fell from 25.3 DDD per 1000 inhabitants per day in quarter 1 (Q1) of 2020 to 12.8 DDD per 1000 inhabitants per day in Q2 2020. This decrease was sustained throughout 2020.²⁴

Aligned with the WHO Action Plan on AMR,²⁵ the strategic objectives of Ireland's national action plan for AMR²⁶ include enhancing surveillance and optimizing use of antibiotics. Measurement of the quality of antibiotic prescribing is essential to inform antimicrobial stewardship (AMS) strategies. National antimicrobial guidelines for community settings are available to support antibiotic prescribing.²⁷ These reflect international guidance, expert opinion and local antimicrobial susceptibility data, where available. They are collated by an expert advisory group consisting of clinical microbiologists, infectious diseases physicians, antimicrobial pharmacists, lead clinicians for relevant specialties and GPs.

Similar to the WHO Access Watch Reserve (AWaRe) antibiotic classification,²⁸ a preferred antibiotic initiative was introduced in Ireland in 2018, outlining a Green (preferred, e.g. amoxicillin, phenoxymethylpenicillin and doxycycline) and Red (reserve, e.g. co-amoxiclav and quinolones) list of antibiotics, to assist GPs in choosing an antibiotic that is likely to be effective, with fewer adverse effects, drug interactions and less potential for AMR.²⁹ A notable difference between the WHO AWaRe classification and Ireland's preferred antibiotic initiative is that co-amoxiclav is a Red (reserve) antibiotic and discouraged as a first-line empirical agent for RTIs.

A number of changes were made to the national antimicrobial guidelines for community setting during the study period. At the start of the COVID-19 pandemic, in April 2020, guidance was issued on the use of antibiotics for the treatment of COVID-19 in primary care, emphasizing that antibiotics should not be prescribed for COVID-19 infection, unless there was a strong suspicion of a bacterial coinfection. Amoxicillin or doxycycline were listed as the preferred options for COVID-19-associated suspected bacterial RTI.

In September 2020, clarithromycin was transferred from the Green to Red antibiotic list, subsequent to a review of the preferred antibiotic initiative by the National Antimicrobial Resistance and Infection Control Team. The RTI guidelines reflected this change and clarithromycin was downgraded as a second-line option in penicillin allergy. Doxycycline was promoted as a preferred antibiotic in penicillin allergy for RTIs, apart from throat infections, where cefalexin was added as a first-choice option in non-severe penicillin allergy.²⁷

National targets for primary care antibiotic consumption of less than 20.5 DDD per 1000 inhabitants per day and proportion of Red antibiotics of less than 26% by 2025 have been recently outlined.³⁰ Internationally, antibiotic prescribing quality indicators (APQIs) have been proposed for outpatient antibiotic prescribing, including targets for the proportion of patients prescribed antibiotics for specific RTIs and class of antibiotic prescribed.^{31–33} Measurement of antibiotic prescribing for RTIs against preferred antibiotic national targets and disease-specific APQIs can all be useful to describe and benchmark the quality of antibiotic prescribing for RTIs in primary care and to identify where improvements can be made.³⁴

Currently there are no regional or central primary care databases in Ireland with the possibility to extract information linking diagnosis to antibiotic prescriptions. Therefore, this study of registering RTI consultations aims to examine the nature of RTI consultations and antibiotic prescribing decisions in Ireland, including how antibiotic prescribing patterns have changed during the COVID-19 pandemic. The results of this study can provide a valuable insight into current opportunities for AMS in the Irish setting.

Methods

The EU-funded Value-Dx consortium (<https://www.value-dx.eu/>) aims to improve antibiotic use by evaluating point-of-care diagnostics for community-acquired RTIs. The Point Prevalence Audit Surveys (PPASs) were set up to evaluate current practices during GP consultations for RTIs, including antibiotic prescribing. The PPASs were conducted in 18 European countries, including Ireland. PPAS1 ran from January to February 2020, just prior to the start of the COVID-19 pandemic, PPAS2 ran from mid-March 2020 to May 2020 at the start of the COVID-19 pandemic, and PPAS3 ran from March to May 2021.

Setting

In Ireland, six GP practices from a wide geographical spread were invited to participate, based on their interest and successful participation in previous studies.

Eligibility criteria

At the start of each time period, GPs in the six GP practices participating in the study were contacted to register approximately 50 consultations each, where a patient presented with symptoms of upper or lower respiratory tract infection (URTI or LRTI). The GPs could choose when they recorded the required RTI consultations within the specified time period. In PPAS1, patients of any age presenting with either acute sore throat or acute cough as their predominant symptom, and the clinician judged symptoms were due to a RTI were included. Consultations of patients with only ear or coryzal symptoms were excluded. For PPAS2 and 3, consultation of patients presenting with symptoms of an RTI, coryzal symptoms, or otherwise suspected of having COVID-19 were included.

Data collection

A paper data collection form was completed by the participating GPs for each time period (See Figure S1 for data collection form, available as [Supplementary data](#) at JAC Online). Information recorded for each consultation included patient demographics, where the consultation took place, number of days of symptoms prior to consultation, tests undertaken including diagnostic tests [e.g. C-reactive protein (CRP), influenza, Group A *Streptococcus*, chest X-ray], suspected aetiology, working diagnosis and whether an antibiotic was prescribed. PPAS1 also recorded whether the patient requested an antibiotic and if a delayed or immediate prescription was provided. PPAS1 and 3 additionally collected data on the class of antibiotic prescribed.

Data analysis

The data collection forms were entered on the electronic data-collection system Research Online (<https://www.researchonline.org>) by the investigators in Ireland. Irish data were analysed independently, and comparisons were made to wider Value-Dx European PPASs from their publications.^{35,36} Data were analysed collectively for all six GP practices, using data from all three surveys and comparisons made between PPASs, using Microsoft Excel v2018 and SPSS v28.

Univariate comparisons were generated for the following: where consultation took place; mean age of patient; median number of days of symptoms prior to consultation; suspected aetiology; working diagnosis; proportion of patients where an antibiotic was prescribed (including delayed or immediate); and class of antibiotic (for PPAS1 and 3). Statistical tests were used to compare differences between the PPASs for age (ANOVA), for number of days of symptoms prior to consultation (Kruskal–Wallis), for proportion of consultations resulting in antibiotic prescriptions, whether patient consultation occurred face to face or remotely, whether patient had any comorbidities, proportion of Red antibiotics and specific agents prescribed (chi squared). Chi-squared test was used

to compare differences in proportion of antibiotic prescriptions, whether a patient requested antibiotic or not in PPAS1. Bonferroni corrections were used for multiple comparisons. Significance was set at $P < 0.05$.

Assessment against European Surveillance of Antimicrobial Consumption (ESAC) disease-specific APQIs was made.³¹ For all PPAS consultations with a working diagnosis of pneumonia, bronchitis and tonsillitis, the proportion being prescribed antibiotics were compared with the ESAC APQIs, and for PPAS1 and 3, assessment of the class of antibiotic prescribed was compared with the ESAC APQIs. Room for improvement was calculated as the difference between the midpoint of the APQI range and the proportion calculated for this study data.

Ethics

Ethical approvals for the study were obtained from the Irish College of General Practitioners Research Ethics Committee on 4 December 2019, 27 March 2020 and 27 January 2021.

Results

Nature of consultations

In total, 765 consultations were recorded at six GP practices in the three PPASs (Table 1). In PPAS1, all consultations were face to face, whilst in PPAS2 and PPAS3 the majority took place remotely. The overall mean age of patients was 34.2 years (SD 25.0). Age was significantly lower in PPAS3 compared with PPAS1 and 2. The overall median number of days of symptoms prior to consultation was 4 days (IQR 5) but declined from 5 in PPAS1 to 4 in PPAS2 and 3 in PPAS3. Overall, 37% of patients presenting for RTI had at least one comorbidity, declining from PPAS1 (47%), to PPAS2 (37%) and PPAS3 (25%).

Overall, the suspected aetiology of infection was 24% bacterial, 52% viral, 15% COVID-19 and 10% unclear. Bacterial

aetiology decreased with each subsequent PPAS, while viral aetiology increased. For PPAS2 and 3, the proportion of patients consulting with suspected URTI and COVID-19 increased, whilst those with pneumonia, influenza and acute bronchitis decreased (Figure 1).

There were no diagnostic tests performed at the point of care in the three surveys, except for one WBC count. Five CRP tests were ordered (<1%). Chest X-rays were ordered in 20 consultations (3%). In PPAS2 and PPAS3, SARS-CoV-2 PCR tests were ordered in 12% and 55% of patients consulting for RTI, respectively.

Factors influencing antibiotic prescribing

Overall, 34% of the consultations resulted in an antibiotic prescription and there was a significant decline in the proportion of consultations resulting in an antibiotic prescription from 54% in PPAS1 to 23% in PPAS2, and 21% in PPAS3. In PPAS2 and 3, where remote consultations were common, 18% of remote consultations resulted in an antibiotic prescription compared with 36% in face-to-face consultations.

Bronchitis, URTI, exacerbations of chronic respiratory conditions, tonsillitis and pneumonia were the most common working diagnoses where antibiotics were prescribed (Figure 2). Overall, antibiotics were prescribed in 94% of patients with a suspected bacterial aetiology of illness, 15% for suspected viral aetiology, 33% with unclear aetiology and 3% for suspected COVID-19 aetiology. The proportion of patients with suspected viral aetiology of illness who received an antibiotic decreased in PPAS2 and 3 (8% each) compared with PPAS1 (26%). Overall, consultations with patients with comorbidities were significantly more likely to result in an antibiotic prescription (47% with at least one comorbidity received an antibiotic versus 26% without comorbidities; chi-squared test $P < 0.05$).

Table 1. Summary of consultation characteristics from the three PPASs

	PPAS1 Jan–Feb 2020	PPAS2 March–May 2020	PPAS3 March–May 2021	Total
Number of patients	287	241	237	765
Mean age, years (SD)	36.7 (27.8)	39.9 (21.2)	25.6 ^a (22.7)	34.2 (25.0)
Type of consultation				
Face-to-face total, <i>n</i> (%)	278 (100)	40 (18)	60 (25)	378 (51)
Face-to-face: practice (<i>n</i>)	254	38	59	351 (47%)
Face-to-face: LTCF (<i>n</i>)	21	0	0	21 (3%)
Face-to-face: home (<i>n</i>)	3	2	1	6 (1%)
Telephone/video, <i>n</i> (%)	0 (0) ^a	184 (82)	177 (75)	361 (49)
Total recorded	278	224	237	739
Median (IQR) number of days of symptoms prior to consultation	5 (7) ^a	4 (5)	3 (2)	4 (5)
At least one comorbidity, <i>n</i> (%)	135 (47) ^a	88 (37) ^a	60 (25) ^a	283 (37)
Suspected aetiology, <i>n</i> (%) ^b				
Viral	161 (56)	117 (49)	118 (50)	396 (52)
Bacterial	100 (35)	47 (20)	37 (16)	184 (24)
Unclear	26 (9)	24 (10)	24 (10)	74 (10)
SARS-CoV-2	0 (0)	48 (20)	69 (29)	117 (15)

LTCF, long-term care facility.

^aSignificant difference from other PPAS ($P < 0.05$).

^bSometimes >1 listed, % of total number of patients.

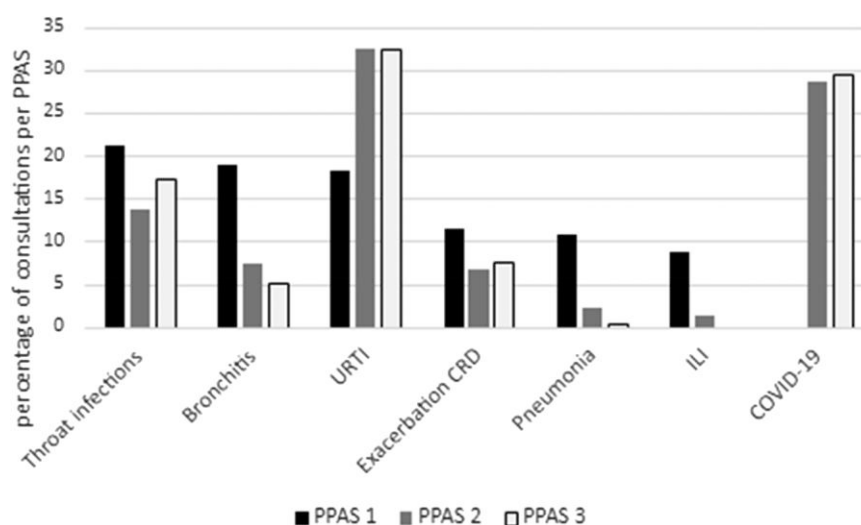


Figure 1. The most common working diagnoses in each PPAS. Throat infections=tonsillitis, pharyngitis and laryngitis; exacerbation CRD=exacerbation of chronic respiratory disease; ILI=influenza-like illness.

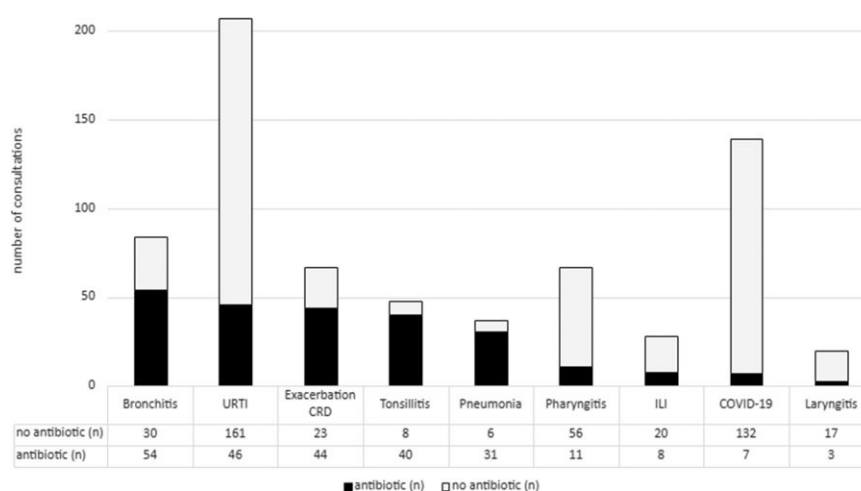


Figure 2. The number of antibiotic prescriptions for each working diagnosis. ILI=influenza-like-illness.

PPAS1 recorded whether a delayed or immediate antibiotic was prescribed and whether a patient requested an antibiotic. Delayed antibiotic prescriptions were utilized in 45/155 (29%) of prescriptions in PPAS1, and of these, 34/45 (76%) were for suspected viral aetiology. An antibiotic was requested by a patient in 78/287 (27%) of consultations. Of these, a significantly greater proportion were prescribed an antibiotic (72%) compared with those who did not request an antibiotic (46%) (chi-squared test $P < 0.05$).

Assessment of antibiotic prescribing

Amoxicillin was the most commonly prescribed antibiotic for RTI (43% of prescriptions), followed by macrolides (17%), co-amoxiclav (15%), phenoxymethylpenicillin (9%), tetracyclines (8%), cephalosporins (4%) and quinolones (1%). There were improvements in the quality of prescribing between PPAS1 and

PPAS3. Prescribing of Red antibiotics was significantly lower in PPAS3 compared with PPAS1, with a significant decrease in clarithromycin prescribing (Table 2).

The overall proportion of certain disease-specific consultations receiving an antibiotic were assessed against the ESAC APQIs. The proportion of consultations for pneumonia prescribed an antibiotic (92%) was within the target range (90%–100%) (Table 3). For bronchitis and tonsillitis, room for improvement in proportions being prescribed an antibiotic was 52% and 75%, respectively. Prescribing of recommended first-line antibiotics according to international ESAC APQIs was below the target range of 80%–100%, namely 64% for pneumonia, 64% for bronchitis and 43% for tonsillitis, but no quinolones were prescribed.

Although there were some improvements in the choice of antibiotic in PPAS3 compared with PPAS1, the proportion of patients receiving antibiotics remained higher than ESAC APQI

Table 2. Antibiotic prescribing during the three PPASs

	PPAS1 Jan–Feb 2020	PPAS2 March–May 2020	PPAS3 March–May 2021	Total
Proportion of consultations with antibiotic prescribed, % (n/N)	54 ^a (155/287)	23 (56/241)	21 (49/237)	34 (260/765)
Proportion of consultations of suspected viral aetiology prescribed an antibiotic, % (n/N)	26 ^a (42/161)	8 (9/117)	8 (9/118)	15 (60/396)
Proportion of Red antibiotics, % (n/N)	43 ^a (65/152)	NA	24 (11/46)	38 (76/198)
Antibiotic % (n/all antibiotics prescribed)				
Amoxicillin	43 ^b (66/155)	NA	43 (21/49)	43 (87/204)
Macrolide	21 ^a (32/155)		4 (2/49)	17 (34/204)
Co-amoxiclav	15 ^b (23/155)		16 (8/49)	15 (31/204)
Tetracycline	8 ^b (12/155)		10 (5/49)	8 (17/204)
Phenoxymethylpenicillin	6 ^b (9/155)		18 (9/49)	9 (18/204)
Cephalosporin	5 ^b (8/155)		2 (1/49)	4 (9/204)
Quinolone	1 ^b (2/155)		0 (0/49)	1 (2/204)
Not stated	2 ^b (3/155)		6 (3/49)	3 (6/204)

NA, data not collected.

^aSignificant difference from other PPAS ($P < 0.05$).^bNot tested for significance.**Table 3.** Comparison of survey findings to ESAC disease-specific APQIs

ESAC APQI	Numbers of antibiotics/ number of consultations	Proportion prescribed antibiotic (%)	ESAC APQI target range (%)	Room for improvement (%) ^b
Bronchitis, aged 18–75 years				
Antibiotic prescriptions/consultations for bronchitis	34/51	67	0–30	52
Amoxicillin or tetracyclines prescriptions/ consultations for bronchitis prescribed antibiotics ^a	18/28	64	80–100	26
Quinolone prescriptions/consultations for bronchitis prescribed antibiotics ^a	0/28	0	0–5	0
Tonsillitis, aged >1 year				
Antibiotic prescriptions/consultations for tonsillitis	39/46	85	0–20	75
Phenoxymethylpenicillin prescriptions/ consultations for tonsillitis prescribed antibiotics ^a	12/28	43	80–100	47
Quinolones prescriptions/consultations for tonsillitis prescribed antibiotics ^a	0/28	0	0–5	0
Pneumonia, aged 16–65 years				
Antibiotic prescriptions/consultations for pneumonia	12/13	92	90–100	0
Amoxicillin or tetracyclines prescriptions/ consultations for pneumonia prescribed antibiotics ^a	7/11	64	80–100	26
Quinolones prescriptions/consultations for pneumonia prescribed antibiotics ^a	0/11	0	0–5	0

^aAntibiotic prescribed only documented for PPAS1 and 3.^bThe room for improvement is the difference between the overall survey proportion prescribed an antibiotic and the midpoint of the acceptable APQI range.

targets. For bronchitis, the prescriptions for the preferred classes of antibiotic according to the ESAC APQIs (amoxicillin or tetracyclines) increased from 55% (12/22) in PPAS1 to 100% (6/6) in PPAS3, and for tonsillitis (phenoxymethylpenicillin) from 35% (6/17) in PPAS1 to 55% (6/11) in PPAS3 (Table S1).

Discussion

Surveillance of RTI consultations, antibiotic prescribing in primary care, and evaluation of the impact of COVID-19 on this, is important to guide future AMS initiatives. There was a reduction

in the proportion of patients prescribed antibiotics during the COVID-19 pandemic consultations, with a decrease in the proportion of Red antibiotics prescribed. The application of the international ESAC APQIs to all survey data demonstrated that prescribing rates for tonsillitis and bronchitis were much higher than the acceptable range. This, together with the current lack of POCT in primary care in Ireland, provides specific opportunities for AMS.

Nature of consultations

In Ireland, as internationally, RTI consultations in primary care changed dramatically with the COVID-19 pandemic, moving predominantly to remote consultation.³⁵ Prior to the COVID-19 pandemic, remote consultations were not commonplace in Irish general practice.³⁷ The surveys showed fewer antibiotics were prescribed during the pandemic. Moreover, antibiotic prescribing was less common in remote than in face-to-face consultations. Whilst this may be attributed to more severe RTI symptoms being seen face to face, it is encouraging to see that in general, remote consultations do not seem to increase likelihood of antibiotic prescriptions.

There was a significant decrease in mean age of patients in PPAS3. During this period, restrictions had recently been lifted and people were attending workplaces, schools, creches and colleges, and younger people were more likely to be more exposed to respiratory pathogens. The public were advised to seek advice from GPs if displaying any respiratory symptoms. At the time, the use of rapid antigen SARS CoV-2 self-tests was not advocated in Ireland and GPs were the only referral pathway for SARS-CoV-2 PCR tests, leading to a high number of younger people seeking a GP consultation. Meanwhile, day centres remained closed and the older population were more likely to stay at home. In PPAS3, a high proportion of consultations were for suspected COVID-19 infections.

Factors influencing antibiotic prescribing

The proportion of RTI consultations resulting in an antibiotic prescription in Ireland is on average higher than in the other European countries that participated in the PPASs.³⁵ This was particularly evident in PPAS1, conducted prior to the pandemic, when 54% of patients were prescribed an antibiotic, compared with the 32% mean for all other participating European countries.³⁵ During this time, Irish primary care antibiotic consumption was also high (25.3 DDD per 1000 inhabitants per day in Q1 2020).²⁴

There was a significant decrease in the proportion of consultations resulting in an antibiotic prescription in PPAS2 and 3 (23% and 21%), bringing the results closer to the European mean of 18% for PPAS2.³⁵ Although in PPAS2 and 3, coryzal symptoms were an additional inclusion criterion and may explain some of the decrease in antibiotic prescribing, this observed decrease was also mirrored in the national antibiotic consumption data for primary care.²⁴ In Ireland, early in the pandemic in April 2020, there was clear messaging from the national antimicrobial advisory group that antibiotics had a limited role in treating COVID-19 in primary care.³⁸ Our analysis showed that 3% of consultations for a suspected COVID-19 aetiology resulted in an antibiotic prescription, whilst the European mean was 12% for PPAS2.³⁵ This may indicate a greater public awareness and/or

prescriber confidence in non-antibiotic prescribing decisions for RTIs of viral or COVID-19 aetiology, aided by public health campaigns during the COVID-19 pandemic, which highlighted self-management strategies for RTI symptoms.

The PPAS surveys reveal some factors that may contribute to the high levels of antibiotic prescribing in PPAS1. Patient desire for antibiotic, or GP perception for patient desire for antibiotic, has been shown to be associated with antibiotic prescriptions.³⁹ The proportion of patients requesting an antibiotic in PPAS1 was greater than the European mean for this study (27% versus 12%).³⁶ This suggests that pressure from patients for GPs to issue an antibiotic prescription is prevalent in Ireland, as previously described by O'Doherty *et al.*⁴⁰ The proportion of patients prescribed an antibiotic was significantly higher if they requested an antibiotic, suggesting that patient requests have an impact on antibiotic prescriptions. The use of delayed antibiotic prescribing was more common in Ireland compared with the European mean (27% versus 14%)³⁶ and may be a contributing factor to high antibiotic prescribing. Delayed antibiotic strategy has been shown to reduce the use of antibiotics compared with immediate antibiotics, while clinical outcomes were similar.⁴¹ In this study, follow-up data on what proportion of delayed antibiotic prescriptions were consumed by patients was not available and would be worth exploring in future research.

Assessment of quality of antibiotic prescribing

The trend in choice of prescribed antibiotic is broadly comparable to national trends in antibiotic consumption in primary care.²⁴ In PPAS1, the proportion of antibiotic prescriptions for co-amoxiclav in Ireland was lower than the European mean for this study (15% versus 22%)³⁶ and lower than previously reported for RTIs in Ireland.⁵ A successful quality improvement initiative in Ireland, with classification of Green/Red antibiotics and prescriber education,⁴² has led to a continued decrease in the proportion of Red antibiotics prescribed, including co-amoxiclav.²⁹ There were improvements seen in quality of antibiotic prescriptions from PPAS1 to 3, with a decrease in proportion of Red antibiotics. In September 2020, clarithromycin was added to the Red (reserve) list of antibiotics, which may explain the reduction in the proportion of macrolide prescriptions seen in PPAS3.

The PPASs recorded the working diagnosis for each consultation, which allowed for the application of international ESAC APQIs to assess the quality and quantity of antibiotics prescribed. Assessment against the international ESAC APQIs showed that a high proportion of consultations for tonsillitis and acute bronchitis resulted in an antibiotic prescription compared with the target levels. This has also been observed in other studies.^{6,9,33,43,44} Utilization of diagnostics and clinical decision supports to help identify which patients are more likely to benefit from antibiotics should be explored. Public belief that antibiotics are necessary for bronchitis has been demonstrated⁴⁵ and should also be considered when developing strategies to reduce antibiotic prescribing, for example strengthening shared decision-making, which can influence antibiotic prescription rates.⁴⁶

Assessment against the ESAC APQIs demonstrated some room for improvement to recommended antibiotics for pneumonia and bronchitis, with the greatest room for improvement for antibiotic choices for tonsillitis. Although the narrow-spectrum

antibiotic phenoxymethylpenicillin is recommended for tonsillitis, both in ESAC APQIs and in the national guidelines, the use of broad-spectrum penicillins (e.g. co-amoxiclav) was common in this study. Factors that may influence the choice of antibiotic agent, specifically in children, are the frequency of dosing with practicality of administration during school hours (phenoxymethylpenicillin is recommended to be dosed four times a day in Ireland), and palatability of certain antibiotic suspensions.^{47,48}

Strengths and limitations

The Europe-wide survey provides a benchmark against which Irish antibiotic prescribing data can be compared over a period of profound change. This study facilitates the evaluation of antibiotic prescribing for RTIs by indication, which would otherwise not be feasible with the current health data systems available in Ireland. This is the first study in Ireland where disease-specific APQIs have been utilized to assess the quality of antibiotic prescribing for RTI in Ireland.

This PPAS only captured RTI consultations in six GP practices, but many trends observed mirror national trends. The total number of RTI presentations over the study periods is unclear. Selection bias was minimized by sequential registration of consultations. GPs self-selected to participate in the study and bias towards GPs with an interest in antibiotic prescribing cannot be ruled out.

Conclusions

The study findings highlight that prior to the COVID-19 pandemic, antibiotic prescribing for RTIs in Ireland was higher than in other European countries. The pandemic changed consultation behaviour, with a reduction in antibiotic prescribing for RTI. Opportunities for AMS include utilization of rapid POCT to reduce unnecessary antibiotics for viral infections and targeting improving antibiotic prescribing for bronchitis and tonsillitis.

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Transparency declarations

None to declare.

Supplementary data

Figure S1 and Table S1 are available as [Supplementary data](#) at JAC Online.

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