Drugs in upper respiratory tract infections in paediatric patients in North Trinidad

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ABSTRACT
Objective: We explored the prescribing patterns of physicians in North Trinidad in treating upper respiratory tract infections (URTI) in paediatric patients and the appropriateness of drugs prescribed.

Methods: A retrospective observational study was conducted, with a sample size of 523 paediatric patients, diagnosed with an URTI during the period of June 2003 to 22 June 2005. The study was conducted at five Primary Health Care Facilities in North Trinidad.

Results: The three most frequent URTIs diagnosed were non-specific URTI, common cold, and acute tonsilitis in rank order. Four patterns of prescribing were identified, (1) no drug therapy [1.9%]; (2) antibiotic therapy alone [6.1%]; (3) antibiotic and symptomatic therapy [53.0%]; and (4) symptomatic therapy alone [39.0%]. The, most frequently prescribed antibiotics were penicillins (amoxicillin [46.3%] and amoxicillin/clavulanate [5.3%]) and a macrolide (erythromycin [6.1%]). The three symptomatic agents most frequently prescribed were paracetamol [40.1%]; diphenhydramine [29.1%]; and normal saline nasal drops [14.2%]. In 112 cases with swab analyses done, of these, 98.2% revealed a growth of commensals only, while 1.8% grew pathogenic micro-organisms. Of the cases showing commensal growth only, acute 84.6% were treated with an antibiotic, 14.5% were treated with symptomatic agents alone and 0.9% received no drug therapy at all.

Conclusions: A large proportion of paediatric patients diagnosed with an URTI in North Trinidad was prescribed antibiotics although not indicated. The inappropriate use of antibiotics can potentiating the worldwide trend of antimicrobial resistance.

Keywords: Drug Utilization. Anti-Bacterial Agents. Trinidad and Tobago.
involving the para-nasal sinuses, middle ear, pharynx, epiglottis and larynx.\textsuperscript{1,2} Upper respiratory tract infections are among the leading cause of acute morbidity and the most frequent cause of health service access worldwide.\textsuperscript{4,5} According to estimates from the United States National Ambulatory Medical Care Survey, acute URTIs were the fifth most common reason for seeking care and accounted for 17 million physician visits in 1991.\textsuperscript{5} In addition 30-50\% medical consultations and 20-40\% were in children.\textsuperscript{7}

Consequently respiratory tract infections are the second most common indication for antibiotic prescriptions in primary care accounting for 10\% of all prescriptions annually in ambulatory practice.\textsuperscript{8} Data from the National Centre for Health Statistics in the United States indicate that in recent years, approximately 75\% of all outpatient prescriptions for antimicrobial medications have been issued primarily for five conditions: otitis media, sinusitis, bronchitis, pharyngitis or non-specific URTIs.\textsuperscript{9}

The majority of URTIs are of viral origin, due to rhinovirus, parainfluenza virus, coronavirus, adenovirus, Coxackie virus, and influenza virus.\textsuperscript{1} However, pharyngitis and the common cold have the greatest probability of being of viral origin.\textsuperscript{10,11} Only 10\% of URTIs has been attributable to bacterial aetiology, with the three most common organisms being \textit{Streptococcus pneumoniae}, \textit{Haemophilus influenzae}, and \textit{Moraxella catarrhalis}.\textsuperscript{12} The development of antimicrobial resistance has occurred predominantly among \textit{Streptococcus pneumoniae}, \textit{Haemophilus influenzae}, and \textit{Moraxella catarrhalis} in paediatric patients.\textsuperscript{13}

Trinidad and Tobago has a two tier system of health care namely public health care and private health care. The former is free of cost to the client at all levels and for all services. While all pharmaceutical agents are free they are limited in range and the majority are generic brands. This service is managed by the Ministry of Health and funded by the state. Private health care is based upon fee for service, is costly and affordable mainly by high income earners.

Prescribing an antibiotic for URTIs is a common practice in the medical profession.\textsuperscript{8,9,12} Watson et al reported that visits for any upper respiratory tract complaint resulted in an antibiotic being prescribed in 65\% of the consultations\textsuperscript{14}, particularly for pharyngitis where antimicrobial therapy should not be prescribed in the absence of diagnosed group A streptococcal or other bacterial infection.\textsuperscript{15}

Mohan et al in 2004 reported that the five most frequent URTIs presenting in children in Trinidad are the common cold, pharyngitis, tonsillitis, sinusitis and acute otitis media in rank order.\textsuperscript{3} Further only 12\% of physicians would request laboratory tests before prescribing antimicrobials; 87.5\% of physicians considered them unnecessary; 30\% felt that a clinical diagnosis was sufficient; and 51.3\% said the long waiting periods for results rendered laboratory impractical.\textsuperscript{3}

The frequent and unnecessary use of broad-spectrum antimicrobial together with the use of second-generation macrolides has been demonstrated unequivocally to lead to antimicrobial resistance.\textsuperscript{16-18} The majority of antibiotic prescriptions are for respiratory infections and occur in primary care.\textsuperscript{9,20} Children are the principal recipients of a disproportionate quantum of these prescriptions.

This study examined the prescribing patterns for URTIs in paediatric patients 97 attending primary care clinics in north Trinidad, and the appropriateness of prescribed 98 agents. We also determined the proportion of paediatric patients who actually had a 99 bacterial URTI based on culture and sensitivity tests.

METHODS

This was a retrospective observational study of paediatric patients with a physician diagnosis of an URTI during the period June 2003 to June 2005. Five public health facilities were randomly selected for this study, four of which had independent routine swab analysis performed by the National Surveillance Unit. A paediatric patient was a subject 12 years or below and an antibiotic was defined as a substance with bactericidal or bacteriostatic effects. The term is often extended however to include synthetic antibacterial agents, not produced by microbes 24, such as sulfonamides and quinolones, which was adopted in this study. The diagnoses of URTIs for the purposes of this study are: the common cold, acute pharyngitis, acute tonsillitis, sinusitis, acute otitis media, viral URTI, influenza and non-specific URTI. Exclusion criteria were (1) age equal or lower 13, (2) subjects immunocompromised, malnourished or infected by laboratory confirmed resistant strains of pathogens and chronic respiratory tract diseases and (3) a subject without a definite diagnosis of URTI. Data were analysed using Minitab version 14. 25 Data from throat swabs performed under the National Surveillance Programme conducted at four (4) of the health facilities studied were collected and used for analysis. Swabs were taken from children presenting with complaints of an upper respiratory tract infection and were obtained on the same day as the physician’s visit and were independent of physician consultation. These swabs were transported in commercially available transport media to the Microbiology department of the Port of Spain General Hospital where they were initially plated on blood agar containing antibiotic strips to detect sensitivity.

RESULTS

Five hundred and twenty three [523] children met the inclusion criteria and included. 285 [54.5\%] boys and 238 [45.5\%] girls. The mean ages for males and females were 1.7 [SD=1.99] and 1.8 [SD=2] years respectively. However 96.2\% of cases were between 0-7 years. The most common condition diagnosed was non-specific URTI [285, 54.5 \%] followed by the common cold [171, 32.7\%]. Acute
tonsillitis, acute otitis media and acute pharyngitis together accounted for only 8.4% of all children studied and no child had a diagnosis of sinusitis. Looking at the distribution of cases by age non-specific URTI was the most common diagnosis in patients 0-2 years [225/392, 57.4%] and 3-4 years [42/84, 50%]. In children less than 4 years the common cold [21/47, 44.7%] was most frequent. The common cold and non-specific URTI were also the only two diagnoses made in children over 9 years of age. Disease occurrence and gender were not associated except for otitis media in which 11(79%) of the 14 cases occurred in boys. Four patterns of prescribing were observed, (1) no drug therapy [10, 1.9%], (2) antibiotic therapy alone [32, 6.1%], (3) antibiotic therapy and symptomatic therapy [277, 53.0%] and (4) only symptomatic therapy [204, 39.0%]. A total of 309 [59.1%] patients received a single antibiotic; two or more antibiotics used in combination were never prescribed. Of patients diagnosed with the common cold 51.5% received an antibiotic and 58.2% of those diagnosed with a non-specific URTI received an antibiotic. Many patients (82.1%) with other diagnoses (acute tonsillitis, acute otitis media, viral URTI, influenza, and acute pharyngitis) also received an antibiotic. The most frequent antibiotics prescribed were amoxicillin [242, 78.3%], erythromycin [32, 10.4%] and amoxicillin/clavulanate [28, 9.1%]. The remaining 7 patients received different agents such as cefaclor, cefuroxime and co-trimoxazole. Irrespective of the diagnosis amoxicillin was the antibiotic of choice even among the 14 patients diagnosed with viral URTI, [42/84.6%]. In just over a third (204, 39%) of patients symptomatic therapy was recommended, one agent in 95, two in 101 and 3 in 8 patients. Both an antibiotic and symptomatic therapy were prescribed for 277 patients. Reported, 78.2% were treated with antibiotics and symptomatic agents and 6.4% were treated with an antibiotic alone. The five symptomatic agents most frequently prescribed were paracetamol [40.1%], diphenhydramine [29.1%], normal saline nose drops [14.2%]; chlorpheniramine [7.3%]; and histatussin [3.1%]. There was a significant association between antibiotic prescribing and therapy for relief of symptoms [p=0.021] so that antibiotic prescription was likely to be given with a prescription for symptom relief. In 112 of the 523 cases studied throat swabs were analysed for culture and sensitivity. In 110 [98.2%] participants growth of commensals only was reported, 78.2% were treated with antibiotics and symptomatic agents and 6.4% were treated with an antibiotic alone. In the 110 participants in whom commensal growth was reported, 78.2% were treated with antibiotics and symptomatic agents and 6.4% were treated with an antibiotic alone.

DISCUSSION

The three most frequent URTI’s diagnosed in children were non-specific URTI, common cold and acute tonsillitis. The diagnosis of non-specific URTI’s may reflect difficulty by physicians in our setting to precisely identify the diagnosis and aetiology. The recognition by physicians that bacterial URTI’s are infrequent is in part due to the lack of local evidence that emphasises this feature of URTI’s which in turn facilitates the misconceptions regarding antibiotics and URTI’s. There were no gender differences in the occurrence of URTI except for acute otitis media in which there were more boys [78.5%] than girls [21.5%]. We find this difficult to explain as did Pukanor et al who reported similar findings.

Four patterns of prescribing prevail in community health care in Trinidad: (1) no drug therapy [1.9%] (2) antibiotic therapy alone [6.1%] (3) antibiotic and symptomatic therapy [53.0%] and (4) only symptomatic therapy [39.0%]. A large percentage [59.1%] of patients was prescribed antibiotics for URTI’s contrary to evidence based practice. The factors contributing to this prevailing pattern of prescribing in our setting is a complex process involving both patient and physician factors. Public misconceptions on the effectiveness of, and indications for, antibiotics exist. Patients presenting with an acute febrile illness often believe that infection is the problem and antibiotics is the answer. Thus patient expectations significantly influence prescribing even if the physician judges that antibiotics are not indicated. Lack of continuing medical education among primary care physicians not presently a legal requirement for continuing to practice may also contribute, as more primary care physicians are more likely to initial see these patients than paediatricians.

Amoxicillin was the most frequently prescribed antibiotic a finding similarly reported by Britt et al. However, in our setting, the choice of this antibiotic may be influenced by the ease of availability at public health pharmacies where antimicrobials are often available without prescription. In addition, 51% of patients with the common cold received an antibiotic contrary to evidence based guidelines. Even with a mucopurulent rhinitis (thick, opaque, or discoloured nasal discharge) which frequently accompanies the common cold antimicrobial treatment is not indicated unless it persists without improvement for 10 to 14 days. More than 50% of patients with a non-specific URTI received an antibiotic which is not recommended as it does not enhance illness resolution or alter the rates of complications.

A large percentage (82.1%) of patients with other URTI’s (acute tonsillitis, acute otitis media, viral
URTIs, influenza, and acute pharyngitis also received an antibiotic. Almost all patients (23/24) with a diagnosis of acute tonsillitis were prescribed antibiotics. Thus is not unusual as physicians are more concerned with the prevention of rheumatic fever especially as laboratory support is inadequate and treatment of Group A streptococcal infection with antimicrobial therapy should be initiated within 9 days of onset to be effective in the prevention acute rheumatic fever.31,32

All patients diagnosed with acute otitis media were treated with antibiotics. While antimicrobials are indicated for treatment of acute otitis media, diagnosis requires documented middle ear effusion and symptoms and signs of acute local or systemic illness.33 The pressures of large volume clinics and the difficulty to follow up patients may strongly influence physicians to use antimicrobials. Eight of the 14 patients diagnosed with acute otitis media received amoxicillin. Any decision to treat children with acute otitis media with an antibacterial agent, requires that amoxicillin be prescribed because of its safety, low cost, acceptable taste, and narrow microbiologic spectrum.34,35 Treating influenza without established secondary bacterial infection with antibiotics has not proven beneficial yet8,36 eight of the nine patients diagnosed with influenza received antibiotics. Only 2 [1.8%] of the 112 children who had swab analyses showed growth of bacterial pathogens supporting the evidence that most URTIs are of viral origin.

The main limitation of the study was the use of nurses at the health facility to take the throat swabs although the technique was explained to them we had no way of validating the procedures. Future studies to evaluate the resistance patterns of organisms commonly implicated in URTIs in Trinidad and Tobago are recommended.

CONCLUSIONS
In conclusion we provide evidence justifying the need to modify the current approach to the management of URTI in the paediatric setting in Trinidad. Mainly as a result of the large proportion of paediatric patients diagnosed with an URTI who were treated with an antibiotic. Although this study was conducted in a small developing country, there are global implications as inappropriate use of antibiotics can potentiate the worldwide trend of antimicrobial resistance.

CONFLICT OF INTEREST
None declared.
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www.pharmacypractice.org (ISSN: 1886-3655)
Resumen
Objetivo: Exploramos los patrones de prescripción de los médicos en Trinidad Norte para el tratamiento de infecciones del tracto superior respiratorio (URT) en pacientes pediátricos y la adecuación de los medicamentos prescritos. M étodos: Se realizó un estudio observacional retrospectivo, con un tamaño de muestra de 523 pacientes pediátricos diagnosticados con una URT entre junio 2003 y 22 junio de 2005. Este estudio fue realizado en 5 centros de atención primaria en Trinidad Norte. La infección con el nuevo coronavirus (coronavirus 2 del s ã ndrome respiratorio agudo grave, o SARS-CoV-2) causa la enfermedad por coronavirus 2019 ( COVID-19 ). El virus que causa COVID-19 se propaga fácilmente entre las personas, y con el tiempo se sigue descubriendo más acerca de su propagación. La Administración de Alimentos y Medicamentos de los Estados Unidos (FDA, por sus siglas en inglés) ha autorizado el uso de emergencia de algunas vacunas contra la COVID-19 en los Estados Unidos. Una vacuna puede prevenir que te contagies del virus de la COVID-19 o que te enfermes de gravedad si te contagiastes del virus de la COVID-19. Los coronavirus no siempre permanecen confinados en el tracto respiratorio, y en determinadas condiciones pueden invadir el sistema nervioso central y causar patologías neurológicas. La capacidad potencial de neuroinvasión está bien documentada en la mayor parte de los coronavirus humanos (OC-43, 229E, MERS y SARS) y en algunos coronavirus animales (coronavirus de la encefalomielitis hemaglutinante porcina). Se han descrito síntomas neurológicos en pacientes afectos por COVID-19, como cefalea, mareo, mialgias y anosmia, así como casos de encefalopatía, encefalitis, encefalopatía necrotizante hemorrágica, ictus, crisis epilépticas, rabdomiólisis y s índrome de Guillain-Barré, asociados a la infección por el SARS-CoV-2. Adultos y pacientes pediátricos: Dosis habitual - 25 a 35 mg/kg de peso corporal al día, administrado en tres dosis con las comidas, durante cinco a diez días. Manejo del Coma Hepático. Adultos: Dosis habitual - 4 g diarios en dosis divididas, administrada a intervalos regulares durante cinco a seis días. Si aparecen nuevas infecciones causadas por organismos no susceptibles durante la terapia, se deben tomar las medidas apropiadas. El medicamento debe usarse con precaución en individuos con lesiones ulcerativas del intestino para evitar la toxicidad renal a través de la absorción inadvertida. Uso pediátrico. Se han notificado náuseas, calambres abdominales y diarrea en pacientes con dosis superiores a 3 g diarios. Sobredosis. No se proporciona información. ¿Por qué?