Canadian Journal of Rural Medicine / Journal canadien de la médecine rurale

Summer 2003 Contents • Été 2003 Table des matières

Rural emergency department antibiotic prescription patterns for the treatment of childhood upper respiratory tract infections

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CJRM 2003;8(3):185-9 [résumé]

Objective: To examine the antibiotic prescribing habits for childhood upper respiratory tract infections in a rural emergency department (ED).

Design: A detailed chart review was conducted of 852 ED records spanning over a total of 8 months between August 2000 and July 2001.

Setting: The South Bruce Grey Health Centre in Walkerton, Ont.

Participants: Children 18 years of age or younger, who had an ED diagnosis of bronchitis, pharyngitis, acute otitis media or viral upper respiratory tract infection.

Main outcome measures: Antibiotic prescription rates for upper respiratory diagnoses. Rates were compared for variations based on patient age and gender, as well as the time of day and the season of year the patient was diagnosed.

Results: Antibiotics were prescribed to 59% of the patients diagnosed, with over half of the prescriptions going to those with acute otitis media (AOM). For the diagnoses of pharyngitis, bronchitis and AOM, antibiotics were given to 64%, 74% and 90% of patients, respectively. Patients were less likely to receive a prescription during the afternoon than during any other time in the emergency room ($p = 0.04$), possibly due to a decreased patient load and stress on the physician's time during this period. The season of year and patient age and gender did not have an impact on the likelihood of receiving antibiotics.

Conclusion: Prescription rates from this rural ED parallel those seen in other Canadian studies. AOM is the most common cause for antibiotic prescription, and should therefore be a focus in educating physicians about appropriate pediatric management.

Objectif : Analyser les habitudes de prescription d'antibiotiques pour une infection des voies respiratoires supérieures chez les enfants dans un service d'urgence rural.

Concept : On a analysé en détail les dossiers de 852 patients reçus au service d'urgence en huit mois au total, soit entre août 2000 et juillet 2001.

Contexte : Centre de santé South Bruce Grey Health à Walkerton (Ontario).

Participants : Enfants de 18 ans ou moins chez lesquels on a diagnostiqué, à l'urgence, une bronchite, une pharyngite, une otite moyenne aiguë ou une infection virale des voies respiratoires supérieures.

Principales mesures de résultat : Taux de prescription d'antibiotiques à la suite d'un diagnostic d'infection des voies respiratoires supérieures. On a comparé les variations des taux en fonction de l'âge et du sexe des patients, ainsi que de la période de la journée et de la saison de l'année au cours de laquelle on a posé le diagnostic.

Résultats : On a prescrit des antibiotiques à 59 % des patients chez lesquels on a posé un diagnostic et plus de la moitié des ordonnances ont été remises à ceux qui avaient une otite moyenne aiguë. Dans les cas où l'on a diagnostiqué une pharyngite, une bronchite et une otite moyenne aiguë, on a prescrit des antibiotiques à 64 %, 74 % et 90 % des patients, respectivement. Les patients étaient moins susceptibles de recevoir une ordonnance l'après-midi que pendant n'importe quelle autre période de la journée à l'urgence ($p = 0,04$), peut-être parce que le nombre de patients et le stress imposé aux médecins diminuent pendant cette période. La saison de l'année, l'âge et le sexe du patient n'ont pas eu d'effet sur la probabilité de recevoir des antibiotiques.

Conclusion : Les taux de prescription de ce service d'urgence rural ressemblent à ceux qu'ont constatés d'autres études canadiennes. L'otite moyenne aiguë constitue la cause la plus fréquente de prescription d'antibiotiques et il faut donc viser à informer les médecins au sujet de la prise en charge appropriée en pédiatrie.

Introduction

Despite a significant rise in the levels of antibiotic-resistant bacteria and strong evidence that the majority of respiratory infections are of viral origin, the level of antibiotic prescription use remains high.1-4 Research has indicated that respiratory illness is overwhelmingly the most common reason for prescribing antibiotics,1 with as many as three-quarters of patients who present with upper respiratory tract symptoms receiving a prescription.5-9 This is despite Canadian guidelines, which recommend taking a streptococcal culture of suspected pharyngitis cases, delaying the treatment of otitis media to see if the condition clears up on its own, and rarely treating bronchitis regardless of duration.10

The impact of current prescribing patterns is best observed in the pediatric population. Normal children suffer from about 8 "colds" per year, and it has been demonstrated that children under 5 have an average of 3.6 physician visits annually for respiratory illness.1,7 Otitis media has become the most common childhood diagnosis, and it is estimated that about 90% of these cases are still treated with antibiotics.1,9 The consequences of overprescribing include potential side effects, more visits to physicians and a greater expense for purchasing the medication. Most importantly, antibiotic treatment has been found to be an independent risk factor for the development of resistant bacteria,10,11 despite one-quarter of physicians still claiming that overprescription will not jeopardize their patients' health.12

Physicians have cited many reasons for why there is such a tendency to prescribe excess antibiotics. Parental pressure and the fear of losing patients are often named as major factors contributing to current habits, with over half of physicians saying they would reduce their prescribing if they did not feel that this pressure existed.12 This is despite multiple studies showing that parent satisfaction is related to the amount and quality of time spent with them, rather than the receipt of an antibiotic.4-6 In addition, it has been demonstrated that physicians often have difficulty identifying which parents expect antibiotics, and overestimate the pressure for a prescription.4,5,13,14 This impression of expectation is often coupled with a lack of confidence in diagnostic skills for childhood illness, due to the overlapping symptoms of viral and bacterial illnesses.3,15,16

Research has shown that rural physicians are more likely than their city counterparts to prescribe antibiotics.8 It has been demonstrated that the rate of prescription is higher for family doctors than for pediatricians, and higher still during emergency department (ED) shifts.1,17,18 This would indicate that those among the greatest at risk would be children living in rural communities, where pediatricians are rarely available and the ED is commonly used for respiratory examinations by patients unable to access busy family practices. Using the ED in this manner also means that an individual may see several family physicians over the course of the year, and therefore experience inconsistent prescribing patterns.

The objective of this study was to examine the antibiotic prescribing habits for childhood upper respiratory tract infections in a rural ED. Although previous research suggests that this group is among the greatest at risk for overprescribing, Canadian data have never previously been published for the pediatric populations in either the rural

setting or for ED treatment. With an estimated 9 million Canadians living in predominately rural locations, it is valuable to identify whether or not this population is at an increased risk of antibiotic misuse, in hopes of educating both local physicians and community about the associated danger.19

Methods

A detailed chart review was conducted of ED records of the South Bruce Grey Health Centre in Walkerton, Ont. Data were collected by the chief investigator for a total of 8 months between August 2000 and July 2001, to allow for seasonal comparisons. Each ED shift was covered by a single, on-site physician.

Subjects included in the study were patients 18 years of age or younger who had been clinically diagnosed with bronchitis, pharyngitis, acute otitis media (AOM) or viral upper respiratory tract infection (URTI, or "cold"). Exclusion criteria included patients returning to be treated for pharyngitis after Group A streptococcus was identified with a positive throat culture, and those given "delayed prescriptions" for AOM with instructions to wait 48 to 72 hours to see if the symptoms improved without antibiotics. When a treatment plan was not identified, it was assumed that no prescription was given. Data obtained included patient age, gender, primary diagnosis, attending physician, time of day, month of year and whether antibiotics had been prescribed.

For analysis, patients were divided into categories of 0-2 years, 3-5 years and 6-18 years of age. For seasonal analysis, "summer" was composed of the months of June, July and August, and January, February and March formed "winter." April and May were added for all other statistical calculations (e.g., gender, time of day) to reach the number needed for an adequate sample size; these months were chosen because of the high incidence of URTI diagnosis at this time of year. For time of day, "morning" was defined as registering at the ED between 8 am and 12 pm, "afternoon" from 12 pm to 6 pm, "evening" from 6 pm and 11 pm, and "overnight" from 11 pm to 8 am. Statistical analysis was performed using Pearson χ^2 and Fisher's Exact Test in SPSS for Windows, version 8, with significance set at 0.05.

Results

Population studied

During the 8 months examined, a total of 852 diagnoses for pediatric upper respiratory tract illness were made by 8 family physicians. As shown in Table 1, acute otitis media and viral URTI were the most common diagnoses, each comprising 34% of the patients studied.

Diagnosis

Antibiotics were prescribed for 501 children, or 59% of the 852 patients studied. Categorized into diagnostic groups, prescriptions were given to 64% of those diagnosed with pharyngitis, 74% of those with bronchitis, and 90% of those with acute otitis media (Fig. 1). Having one of these 3 diagnoses made it significantly more likely that a patient would receive antibiotics than if the diagnosis of URTI had been given ($p < 0.001$). For those diagnosed with a URTI ("cold"), antibiotics were given to 18% of patients. Fifty-one percent of the total antibiotics prescribed were for the treatment of AOM.

Time of day

Of the children included in the analysis, 30% presented to the ED in the morning, 22% in the afternoon, 33% in the evening and 15% overnight. Comparing the likelihood of receiving antibiotics during these times, it was significantly less likely that the child would receive a prescription if presenting during the afternoon than during any other part of the day ($p = 0.04$). The results of each time of day are displayed in Fig. 2.

Season of year

During the summer months, 97 (61%) children were treated with antibiotics out of a total of 158 diagnosed with

URTI. There was no significant change in prescribing patterns during the winter months, when 252 (56%) out of 447 children were started on antibiotics.

Gender and age of patient

Boys accounted for 49% of the patients diagnosed. As shown in Table 2, there was no effect of gender on likelihood of receiving a prescription, and patient age had no significant effect on prescription patterns, although there was a trend for a lower rate in those 3 to 5 years old ($p = 0.10$).

Discussion

It has been estimated that overprescription is responsible for half of the money spent on childhood antibiotics annually,7 with the vast majority of these prescriptions going to patients diagnosed with otitis media, pharyngitis or bronchitis.1 The results of this ED chart review confirm that Canadian guidelines are not being followed in many cases of pediatric URTI, with 59% of children diagnosed being prescribed antibiotics.

This level of prescription is very similar to that found by Pennie,1 whose prospective analysis of primary care offices in Ontario showed that 61% of children with acute respiratory illnesses were receiving antibiotic prescriptions. Similarly, a St. John's, Nfld., study3 showed a prescription rate of 64%, and a Toronto-based study7 of over 140 000 preschool children showed comparable levels to this analysis for each of the different respiratory diagnoses. These similarities in prescription levels therefore suggest that, despite previous research indicating otherwise,1,17,18,20 being treated in this rural ED by family physicians did not greatly affect a child's likelihood of receiving antibiotic treatment.

Pharyngitis, bronchitis and AOM all contributed to the high rate of prescription, with diagnosed patients receiving antibiotics 64%, 74% and 90% of the time, respectively. For change to be implemented, all 3 of these diseases will therefore need to be addressed in educating physicians and the public. For example, Little et al14 had physicians attempt a "wait-and-see" approach for appropriate AOM cases, resulting in a 76% reduction in prescriptions for this diagnosis. As over half of the antibiotics prescribed in this study were for otitis media, an approach such as this would prove to have a significant effect.

Although it could be debated whether "bronchitis" is an URTI diagnosis, the decision to include it in this analysis was based on 3 factors. First, a recent study by Dosh and colleagues9 argued that URTI, sinusitis and bronchitis should be considered a single entity, despite the considerable weight some attach to nonspecific symptoms such as cough and chest sounds. Second, recommendations for the treatment of bronchitis were included in the pediatric URTI treatment guidelines endorsed by the Canadian Paediatric Society. Lastly, the inclusion of this diagnosis in recent studies allowed for more direct comparisons between this analysis and conclusions reached by other authors.

The time of day that children presented to the ED had a significant effect on the probability of receiving a prescription, it being less likely during the afternoon than at any other time in the day. Pressure for time is one of the reasons physicians may resort to writing a quick prescription rather than taking the time to explain the natural course of viral disease to each patient. More patients were seen in the ED during the morning and evening hours, and it was during these busy hours that there was a greater tendency to give a prescription. Since no rise in antibiotic prescription was seen during the winter months, where respiratory illness was far more common, it may be that the rate of prescription is associated with the number of patients in the ED rather than simply the number of respiratory cases seen by a physician. More research into this association is warranted.

Although it has been previously published that there is an age effect in a child's likelihood of receiving antibiotics,11 no correlation was demonstrated with either patient age or gender in this study.

Limitations to this study include a small number of family physicians, and records from only a single site. In addition, an increase in the number of years studied could be used to give added strength to comparisons between seasons, especially because a recent outbreak of Escherichia coli infections in the area could have affected parents' expectations to have their children on antimicrobials. The objective of this project was to give an accurate portrayal of a rural community's current status with regard to antibiotic prescribing, in hopes of educating local physicians about prescription patterns. As a follow-up to this study, each physician was offered a breakdown of their individual prescribing habits, and a presentation was made to local health care professionals regarding the collective patterns.

Conclusion

In this study of a rural ED, 59% of children diagnosed with an URTI received antibiotics, a percentage comparable to other Canadian studies. Acute otitis media, pharyngitis and bronchitis all contributed to this high level of prescription, whereas very few patients diagnosed with URTI, or a viral cold, were given antibiotics. No seasonal, gender or age effects were found. Patients were less likely to receive a prescription during the afternoons than during other busy parts of the day, possibly due to the amount of time permitted to spend with each patient. Strict prescribing habits and continued diligence in education are required to combat the risks associated with antibiotic misuse.

This article has been peer reviewed.

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Competing interests: None declared.

Acknowledgements: We are indebted to the Southwestern Ontario Rural Medicine (SWORM) program for funding of the project. In addition, warm thanks go to the records staff of the South Bruce Grey Health Centre for their countless hours of chart organization.

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