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Antibiotics for acute bronchitis

Four reviews and still no answers: our clinical definitions are at fault

Acute bronchitis is one of the commonest medical problems managed by health services, and one of the important clinical questions is whether antibiotics do any good. Fittingly, for such a common problem, there have been four systematic reviews comparing antibiotics with placebo for treating bronchitis. All, however, have reached clinically unhelpful conclusions, which simply exposes the perennial problem for all systematic reviews that demonstrate no or only marginal benefits from the intervention: is there a subgroup that might derive benefit? It also exposes the procrustean nature of our definitions of acute bronchitis.*

Three of the reviews included meta-analyses[1–3] and one was a qualitative systematic review of the literature.[4] They include almost all the same studies,† although Fahey et al[2] called their review a systematic review of acute cough in adults and included unpublished data from Stephenson. They all came to similar ambiguous and clinically unhelpful conclusions, the most negative being, "the current literature does not support antibiotic treatment for acute bronchitis,"[4] while the most positive concluded, "antibiotics may be modestly effective for a minority of patients with acute bronchitis."[3]

We speculate that these findings conceal a small group of patients with pneumonia who obtain a large benefit from antibiotics hidden within a larger group of patients without serious bacterial infection—that is, who have viral infection, bronchospasm, or minor bacterial infection. The problem stems from the multiple definitions of acute bronchitis in the primary studies, all of which have been treated as a single entity for the purposes of review or meta-analysis. The primary trials accept patients with acute cough and either purulent or productive sputum. This is contrary to the accepted diagnostic classification criteria for acute bronchitis (which are consensus based not evidence based) in which patients need to have an acute cough and scattered or generalised abnormal chest signs: wheeze and coarse or moist sounds—that is, signs of lower respiratory tract disease.[5]

The lower respiratory signs are central to our argument as it is possible to confirm pneumonia in patients with clear chests but not possible to exclude it in the presence of signs.[6] Each of the primary studies except that of Howie et al[7] attempted to eliminate patients with pneumonia. However, the exclusion method varied considerably from study to study: severe dyspnoea and fine crackles, localised crackles or wheezes, clinical signs, the option of a chest radiograph, or a compulsory chest radiograph.[8] The range of lower respiratory tract signs ranges from zero[9] to 55%.[10]

Five studies were more likely to eliminate pneumonia by chest radiograph or exclusion with any lower respiratory signs yet only two found statistically significant results for benefit from antibiotics. One of these discounted the positive findings as being due to multiple comparisons, with 10 statistically different findings, six in favour of erythromicin and four in favour of placebo out of 140 statistical comparisons.[8] In the five remaining studies that we do not think effectively excluded pneumonia there were 0-23 significant findings. In one of the reviews (Cochrane review by Smucny[11]) analysis by lower respiratory signs found a statistically significant improvement with antibiotics (relative risk 0.48, 95% confidence interval 0.26 to 0.89)[12–15] This suggests that antibiotics are effective in patients with lower respiratory signs and a clinical diagnosis of acute bronchitis.

This does not help us decide if there is really an entity that can be called acute bacterial bronchitis because we do not know how many of those patients had pneumonia. Only a chest radiograph would help in that dilemma. If antibiotics, in a research setting, were effective in patients with lower respiratory tract signs and who had a cough and productive sputum and a clear chest radiograph then it would be possible to postulate the existence of acute "bacterial" bronchitis. If such an entity exists then prescribing antibiotics in this situation would not be so highly criticised.[16] If the patients had pneumonia in the original studies one may ask why did they not present clinically. There are many potential answers: the pneumonia may have resolved spontaneously or the patients may have been given antibiotics, either by study or non-study doctors, without this fact being recorded in the study manuscript.

The short term solution is only to analyse studies by symptoms (cough and productive or purulent sputum) in groups according to the presence or absence of lower respiratory tract signs. It would be far better to have a review that contained data from only a few studies but was analysed in a way that clinicians could be reasonably sure that they were not dealing with some cases of pneumonia.

What can the practising clinician do while awaiting such analysis? The use of antibiotics may be justified in those with lower respiratory tract signs—confirmed by 256 patients in four studies[11]—or in those who are aged 55 or older and either "feel ill" or have a "frequent day-

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time cough"—confirmed by 27 patients in one study.[12] For other patients there is more evidence for benefit from bronchodilators than from antibiotics—shown in 80 patients in two studies.[14 17]

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*Proscrustes was a mythical Greek who adjusted the size of his guests so that they would fit his iron bed. We suggest that "acute bronchitis" is a "one size fits all" diagnosis.
†The abstracts of all the reviews are available at http://hiru.mcmaster.ca/cochrane/centres/Canadian/

Injury prevention in people with disabilities

Risks can be minimised without unduly restricting activities

Clinical review p 975

Some risk of injury exists for almost every human activity, and this risk may be increased for people with impairments, disabilities, or other special healthcare needs. The mechanism of injury is insensitive to the presence or type of disability, whether the injury involves transfer of excessive kinetic energy to the body, as in physical trauma, or deprivation of an essential element such as oxygen, as in submersion. However, the additional risk associated with the underlying condition changes the dynamics of the injury process. Epidemiological studies have, for example, found that people with epilepsy have a greater risk of drowning and burns than those without the disease[1–3] and that individuals with a sensory deficit are at greater risk of pedestrian injury.[4] Besag's description in this week's *BMJ* of the death by drowning of a 14 year old boy who suffered from tonic seizures (p 975)[5] raises questions about injury prevention strategies in an area where there is not much evidence. The instinctive reaction of restricting the activities of people with disabilities would, however, be wrong.

Several aspects of Besag's case, along with his analysis,[5] deserve comment. The observation that seizures result in expulsion of air from the lungs, thereby increasing the density of the body and promoting submersion, makes logical sense, even though there may be no research. Besag rightly points out the implications for both risk and prevention. Unsupervised swimming in "murky" water may be particularly dangerous, and Besag quotes the boy's parents, who asked what is meant by proper supervision. It is easy to lay blame in such situations on inadequate supervision without paying attention to the components of such oversight. How would "supervision" have made a difference?

Injury prevention is the multidisciplinary science of averting damage to body tissues[6] by identifying the host, agent, and environmental factors that interact to create the risk of injury. Successful injury prevention strategies have resulted from careful observations followed by formal research using the principles of epidemiology and biomechanics. These approaches have been used to develop interventions like car seat belts, poison prevention packaging, and helmets for motorcyclists. Additionally, injury prevention strategies often involve combinations of education to improve safe behaviour, better engineering of environments and products, and legal requirements to regulate both the engineering and the behaviour. All strategies, however, require evaluation and re-evaluation over time.

Besag's case study illustrates several of these injury prevention issues. Firstly, the level of understanding of the underlying condition among patients, their families, their primary care physicians, and other responsible adults must be assessed. Many people with epilepsy may not know much about their condition and its inherent risks,[7] and those entrusted with their care may also be ignorant. In a study of epilepsy awareness among schoolteachers in Thailand 38% reported that they had never heard or read about epilepsy.[8]

Secondly, this case emphasises the host-environment interactions in injury risk. As Besag points out, the child was in an unfamiliar setting, a body of murky water. The parents, who had previously supervised his swimming, were not present. Rather, a group of schoolteachers, who may have been unfamiliar with both the condition and the risks of the setting, were in attendance. There appears to have been no preparation for the dangers. Injuries are predictable and occur to people at high risk, in high risk settings.

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