Duration of intravenous antibiotic treatment for respiratory exacerbations in children with cystic fibrosis

Over the past decades, the continued improvement in survival of patients with cystic fibrosis (CF) has partly been attributed to improved nutritional status and aggressive treatment of respiratory exacerbations.[1] Standard intravenous antibiotic treatment for an exacerbation lasts 14 days, and most centres follow this guideline.[2] Some patients receive courses >14 days, usually for continuing symptoms or inadequate improvement in lung function. However, there is limited evidence to guide the optimum duration, and a Cochrane systematic review in 2008 found that there were no clear guidelines available and suggested that a multicentre, randomised, controlled trial was necessary.[3] Courses that are too long are likely to lead to increased antibiotic resistance and possibly more allergic reactions.[4] There may also be an increase in significant adverse effects, particularly from aminoglycosides. Additionally, there are increased financial implications from prolonged hospital stays and consequences for the child and family regarding work and school. In contrast, courses that are too short may lead to inadequate treatment, shorter intervals before the next exacerbation and subsequent pulmonary damage.

We prospectively reviewed all admissions for intravenous antibiotics in our tertiary paediatric CF centre over a 5-month period. Children were divided by length of treatment into three groups: those having 14 days, 15–20 days, and ≥21 days. We recorded the change in forced expiratory volume in 1 second (FEV_1) at the end of the treatment period, subjective symptomatic benefit for those having >14 days and whether any improvement in FEV_1 was sustained at the next clinic appointment.

Fifty-one children were admitted over the 5-month period; 18 (35%) were boys. Their median age was 12.9 years (interquartile range 9.8–15.3 years). Intravenous antibiotic courses were given for 14 days to 30 (59%) patients, for 15–20 days to 9 (18%), and for ≥21 days to 12 (23%). There were no significant differences in age, body mass index, pancreatic status, admission FEV_1 or diagnosis of CF-related diabetes between the three groups. There were more girls than boys who received treatment for ≥21 days—2/18 (11%) boys versus 10/33 (30%) girls compared to the other treatment groups, but this was not statistically significant. Intravenous antibiotics were given to 30/51 (59%) children as elective treatment and to 21/51 (41%) children for respiratory exacerbations. However, there were no statistically significant differences in treatment length between those admitted electively and those admitted for an exacerbation. There were also no statistically significant differences in the pathogens isolated in the three treatment groups (unsurprising given the small numbers), although patients treated for >14 days were more likely to isolate *Staphylococcus aureus*, mucoid *Pseudomonas aeruginosa* and other species such as non-tuberculous mycobacteria and *Stenotrophomonas maltophilia*. Those treated for up to 14 days most commonly grew non-mucoid *Pseudomonas aeruginosa*. Of the 21 patients who stayed beyond 14 days, 16 patients were kept in for respiratory reasons, mostly for continued wet cough and/or unsatisfactory lung function. The other five children stayed primarily for other reasons but had their intravenous antibiotics continued anyway. Initial lung function was poorly predictive of the need for longer stays, and the resultant changes were too variable to make conclusions. We were also unable to define the impact of an extended stay on lung function at clinic follow-up.

The child, parents and attending doctor were asked whether they felt there had been any benefit in extending the course of intravenous antibiotics beyond 14 days for the 16 children who needed to stay for respiratory reasons. Data were collected for 13/16 children, although two of the children were too young to answer the question themselves (table 1).

The overall outcome as to whether intravenous antibiotic treatment for >14 days leads to sustained clinical benefit is difficult to ascertain, and even a randomised, controlled study may not produce firm conclusions. Lung function as a guide was unhelpful. However, subjectively in most patients who stayed beyond 14 days, the parents and the child felt that the third week was beneficial.

Table 1 Subjective symptomatic benefit for children treated with intravenous antibiotics >14 days

Perceived benefit of intravenous antibiotics >14 days		
	Yes	**No**
Child	10/11 (91%)	1/11 (9%)
Parent	11/13 (85%)	2/13 (15%)
Doctor	12/13 (92%)	1/13 (8%)

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