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How do the duration of consults vary for upper respiratory tract infections in general practice where an antibiotic has been prescribed?

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Key Messages

- Demographic factors may influence general practice visit length.
- The most affluent patients, and those who were female had the longest visits.
- Consults were shorter on Sundays and in two Australian states and territories.

Abstract

Background There is limited data on the duration of consults resulting in the prescription of antibiotics for upper respiratory tract infections (URTIs) in general practice.

Objective To explore how demographic factors influence consult duration where antibiotics have been prescribed for URTI in Australian general practice.

Methods 2,985 URTI-specific presentations were identified from a national study of patients who were prescribed an antibiotic after presenting to general practice between June and September 2017. Consult duration was analysed to assess for any variation in visit length based on demographic factors.

Results The overall median consult duration was 11.42 minutes [IQR 7.95]. Longer consult duration was associated with areas of highest socioeconomic advantage where patients living in postcodes of IRSAD quintile 5 (highest 20% on the Index of Relative Socio-economic Advantage and Disadvantage) had significantly longer consults (median 13.12 [IQR 8.01]) than all other quintiles ($p < 0.001$). Females (11.75 [IQR 8.13]) had significantly longer consults than males (10.87 [IQR 7.57]; $p < 0.001$). Clinics based in State C and State F had significantly shorter consults when compared with all other included states and territories ($p < 0.001$) and shorter consult duration was associated with visits on Sundays (median 8.18 [IQR 5.04]).

Conclusion There is evidence for the association of demographic and temporal factors with the duration of consultations for URTIs where an antibiotic has been prescribed. These factors warrant further research.

Key words: primary health care, upper respiratory infections, appointments and schedules, office visits, time factors, antimicrobial stewardship

Introduction

Current literature suggests that antibiotic treatment is rarely indicated for upper respiratory tract infections (URTI), the majority of which have a viral aetiology, yet prescription rates remain high (1–3). General practitioners represent a large proportion of antibiotic prescribers (4,5), and thus have a crucial role in antibiotic stewardship to decrease the likelihood of antimicrobial resistance (1,3,5,6). Both consult duration and medication prescribing rates are also common markers of consultation quality (7–9) and research has established shorter visit lengths and higher prescribing rates are associated with poorer patient outcomes with a lesser focus on patient needs (9,10).

This study utilises data from a larger national project published in this journal (5) that investigated the symptom trajectory of patients who were prescribed antibiotics in general practice for upper respiratory tract infections. The original study found the illness trajectory of patients receiving antibiotic for URTI paralleled that of a viral URTI with no treatment, and that antibiotic treatment did not accelerate recovery in most cases (5). The dataset from the original study is used here to further explore whether the duration of these consults was influenced by demographic factors including patient characteristics, temporal factors, and geographic location.

Demographic factors have been found to influence consult length and prescribing rates in the wider literature. Consult durations tend to be longer with fewer medications prescribed in consults with female patients, and patients from more affluent areas (10–13), while prescribing rates may be higher in out-of-hours care, and certain geographical regions (14–16).

Much of the current literature surrounding GP consult duration and antibiotic prescribing comes from research elsewhere (9,10,12,17), with Australian data largely derived from the longitudinal Bettering the Evaluation and Care of Health (BEACH) study (11,18). What is offered here is a new perspective on these data. This study aims to explore the influence of demographic factors on consult duration where antibiotics have been prescribed for URTI in Australian general practice.

Methods

Data Set

This study analysed a subset of data from an Australian national project previously published in this journal (5). Data collection methods are detailed in the original study (5). Briefly: patients presenting to participating general practice clinics who were prescribed an antibiotic were identified by the antibiotic prescription using data extraction from electronic medical records. At the time this study was conducted automatic identification of potential participants by antibiotic prescription was the most reliable option to meet the aims of the original study (5). Potential participants were sent a survey invitation by text message from the practice software to their mobile phone within 72 hours of attending the clinic. All text messages and survey responses were automatically date and time stamped and any responses received more than 3 days post invitation were excluded to minimise recall bias.

URTI-specific presentations in the sample for this study were identified from either (i) the diagnosis recorded in the patients' electronic medical record, or (ii) derived from a combination of symptoms recorded in patient survey responses. The combination of symptoms attributed to URTI presentations from survey data was based on previous work by Barrett et al. (19) using the same survey instrument (Table 1.) URTIs are variably described in the literature due to the diversity of aetiology covered by this term. We felt it more appropriate to define our definition accurately via the protocol listed in Table 1. The recorded list of URTI diagnoses in Table 1 is not an exhaustive list of possible URTI aetiology but consists of the list of URTI conditions that GPs recorded in the patient medical records used for this sample. The survey response rate for URTI-specific responders was 15%. The data represents 24 GP clinics in six states and territories of Australia and included patient and GP clinic demographic variables.

Data Cleaning and Selection Criteria

Data for this study were selected to identify visits where an antibiotic was prescribed for an acute URTI for a consult duration of <60 minutes or >1 minute. The timing of consults in this study was calculated from the time that is automatically recorded in the electronic health record of the consultation. The start point of the consultation is generated by the GP at the commencement of the

consultation automatically when they open the electronic record. Inclusion and exclusion criteria (Table 1) were applied using a protocol (Figure 1) which aimed to identify URTI presentations and those with symptoms suggestive of URTI. After this selection process, the data set contained a total of 3,183 cases.

Data Coding

Cases with missing data were included and coded as 'unknown' where applicable. Data categories included GP state, patient gender, patient postcode, visit day, and duration of consult.

Patient postcodes were used to evaluate patients' socio-economic standing by assessing correlating index of relative socio-economic advantage and disadvantage (IRSAD) quintiles obtained via the Australian Bureau of Statistics (ABS) Socio-Economic Indexes for Areas (SEIFA) 2016 interactive maps (20). IRSAD quintiles are derived from the SEIFA program developed by the ABS (20). The IRSAD assesses socioeconomic disadvantage and advantage to provide a score based on individuals' geographical location (20). Regions are divided into quintiles, where quintile 1 refers to the most disadvantaged (and least advantaged) 20% of regions, and quintile 5 refers to the most advantaged (and least disadvantaged) 20% of regions. Included states and territories were assigned letter codes which are denoted by State A, State B, State C, State D, State E, and State F. The consult duration was transformed from hh:mm:ss format to minutes in decimal format.

Data Analysis

Data was analysed in two sets; the first contained all data including outliers with a consult duration range of >1 minute and <60 minutes. The second was a subset of data with a reduced consult time of >2 minutes and <31 minutes. This latter subset excluded outliers identified in the complete data set and took into consideration that consults <2 minutes would potentially be due to inaccuracies in the use of the computerised timing system which doctors activate and disable for each consult. The second subset was utilised for the analysis reported here and contained 2,985 cases. Data was analysed using SPSS Statistics version 25.0.

Descriptive statistics were used to assess the data based on consult duration. Normality tests of consult duration found the data set to be non-parametric. Non-parametric analysis explored

relationships between demographic categories and consultation duration. The Kruskal-Wallis Test was used to assess for significance within variable categories ($p < 0.05$, 95% CI). The null hypothesis was that the distribution of consult duration (minutes) was the same between variables of each category. Pairwise comparisons using the null hypothesis were performed for each variable within the test group with significance values adjusted by the Bonferroni correction for multiple tests (sig. level < 0.05 , 95% CI).

Results

Sample Characteristics

The data represents most states and territories of Australia and includes a large proportion of presentations from clinics in one state. The distribution of cases between the five IRSAD quintiles was similar across the states with marginally lower representation of quintiles 3 and 4. The proportion of weekday visits was higher than those on Saturdays and Sundays. Approximately double the number of patients identified as female compared to male (Table 2).

Consult Duration (>2 <31 minutes)

The consult duration data is a positively skewed leptokurtic distribution with a median of 11.42 minutes and interquartile range (IQR) of 7.95 minutes (25th percentile 7.98 minutes, 75th percentile 15.93 minutes) (Supplementary Figure 1). The Kolmogorov-Smirnov test suggested that the data is non-parametric (sig. < 0.001). Table 3 displays median consult duration categorised by individual variables (Supplementary figures 2-5). The median duration of GP visits was highest in regions of IRSAD quintile 5, while those in quintile 1 experienced the shortest median consult duration. GP clinics located in State C had the shortest median visit length while the longest occurred in State D. Visits on Sundays had the lowest median visit length, while the longest were on Thursdays. The median visit duration for female patients was highest, while those whose gender was not recorded had the shortest median consults.

Significance Tests

A Kruskal-Wallis null hypothesis test examining whether the consult duration (minutes) was the same between variables of each category was rejected with statistical significance ($p < 0.05$, 95% CI) for all categories. Pairwise comparisons of variables within each category found specific comparisons statistically significant (two-sided tests, sig. level $p < 0.05$, adjusted by Bonferroni correction), while others were not. Those results with statistical significance are displayed in Table 4.

State C and State F had significantly shorter consults when compared with all other included states and territories ($p < 0.001$). Patients living in postcodes of IRSAD quintile 5 had significantly longer consults than all other quintiles ($p < 0.001$). Patients living in regions of quintile 2 had significantly longer consults than those in quintile 1 ($p = 0.011$). There was a significant difference in the distribution of consult duration between those identifying as female, compared to those identifying as male, with females having significantly longer consults than males ($p < 0.001$). There were only 6 cases of unrecorded gender. The distribution of consult duration on Sundays was significantly shorter than every other day of the week ($p < 0.001$).

Discussion

Key Findings

This study suggests that a number of demographic factors influenced GP visit length for patients who presented with URTI and were subsequently prescribed an antibiotic. Those living in the most advantaged areas and those identifying as female received longer consults, while consults in some states, as well as those consulting on Sundays were significantly shorter by comparison.

Comparison with Literature

Australian GP consultation lengths have been stable since the start of the millennium, with a median of 12-14 minutes (12,16,21). The median duration in this study was marginally lower than those reported in the BEACH data (18,21). Variation may be explained by a smaller >65-years group compared to the BEACH study (26,27). Additionally, BEACH study general practitioners were required to record the time of commencement and time of completion of each consult (16), whereas

this study used a computerised timing system, which may not be reliable as it depended on when during the consult the doctor opened the computer record.

There is limited literature exploring variations in GP consult duration by region (state and territorial); most studies compare consult length between countries (12), and some by clinic rurality (16).

The relationship between socioeconomic disadvantage and GP consultation characteristics is well described in Australian and international literature (10,12,13). The findings of this study reflect themes found in wider research; that people living in areas of greater socioeconomic disadvantage tend to have shorter GP consultations (10–13,15). A number of studies also found that those of lower socioeconomic status tend to be prescribed antibiotics at a higher rate (17,22). Within the limitations of this study we can only speculate as to the causes of the observed differences but it is unlikely that patients in more deprived areas presented fewer medical problems at the consultation (10,12,13,23,24).

Discrepancies found in visit length between genders were generally consistent with literature. Female patients tend to have longer GP consults than males (11,15,25). Although the duration of consultation time difference between genders in this study was quite small and may have a limited clinical impact it nevertheless mirrors trends seen in the international literature (11,15,25). A recurring theme in the literature that was not explored in this study was the influence of the doctors' gender on consult length with female doctors tending toward longer consultations, particularly with female patients (16,26,27).

In out-of-hours consults (including weekends and evenings), high antibiotic prescribing rates and busier clinics have been associated with shorter consult duration (14,28). However, there is minimal literature comparing consult length of out-of-hours services and weekday services. A possible explanation for the data reported here is that many visits on Sundays may be emergency appointments with fewer doctors on duty and a higher patient load. It is also possible that remuneration structures out of hours incentivise shorter consults.

Study Limitations and Strengths

As we have already acknowledged the process of timing the consults on electronic records may not be reliable. The data coding was not consistent between practices, so some URTI cases may have been missed and the numbers assessed may not be complete. The data did not include information on the content of each appointment; nonetheless, median consult duration differed by up to 4 minutes, which is clinically significant for a GP consultation. It was not possible to determine the length of consult duration for URTI presentations where antibiotics were not prescribed as this information was not part of the data set available for this study. We therefore urge caution in any extrapolation of the findings of this study. The sample population was not representative of all demographic groups, for instance there was a greater proportion of GP clinics and cases from one state and the older than sixty five years age group was most likely under-represented. Nonetheless, this was a national study and the profile reflected the Australian BEACH study (18).

Clinical Implications

This study provides an Australian perspective to current literature, adding further evidence that demographic factors may influence GP consult duration. Further exploration of how temporal factors influence consult length, as well as the relationship between duration, content, and outcomes of visits warrants future research. Organisational factors, such as the influence of remuneration may also play a part in consultation length and needs to be considered as an explanatory variable.

Declarations

Ethics: Ethics approval for this project was received from the National Research and Evaluation Ethics Committee of the RACGP (NREEC 16-008) and the University of Notre Dame Ethics Committee (approval number 017034S).

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Conflict of interest: All authors have no declarations of interest to declare.

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Figures

Figure 1. Selection protocol to identify URTI-specific presentations to Australian general practice in June-September 2017.

Table 1. Inclusion and exclusion criteria terms and themes to identify the URTI-specific presentations to Australian general practice in June-September 2017

Inclusion Criteria		Exclusion Criteria
URTI defined as any presentation stated as:	Presentation of symptom on day of consult:	Specific terms and themes not classified as suggesting URTI:
<ul style="list-style-type: none"> – Upper respiratory tract infection /URTI – Sinusitis – Tonsillitis – Pharyngitis – Laryngitis – Rhinosinusitis – Tracheitis – Respiratory tract infection/RTI (not specified as LRTI) – Throat infection – Nasal Infection 	<ul style="list-style-type: none"> – Flu/Fluey/Flu-like illness/Influenza-like illness/?influenza – Sinus symptoms – Runny nose – Strep throat – Sore throat – Common cold/cold – Fever + URTI symptoms – Hot and cold + URTI symptoms – Cough + URTI symptoms 	<ul style="list-style-type: none"> – Lower Respiratory Tract Infection/LRTI – Influenza/A/B – Asthma – COPD/COAD – Group B Streptococcal infection – Otitis media – Otitis Externa – Labyrinthitis – Unwell – Viral illness (not specified) – Chest infection – Clearly non-URTI – Allergic rhinitis – Unknown (not stated)

Table 2. Demographic profile of general practice clinics and patients presenting with URTI to Australian general practice in June-September 2017.

Category	Variable	N(%)	Category	Variable	N (%)
Clinic State (No. Clinics)	State A (1)	176 (5.9)	Visit Day	Sunday	137 (4.6)
	State B (2)	395 (13.2)		Monday	593 (19.9)
	State C (2)	303 (10.2)		Tuesday	548 (18.4)
	State D (3)	154 (5.2)		Wednesday	476 (15.9)
	State E (4)	704 (23.6)		Thursday	539 (18.1)
	State F (12)	1253 (42.0)		Friday	493 (16.5)
IRSAD Quintile	Quintile 1	576 (19.3)	Patient Gender	Saturday	199 (6.7)
	Quintile 2	766 (25.7)		Female	1995 (66.8)
	Quintile 3	487 (16.3)		Male	984 (33.0)
	Quintile 4	429 (14.4)		Unknown	6 (0.2)
	Quintile 5	717 (24.0)			
	Unknown	10 (0.3)			

The number of participants for each variable is displayed the column headed 'N(%)' with the corresponding percentage of the total population in parenthesis alongside. General practice clinic state is denoted as 'clinic state' with the number of clinics displayed in parenthesis alongside the state code (A-F). Included Australian states and territories are denoted by State A, State B, State C, State D, State E, and State F. IRSAD Quintile=Index of Relative Socio-economic Advantage and Disadvantage Quintile, is based on patient postcode, and is evaluated using SEIFA interactive maps produced by the ABS (19). Quintile 1=20% most disadvantaged and least advantaged population. Quintile 5=20% most advantaged and least disadvantaged population.

Table 3. Median consult duration by demographic factors of URTI-specific presentations to Australian general practice in June-September 2017.

Category	Variable	Median (IQR)	Category	Variable	Median (IQR)
Clinic State	State A	13.65 (7.45)	Visit Day	Sunday	8.18 (5.04)
	State B	12.25 (7.45)		Monday	12.13 (8.68)
	State C	9.72 (7.12)		Tuesday	11.51 (8.00)
	State D	13.71 (11.28)		Wednesday	11.12 (7.81)
	State E	11.97 (8.02)		Thursday	12.20 (8.42)
	State F	10.85 (8.02)		Friday	11.20 (7.46)
IRSAD Quintile	Quintile 1	10.51 (8.08)	Patient Gender	Saturday	11.57 (7.60)
	Quintile 2	11.44 (8.00)		Female	11.75 (8.13)
	Quintile 3	10.57 (7.58)		Male	10.87 (7.57)
	Quintile 4	10.80 (7.98)		Unknown	7.61 (9.70)
	Quintile 5	13.12 (8.01)			
	Unknown	11.53 (8.75)			

The median visit length for each variable is displayed the column headed 'Median (IQR)' with the corresponding interquartile range of the distribution in parenthesis alongside. Included Australian states and territories are denoted by State A, State B, State C, State D, State E, and State F. IRSAD Quintile=Index of Relative Socio-economic Advantage and Disadvantage Quintile, is based on patient postcode, and is evaluated using SEIFA interactive maps produced by ABS (19). Quintile 1=20% most disadvantaged and least advantaged population. Quintile 5=20% most advantaged and least disadvantaged population.

Table 4. Kruskal-Wallis pairwise comparison test of consult duration by demographic factors of URTI-specific presentations to Australian general practice in June-September 2017.

Category	Variable	Significance	Category	Variable	Significance
Clinic State	State C-State E	<0.001	IRSAD Quintile	5-1	<0.001
	State C-State B	<0.001		5-2	<0.001
	State C-State D	<0.001		5-3	<0.001
	State C-State A	<0.001		5-4	<0.001
	State F-State E	<0.001	Visit Day	2-1	0.011
	State F-State B	<0.001		Sun-Mon	<0.001
	State F-State D	<0.001		Sun-Tues	<0.001
	State F-State A	<0.001		Sun-Wed	<0.001
Patient Gender	F-M	<0.001	Sun-Thurs	<0.001	
			Sun-Fri	<0.001	
			Sun-Sat	<0.001	

Significance level<0.05, 95% confidence interval, two-sided tests adjusted by Bonferroni correction. Included Australian states and territories are denoted by State A, State B, State C, State D, State E, and State F. IRSAD Quintile=Index of Relative Socio-economic Advantage and Disadvantage Quintile, is based on patient postcode, and is evaluated using SEIFA interactive maps produced by ABS (19). Quintile 1=20% most disadvantaged and least advantaged population. Quintile 5=20% most advantaged and least disadvantaged population.