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Previous antibiotic-related adverse drug reactions do not reduce expectations for antibiotic treatment of upper respiratory tract infections

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ABSTRACT

Background: Patients' expectations may influence prescribers' decisions about antibiotic prescribing for upper respiratory tract infection (URTI). We examined whether a history of an antibiotic related adverse drug reaction (aADR) influenced a person's perception about the safety of antibiotics or their expectation of receiving an antibiotic prescription for an URTI.
Methods: We developed a questionnaire and surveyed 103 hospital inpatients, 38 of whom (37%) reported past experience of aADR.
Results: Of the 88 participants who reported recent antibiotic use, participants with a history of aADR reported increased perception of harm from their last antibiotic treatment ($P < 0.05$). Overall, 41/103 (40%) participants expected their doctors to prescribe antibiotics to treat an URTI. Participants' perceptions of antibiotic safety or expectation of antibiotic treatment for an URTI did not differ between those who had personal experience of an aADR compared with those with no history of aADR.
Conclusions: The almost universal belief that antibiotics are safe, beneficial medications, even among people with prior aADR, helps to explain the strong patient expectations for antibiotic treatment in a range of conditions. Educational campaigns about the prescription of antibiotics for viral URTI should include information that the risk of harm far outweighs any potential benefits.

Keypoints: 37% of participants reported prior antibiotic adverse drug reaction, which were perceived as being severe. Participants who reported prior aADR were more aware of antibiotic harm, but were not less likely to consider antibiotics to be safe medications.

1. Introduction

Antimicrobial resistance is one of the major threats to human health — infections caused by multi-resistant bacteria are associated with worse clinical outcomes, and increased cost [1]. In comparison with many other developed countries, New Zealand has high rates of antibiotic consumption [2]. Reduction in antibiotic prescribing for illnesses where they have negligible benefit (e.g. viral upper respiratory tract infection, URTI) can reduce antibiotic consumption [3,4,5]; and, hence, slow the spread of antibiotic resistant bacteria.

The decision to prescribe an antibiotic to a patient with URTI is a complex one, and is strongly influenced by patient factors [6,7]. Primary care clinicians in the United States acknowledged that antibiotic over-prescribing was common; but individual clinicians felt that other clinicians were responsible for overprescribing, which they thought was driven by patients' demands [8]. Patients' expectations to be prescribed an antibiotic are directly associated with increased antibiotic prescribing but are not related to the severity of illness or the illness outcomes [7]. When clinicians were asked for their proposals to reduce patient-driven overprescribing, the main strategy recommended was to improve the health literacy of patients [8].

Health literacy, the capacity to obtain and understand information about health and healthcare, is an essential factor in allowing people to make sensible decisions about their own

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healthcare. Educational level is one of the key determinants of health literacy [9,10,11], and efforts to improve health literacy through educational interventions have had marked success. A brief pharmacy-based educational intervention almost doubled the rates of perfect adherence to a course of antibiotics [12]. Education about URTI provided to parents and caregivers reduced both healthcare visits and inappropriate medication use in their families [13].

Despite these successes, little is known about the general population's infection-related health literacy [6]. The available data indicates that patients' knowledge about URTI is rudimentary [11,14]. Low levels of infection-related health literacy are associated with increased consumption, including inappropriate self-medication with antibiotics [14]. Improved understanding about how patients' own experiences inform their understanding of the actual risks and benefits of antibiotic treatment for viral URTI may provide insights into how to most effectively increase URTI-related health literacy.

One of the primary reasons to reduce antibiotic overprescribing to patients with viral URTI is to slow the development of antibiotic resistance; however, the threat of antibiotic resistance is likely to have relatively little impact on patients' expectations of antibiotic prescribing. Knowledge and understanding of the factors involved in antibiotic resistance requires very high levels of health literacy — detailed knowledge of the mechanisms of bacterial antibiotic resistance is, for most healthcare professionals, unnecessary in their daily roles.

Another compelling argument to reduce antibiotic overprescribing to patients with viral URTI is to reduce patient harm from adverse drug reactions (ADR) [15]. Collectively, antibiotics are the drugs that most commonly cause serious ADRs in inpatients [16]; and they are the most common cause of ADR-related visits to emergency departments [17]. The burden of less serious antibiotic related ADRs (aADRs) is not known, but it is estimated that up to 25% of antibiotic treatment courses result in antibiotic related diarrhoea [15]. Whilst diarrhoea might be considered a relatively minor aADR from a clinician's perspective, from patients' perspectives antibiotic related diarrhoea has been reported to cause marked distress and "collapse of their social lives" [18].

We surveyed hospital inpatients, expected to often have recent experience of antibiotic treatment, to estimate: (i) patients' perceptions of the harms and benefits of recent antibiotic treatment; (ii) patients' perceptions of the severity of past aADRs; and (iii) patients' perceptions about the safety of antibiotic treatment. Our primary aim was to examine whether a history of an aADR influenced a person's perception about the safety of antibiotics or their expectation of receiving an antibiotic prescription for a viral URTI.

2. Methods

2.1. Participants and setting

Auckland City Hospital is a large tertiary care hospital located in the centre of NZ's largest city. It provides government subsidised secondary care to approximately 464,000 of Auckland's 1.42 million residents.

On six occasions between March and May 2015, a group of four investigators invited adult inpatients over the age of 18 on general medical and orthopaedic wards of Auckland City Hospital to answer a short questionnaire (appendix). No formal exclusion criteria were used, but people who were unable to participate due to illness (e.g. neurological disease or cognitive impairment) were not invited to participate.

2.2. The questionnaire

Although use of an established health literacy tool would allow for comparison with previous research [19], existingquestionnaires may have some shortcomings [20] and did not include questions about the type of information required for our aims. Thus, each of the investigators designed potential questionnaire items. These suggestions were reviewed during a series of meetings until a draft questionnaire was developed. The draft questionnaire was trialled on several academic staff at the University of Auckland, and several ambiguous questions were removed.

We aimed to seek opinions and perceptions about four themes: experience of recent antibiotic use, perceptions of the safety and harms of antibiotic use, previous experience of aADRs, and healthcare behaviours regarding URTI.

The majority of the questions were designed to examine each participant's opinion, therefore a visual scale from 1 to 9 was used to indicate the degree to which they agreed, or disagreed, with each questionnaire item.

Prior to surveying participants the investigators met and reviewed the questionnaire carefully, in an effort to reduce variability between investigators. All participants were informed that a score of 5 corresponded to a neutral response, a score between 6 and 9 indicated varying levels of agreement with the questionnaire item and a score between 1 and 4 indicated varying levels of disagreement.

2.3. Measures and analysis

Participant ethnicity was self-reported and the ethnicities of participants who identified with multiple ethnic groups were prioritised in accordance with NZ Ministry of Health guidelines [21]. The socioeconomic status of each person was estimated from each participant's address using the NZDep index [22]. The NZDep index is derived from various measures of socioeconomic status (e.g. household income, employment levels, education levels) for small geographical areas using data obtained from the 2013 NZ Census. It is commonly expressed as a decile score (10 is most deprived) and we grouped NZDep scores into low deprivation (NZDep 1–4), medium deprivation (NZDep 5–7) and high deprivation (NZDep 8–10).

In order to test whether our questionnaire elicited different responses from participants with different levels of education (or other demographic factors) we used PERMANOVA [23], implemented in Primer 6.1.15 [24], to determine which demographic factors were associated with the participants' responses to the combined questionnaire items that asked for an opinion on a scale of 1–9. The multivariable model contained all of the demographic factors that we recorded: age (either decade of age, quartile, or above/below the median age), sex, ethnicity, NZDep group, and highest educational level (primary, secondary, trade certification, or tertiary).

The perceived benefit of a participant's most recent antibiotic treatment was analysed as low benefit (respondent's score 1–5) or high benefit (respondent's score 6–9). Because most participants did not perceive any harm from their most recent antibiotic treatment, this response was analysed as "no harm" (respondent's score 0–2) or "some harm" (respondent's score 3–9).

None of the participants' responses (between 1 and 9) to a questionnaire item were normally distributed, and the Mann–Whitney U test was used to compare scores between factors of interest. The chi square test was used for hypothesis testing involving categorical responses.

Ethical approval for this study was granted by the Southern New Zealand Health and Disability Ethics Committee of the New Zealand Ministry of Health.