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Medical Management of Acute Respiratory Infections in an Out of Hours Centre; Patient Presentations and Expectations

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Abstract

Objectives: The purpose of this study was to examine patients' expectations of clinical examination, symptom management, information on their condition, reassurance, antibiotic treatment and other possible options including referral

Design: Cross-sectional design

Setting: One primary care out of hours GP centre located in the Mid-West

Participants: 457 patients filled out a questionnaire while waiting in the out of hours service. 22 surveys were excluded as the patients did not present with symptoms of acute respiratory tract infections resulting in 435 patients' data being included in this study. There were 59.5% female participants and 40.5% male participants.

Results: 435 patients with ARTI symptoms participated in the survey, representing 3.8% of the total number of face-to-face consultations with ARTI patients at the primary care OOH facility during the study period (n=11455). Of the study participants, 43% were aged under six years and 60% were female. The most common presenting symptoms were cough (72%), throat ache (46%) and common cold (26%). The most common expectations were for further examination (53%), reassurance (51%), information (49%) and medication for cough (47%), with 34% expecting an antibiotic.

Conclusions: Only one in three patients attending this primary care out of hours facility with ARTI symptoms had an expectation of antibiotics, with most seeking further assessment, information and reassurance. Recognition of such expectations may be important considerations for clinicians when deciding on management options for ARTI patients.

Patient and Public Involvement: Patients were not involved in the design of the study

Patient data was collected but not identifying data was included in this study. Patients were

recruited by staff at the out of hours service based on their physical symptoms of ARTI. Patients will be able to view the results of this study when it published in a peer reviewed journal.

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Strengths and Limitations

- Patients or guardians filling in the short and anonymous questionnaire before the consultation in the waiting room meant that respondents were more likely to be honest in their opinion.
- The age and gender profile of our sample is very similar to that of the population attending during the study period with ARTI symptoms.
- The higher number of private patient respondents helped to ensure that the finding that they do not expect antibiotics is reliable, because this bigger number is more likely to contain a spectrum of those who have different views on antibiotic prescription for their ARTI.
- Our study surveyed people attending only one OOH service. It is possible that those who refused to participate in the survey were more severely ill than those who did and were more likely to look for antibiotics (approximately 5% of those requested, refused to participate).
- Also while every effort was made to ensure that this was a representative sample of those attending with ARTI, it is possible that the results were skewed as those eligible

for free care was slightly lower than the centres overall population. However the age and gender profile was similar to the general attendees over the study period.

BACKGROUND

Antimicrobial or antibiotic resistance (AMR) is a growing threat to global public health [1]. Increasing consumption of antibiotics is associated with the development of antibiotic resistance at individual, community, national and international levels [2-5]. It is estimated that 25,000 people in the EU die annually as a result of infections caused by resistant bacteria, at a societal cost of approximately €1.5 billion annually [6]. Over the last 30 years, no major new types of antibiotics have been developed [7]. Therefore, antibiotic stewardship programmes, aiming to ensure the judicious use of antimicrobials by preventing their unnecessary use, have been established [1, 8-12].

Acute respiratory tract infection (ARTI), which incorporates the term "upper respiratory infection" (URTI), is the most common reason for antibiotic prescription in adults and children [13], and these prescriptions are often inappropriate [13-14]. Typically, inappropriate antibiotic prescribing occurs when a doctor prescribes an antibiotic that is not clinically indicated. The benefits of antibiotics are marginal for the management of most cases of ARTI [15-22], including sore throat [23-24]. Internationally, research shows that, with few exceptions [25], inappropriate prescribing of antibiotics for patients with mainly URTI is common [26-30]. This is thought to be related to a poor standard of knowledge among the general public regarding the usefulness of antibiotics in ARTI, with widespread belief, for example, that antibiotics work well for treating viral infections [31-32].

It has been reported that 75% of overall antibiotic prescribing takes place in primary care [33]. For example, the majority of outpatient antibiotic prescriptions in the USA are for ARTIs [14, 34]. In Ireland, the UK and many other countries, out of hours (OOH) services are an integral part of primary care provision, providing primary care outside of 'core' contracted hours during weekday evenings and nights and on weekends or bank holidays.

This care is usually for clinical cases that are deemed to be of sufficiently urgent nature that they cannot wait until the next available routine consulting period. Internationally, ARTIs are estimated to constitute 9% of the consultations in general practice, while the corresponding proportion in the OOH service is 16.7% [35]. Hence, this service handles a substantial proportion of ARTIs and is, thereby, potentially an important contributor to overall antibiotic consumption.

Patterns of antibiotic prescribing that clearly do not adhere to guidelines have been reported [36 - 37]. In some regions, this has contributed to a 25% rate of antibiotic prescribing for children with fever in an OOH setting [38]. Giesen described how national clinical guidelines are not suited to the context of the OOH setting leading to clinical uncertainty for doctors [39]. This has resulted in quality of antibiotic prescribing being less than optimal [40]. Trends in prescribing have also suggested that there may be a partial displacement of antibiotic prescribing from in-hours to the OOH setting, where patients with acute infective symptoms seeking antibiotics present to the OOH service after refusal by the in-hours general practice [41]. In contrast, other studies have shown antibiotic prescription rates to be similar in the OOH setting compared with the daytime in-hours setting [35, 42].

While it is true that poor public understanding of the usefulness of antibiotics in ARTI may increase patient expectation for antibiotic prescription, there is evidence that clinical examination and explanation of the diagnosis is important to patients' satisfaction with the consultation [43]. It has also been shown that taking a patient's concerns seriously, conducting a physical examination, communicating a treatment plan and explaining treatment decisions all increase patient satisfaction with the management of ARTI [44].

One of the most important factors influencing doctors prescribing of antibiotics for ARTI is patient expectation [45-59]. However, doctors often overestimate the level of this expectation [54, 60-63].

Hence, there is an important need to determine what patients presenting to an OOH centre with ARTI symptoms are expecting from their consultation with the healthcare professional (HCP). The purpose of this study was to examine patients' expectations of clinical examination, symptom management, information on their condition, reassurance, antibiotic treatment and other possible options including referral. This insight into patient expectation will inform HCPs dealing with patients presenting with ARTI in an OOH setting.

METHODS

Study Setting

The 'Shannondoc' primary care OOH facility (hereinafter referred to as 'the OOH facility') in Limerick City, in the Mid-West of Ireland is the regional primary care setting for treating patients between the hours of 6 pm to 8 am on weekdays and at all hours over weekends. The OOH facility has a mixed private-public system with 45% of the population eligible for free care under a means-tested General Medical Services (GMS) card or doctor visit only card which is issued by the Irish Health Service Executive [64]. Eligibility criteria for free medical care include: age under six or over 70 years; or earning below a certain figure based on family size. This group is hereinafter referred to as those eligible for free care. GPs (general practitioners) (who are self-employed) are paid a 'per capita' fee by the state for their care. These patients do not pay directly for GP consultations whereas patients without a card pay an average of €55 per consultation.

Participants

Each day reception staff distributed the paper-based questionnaires along with information and consent forms to patients in the waiting room, prior to their consultation. Only patients attending with symptoms of ARTI were invited to participate in the study. For those aged under 18 years, parents or guardians were asked to complete the questionnaire. Reception staff were briefed by a member of the research team (ROC) on the aims of the study and given a list of ARTI symptoms. All questionnaires were completed at the OOH facility. Completed forms were securely stored in the University of Limerick Graduate Entry Medical School building.

Sample size

It was calculated that a random sample of 400 patients would be required to estimate the percentage of patients expecting a prescription for antibiotics with 95% confidence and a margin of error of 5%. Our sample represents 3.8% (n= 435) of the total number of face-to-face consultations for ARTI at the OOH facility from October 2017-February 2018 (n=11455).

Measures

The questionnaire used was adapted from an instrument used by a recent study of patient experiences of antibiotic prescribing by non-medical practitioners [44]. The modifications made to the original instrument were: eliminating the post consultation element which asked patients what treatment they were given and ranking their satisfaction with various aspects of the consultation. All patients provided information regarding their age, gender, eligibility for

free care and whether this was their first consultation with their GP or the OOH facility for the current complaint.

Other data collected included:

- Expecting antibiotics: Yes, no, unsure
- Reasons for seeing the GP: Earache or ear discharge, complaints of nose/sinuses, common cold, throat ache, cough, other reasons e.g. flu like symptoms
- What did they expect to receive from the GP: Further examination, information, reassurance, medication for pain relief, nose drops, medication for cough, referral to hospital or specialist, other

Data analysis

Descriptive statistics were used to explore the demographic profile, patient symptoms and patient expectations. Variables were summarized using graphical and numeric descriptive statistics. Categorical variables were described using counts and percentages. The demographic characteristics of the sample and known characteristics of the population attending the OOH facility with ARTI symptoms were compared. The percentage of the sample with an expectation of antibiotics was calculated with a 95% confidence interval. The Pearson's chi-squared test was used to investigate associations between categorical variables. SPSS Version 24 and R software were used for the statistical analysis. Ethical approval for the study was granted by the Health Service Executive Mid-West Research Ethics Committee.

RESULTS

Patient characteristics

A total of 457 questionnaires were collected during the time period of the study. When reviewing the data, 22 questionnaires were excluded as patients presented with non-ARTI symptoms. This yielded a total of 435 questionnaires related to patients with symptoms of ARTI. Patient characteristics and pre-consultation expectation for antibiotic treatment are summarised in Table 1.

The majority of the sample was female (60%) and over half (56%) were eligible for free care. The most common age group was under six years of age (43%). Two hundred and twenty one respondents (50.8%) indicated that this was not their first consultation for this illness. The demographic characteristics of the sample and known characteristics of the population attending the OOH facility with ARTI symptoms are presented in Supplementary Material (Tables A, B and C). Compared to the demographic characteristics of the population attending the OOH facility with ARTI, patients who were eligible for free care were under-represented in the sample (56% vs 74%). The age and gender profile of our sample compared to the OOH facility was similar (see Supplementary Material; Tables A, B and C).

Table 1: Patient characteristics and pre-consultation expectations of antibiotics (n=435)

Patient Characteristics and pre-consultation expectations	**N (%)**
Gender	
Male	176 (40.5)
Female	259 (59.5)

Age (Years)	
Under 6	186 (42.8)
6-25	130 (29.9)
25-55	96 (22.1)
56+	23 (5.3)
Eligibility for Free Care	
Yes	244 (56.1)
No	191 (43.9)
First medical consultation for this complaint	
Yes	214 (49.2)
No	221 (50.8)

Presenting Symptoms

Patients presented with varying symptoms; many of them reported multiple symptoms. Cough was the most common (72%), followed by throat ache (46%). The least common symptoms included earache or discharge (15%) and complaints of nose/sinuses (24.1%). These symptoms are displayed in Table 2.

Patient Expectations

The most commonly expressed expectations were for further examination (53%), reassurance (51%), information (49%) and medication for cough (47%). Patients least expected to receive nose drops (5%) or a referral to hospital or specialist (3%). Thirty four percent (95% CI = 30%, 39%) of patients expected to receive an antibiotic, 10% (95% CI = 8%, 14%) did not expect to receive and antibiotic and the majority (55%, 95% CI = 50%, 60%) were unsure

whether they would need an antibiotic or not (Table 1). There was no association found between expectation of antibiotics and eligibility for free care (Pearson's Chi-Squared test, p=0.22). There was a statistically significant difference in expecting an antibiotic for gender (p=0.008) and age (p=0.026). Males were less likely to expect an antibiotic than females (16% compared to 7%). While older people (56+) are more likely to be 'unsure' whether they will need antibiotics or not (70%).

Figure 1: Patient Overall Expectations

Differences between patient expectation, expecting an antibiotic and symptom presented

Patient expectations for each symptom are described in Table 2. No differences were observed across any symptoms presented, for expecting further examination, information or reassurance, with approximately half those who presented with each symptom expected to receive these treatments. Patients presenting with symptoms of an earache (67%) or cough (65%) were more likely to expect pain relief. Patients presenting with sinusitis (60%) or cough (62%) symptoms were more likely to expect cough medication.

Table 2: Patient Expectations for each symptom

	Patient Expectation						
Symptom*	**Further Exam**	**Info**	**Reassure**	**Pain relief**	**Nose Drops**	**Cough Medicine**	**Referral**

	Yes	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Overall expectation**	**528**	**501**	**521**	**426**	**71**	**510**	**38**
Earache (n=64, 14.7%)	39 (60.9)	34 (53.1)	30 (46.9)	43 (67.2)	6 (9.4)	23 (35.9)	0 (0.0)
Sinuses (n=105, 24.1%)	53 (50.5)	56 (53.3)	53 (50.5)	47 (44.8)	14 (13.3)	63 (60.0)	5 (4.8)
Common cold (n=114, 26.2%)	64 (56.1)	54 (47.4)	62 (54.4)	53 (46.5)	10 (8.8)	64 (56.1)	5 (4.4)
Throat Ache (n=202, 46.4%)	104 (51.5)	99 49.0)	96 (47.5)	115 (56.9)	13 (6.4)	101 (50.0)	8 (4.0)
Cough (n=314, 72.2%)	164 (52.2)	159 (50.6)	161 (51.3)	109 (34.7)	19 (6.1)	195 (62.1)	12 (3.8)
Other (n=169, 38.9%)	104 (61.5)	99 (58.6)	119 (70.4)	59 (34.9)	9 (5.3)	64 (37.9)	8 (4.7)

Counts (%) presented.

*Represents those who presented with symptom (yes response)

** As many patients presented with multiple symptoms, the count exceeds the number of patients surveyed

Abbreviations: Further Exam: further examination; Info: Information

Table 3 presents differences in antibiotic expectations. Patients presenting with symptoms of an earache (44%) or throat ache (39%) were most likely to expect antibiotics. The majority of patients across all symptoms where 'unsure' whether they would require antibiotics.

Table 3: Antibiotic expectations of those presenting with different symptoms

		Patients expecting an antibiotic		
Symptoms*		**Yes (n=149, 34.3%)**	**No (n=45, 10.3%)**	**Unsure (n=241, 55.4%)**
Earache or discharge: (15%)	64	28 (43.8)	6 (9.4)	30 (46.9)
Complaints of nose/sinuses: (24%)	105	35 (33.3)	10 (9.5)	60 (57.1)
Common cold: (26%)	114	43 (37.7)	8 (7.0)	63 (55.3)
Throat Ache: (46%)	202	79 (39.1)	12 (5.9)	111 (55.0)
Cough: (72%)	314	100 (31.8)	31 (9.9)	183 (58.3)
Other: (39%)	169	44 (26.0)	25 (14.8)	100 (59.2)
Count (%) presented. * Represents those who presented with symptom (yes response)				

DISCUSSION

Our finding that only 34% of those attending an out of hours centre with ARTI symptoms expected to be prescribed antibiotics prior to seeing the doctor is clinically relevant. The international literature over the last 20 years indicates that patient expectation for antibiotics for management of ARTI varies from 10% [47] to 74% [65]. In our study, patient expectation

for antibiotic treatment ranks third lowest in this literature, and second lowest among studies published in the last 10 years. In a qualitative study, Dempsey et al reported a recent decrease in demand for antibiotics for acute bronchitis [58], however continued significant demand for antibiotics for ARTI is evident. This is illustrated in Supplementary Material: Table D.

The statistically significant difference in expecting an antibiotic for gender and age whereby males were less likely to expect an antibiotic than females and older people (56+) are more likely to be 'unsure' whether they will need antibiotics or not (70%) may be helpful to the PCP in communicating with the patient regarding the risk/benefit balance of antibiotic treatment for ARTI. The fact that there was no association found between nearly all symptoms (except throat ache), and antibiotic expectation is also important in helping inform the doctor's assessment of the likelihood of patient expectation for antibiotics. Also the finding of no difference between those who are entitled to free care (medical card holders) and those who aren't, in their expectations of receiving antibiotics indicates that economic factors (whether or not the patient is paying for the consultation) are not of major importance in antibiotic expectation.

GPs and other primary care doctors are more likely to prescribe antibiotics to patients who expect them or whom they believe expect them [45-59]. It has been suggested that 'patient expectations' is an all-encompassing phrase that includes other reasons such as limited time, poor doctor–patient communication and diagnostic uncertainty [45]. Therefore knowing that only 34% of patients attending an OOH service expect an antibiotic for their ARTI symptoms and that this expectation is not associated with eligibility for free care helps in the clinical decision making process and allows doctors to concentrate more on the medical need.

Doctors may overestimate the pressure to prescribe antibiotics for acute cough [60-62] or other acute respiratory illnesses [54], often prescribing antibiotics for patients who did not

request them [63]. Wong et al studying a Chinese primary care population presenting with ARTI symptoms, found that concern about illness severity and obtaining a prescription for symptomatic medications, rather than obtaining a prescription for antibiotics, were the main reasons for patients consulting [47]. Ong et al found, in a study of patients attending an emergency department with ARTI symptoms, that doctors were only able to identify 1 in 4 of those patients who expected antibiotic treatment for their symptoms [54]. The same study also found that patient satisfaction was not related to receipt of antibiotics but was related to the belief they had a better understanding of their illness [54].

There is some evidence that patients are less satisfied in general practices that have frugal antibiotic prescribing practices in general [66]. However this retrospective study from England with a 36% response rate did not estimate the effect of communication skills. It could be argued that with enhanced communication skills and with the primary care provider (PCP) eliciting and addressing the patients concerns, the satisfaction rating for frugal prescribers would be considerably higher.

Several studies have shown that private patients who pay for their consultations [47, 67 - 68], as well as those of lower socioeconomic status [51, 69-72] are more likely to be prescribed antibiotics for ARTI. Our study showed an association between having free access to the OOH doctor and absence of expectation for receiving an antibiotic for their ARTI because this eligibility was either due to age (under 6 and over 70 years of age) or income, it is difficult to draw direct conclusions. However, most importantly and in contrast to earlier studies [51, 69 -72], patient expectation for antibiotics was found to be unrelated to having access to free care

In a study of non-medical practitioners (NMPs), Courtenay et al found reduced levels of satisfaction among patients who expected but did not receive an antibiotic [44]. This figure

indicates that although NMPs appear to have strategies for managing ARTI consultations, there is still scope for improvement and these prescribers are therefore an important group to involve in antimicrobial stewardship [44]. Antimicrobial stewardship programs should continue to expand in the outpatient setting and should emphasize the importance of clear and direct communication between patients and physicians [59, 73]. Patients from our study anticipated further examination, information and symptomatic treatment. These findings closely echo those of recent studies [44, 47, 54]. It is important to continue with public health campaigns to educate the public on the ineffectiveness of antibiotics in treatment of ARTI, which has been shown to reduce public expectation for antibiotics in such cases [74].

Our sample represent 3.8% of the total number of consultations for ARTI at the OOH facility' from October 2017-February 2018. All patients had ARTI symptoms. The overall age and gender profile of those attending at the OOH facility with ARTI symptoms are very similar to those investigated in this study (see tables A and B in Supplementary Material), suggesting that our results are representative of those attending at the OOH facility during the study period. However, the proportion of those surveyed who were eligible for free care differed considerably to the overall proportion of those attending at the OOH facility with ARTI during the study period (56% compared to 74%). However it can also be argued that people who decide that their illness is severe enough that they need to see a strange GP in an out of hours service in the evening or late at night and pay at least €55 as a fee for doing so have a much greater motivation for getting an antibiotic prescription. Any other medication that they receive from the GP (e.g. analgesia, cough bottles and antipyretics) does not require a prescription. The fact that 2/3 of respondents were unsure of whether they expected to receive an antibiotic or did not expect to receive one is indicative that the message on AMR

and the overuse of antibiotics has reached the mind set of those attending an out of hours centre.

It is difficult to explain why over 50% of respondents had previously consulted for this particular complaint. We did not ask when this previous consultation had taken place. Repeat consultation rates of between 15% and 20% in children with ARTI and between 20% and 30% in adults with lower respiratory tract infections (LRTIs) have been described [75]. Between a half and two thirds of adults with LRTI who re-consult are prescribed antibiotics, despite little evidence of an infection requiring antibiotics [75].

Strengths and Limitations

Patients or guardians filled in the questionnaire before the consultation in the waiting room. The fact that the questionnaire was anonymous and short meant that respondents were more likely to be honest in their opinion. The age and gender profile of our sample is very similar to that of the population attending during the study period with ARTI symptoms. People were specifically asked about the nature of their complaints, ensuring that only those with ARTI symptoms were surveyed. The higher number of private patient respondents helped to ensure that the finding that they do not expect antibiotics is reliable, because this bigger number is more likely to contain a spectrum of those who have different views on antibiotic prescription for their ARTI.

Our study surveyed people attending only one OOH service. It is possible that those who refused to participate in the survey were more severely ill than those who did and were more likely to look for antibiotics (approximately 5% of those requested, refused to participate). Also while every effort was made to ensure that this was a representative sample of those attending with ARTI, it is possible that the results were skewed as those eligible for free care

was slightly lower than the centres overall population. However the age and gender profile was similar to the general attendees over the study period.

CONCLUSIONS

A large proportion of those attending out of hours GP service do not have fixed ideas regarding antibiotics and are seeking further assessment, information and reassurance. Most seem to be amenable to not receiving an antibiotic for their illness if their underlying needs are met. This group includes patients eligible for free care as well as those paying for their consultation. Communication and clinical skills of healthcare professionals need to be optimised to ensure reduction in antibiotic prescribing.

Recommendations for Further Research

The high number of repeat attendances for ARTI requires further study. A qualitative study of patients attending OOH setting to elicit what their intentions are for attending and their understanding of AMR is also appropriate.

Abbreviations

AMR: antimicrobial or antibiotic resistance; ARTI: acute respiratory tract infection; URTI: upper respiratory tract infection; OOH: out of hours; HCP: healthcare professional; GPs: general practitioners; Further Exam: further examination; Info: Information; LRTIs: lower respiratory tract infections

DECLARATIONS

Ethical approval and consent to participate

Ethical approval for the study was granted by the Health Service Executive Mid-West Research Ethics Committee.

Consent for publication

Not applicable

Availability of data and materials

The datasets generated and/or analysed during the current study are not publically available due to variables that could identify GPs through name of practice and location but are available from the corresponding author on reasonable request.

Competing Interests

The authors declare they have no competing interests.

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Authors Contributions

ROC conceived the study. AOR, JOD, CMcM and ROC were involved in the design of the study. ROC and CMcM collected the data. JOD and ROC inputted the data. AON carried out statistical analysis. ROC, CD, AOR and JOD wrote the first draft of the paper. All authors made critical comments on all drafts of the paper, as well as read and approved the final manuscript.

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Figure 1: Patient Overall Expectations

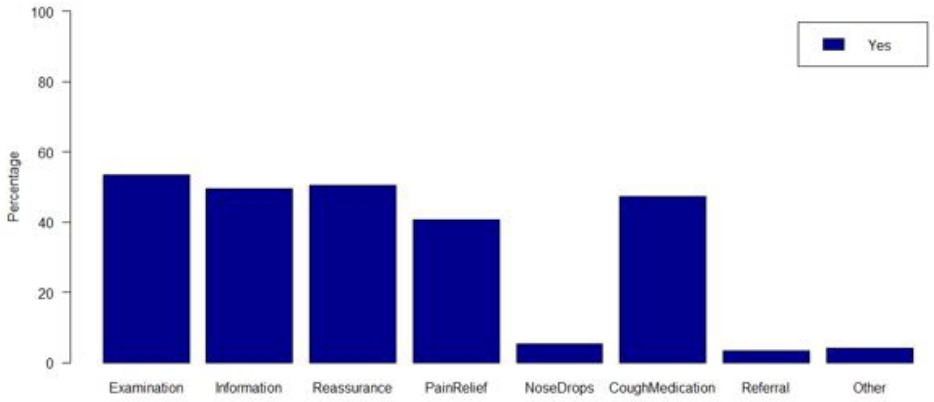

Figure 1: Patient Overall Expectations

162x93mm (96 x 96 DPI)

SUPPLEMENTARY MATERIAL: AGE AND GENDER COMPARISION OF OUR SAMPLE WITH THOSE ATTENDING SHANNONDOC FACILITY DURING THE STUDY PERIOD

Table A: Gender Proportion of those attending OOH Facility with ARTI symptoms

		Shannondoc Dooradoyle* (n=1715)	**GEMS (n=435)**
Gender	Male	783 (39.4)	176 (40.5)
	Female	1205 (60.1)	259 (59.5)
*1988 with resp. complaints Counts (%) presented			

Shannondoc Dooradoyle*: This number refers to the population who attended the 'Shannondoc' Dooradoyle out of hours centre, where the study took place, during the study period.

Table B: Age of those attending OOH Facility overall during the study period

Shannondoc OOH Facility (n=11,455)**		
Age	**0-4**	4706 (41.1)
	5-64	5208 (45.5)
	65+	1541 (13.4)
UL Antibiotic Study (n=435)		
Age	**0-6**	186 (42.7)
	7-55	

		226 (51.9)
	56+	23 (5.3)
Counts (%) presented.		

Shannondoc OOH Facility:** This number refers to the entire population of patients who attended all 'Shannondoc' out of hours centres during the study period.

Table C: Eligibility for free care

		Shannondoc OOH Facility (Total=11,455)	**UL Antibiotic Study (Total=435)**
Eligible for Free Care	Yes	8477 (74)	244 (56)
	No	2978 (26)	191 (44)
Counts (%) presented			

Table D: Patient expectation for antibiotics for ARTI over the last 20 years.

Study	**Year**	**Location**	**Patient Expectation For Antibiotic for ARTI**
Hamm	1996	USA	65%
Shlomo Vinker	2003	Israel	25%
Martin	2004	USA	76%
Soma	2005	Norway	38%

Panagakau	2011	Greece	74%
McNulty	2013	UK	53%
Zyoud	2015	Palestine	73%
Wong	2017	China	10%
UL/Shannondoc	2018	Ireland	34%

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	3+4
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5-7
Objectives	3	State specific objectives, including any prespecified hypotheses	7
Methods			
Study design	4	Present key elements of study design early in the paper	7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	7
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	8
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	8-9
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	8-9
Bias	9	Describe any efforts to address potential sources of bias	N/A
Study size	10	Explain how the study size was arrived at	8
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	9
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	9
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	N/A
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(*e*) Describe any sensitivity analyses	N/A
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	10
		(b) Give reasons for non-participation at each stage	10
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	10
		(b) Indicate number of participants with missing data for each variable of interest	N/A
Outcome data	15*	Report numbers of outcome events or summary measures	11-12
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	11-12
		(*b*) Report category boundaries when continuous variables were categorized	10-14
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	[redacted] 12-14
Discussion			
Key results	18	Summarise key results with reference to study objectives	14-18
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	18
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	14-18
Generalisability	21	Discuss the generalisability (external validity) of the study results	18-19
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	20

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Medical Management of Acute Upper Respiratory Infections in an Urban Primary Care Out of Hours Facility; Cross Sectional Study of Patient Presentations and Expectations

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Abstract

Objectives: The purpose of this study was to examine the expectations of patients attending an urban primary care out of hours facility with acute upper respiratory tract infection (acute URTI) regarding clinical examination, symptom management, information on their condition, reassurance, antibiotic treatment and other possible options including referral

Design: Cross-sectional design

Setting: One urban primary care out of hours facility located in the Mid-West of Ireland.

Participants: 457 patients filled out a questionnaire while waiting in the out of hours facility, 22 surveys were excluded as the patients did not present with symptoms of acute URTI resulting in 435 patients' data being included in this study. There were 59.5% female participants and 40.5% male participants.

Results: 435 patients with acute URTI symptoms participated in the survey, representing 25.4% of those attending the single branch where the survey was conducted (n=1715). Of the study participants, 43% were aged under six years and 60% were female. The most common presenting symptoms were cough (72%), throat ache (46%) and common cold (26%). The most common expectations were for further examination (53%), reassurance (51%), information (49%) and medication for cough (47%), with 34% expecting an antibiotic.

Conclusions: Only one in three patients attending this primary care OOH facility with acute URTI symptoms had an expectation of antibiotics, with most seeking further assessment,

information and reassurance. Recognition of such expectations may be important considerations for clinicians when deciding on management options for acute URTI patients.

Word Count: 3680

Strengths and limitations of this study.

- The study used a previously validated questionnaire that was adapted and piloted by a multi-disciplinary research and clinical team.
- The research was conducted over four consecutive months which would mitigate the effects of any public health campaigns aimed at reducing antibiotic use at the time.
- The higher number of private patient respondents helped to ensure that the finding that they do not expect antibiotics is reliable.
- As this is a single centre study, the population studied in this particular OOH service may not reflect those seen in OOH services throughout Ireland and/or the UK
- The patient's desire for antibiotics was not assessed against the clinician-assessed need for antibiotics. Severity and duration of the illness was not assessed which may have affected patient expectation for antibiotics.

BACKGROUND

Antimicrobial or antibiotic resistance (AMR) is a growing threat to global public health [1]. Increasing consumption of antibiotics is associated with the development of antibiotic resistance at individual, community, national and international levels [2-5]. It is estimated that 25,000 people in the EU die annually as a result of infections caused by resistant bacteria, at a societal cost of approximately €1.5 billion annually [6]. Over the last 30 years, no major new types of antibiotics have been developed [7]. Therefore, antibiotic stewardship programmes, aiming to

ensure the judicious use of antimicrobials by preventing their unnecessary use, have been established [1, 8-12].

Acute upper respiratory tract infection (acute URTI), which incorporates the term "upper respiratory infection" (URTI), describes infections of the upper airways [13]. It is the most common reason for antibiotic prescription in adults [13] and children [14]. These prescriptions are often inappropriate in that they may be unnecessary, lead to increased antibiotic resistance and put patients at risk of adverse events [13]. Typically, inappropriate antibiotic prescribing occurs when a doctor prescribes an antibiotic that is not clinically indicated. The benefits of antibiotics are marginal for the management of most cases of acute URTI [15-22], including sore throat [23, 24]. Internationally, research shows that, with few exceptions [25], inappropriate prescribing of antibiotics for patients with mainly acute URTI is common [26-30]. This is thought to be related to a poor standard of knowledge among the general public regarding the usefulness of antibiotics in acute URTI, with widespread belief, for example, that antibiotics work well for treating viral infections [31, 32].

It has been reported that 75% of overall antibiotic prescribing takes place in primary care [33]. For example, the majority of outpatient antibiotic prescriptions in the USA are for acute URTIs [13, 34]. In Ireland, the UK and many other countries, out of hours (OOH) services are an integral part of primary care provision, providing primary care outside of 'core' contracted hours during weekday evenings and nights and on weekends or bank holidays. This care is usually for clinical cases that are deemed to be of sufficiently urgent nature that they cannot wait until the next available routine consulting period. Internationally, acute URTIs are estimated to constitute 9% of the consultations in general practice, while the corresponding proportion in the OOH

service is 16.7% [35]. Hence, this service handles a substantial proportion of acute URTIs and is, thereby, potentially an important contributor to overall antibiotic consumption.

Patterns of antibiotic prescribing that clearly do not adhere to guidelines have been reported [36, 37]. In some regions, this has contributed to a 25% rate of antibiotic prescribing for children with fever in an OOH setting [38]. Giesen described how national clinical guidelines are not suited to the context of the OOH setting leading to clinical uncertainty for doctors [39]. This has resulted in quality of antibiotic prescribing being less than optimal [40]. Trends in prescribing have also suggested that there may be a partial displacement of antibiotic prescribing from in-hours to the OOH setting, where patients with acute infective symptoms seeking antibiotics present to the OOH service after refusal by the in-hours general practice [41]. In contrast, other studies have shown antibiotic prescription rates to be similar in the OOH setting compared with the daytime in-hours setting [35, 42].

While it is true that poor public understanding of the usefulness of antibiotics in acute URTI may increase patient expectation for antibiotic prescription, there is evidence that clinical examination and explanation of the diagnosis is important to patients' satisfaction with the consultation [43]. It has also been shown that taking a patient's concerns seriously, conducting a physical examination, communicating a treatment plan and explaining treatment decisions all increase patient satisfaction with the management of acute URTI [44].

One of the most important factors influencing doctors prescribing of antibiotics for acute URTI is patient expectation [45-59]. However, doctors often overestimate the level of this expectation [54, 60-63].

Hence, there is an important need to determine what patients presenting to an OOH centre with acute URTI symptoms are expecting from their consultation with the healthcare professional (HCP). The purpose of this study was to examine patients' expectations of clinical examination, symptom management, information on their condition, reassurance, antibiotic treatment and other possible options including referral. This insight into patient expectation will inform HCPs dealing with patients presenting with acute URTI in an OOH setting.

METHODS

Study Setting

The 'Shannondoc' primary care OOH facility (hereinafter referred to as 'the OOH facility') in Limerick City, in the Mid-West of Ireland is the regional primary care setting for treating patients between the hours of 6 pm to 8 am on weekdays and at all hours over weekends. The OOH facility has 12 branches throughout the region. It has a mixed private-public system with 45% of the population eligible for free care under a means-tested General Medical Services (GMS) card or doctor visit only card which is issued by the Irish Health Service Executive [64]. Eligibility criteria for free medical care include: age under six or over 70 years; or earning below a certain figure based on family size. This group is hereinafter referred to as those eligible for free care. GPs (general practitioners) (who are self-employed) are paid a 'per capita' fee by the state for their care. These patients do not pay directly for GP consultations whereas patients without a card pay an average of €55 per consultation.

Participants

Each day reception staff distributed the paper-based questionnaires along with information and consent forms to patients in the waiting room, prior to their consultation. The trained reception staff are experienced at working in a supervised clinical setting out of hours. Only patients attending with symptoms of acute URTI were invited to participate in the study. For those aged under 18 years, parents or guardians were asked to complete the questionnaire. Reception staff were briefed by a member of the research team (ROC) on the aims of the study and given a list of acute URTI symptoms. All questionnaires were completed at the OOH facility. Completed forms were securely stored in the University of Limerick Graduate Entry Medical School building.

Sample Size

It was calculated that a random sample of 400 patients would be required to estimate the percentage of patients expecting a prescription for antibiotics with 95% confidence and a margin of error of 5%. While our sample is not randomly selected, this sample size calculation was used to guide recruitment.

Measures

The questionnaire used was adapted from an instrument used by a recent study of patient experiences of antibiotic prescribing by non-medical practitioners [44]. The modifications made to the original instrument were: eliminating the post consultation element which asked patients what treatment they were given and ranking their satisfaction with various aspects of the consultation. All patients provided information regarding their age, gender, eligibility for free

care and whether this was their first consultation with their GP or the OOH facility for the current complaint.

Other data collected included:

- Expecting antibiotics: Yes, no, unsure
- Reasons for seeing the GP: Earache or ear discharge, complaints of nose/sinuses, common cold, throat ache, cough, other reasons e.g. flu like symptoms
- What did they expect to receive from the GP: Further examination, information, reassurance, medication for pain relief, nose drops, medication for cough, referral to hospital or specialist, other

The modified questionnaire was piloted among non-medical staff and students in the medical school who were not associated with the study to ensure face validity (see appendix 1). Completed questionnaires were de-identified for storage where patients had entered identifying data on the questionnaire during its completion.

Data analysis

Descriptive statistics were used to explore the demographic profile, patient symptoms and patient expectations. Variables were summarized using graphical and numeric descriptive statistics. Categorical variables were described using counts and percentages. The demographic characteristics of the sample and known characteristics of the population attending the OOH facility with acute URTI symptoms were compared. The percentage of the sample with an expectation of antibiotics was calculated with a 95% confidence interval. The Pearson's chi-

squared test was used to investigate associations between categorical variables. SPSS Version 24 and R software were used for the statistical analysis. Ethical approval for the study was granted by the Health Service Executive Mid-West Research Ethics Committee reference number 068/17.

Patient and Public Involvement

Patients were not involved in the design of the study. Patient data was collected but no identifying data was included in this study. Patients were recruited by staff at the out of hours service based on their physical symptoms of acute URTI. Patients will be able to view the results of this study when it is published in a peer reviewed journal.

RESULTS

Patient characteristics

A total of 457 questionnaires were collected during the time period of the study. When reviewing the data, 22 questionnaires were excluded as patients presented with non-acute URTI symptoms. This yielded a total of 435 questionnaires related to patients with symptoms of acute URTI. This sample represents one in four of the 1715 patients with acute URTI who attended this treatment centre from October 2017-February 2018 and 3.8% of the 11,455 face-to-face consultations for acute URTI at all treatment centres of the OOH service in the region during the same period. Patient characteristics and pre-consultation expectation for antibiotic treatment are summarised in Table 1.

The majority of the sample was female (60%) and over half (56%) were eligible for free care. The most common age group was under six years of age (43%). Two hundred and twenty one respondents (50.8%) indicated that this was not their first consultation for this illness. The demographic characteristics of the sample and known characteristics of the population attending the OOH facility with acute URTI symptoms are presented in Supplementary Material (Tables A, B and C). Compared to the demographic characteristics of the population attending the OOH facility with acute URTI, patients who were eligible for free care were under-represented in the sample (56% vs 74%). The age and gender profile of our sample compared to the OOH facility was similar (see Supplementary Material; Tables A, B and C). Older people (over the age of 56 years) are poorly represented in our sample, making up only 5.3% of the population studied.

Table 1: Patient characteristics and pre-consultation expectations of antibiotics (n=435)

Patient Characteristics and pre-consultation antibiotic expectations	**n (%)**
Gender	
Male	176 (40.5)
Female	259 (59.5)
Age (Years)	
Under 6	186 (42.8)
6-25	130 (29.9)
25-55	96 (22.1)
56+	23 (5.3)

Eligibility for Free Care	
Yes	244 (56.1)
No	191 (43.9)
First medical consultation for this complaint	
Yes	214 (49.2)
No	221 (50.8)
Expecting Antibiotics Pre Consultation	
Yes	149 (34.3)
No	45 (10.3)
Unsure	241 (55.4)

Presenting Symptoms

Patients presented with varying symptoms; many of them reported multiple symptoms. Cough was the most common (72%), followed by throat ache (46%). The least common symptoms included earache or discharge (15%) and complaints of nose/sinuses (24.1%). These symptoms are displayed in Table 2.

Patient Expectations

Patient expectations for each symptom are illustrated in figure 1 and described in table 2. Table 2 also gives the overall expectation for each potential response of the HCP. The most commonly expressed expectations were for further examination (53%), reassurance (51%), information (49%) and medication for cough (47%). Patients least expected to receive nose drops (5%) or a

referral to hospital or specialist (3%). Thirty four percent (95% CI = 30%, 39%) of patients expected to receive an antibiotic, 10% (95% CI = 8%, 14%) did not expect to receive and antibiotic and the majority (55%, 95% CI = 50%, 60%) were unsure whether they would need an antibiotic or not (Table 1). There was no association found between expectation of antibiotics and eligibility for free care (Pearson's Chi-Squared test, p=0.22). Also using Pearson's test, there was a statistically significant difference in expecting an antibiotic for gender and age in that males were less likely to expect an antibiotic than females p=0.008) and older people (aged 56 and over) were more likely to be 'unsure' whether they needed antibiotics or not (p=0.026).

Figure 1: Patient Overall Expectations

Differences between patient expectation, expecting an antibiotic and symptom presented

Patient expectations for each symptom are described in Table 2. For each symptom presented, patient expectations of further examination, information or reassurance were similar, with approximately half those who presented with each symptom reporting an expectation to receive these treatments. A large proportion of patients presenting with symptoms of an earache (67%) or cough (65%) reported expecting to receive pain relief. A large proportion of patients presenting with sinusitis (60%) or cough (62%) symptoms reported expecting to receive cough medication.

Table 2: Patient expectations for each symptom

Symptom*	**Patient Expectation**

	Further Exam	**Info**	**Reassure**	**Pain relief**	**Nose Drops**	**Cough Medicine**	**Referral**
Earache (n=64, 14.7%)	39 (60.9)	34 (53.1)	30 (46.9)	43 (67.2)	6 (9.4)	23 (35.9)	0 (0.0)
Sinuses (n=105, 24.1%)	53 (50.5)	56 (53.3)	53 (50.5)	47 (44.8)	14 (13.3)	63 (60.0)	5 (4.8)
Common cold (n=114, 26.2%)	64 (56.1)	54 (47.4)	62 (54.4)	53 (46.5)	10 (8.8)	64 (56.1)	5 (4.4)
Throat Ache (n=202, 46.4%)	104 (51.5)	99 49.0)	96 (47.5)	115 (56.9)	13 (6.4)	101 (50.0)	8 (4.0)
Cough (n=314, 72.2%)	164 (52.2)	159 (50.6)	161 (51.3)	109 (34.7)	19 (6.1)	195 (62.1)	12 (3.8)
Other (n=169, 38.9%)	104 (61.5)	99 (58.6)	119 (70.4)	59 (34.9)	9 (5.3)	64 (37.9)	8 (4.7)
Overall expectation**	**528**	**501**	**521**	**426**	**71**	**510**	**38**

Counts (%) presented.

*Represents those who presented with symptom (yes response)

** As many patients presented with multiple symptoms, the count exceeds the number of patients surveyed

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Table 3 presents differences in antibiotic expectations. Patients presenting with symptoms of an earache (44%) or throat ache (39%) were most likely to expect antibiotics. The majority of patients across all symptoms where 'unsure' whether they would require antibiotics.

Table 3: Antibiotic expectations of those presenting with different symptoms

		Patients expecting an antibiotic		
Symptoms*		**Yes (n=149, 34.3%)**	**No (n=45, 10.3%)**	**Unsure (n=241, 55.4%)**
Earache or discharge: (15%)	64	28 (43.8)	6 (9.4)	30 (46.9)
Complaints of nose/sinuses: (24%)	105	35 (33.3)	10 (9.5)	60 (57.1)
Common cold: (26%)	114	43 (37.7)	8 (7.0)	63 (55.3)
Throat Ache: (46%)	202	79 (39.1)	12 (5.9)	111 (55.0)
Cough: (72%)	314	100 (31.8)	31 (9.9)	183 (58.3)
Other: (39%)	169	44 (26.0)	25 (14.8)	100 (59.2)
Count (%) presented. * Represents those who presented with symptom (yes response)				

DISCUSSION

Our finding that 34% of those attending an out of hours centre with acute URTI symptoms expected to be prescribed antibiotics prior to seeing the doctor is clinically relevant. The international literature over the last 20 years indicates that patient expectation for antibiotics for management of acute URTI varies from 10% (47) to 74% [65]. In our study, patient expectation for antibiotic treatment ranks third lowest in this literature and second lowest among studies published in the last 10 years. In a qualitative study, Dempsey et al reported a recent decrease in demand for antibiotics for acute bronchitis [58], however continued significant demand for antibiotics for acute URTI is evident. This is illustrated in Table D in Supplementary Material.

The statistically significant difference in expecting an antibiotic for gender and age whereby males were less likely to expect an antibiotic than females and older people (56+) are more likely to be 'unsure' whether they will need antibiotics or not (70%) may be helpful to the HCP in communicating with the patient regarding the risk/benefit balance of antibiotic treatment for acute URTI. Also the finding of no difference between those who are entitled to free care (medical card holders) and those who aren't, in their expectations of receiving antibiotics indicates that economic factors (whether or not the patient is paying for the consultation) are not of major importance in antibiotic expectation.

GPs and other primary care doctors are more likely to prescribe antibiotics to patients who expect them or whom they believe expect them [45-59]. It has been suggested that 'patient expectations' is an all-encompassing phrase that includes other reasons such as limited time, poor doctor–patient communication and diagnostic uncertainty [45]. Therefore knowing that only 34% of patients attending an OOH service expect an antibiotic for their acute URTI

symptoms and that this expectation is not associated with eligibility for free care helps in the clinical decision making process and allows doctors to concentrate more on the medical need.

Doctors may overestimate the pressure to prescribe antibiotics for acute cough [60-62] or other acute respiratory illnesses [54], often prescribing antibiotics for patients who did not request them [63]. Wong et al studying a Chinese primary care population presenting with acute URTI symptoms, found that concern about illness severity and obtaining a prescription for symptomatic medications, rather than obtaining a prescription for antibiotics, were the main reasons for patients consulting [47]. Ong et al found, in a study of patients attending an emergency department with acute URTI symptoms, that doctors were only able to identify 1 in 4 of those patients who expected antibiotic treatment for their symptoms [54]. The same study also found that patient satisfaction was not related to receipt of antibiotics but was related to the belief they had a better understanding of their illness [54].

There is some evidence that patients are less satisfied in general practices that have frugal antibiotic prescribing practices in general [66]. However this retrospective study from England with a 36% response rate did not estimate the effect of communication skills. It could be argued that with enhanced communication skills and with the HCP eliciting and addressing the patients concerns, the satisfaction rating for frugal prescribers would be considerably higher.

Several studies have shown that private patients who pay for their consultations [47, 67, 68], as well as those of lower socioeconomic status [51, 69-72] are more likely to be prescribed antibiotics for acute URTI. Our study showed no association between a patient's eligibility for free care (or paying for their consultation) and expectation of an antibiotic for their acute URTI. Because this eligibility was either due to age (under 6 and over 70 years of age) or income, it is difficult to draw direct conclusions. However, most importantly and in contrast to earlier studies

[47, 67-68], patient expectation for antibiotics was found to be unrelated to having access to free care.

In a study of non-medical practitioners (NMPs), Courtenay et al found reduced levels of satisfaction among patients who expected but did not receive an antibiotic [44]. This figure indicates that although NMPs appear to have strategies for managing acute URTI consultations, there is still scope for improvement and these prescribers are therefore an important group to involve in antimicrobial stewardship [44]. Antimicrobial stewardship programs should continue to expand in the outpatient setting and should emphasize the importance of clear and direct communication between patients and physicians [59, 73]. Patients from our study anticipated further examination, information and symptomatic treatment. These findings closely echo those of recent studies [44, 47, 54]. It is important to continue with public health campaigns to educate the public on the ineffectiveness of antibiotics in treatment of acute URTI, which has been shown to reduce public expectation for antibiotics in such cases [74].

Our sample represented 25% of the 1715 patients with acute URTI who attended the single branch of the OOH facility from October 2017-February 2018 where all the sampling was conducted. All patients had acute URTI symptoms. Although older people are under-represented, the overall age and gender profile of those attending at the OOH facility with acute URTI symptoms are very similar to those investigated in this study (see tables A and B in Supplementary Material), suggesting that our results are representative of those attending at the OOH facility during the study period. However, the proportion of those surveyed who were eligible for free care differed considerably to the overall proportion of those attending at the OOH facility with acute URTI during the study period (56% compared to 74%). It can also be argued that people who decide that their illness is severe enough that they need to see a strange

GP in an out of hours service in the weekend, evening or late at night and pay at least €55 as a fee for doing so have a much greater motivation for getting an antibiotic prescription. Any other medication that they receive from the GP (e.g. analgesia, cough bottles and antipyretics) does not require a prescription. The fact that 2/3 of respondents were unsure of whether they expected to receive an antibiotic or did not expect to receive one is indicative that the message on AMR and the overuse of antibiotics has reached the mind set of those attending an out of hours centre.

It is difficult to explain why over 50% of respondents had previously consulted for this particular complaint. We did not ask when this previous consultation had taken place. Repeat consultation rates of between 15% and 20% in children with acute URTI and between 20% and 30% in adults with lower respiratory tract infections (LRTIs) have been described [75]. Between a half and two thirds of adults with LRTI who re-consult are prescribed antibiotics, despite little evidence of an infection requiring antibiotics [75].

This study contains several strengths. We used a previously validated questionnaire that was adapted and piloted by a multi-disciplinary research and clinical team. The research was conducted over four consecutive months which would mitigate the effects of any public health campaigns aimed at reducing antibiotic use at the time. Patients or guardians filling in the short and anonymous questionnaire before the consultation in the waiting room meant that respondents were more likely to be honest in their opinion. The age and gender profile of our sample is very similar to that of the population attending during the study period with acute URTI symptoms. Reception staff received training from the research team and were tasked with identifying and recruiting participants, ensuring that only those with acute URTI symptoms were surveyed. The higher number of private patient respondents helped to ensure that the finding that they do not

expect antibiotics is reliable. Previous studies of this subgroup have indicated that they have a higher expectation for antibiotics for acute URTI.

There are also some limitations. Our study surveyed people attending only one urban OOH service. It is possible that those who refused to participate in the survey were more severely ill than those who did and were more likely to look for antibiotics (approximately 5% of those requested, refused to participate). The demographics of those who refused to participate were not studied. As this is a single centre study, the population studied in this particular OOH service may not reflect those seen in OOH services throughout Ireland and/or the UK. While every effort was made to ensure that this was a representative sample of those attending with acute URTI, it is possible that the results were skewed as those eligible for free care was slightly lower than the centres overall population. Older people (over the age of 56 years) are poorly represented in our sample. It is possible that the results would have been different if older people were better represented. Reception staff who were not medically trained were charged with the tasks of distributing questionnaires. This is a potential limitation in that they may have not correctly identified (and therefore missed) a cohort of patients who had acute respiratory tract infections. However the note of the patient's initial presenting symptom to the call centre was available to reception staff which would have minimised this. The patient's desire for antibiotics was not assessed against the clinician-assessed need for antibiotics. However the point of the study was to assess overall patient expectation. Severity and duration of the illness was not assessed which may have affected patient expectation for antibiotics.

CONCLUSIONS

A large proportion of those attending out of hours GP service do not have fixed ideas regarding antibiotics and are seeking further assessment, information and reassurance. Most seem to be amenable to not receiving an antibiotic for their illness if their underlying needs are met. This group includes patients eligible for free care as well as those paying for their consultation. Communication and clinical skills of healthcare professionals need to be optimised to ensure reduction in antibiotic prescribing.

Recommendations for Further Research

The high number of repeat attendances for acute URTI requires further study. A qualitative study of patients attending OOH setting to elicit what their intentions are for attending and their understanding of AMR is also appropriate.

Abbreviations

AMR: antimicrobial or antibiotic resistance; acute URTI: acute upper respiratory tract infection; URTI: upper respiratory tract infection; OOH: out of hours; HCP: healthcare professional; GPs: general practitioners; Further Exam: further examination; Info: Information; LRTIs: lower respiratory tract infections

DECLARATIONS

Ethical approval and consent to participate

Ethical approval for the study was granted by the Health Service Executive Mid-West Research Ethics Committee. Ethics Approval Number: 068/17.

Consent for publication

Not applicable

Availability of data and materials

The datasets generated and/or analysed during the current study are not publically available due to variables that could identify GPs through name of practice and location but are available from the corresponding author on reasonable request.

Competing Interests

The authors declare they have no competing interests.

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Authors Contributions

ROC conceived the study. AOR, JOD, CMcM, ROC were involved in the design of the study. ROC and CMcM collected the data. JOD and ROC inputted the data. AON carried out statistical analysis. ROC, CD, AOR and JOD wrote the first draft of the paper. All authors made critical comments on all drafts of the paper, as well as read and approved the final manuscript.

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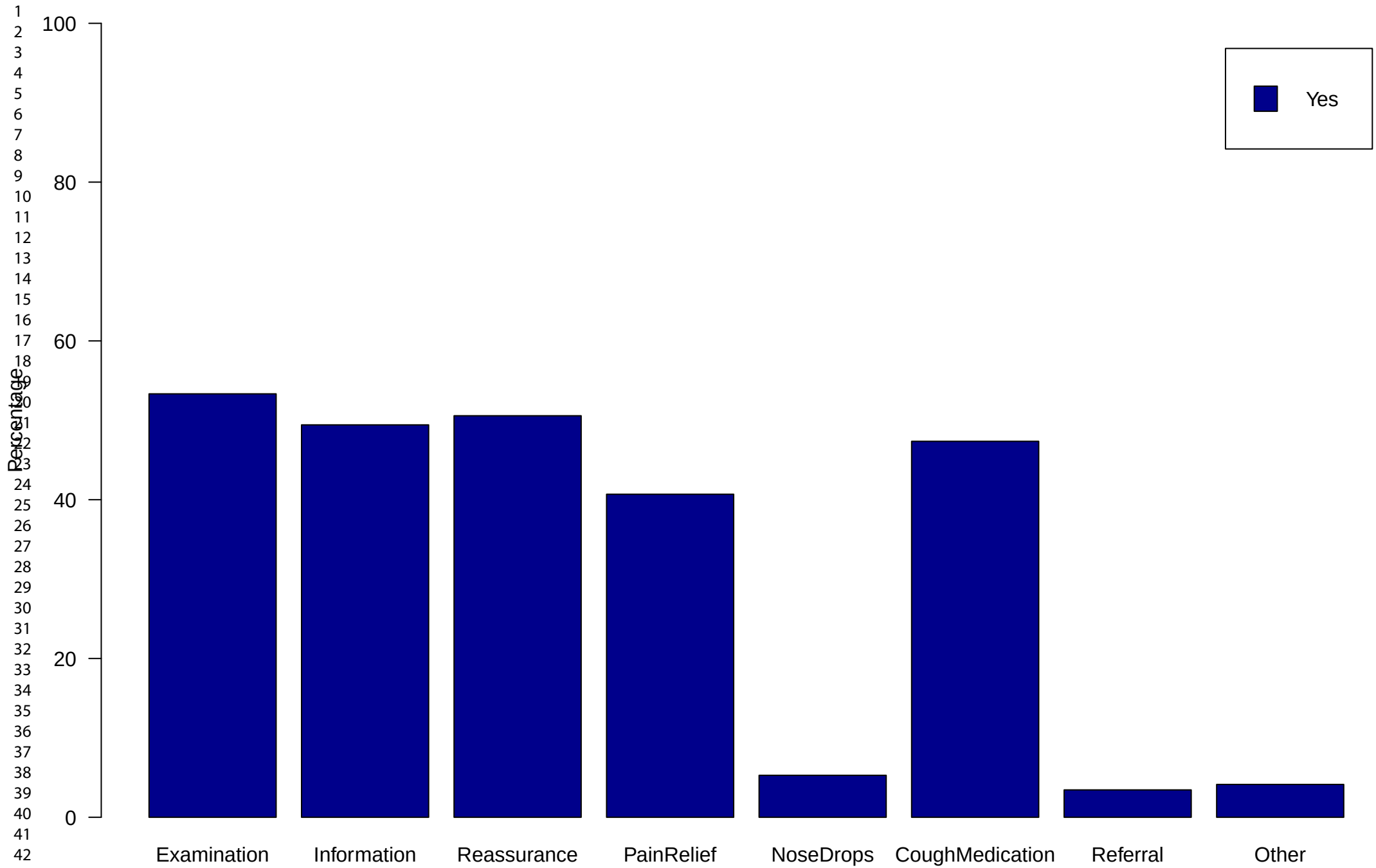

Study of The Treatment of Breathing Complaints of the Upper Airway

Appendix 1. Patient questionnaire.

Please complete the following for you (if you are the patient) or your child (if your child is the patient):

1. Age: Under 6 ❑ 6-25 ❑ 26-55 ❑ 56-70 ❑ Over 70 ❑

2. Gender: Male ❑ Female ❑

3. Medical card: Yes ❑ No ❑

4. Is it your first consultation with a GP or Shannondoc for this complaint? Yes ❑ No ❑

5. Do you expect to receive antibiotics for this illness? Yes ❑ No ❑ Unsure ❑

6. Reasons for seeing the doctor (please tick all that apply):	
Ear ache or discharge	
Complaints of nose/sinuses	
Common cold	
Throat ache	
Cough	
Other (please specify): *e.g. flu like symptoms*	

7. Do you expect to receive from the doctor (please tick all that apply):	
Further examination	
Information	
Reassurance	
Medication for pain relief	
Nose drops	
Medication for cough	
Referral to hospital or specialist	
Other (please specify):	

8. We may wish to contact you to discuss your experience in more detail as part of a follow up study. If you are happy to be contacted for this purpose then please provide your details below (please print):

Name: _____

Address: _____

Contact Telephone Number/Email:

_____

Please hand your completed questionnaire to the receptionist

SUPPLEMENTARY MATERIAL: AGE AND GENDER COMPARISION OF OUR SAMPLE WITH THOSE ATTENDING SHANNONDOC FACILITY DURING THE STUDY PERIOD

Table A: Gender Proportion of those attending OOH Facility with ARTI symptoms

		Shannondoc Dooradoyle* (n=1715)	**GEMS (n=435)**
Gender	Male	783 (39.4)	176 (40.5)
	Female	1205 (60.1)	259 (59.5)
*1988 with resp. complaints Counts (%) presented			

Shannondoc Dooradoyle*: This number refers to the population who attended the 'Shannondoc' Dooradoyle out of hours centre, where the study took place, during the study period.

Table B: Age of those attending OOH Facility overall during the study period

Shannondoc OOH Facility (n=11,455)**		
Age	**0-4**	4706 (41.1)
	5-64	5208 (45.5)
	65+	1541 (13.4)
UL Antibiotic Study (n=435)		
Age	**0-6**	186 (42.7)
	7-55	

		226 (51.9)
	56+	23 (5.3)
Counts (%) presented.		

Shannondoc OOH Facility:** This number refers to the entire population of patients who attended all 'Shannondoc' out of hours centres during the study period.

Table C: Eligibility for free care

		Shannondoc OOH Facility (Total=11,455)	**UL Antibiotic Study (Total=435)**
Eligible for Free Care	Yes	8477 (74)	244 (56)
	No	2978 (26)	191 (44)
Counts (%) presented			

Table D: Patient expectation for antibiotics for ARTI over the last 20 years.

Study	**Year**	**Location**	**Patient Expectation For Antibiotic for ARTI**
Hamm	1996	USA	65%
Shlomo Vinker	2003	Israel	25%
Martin	2004	USA	76%
Soma	2005	Norway	38%

Panagakau	2011	Greece	74%
McNulty	2013	UK	53%
Zyoud	2015	Palestine	73%
Wong	2017	China	10%
UL/Shannondoc	2018	Ireland	34%

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	3+4
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5-7
Objectives	3	State specific objectives, including any prespecified hypotheses	7
Methods			
Study design	4	Present key elements of study design early in the paper	7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	7
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	8
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	8-9
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	8-9
Bias	9	Describe any efforts to address potential sources of bias	N/A
Study size	10	Explain how the study size was arrived at	8
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	9
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	9
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	N/A
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(*e*) Describe any sensitivity analyses	N/A
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	10
		(b) Give reasons for non-participation at each stage	10
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	10
		(b) Indicate number of participants with missing data for each variable of interest	N/A
Outcome data	15*	Report numbers of outcome events or summary measures	11-12
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	11-12
		(*b*) Report category boundaries when continuous variables were categorized	10-14
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	[redacted] 12-14
Discussion			
Key results	18	Summarise key results with reference to study objectives	14-18
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	18
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	14-18
Generalisability	21	Discuss the generalisability (external validity) of the study results	18-19
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	20

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Medical Management of Acute Upper Respiratory Infections in an Urban Primary Care Out of Hours Facility; Cross Sectional Study of Patient Presentations and Expectations

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Abstract

Objectives: The purpose of this study was to examine the expectations of patients attending an urban primary care out of hours facility with acute upper respiratory tract infection (acute URTI) regarding clinical examination, symptom management, information on their condition, reassurance, antibiotic treatment and other possible options including referral

Design: Cross-sectional design

Setting: One urban primary care out of hours facility located in the Mid-West of Ireland.

Participants: 457 patients filled out a questionnaire while waiting in the out of hours facility, 22 surveys were excluded as the patients did not present with symptoms of acute URTI resulting in 435 patients' data being included in this study. There were 59.5% female participants and 40.5% male participants.

Results: 435 patients with acute URTI symptoms participated in the survey, representing 25.4% of those attending the single branch where the survey was conducted (n=1715). Of the study participants, 43% were aged under six years and 60% were female. The most common presenting symptoms were cough (72%), throat ache (46%) and common cold (26%). The most common expectations were for further examination (53%), reassurance (51%), information (49%) and medication for cough (47%), with 34% expecting an antibiotic.

Conclusions: Only one in three patients attending this primary care OOH facility with acute URTI symptoms had an expectation of antibiotics, with most seeking further assessment, information and reassurance. Recognition of such expectations may be important considerations for clinicians when deciding on management options for acute URTI patients.

Word Count: 3680

Strengths and limitations of this study.

The study used a previously validated questionnaire that was adapted and piloted by a multi-disciplinary research and clinical team.

The research was conducted over four consecutive months which would mitigate the effects of any public health campaigns aimed at reducing antibiotic use at the time.

As this is a single centre study, the population studied in this particular OOH service may not reflect those seen in OOH services throughout Ireland and/or the UK

The patient's desire for antibiotics was not assessed against the clinician-assessed need for antibiotics. Severity and duration of the illness was not assessed which may have affected patient expectation for antibiotics.

BACKGROUND

Antimicrobial resistance (AMR) is a growing threat to global public health [1]. Increasing consumption of antibiotics is associated with the development of antibiotic resistance at individual, community, national and international levels [2-5]. It is estimated that 25,000 people in the EU die annually as a result of infections caused by resistant bacteria, at a societal cost of approximately €1.5 billion annually [6]. Over the last 30 years, no major new types of antibiotics have been developed [7]. Therefore, antibiotic stewardship programmes, aiming to ensure the judicious use of antimicrobials by preventing their unnecessary use, have been established [1, 8-12].

Acute upper respiratory tract infection (acute URTI), which incorporates the term “upper respiratory infection” (URTI), includes infections such as otitis media, pharyngitis, sinusitis and acute bronchitis [13]. It is the most common reason for antibiotic prescription in adults [13] and children [14]. These prescriptions are often inappropriate in that they may be unnecessary, lead to increased antibiotic resistance and put patients at risk of adverse events [13]. Typically, inappropriate antibiotic prescribing occurs when a doctor prescribes an antibiotic that is not clinically indicated. The benefits of antibiotics are marginal for the management of most cases of acute URTI [15-22], including sore throat [23, 24]. Internationally, research shows that, with few exceptions [25], inappropriate prescribing of antibiotics for patients with mainly acute URTI is common [26-30]. This is thought to be related to a poor standard of knowledge among the general public regarding the usefulness of

antibiotics in acute URTI, with widespread belief that antibiotics work well for treating viral infections [31, 32].

It has been reported that 75% of overall antibiotic prescribing takes place in primary care [33]. For example, the majority of outpatient antibiotic prescriptions in the USA are for acute URTIs [13, 34]. In Ireland, the UK and many other countries, out of hours (OOH) services are an integral part of primary care provision, providing primary care outside of 'core' contracted hours during weekday evenings and nights and on weekends or bank holidays. This care is usually for clinical cases that are deemed to be of sufficiently urgent nature that they cannot wait until the next available routine consulting period. Internationally, acute URTIs are estimated to constitute 9% of the consultations in general practice, while the corresponding proportion in the OOH service is 16.7% [35]. Hence, this service handles a substantial proportion of acute URTIs and is, thereby, potentially an important contributor to overall antibiotic consumption.

Patterns of antibiotic prescribing that clearly do not adhere to guidelines have been reported [36, 37]. In some regions, this has contributed to a 25% rate of antibiotic prescribing for children with fever in an OOH setting [38]. Giesen described how national clinical guidelines are not suited to the context of the OOH setting leading to clinical uncertainty for doctors [39]. This has resulted in quality of antibiotic prescribing being less than optimal [40]. Trends in prescribing have also suggested that there may be a partial displacement of antibiotic prescribing from in-hours to the OOH setting, where patients with acute infective symptoms seeking antibiotics present to the OOH service after refusal by the in-hours general practice [41]. In contrast, other studies have shown antibiotic prescription rates to be similar in the OOH setting compared with the daytime in-hours setting [35, 42].

While it is true that poor public understanding of the usefulness of antibiotics in acute URTI may increase patient expectation for antibiotic prescription, there is evidence that clinical examination and explanation of the diagnosis is important to patients' satisfaction with the consultation [43]. It has also been shown that taking a patient's concerns seriously, conducting a physical examination, communicating a treatment plan and explaining treatment decisions all increase patient satisfaction with the management of acute URTI [44].

One of the most important factors influencing doctors prescribing of antibiotics for acute URTI is patient expectation [45-59]. However, doctors often overestimate the level of this expectation [54, 60-63].

Hence, there is an important need to determine what patients presenting to an OOH centre with acute URTI symptoms are expecting from their consultation with the healthcare professional (HCP). The purpose of this study was to examine patients' expectations of clinical examination, symptom management, information on their condition, reassurance, antibiotic treatment and other possible options including referral. This insight into patient expectation will inform HCPs dealing with patients presenting with acute URTI in an OOH setting.

METHODS

Study Setting

The 'Shannondoc' primary care OOH facility (hereinafter referred to as 'the OOH facility') in Limerick City, in the Mid-West of Ireland is the regional primary care setting for treating patients between the hours of 6 pm to 8 am on weekdays and at all hours over weekends. The OOH facility has 12 branches throughout the region. It has a mixed private-public system with 45% of the population eligible for free care under a means-tested General Medical

Services (GMS) card or doctor visit only card which is issued by the Irish Health Service Executive [64]. Eligibility criteria for free medical care include: age under six or over 70 years; or earning below a certain figure based on family size. This group is hereinafter referred to as those eligible for free care. GPs (general practitioners) (who are self-employed) are paid a 'per capita' fee by the state for their care. These patients do not pay directly for GP consultations whereas patients without a card pay an average of €55 per consultation.

Participants

Each day reception staff distributed the paper-based questionnaires along with information and consent forms to patients in the waiting room, prior to their consultation. The trained reception staff are experienced at working in a supervised clinical setting out of hours. Only patients attending with symptoms of acute URTI were invited to participate in the study. For those aged under 18 years, parents or guardians were asked to complete the questionnaire. Reception staff were briefed by a member of the research team (ROC) on the aims of the study and given a list of acute URTI symptoms. All questionnaires were completed at the OOH facility. Completed forms were securely stored in the University of Limerick Graduate Entry Medical School building.

Sample Size

It was calculated that a random sample of 400 patients would be required to estimate the percentage of patients expecting a prescription for antibiotics with 95% confidence and a margin of error of 5%. While our sample is not randomly selected, this sample size calculation was used to guide recruitment.

Measures

The questionnaire used was adapted from an instrument used by a recent study of patient experiences of antibiotic prescribing by non-medical practitioners [44]. The modifications made to the original instrument were: eliminating the post consultation element which asked patients what treatment they were given and ranking their satisfaction with various aspects of the consultation. All patients provided information regarding their age, gender, eligibility for free care and whether this was their first consultation with their GP or the OOH facility for the current complaint.

Other data collected included:

- Expecting antibiotics: Yes, no, unsure
- Reasons for seeing the GP: Earache or ear discharge, complaints of nose/sinuses, common cold, throat ache, cough, other reasons e.g. flu like symptoms
- What did they expect to receive from the GP: Further examination, information, reassurance, medication for pain relief, nose drops, medication for cough, referral to hospital or specialist, other

The modified questionnaire was piloted among non-medical staff and students in the medical school who were not associated with the study to ensure face validity (see appendix 1). Completed questionnaires were de-identified for storage where patients had entered identifying data on the questionnaire during its completion.

Data analysis

Descriptive statistics were used to explore the demographic profile, patient symptoms and patient expectations. Variables were summarized using graphical and numeric descriptive statistics. Categorical variables were described using counts and percentages. The

demographic characteristics of the sample and known characteristics of the population attending the OOH facility with acute URTI symptoms were compared. The percentage of the sample with an expectation of antibiotics was calculated with a 95% confidence interval. The difference and corresponding 95% confidence interval for the difference between two independent proportions (expectation of antibiotics by gender, age group, eligibility for free care and first consultation) was calculated. The Z test for independent proportions was used to investigate differences between proportions. SPSS Version 24 and R software were used for the statistical analysis. Ethical approval for the study was granted by the Health Service Executive Mid-West Research Ethics Committee reference number 068/17.

Patient and Public Involvement

Patients were not involved in the design of the study. Patient data was collected but no identifying data was included in this study. Patients were recruited by staff at the out of hours service based on their physical symptoms of acute URTI. Patients will be able to view the results of this study when it is published in a peer reviewed journal.

RESULTS

Patient characteristics

A total of 457 questionnaires were collected during the time period of the study. When reviewing the data, 22 questionnaires were excluded as patients presented with non-acute URTI symptoms. This yielded a total of 435 questionnaires related to patients with symptoms of acute URTI. This sample represents one in four of the 1715 patients with acute URTI who attended this treatment centre from October 2017-February 2018 and 3.8% of the 11,455

face-to-face consultations for acute URTI at all treatment centres of the OOH service in the region during the same period. Patient characteristics and pre-consultation expectation for antibiotic treatment are summarised in Table 1.

The majority of the sample was female (60%) and over half (56%) were eligible for free care. The most common age group was under six years of age (43%). Two hundred and twenty-one respondents (50.8%) indicated that this was not their first consultation for this illness. The demographic characteristics of the sample and known characteristics of the population attending the OOH facility with acute URTI symptoms are presented in Supplementary Material (Tables A, B and C). Compared to the demographic characteristics of the population attending the OOH facility with acute URTI, patients who were eligible for free care were under-represented in the sample (56% vs 74%). The age and gender profile of our sample compared to the OOH facility was similar (see Supplementary Material; Tables A, B and C). Older people (over the age of 56 years) are poorly represented in our sample, making up only 5.3% of the population studied.

Table 1: Patient characteristics and pre-consultation expectations of antibiotics (n=435)

Patient Characteristics and pre-consultation antibiotic expectations	n (%)
Gender	
Male	176 (40.5)
Female	259 (59.5)
Age (Years)	
Under 6	186 (42.8)

6-25	130 (29.9)
25-55	96 (22.1)
56+	23 (5.3)
Eligibility for Free Care	
Yes	244 (56.1)
No	191 (43.9)
First medical consultation for this complaint	
Yes	214 (49.2)
No	221 (50.8)
Expecting Antibiotics Pre Consultation	
Yes	149 (34.3)
No	45 (10.3)
Unsure	241 (55.4)

Presenting Symptoms

Patients presented with varying symptoms; many of them reported multiple symptoms. Cough was the most common (72%), followed by throat ache (46%). The least common symptoms included earache or discharge (15%) and complaints of nose/sinuses (24.1%). These symptoms are displayed in Table 2.

Patient Expectations

Patient expectations for each symptom are illustrated in figure 1 and described in table 2. Table 2 also gives the overall expectation for each potential response of the HCP. The most commonly expressed expectations were for further examination (53%), reassurance (51%),

information (49%) and medication for cough (47%). Patients least expected to receive nose drops (5%) or a referral to hospital or specialist (3%). Thirty four percent (95% CI = 30%, 39%) of patients expected to receive an antibiotic, 10% (95% CI = 8%, 14%) did not expect to receive and antibiotic and the majority (55%, 95% CI = 50%, 60%) were unsure whether they would need an antibiotic or not (Table 1).

We explored all the differences between expectation of antibiotics by age group, gender, eligibility for free care and whether or not this was the patient's first consultation for this illness. The results are presented in supplementary table D.

Males were more likely to not expect antibiotics (16%) compared to 7% of females (difference 9%, 95% CI for the difference 3% to 16%, p=0.002). While those eligible for free care were more likely to expect antibiotics (38%) compared to those who were not eligible (30%), the difference was not statistically significant (difference 4%, 95% CI for the difference -1% to 17%, p=0.09). Patient's receiving a subsequent consultation were more likely to expect an antibiotic (37%) compared to 31% receiving their first consultation, however this difference was not statistically significant (difference 6%, 95% CI for the difference = -3% to 15%, p=0.20). No significant patterns were observed in the expectation of antibiotics by age group (Supplementary Table D).

Figure 1: Patient Overall Expectations

Differences between patient expectation, expecting an antibiotic and symptom presented

Patient expectations for each symptom are described in Table 2. For each symptom presented, patient expectations of further examination, information or reassurance were

similar, with approximately half those who presented with each symptom reporting an expectation to receive these treatments. A large proportion of patients presenting with symptoms of an earache (67%) or cough (65%) reported expecting to receive pain relief. A large proportion of patients presenting with sinusitis (60%) or cough (62%) symptoms reported expecting to receive cough medication.

Table 2: Patient expectations for each symptom

Symptom*	Patient Expectation						
	Further Exam	Info	Reassure	Pain relief	Nose Drops	Cough Medicine	Referral
Earache (n=64, 14.7%)	39 (60.9)	34 (53.1)	30 (46.9)	43 (67.2)	6 (9.4)	23 (35.9)	0 (0.0)
Sinuses (n=105, 24.1%)	53 (50.5)	56 (53.3)	53 (50.5)	47 (44.8)	14 (13.3)	63 (60.0)	5 (4.8)
Common cold (n=114, 26.2%)	64 (56.1)	54 (47.4)	62 (54.4)	53 (46.5)	10 (8.8)	64 (56.1)	5 (4.4)
Throat Ache (n=202, 46.4%)	104 (51.5)	99 49.0)	96 (47.5)	115 (56.9)	13 (6.4)	101 (50.0)	8 (4.0)
Cough (n=314, 72.2%)	164 (52.2)	159 (50.6)	161 (51.3)	109 (34.7)	19 (6.1)	195 (62.1)	12 (3.8)
Other (n=169, 38.9%)	104 (61.5)	99 (58.6)	119 (70.4)	59 (34.9)	9 (5.3)	64 (37.9)	8 (4.7)
Overall expectation**	528	501	521	426	71	510	38
Counts (%) presented.							

*Represents those who presented with symptom (yes response)

** As many patients presented with multiple symptoms, the count exceeds the number of patients surveyed

Table 3 presents differences in antibiotic expectations. Patients presenting with symptoms of an earache (44%) or throat ache (39%) were most likely to expect antibiotics. The majority of patients across all symptoms where 'unsure' whether they would require antibiotics.

Table 3: Antibiotic expectations of those presenting with different symptoms

		Patients expecting an antibiotic		
Symptoms*		Yes (n=149, 34.3%)	No (n=45, 10.3%)	Unsure (n=241, 55.4%)
Earache or discharge: (15%)	64	28 (43.8)	6 (9.4)	30 (46.9)
Complaints of nose/sinuses: (24%)	105	35 (33.3)	10 (9.5)	60 (57.1)
Common cold: (26%)	114	43 (37.7)	8 (7.0)	63 (55.3)
Throat Ache: (46%)	202	79 (39.1)	12 (5.9)	111 (55.0)
Cough: (72%)	314	100 (31.8)	31 (9.9)	183 (58.3)
Other: (39%)	169	44 (26.0)	25 (14.8)	100 (59.2)

Count (%) presented.

* Represents those who presented with symptom (yes response)

DISCUSSION

Our finding that 34% of those attending an out of hours centre with acute URTI symptoms expected to be prescribed antibiotics prior to seeing the doctor is clinically relevant. The international literature over the last 20 years indicates that patient expectation for antibiotics for management of acute URTI varies from 10% (47) to 74% [65]. In our study, patient expectation for antibiotic treatment ranks third lowest in this literature and second lowest among studies published in the last 10 years. In a qualitative study, Dempsey et al reported a recent decrease in demand for antibiotics for acute bronchitis [58], however continued significant demand for antibiotics for acute URTI is evident. This is illustrated in Table E in Supplementary Material.

The statistically significant difference in expecting an antibiotic for gender and age whereby males were less likely to expect an antibiotic than females and older people (56+) are more likely to be 'unsure' whether they will need antibiotics or not (70%) may be helpful to the HCP in communicating with the patient regarding the risk/benefit balance of antibiotic treatment for acute URTI. Also the finding of no difference between those who are entitled to free care (medical card holders) and those who aren't, in their expectations of receiving antibiotics indicates that economic factors (whether or not the patient is paying for the consultation) are not of major importance in antibiotic expectation.

GPs and other primary care doctors are more likely to prescribe antibiotics to patients who expect them or whom they believe expect them [45-59]. It has been suggested that 'patient expectations' is an all-encompassing phrase that includes other reasons such as limited time,

poor doctor–patient communication and diagnostic uncertainty [45]. Therefore knowing that only 34% of patients attending an OOH service expect an antibiotic for their acute URTI symptoms and that this expectation is not associated with eligibility for free care helps in the clinical decision making process and allows doctors to concentrate more on the medical need.

Doctors may overestimate the pressure to prescribe antibiotics for acute cough [60-62] or other acute respiratory illnesses [54], often prescribing antibiotics for patients who did not request them [63]. Wong et al studying a Chinese primary care population presenting with acute URTI symptoms, found that concern about illness severity and obtaining a prescription for symptomatic medications, rather than obtaining a prescription for antibiotics, were the main reasons for patients consulting [47]. Ong et al found, in a study of patients attending an emergency department with acute URTI symptoms, that doctors were only able to identify 1 in 4 of those patients who expected antibiotic treatment for their symptoms [54]. The same study also found that patient satisfaction was not related to receipt of antibiotics but was related to the belief they had a better understanding of their illness [54].

There is some evidence that patients are less satisfied in general practices that have frugal antibiotic prescribing practices in general [66]. However this retrospective study from England with a 36% response rate did not estimate the effect of communication skills. It could be argued that with enhanced communication skills and with the HCP eliciting and addressing the patients concerns, the satisfaction rating for frugal prescribers would be considerably higher.

Several studies have shown that private patients who pay for their consultations [47, 67, 68], as well as those of lower socioeconomic status [51, 69-72] are more likely to be prescribed antibiotics for acute URTI. Our study showed no association between a patient's eligibility for free care (or paying for their consultation) and expectation of an antibiotic for their acute

URTI. Because this eligibility was either due to age (under 6 and over 70 years of age) or income, it is difficult to draw direct conclusions. However, most importantly and in contrast to earlier studies [47, 67-68], patient expectation for antibiotics was found to be unrelated to having access to free care.

In a study of non-medical practitioners (NMPs), Courtenay et al found reduced levels of satisfaction among patients who expected but did not receive an antibiotic [44]. This figure indicates that although NMPs appear to have strategies for managing acute URTI consultations, there is still scope for improvement and these prescribers are therefore an important group to involve in antimicrobial stewardship [44]. Antimicrobial stewardship programs should continue to expand in the outpatient setting and should emphasize the importance of clear and direct communication between patients and physicians [59, 73]. Patients from our study anticipated further examination, information and symptomatic treatment. These findings closely echo those of recent studies [44, 47, 54]. It is important to continue with public health campaigns to educate the public on the ineffectiveness of antibiotics in treatment of acute URTI, which has been shown to reduce public expectation for antibiotics in such cases [74].

Our sample represented 25% of the 1715 patients with acute URTI who attended the single branch of the OOH facility from October 2017-February 2018 where all the sampling was conducted. All patients had acute URTI symptoms. Although older people are under-represented, the overall gender profile of those attending at the OOH facility with acute URTI symptoms are broadly similar to those investigated in this study (see tables A and B in Supplementary Material), suggesting that our results are representative of those attending at the OOH facility during the study period. However, the proportion of those surveyed who were eligible for free care differed considerably to the overall proportion of those attending at the OOH facility with acute URTI during the study period (56% compared to 74%). It can

also be argued that people who decide that their illness is severe enough that they need to see a locum GP in an out of hours service in the weekend, evening or late at night and pay at least €55 as a fee for doing so have a much greater motivation for getting an antibiotic prescription. Any other medication that they receive from the GP (e.g. analgesia, cough bottles and antipyretics) does not require a prescription. The fact that 2/3 of respondents were unsure of whether they expected to receive an antibiotic or did not expect to receive one is indicative that the message on AMR and the overuse of antibiotics has reached the mind set of those attending an out of hours centre.

It is difficult to explain why over 50% of respondents had previously consulted for this particular complaint. We did not ask when this previous consultation had taken place. Repeat consultation rates of between 15% and 20% in children with acute URTI and between 20% and 30% in adults with lower respiratory tract infections (LRTIs) have been described [75]. Between a half and two thirds of adults with LRTI who re-consult are prescribed antibiotics, despite little evidence of an infection requiring antibiotics [75]. However an important finding from this study was that no association was identified between whether this was the patient's first or subsequent consultation for the presenting illness and their expectation of being prescribed an antibiotic.

This study contains several strengths. We used a previously validated questionnaire that was adapted and piloted by a multi-disciplinary research and clinical team. The research was conducted over four consecutive months which would mitigate the effects of any public health campaigns aimed at reducing antibiotic use at the time. Patients or guardians filling in the short and anonymous questionnaire before the consultation in the waiting room meant that respondents were more likely to be honest in their opinion. The gender profile of our sample is broadly similar to that of the population attending during the study period with acute URTI symptoms, although older people are under-represented. Reception staff received

training from the research team and were tasked with identifying and recruiting participants, ensuring that only those with acute URTI symptoms were surveyed. The higher number of private patient respondents helped to ensure that the finding that they do not expect antibiotics is reliable. Previous studies of this subgroup have indicated that they have a higher expectation for antibiotics for acute URTI.

There are also some limitations. Our study surveyed people attending only one urban OOH service. It is possible that those who refused to participate in the survey were more severely ill than those who did and were more likely to look for antibiotics (approximately 5% of those requested, refused to participate). The demographics of those who refused to participate were not studied. As this is a single centre study, the population studied in this particular OOH service may not reflect those seen in OOH services throughout Ireland and/or the UK.

Another limitation is that ours was not a randomly selected sample. The non-probability nature of our sample means that bias may have been introduced and some groups under-represented.

While every effort was made to ensure that this was a representative sample of those attending with acute URTI, it is possible that the results were skewed as those eligible for free care was slightly lower than the centres overall population. Older people (over the age of 56 years) are poorly represented in our sample. It is possible that the results would have been different if older people were better represented. Reception staff who were not medically trained were charged with the tasks of distributing questionnaires. This is a potential limitation in that they may have not correctly identified (and therefore missed) a cohort of patients who had acute respiratory tract infections. However the note of the patient's initial presenting symptom to the call centre was available to reception staff which would have minimised this. The patient's desire for antibiotics was not assessed against the clinician-

assessed need for antibiotics. However the point of the study was to assess overall patient expectation. Severity and duration of the illness was not assessed which may have affected patient expectation for antibiotics.

CONCLUSIONS

A large proportion of those attending out of hours GP service do not have fixed ideas regarding antibiotics and are seeking further assessment, information and reassurance. Most seem to be amenable to not receiving an antibiotic for their illness if their underlying needs are met. This group includes patients eligible for free care as well as those paying for their consultation. Communication and clinical skills of healthcare professionals need to be optimised to ensure reduction in antibiotic prescribing.

Recommendations for Further Research

The high number of repeat attendances for acute URTI requires further study. A qualitative study of patients attending OOH setting to elicit what their intentions are for attending and their understanding of AMR is also appropriate.

Abbreviations

AMR: antimicrobial or antibiotic resistance; acute URTI: acute upper respiratory tract infection; URTI: upper respiratory tract infection; OOH: out of hours; HCP: healthcare professional; GPs: general practitioners; Further Exam: further examination; Info: Information; LRTIs: lower respiratory tract infections

DECLARATIONS

Ethical approval and consent to participate

Ethical approval for the study was granted by the Health Service Executive Mid-West Research Ethics Committee. Ethics Approval Number: 068/17.

Consent for publication

Not applicable

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due to variables that could identify GPs through name of practice and location but are available from the corresponding author on reasonable request.

Competing Interests

The authors declare they have no competing interests.

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Authors Contributions

ROC conceived the study. AOR, JOD, CMcM, ROC were involved in the design of the study. ROC and CMcM collected the data. JOD and ROC inputted the data. AON carried out statistical analysis. ROC, CD, AOR and JOD wrote the first draft of the paper. All authors made critical comments on all drafts of the paper, as well as read and approved the final manuscript.

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Data Availability statement

Deidentified participant data are available upon request from the principal author Dr Raymond O'Connor for a 6 month time period from publication. Reuse is permitted with the consent of all of the authors. There is no additional information available. Email Raymond.oconnor@ul.ie

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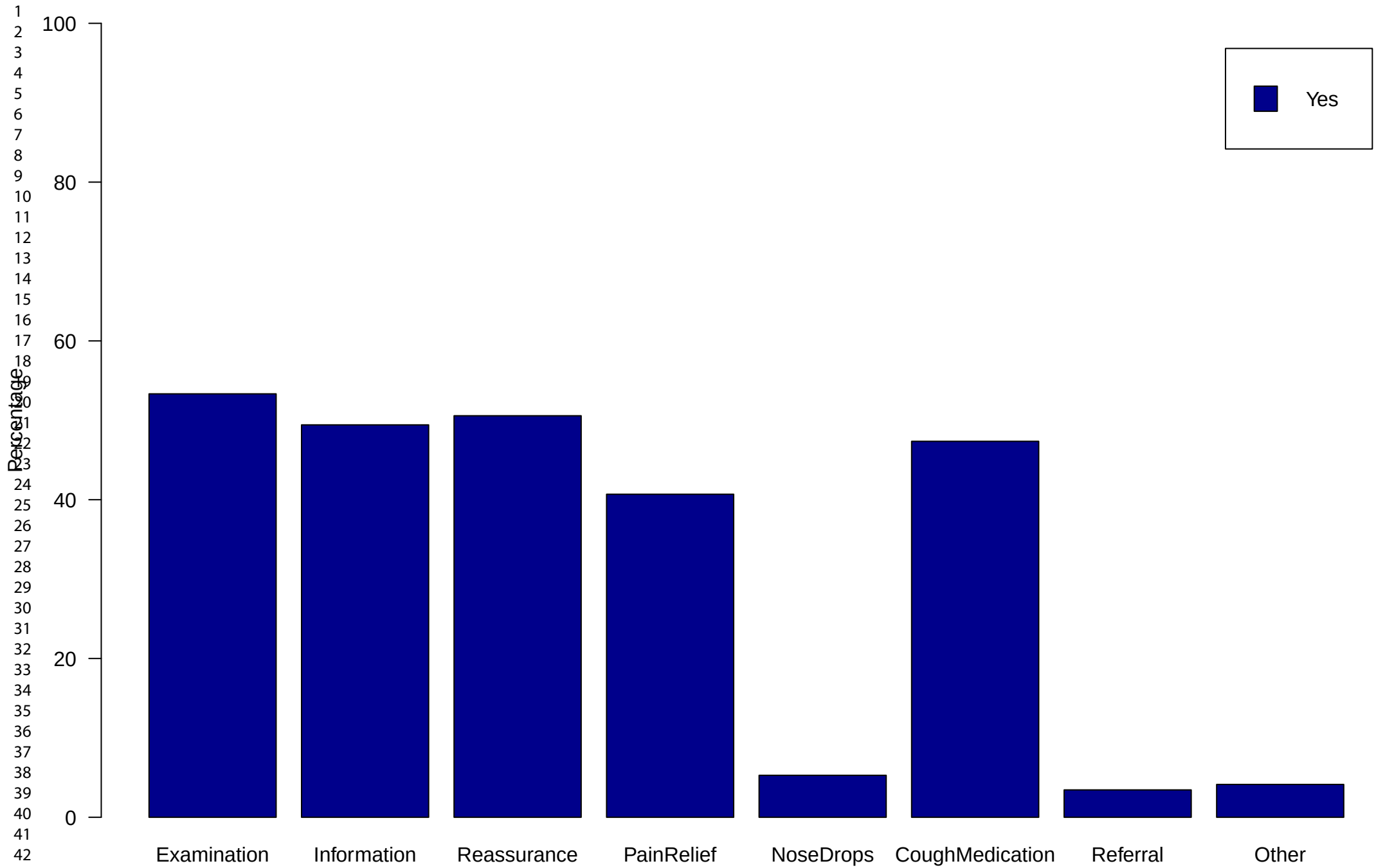

SUPPLEMENTARY MATERIAL: AGE AND GENDER COMPARISION OF OUR SAMPLE WITH THOSE ATTENDING SHANNONDOC FACILITY DURING THE STUDY PERIOD

Table A: Gender Proportion of those attending OOH Facility with ARTI symptoms

		Shannondoc Dooradoyle* (n=1715)	GEMS (n=435)
Gender	Male	783 (39.4)	176 (40.5)
	Female	1205 (60.1)	259 (59.5)
*1988 with resp. complaints Counts (%) presented			

Shannondoc Dooradoyle*:This number refers to the population who attended the µ6KDQQRQGRF¶ 'RRUDGR\OH Centre, where the study took place, during the study period.

Table B: Age of those attending OOH Facility overall during the study period

Shannondoc OOH Facility** (n=11,455)		
Age	0-4	4706 (41.1)
	5-64	5208 (45.5)
	65+	1541 (13.4)
UL Antibiotic Study (n=435)		
Age	0-6	186 (42.7)
	7-55	

		226 (51.9)
	56+	23 (5.3)
Counts (%) presented.		

Shannondoc OOH Facility**: This number refers to the entire population of patients who

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Table C: Eligibility for free care

		Shannondoc OOH Facility (Total=11,455)	UL Antibiotic Study (Total=435)
Eligible for Free Care	Yes	8477 (74)	244 (56)
	No	2978 (26)	191 (44)
Counts (%) presented			

Table E: Patient expectation for antibiotics for ARTI over the last 20 years.

Study	Year	Location	Patient Expectation For Antibiotic for ARTI
Hamm	1996	USA	65%
Shlomo Vinker	2003	Israel	25%
Martin	2004	USA	76%
Soma	2005	Norway	38%

Panagakau	2011	Greece	74%
McNulty	2013	UK	53%
Zyoud	2015	Palestine	73%
Wong	2017	China	10%
UL/Shannondoc	2018	Ireland	34%

Supplementary Table D: Differences in expectation of antibiotics										
		Yes (vs no/unsure)			Unsure (vs yes/no)			No (vs yes/unsure)		
		%	Difference (95% CI difference	p-value	%	Difference (95% CI difference	p-value	%	Difference (95% CI difference)	p-value
Gender	Males	32%	4% (-5%, 13%)	0.38	52%	5% (-4%, 15%)	0.28	16%	9% (3%, 16%)	0.002*
	Females	36%			58%			7%		
Age	<56	34%	4% (-17%, 20%)	0.69	55%	15% (-6%, 31%)	0.16	11%	11% (-7%, 14%)	0.09
	56+	30%			70%			0%		
Eligibility for Free Care	Yes	38%	8%(-1%, 17%)	0.09	53%	6% (-4%, 15%)	0.23	9%	2% (-4%, 10%)	0.48
	No	30%			59%			12%		
First Consultation	Yes	31%	6% (-3%, 15%)	0.20	59%	7% (-2%, 16%)	0.15	10%	1% (-5%, 7%)	0.72
	No	37%			52%			11%		

Study of The Treatment of Breathing Complaints of the Upper Airway

Appendix 1. Patient questionnaire.

Please complete the following for you (if you are the patient) or your child (if your child is the patient):

1. Age: Under 6 ‰ 6-25 ‰ 26-55 ‰ 56-70 ‰ Over 70 ‰

2. Gender: Male ‰ Female ‰

3. Medical card: Yes ‰ No ‰

4. Is it your first consultation with a GP or Shannondoc for this complaint? Yes ‰ No ‰

5. Do you expect to receive antibiotics for this illness? Yes ‰ No ‰ Unsure ‰

6. Reasons for seeing the doctor (please tick all that apply):	
Ear ache or discharge	
Complaints of nose/sinuses	
Common cold	
Throat ache	
Cough	
Other (please specify): e.g. flu like symptoms	

7. Do you expect to receive from the doctor (please tick all that apply):	
Further examination	
Information	
Reassurance	
Medication for pain relief	
Nose drops	
Medication for cough	
Referral to hospital or specialist	
Other (please specify)	

8. We may wish to contact you to discuss your experience in more detail as part of a follow up study. If you are happy to be contacted for this purpose then please provide your details below (please print):

Name: _____

Address: _____

Contact Telephone Number/Email: _____

Please hand your completed questionnaire to the receptionist

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	3+4
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5-7
Objectives	3	State specific objectives, including any prespecified hypotheses	7
Methods			
Study design	4	Present key elements of study design early in the paper	7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	7
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	8
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	8-9
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	8-9
Bias	9	Describe any efforts to address potential sources of bias	N/A
Study size	10	Explain how the study size was arrived at	8
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	9
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	9
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	N/A
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(*e*) Describe any sensitivity analyses	N/A
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	10
		(b) Give reasons for non-participation at each stage	10
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	10
		(b) Indicate number of participants with missing data for each variable of interest	N/A
Outcome data	15*	Report numbers of outcome events or summary measures	11-12
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	11-12
		(*b*) Report category boundaries when continuous variables were categorized	10-14
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	[redacted] 12-14
Discussion			
Key results	18	Summarise key results with reference to study objectives	14-18
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	18
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	14-18
Generalisability	21	Discuss the generalisability (external validity) of the study results	18-19
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	20

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.