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Antibiotic prescription in paediatric emergency departments: fear and reason

Published Online February 28, 2019 http://dx.doi.org/10.1016/S1473-3099(18)30727-8

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In their cross-sectional study of 5177 children admitted to 28 emergency departments across Europe between Nov 1, 2014, and Feb 28, 2016, Josephine van de Maat and colleagues[1] report in *The Lancet Infectious Diseases* that 1454 (32%) of 4560 children without comorbidities were given a course of antibiotics on discharge. The variation in prescription frequency across countries was vast, from 19% (81 of 428 children received antibiotics) in Switzerland to 64% (450 of 708) in Turkey. The authors focused their analysis on respiratory tract infections, which accounted for 82% of all antibiotic prescriptions, to identify factors affecting prescription decisions. Duration of fever, elevated C-reactive protein concentration, focal abnormalities, or, to a lesser degree, diffuse abnormalities in chest X-rays were associated with increased prescribing but these factors did not fully explain the variance in the model. The authors hypothesised that other factors they did not include might be contributing. However, the high frequency of prescriptions also raises the issue of irrationality toward prescribing antibiotics.

Why do we prescribe antibiotics? To avoid death can be one reason. Serious bacterial infections are rare but potentially life-threatening and suboptimal care (eg, late recognition or delayed antibiotic treatment) could lead to death.[2] When in doubt, clinicians generally might prescribe antibiotics, thinking that the treatment would be less harmful than missing a severe bacterial infection. Pneumonia is a good example of a doubtful situation that could explain why children with lower respiratory tract infections showed the most variation in antibiotic prescription frequency.[1] In fact, there is no international consensus on diagnostic criteria for bacterial pneumonia, one of the leading global causes of death, for which *Streptococcus pneumoniae* was implicated by the *Lancet* Infectious Diseases Global Burden of Disease 2016 study on lower respiratory infections.[3] In this report, estimated mortality due to pneumonia in children under 5 years of age was fewer than two in 1000 in western European countries, which meant that about 250 000 children needed to be treated with antibiotics to avoid one death. These proportions were 12·4/1000 children in Turkey and 50·8/1000 in Romania, which meant that the number to treat to prevent one death was considerably lower (about 7000). The high frequency of antibiotic prescriptions for lower respiratory tract infections could thus reflect fear of death, as observed for Turkey, but in other centres the frequency was higher than expected despite a low mortality rate within the country. Moreover, in the investigators' multilevel analysis of determinants of antibiotic prescription, individual factors such as signs usually associated with severe bacterial infection did not appear to influence the prescription frequency, whereas radiological signs, with arguable diagnostic value, had a significant effect. This observation supports the hypothesis that some antibiotic prescriptions are driven by sepsis phobia and the trivialisation of antibiotics, rather than by clinical evidence.

In high-income countries, implementation of pneumococcal vaccination has reduced the incidence of pneumonia and contributed more to a reduction in mortality than antibiotic use.[3,4] In these settings, patients with lower respiratory tract infections are at a decreased risk of death and severe bacterial infections compared with those in other lower-income European countries, which tend to overprescribe antibiotics. The US[5] and UK[6] guidelines on treating pneumonia in children, which

make the evidence-based recommendation to not prescribe chest x-rays or antibiotics to well vaccinated preschool children with mild disease, seem reasonable and could be generalised to other high-income countries.

Another reason to prescribe antibiotics is to avoid complications. The much higher prescription frequency in Turkish patients with upper respiratory tract infections than in the other participating European centres[1] could be explained in part by high incidence of rheumatic fever in Turkey.[7] In countries where rheumatic fever is rare, treating a sore throat with antibiotics aims to reduce the duration of symptoms by about 16 h overall, and the number to treat to avoid one suppurative complication such as otitis media is about 200.[8] The expected effect of immediate antibiotic treatment in children with acute otitis media is to reduce the duration of symptoms but the number to treat to avoid one complication of invasive disease is still unclear.[9]

In the era of emerging multidrug-resistant bacteria, safely and reasonably minimising antibiotic prescriptions for respiratory tract infections should rely on appropriate risk stratification of patients. Rules on clinical decision should be implemented that consider signs of sepsis, probability of bacterial infection (eventually with the help of point-of-care tests such as measuring procalcitonin and host response biomarkers or multiplex PCR),[10–13] and the expected benefit of treating a bacterial infection versus the potential harms.

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EL is the scientific director of a study aiming to validate a clinical decision rule using point-of-care procalcitonin testing to detect severe bacterial infection in children presenting with fever at emergency departments. This study has begun in Nov 1, 2018, and is funded by a public national grant PHRC-17-0354. CGLG is the main investigator in the same study.

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Maternal pertussis immunisation as the first infant dose

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We read with great interest the Article by Daan Barug and colleagues[1] on maternal pertussis immunisation combined with a delayed (at age 3 months instead of 2 months) and reduced (two doses instead of three doses) primary infant vaccination schedule, using acellular pertussis vaccines. The trial explores the possibility of adding maternal pertussis immunisation to the vaccination schedule as, in effect, a first infant dose, with a view of reducing the blunting effect of the infant immune response by maternal antibodies. When revising the infant schedule, the main concern is whether a decent enough coverage of maternal vaccination to protect all infants from birth can be achieved.

The effectiveness of the maternal pertussis immunisation strategy has already been shown;[2,3] however, infants' immune response to primary vaccination is blunted regardless of different infant vaccination