

Category: Therapeutics

Study type: Retrospective cohort study

Author's declarative title: Oral antibiotics can as effective as intravenous antibiotics for post-discharge treatment of complicated pneumonia in children.

Citation: Shah SS, Srivastava R, Wu S et al. Intravenous Versus Oral Antibiotics for Postdischarge Treatment of Complicated Pneumonia. *Pediatrics*. 2016 Dec;138(6). pii: e20161692.

Commentary (663 words starting from context)

Context

In children, complicated pneumonia implies pneumonia infection that is associated with pleural effusion or empyema [1]. The initial management involves use of parenteral broad spectrum antibiotics to cover the most common organisms [1]; thoracotomy or chest tube insertion may be indicated if there is no response to antibiotic therapy, or if there is significant respiratory difficulty. Most national guidelines do not specify the preferred route of antibiotic therapy for post-discharge treatment of complicated pneumonia in children, and the guidance are mostly based on historical precedence. For instance, British guidelines recommend a switch to oral antibiotics if there is clear evidence of improvement [2], while American guidelines are non-specific [3]. This retrospective study compared the benefits and harms of intravenous versus oral antibiotic therapy for treatment of complicated pneumonia in children post-discharge.

Methods

This was a multi-centre, retrospective, cohort study that compared the effectiveness of intravenous antibiotics administered through peripherally inserted central venous catheter (PICC) versus oral antibiotics in children treated for complicated pneumonia post-discharge. The primary outcome was treatment failure. Secondary outcomes were PICC-related complications, emergency department visits or re-hospitalizations, adverse drug reactions, and a composite of all outcomes (both primary and secondary). The authors explicitly stated the study objectives, clearly defined the primary and secondary outcome measures, specified their inclusion and exclusion criteria, and adequately described the methods used to collect data. The study covariates were sufficiently classified, adjustments were made to ensure matching balance, and appropriate statistical tests were used to compare the effect of interventions between the groups. The results were presented as odds ratios (OR) with their 95% confidence intervals (CI).

Findings

A total of 7280 eligible encounters were identified, out of which 2123 children (PICC 281; oral route 1842) from 36 hospitals were included. The median age of the children was 5 years (IQR = 2 to 8). PICC use post-discharge varied from 0 to 71% across hospitals. There was no significant difference in the odds of treatment failure between PICC and oral routes in across-hospital-matched analysis: matched OR 1.26, 95% CI: 0.54 to 2.94. PICC-related complications occurred in 20 children (7.11%); however, no PICC-related

blood stream infections were observed. Antibiotic administration via PICC was associated with significantly increased odds of adverse drug reactions (matched OR 19.1, 95% CI: 4.2 to 87.3, $P < 0.001$) and the composite outcome of all complicated pneumonia-related hospital revisits (matched OR 4.71, 95% CI: 2.97 to 7.46, $P < 0.001$).

Commentary

The study results provide compelling evidence that intravenous antibiotics are no more effective than oral antibiotics for post-discharge treatment of complicated pneumonia in children. The findings are consistent with those of a previous retrospective study which showed that oral therapy is as effective as intravenous therapy for the completing the course of antibiotic therapy in children treated for complicated pneumonia [4], and also corroborate those of another study (by same group of authors) that showed similar failure rates between groups (intravenous versus oral therapy) for children treated for acute osteomyelitis [5].

Although the trial had a large sample, there was no *a priori* sample size calculation [6]. While adjustments were made to ensure balanced matching, this was performed across hospitals (not within hospitals), the matching was skewed in favour of the oral antibiotic group (ratio 7:1). The study does not account for the severity of the pneumonia, e.g. the size of the pleural effusions, which may have influenced the choice of antibiotic route at discharge; this may have resulted in a lack of baseline comparability between the groups, and biased the study results. The variation in the classes and type of antibiotic therapy may have influenced the frequency of adverse reactions reported (a fact noted by the authors). The wide 95% CIs also suggest imprecision of the study results, and indicate need for caution when interpreting the findings [7]. The authors reported some limitations in their study, and stated that randomized clinical trials comparing oral versus intravenous antibiotics may be unethical; however, well-designed prospective studies would shed more light on the comparative effectiveness of intravenous versus oral antibiotics.

The inherent limitations in the study design and methodology therefore indicate the need for further research.

Implications for practice

There is some evidence that supports the use of oral therapy for antibiotic administration post-discharge for complicated pneumonia in children. Clinicians should consider completing the course of antibiotic therapy through the oral route. National guideline recommendations should also reflect up-to-date evidence to guide clinicians on route of antibiotic therapy post-discharge.

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Competing interests

None

References

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