COMMENTARY

Toward Optimal Outpatient Therapy for Pediatric Parapneumonic Empyema

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Parapneumonic empyema (PPE) is an important complication of pediatric pneumonia and leads to prolonged hospitalization and substantial short-term morbidity. Over the past decade, there has been vigorous debate into the optimal management of such patients leading to marked variation in care. Most of the debate has focused on the optimal drainage procedure, focusing on clinical trials that have assessed the relative merits of chest tubes with instillation of fibrinolytic agents compared with surgical approaches, such as video-assisted thorascopic surgery.1–3 Relatively less attention has been paid to important questions related to the medical management of these patients, especially those that address the route and duration of antimicrobial therapy. In terms of outpatient therapy duration, current national guidelines recommend 2 to 4 weeks of outpatient therapy (Pediatric Infectious Diseases Society [PIDS] and Infectious Diseases Society of America [IDSA]4). Other reputable guidelines are fairly similar; for instance, the British Thoracic Society recommends 1 to 4 weeks of outpatient therapy or longer, if residual disease.5 Little research to date has specifically explored the question of the comparative effectiveness of outpatient parenteral antibiotic therapy (OPAT) with oral antibiotic therapy in the posthospitalization therapy of PPE. The PIDS/IDSA guidelines (for children >3 months of age) recommend conversion to oral outpatient stepdown therapy rather than parenteral outpatient therapy as a strong recommendation, but acknowledge that this recommendation is based on low-quality evidence.

The work by Stockmann et al6 attempts to address this question. The study observed 391 children with PPE requiring pleural drainage in a single center (Primary Children’s Hospital, Salt Lake City, UT) from 2005 to 2014. Of these, 337 children were in the OPAT group, with the remaining 54 children discharged with oral antibiotics. The mode of antibiotic delivery at discharge was determined by the attending physician. All-cause complications were 9% in total, with 9.3% in the group discharged with oral antibiotics and 8.9% in the OPAT group. Secondary outcomes included pneumonia-related complications (3.7% oral vs 1.5% OPAT), treatment failure (0% vs 0.6%), treatment-related complications (5.6% vs 7.7%), and catheter-related complications (5% of the OPAT group).

A key limitation of this study is that it was performed in a single center by using retrospective data with important temporal confounding. This center had a strikingly low rate of oral antibiotic use at discharge, especially in the early years of observation. Many centers tend to step down to oral antibiotic therapy when chest drains are removed and/or the child is afebrile.6 To accrue sufficient numbers of patients treated with oral antibiotics for comparative analysis, the time period observed was almost 10 years, over which time the aforementioned national PIDS/IDSA guidelines had been published4 suggesting the use of oral antibiotic therapy on discharge. The rate of

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discharge with OPAT fell dramatically in the last few years observed. Data were collected from readily available hospital databases and medical records. This has the advantages of including demographic information, inpatient information, and further hospital attendances after discharge. However, they did not reliably have records of treatment type or treatment duration; specifically, it is not known whether surgical drainage of the empyema was used, and if so, what mode was used. Moreover, the study center is a quaternary referral center, with the referral patient population appearing to have been unusually ill, in terms of the numbers with preexisting chronic medical conditions and numbers requiring PICU stay, as well as ventilatory support. These factors would have likely had an important impact on the outcomes measured in this analysis. The choice of OPAT versus oral therapy was the decision of the discharging physician, and would have likely been based on a number of unmeasured factors, including concurrent medical conditions and hospital course to time of discharge, previous personal experience, and concerns about compliance with oral antibiotics. Propensity score weights were used, which is applaudable. Such weights can account for some but certainly not all of the important factors that lead to the final decision for antibiotic administration route. Although it is unlikely that we will see a well-designed randomized controlled trial on this question, replication of these findings with a multicenter cohort will be helpful. Preliminary results using data from 36 hospitals in the Pediatric Research in Inpatient Settings network were presented at the 2015 Pediatric Academic Societies Meeting (E-PAS2015:21704); publication of these findings is eagerly awaited.

Despite these important limitations, this study adds to the growing body of literature questioning the need for prolonged intravenous therapy for certain serious bacterial infections, such as urinary tract infection in young infants and acute osteomyelitis. Similar to these conditions, complicated pneumonia shares a good long-term prognosis with normal radiographic, spirometric, and quality-of-life outcomes described in the vast majority of cases. This highlights the importance of minimizing the not insignificant risks and costs of prolonged intravenous therapy, especially when delivered through central venous catheters. Such risks include, but are not limited to, deep vein thrombosis in as many as 11% to 30%, the cost of line insertion/removal and parenteral medications, the risk of hospital attendance for line complications, and the training of guardians and skilled home health providers in the use and care of lines. Alternative approaches for delivering parenteral therapy (eg, intramuscular injections) are not any more appealing. Given the apparent severity of illness in the patient population studied by Hersh et al, the absence of any discernable clinical advantage of OPAT over oral antibiotic therapy is reassuring. Parapneumonic empyema therefore seems to be another condition for which the risks of OPAT likely far outweigh the benefits in most cases.

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