Review of Guidelines for Evidence-based Management for Childhood Community-acquired Pneumonia in Under-5 Years From Developed and Developing Countries

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Community-acquired pneumonia (CAP) is a major public health challenge globally, particularly in children aged under 5 years. Children from developing countries have a greater exposure to underlying risk factors, which contribute to higher incidence of CAP and greater case fatality rates. Estimates for developed countries before introduction of pneumococcal conjugate vaccine (PCV) suggested an annual attack rate of 0.05 CAP-episodes per child-year. This resulted in approximately 2.6 million episodes of CAP, including 1.5 million children hospitalized for their illness and 3000 CAP-associated deaths annually among children under 5 years. In contrast, the incidence of CAP in children from developing countries is approximately 6-fold greater, 0.29 per child-year, resulting in 151 million new episodes annually, 9% of which are associated with hospitalization, and approximately 1.4 million which resulted in death in 2010. More recent disease burden estimates place the number of hospitalizations for acute lower respiratory disease among those under 5 years at 14.9 million in 2010, of which some substantial fraction is likely to be for pneumonia. Although the absolute magnitude of these estimates all have significant uncertainty associated with them, it is evident that the proportion of CAP cases associated with hospitalization is several fold greater in children from developed (58%) compared with those from developing countries (9%). The difference in proportion of CAP cases that are hospitalized in developing and developed countries likely reflects a combination of physician differences in management, limited access to health care and differences on healthcare seeking behavior among parents for children and not less severe disease among children in developing countries.

This review aimed to summarize the most current evidence-based recommendations for management of CAP in HIV-negative children under 5 years of age from developed and developing countries. We also discuss the differences in published recommendations regarding diagnostic criteria, severity assessment for hospitalization and recommended antimicrobial therapy for outpatient and inpatient care. The data used were identified by searching PubMed and the references of relevant publications. The search terms comprised “guidelines,” “community-acquired pneumonia” and “children”; only articles written in English were retrieved. Guidelines from USA, UK, Italy, Japan, Brazil, Taiwan, South Africa and Canada were identified; we excluded from review the Italian (not available in English) and Taiwanese guidelines (not electronically accessible). Guidelines from the World Health Organization, which are implemented in many developing countries as part of the Integrated Management for Childhood Illness, were also reviewed. According to the United Nations classification, USA, UK, Japan and Canada are developed countries whereas Brazil and South Africa are middle-income industrializing countries. Table, Supplemental Digital Content 1, http://links.lww.com/InF/B669, summarizes the various CAP management guidelines identified.

Notably, the criteria employed for clinical diagnosis and to guide initiation of empiric antibiotic therapy for children in developing countries are similar to those used for severity assessment and hospital admission in developed countries. For example, signs of respiratory distress including tachypnea together with chest wall retractions are included in the guidelines from USA, UK and Japan as indicators for hospitalization, whereas tachypnea alone is regarded as the indicator diagnostic criterion to manage a child with cough or difficult breathing as having CAP in ambulatory settings in developing countries in the absence of other danger signs.

No published studies from developed countries have systematically compared outcomes of children treated as outpatients compared with inpatients according to varying degrees of respiratory distress. Current recommendations from developed countries are based on the assumption that children have reasonable access to healthcare, including evaluation by a doctor. The attending physician’s overall assessment of the child’s clinical status and the anticipated clinical course are used to determine whether hospitalization is required. Moreover, there were no studies from developed countries to establish a proscribed algorithm of clinical signs and symptoms, which are then routinely applied to diagnose CAP; instead in developed world settings, the diagnosis of CAP is considered as a diagnosis based on the professional judgment of the physician. Interestingly, tachypnea was firstly identified as an efficient approach to the ordering of chest radiograph among children with fever or respiratory symptoms in United States in 1982, when it was demonstrated that out of the 29 individual symptoms analyzed, tachypnea was the best predictor of radiological-confirmed pneumonia. Subsequently, several studies undertaken in resource-limited settings such as The Gambia, India and Papua New Guinea confirmed the utility of tachypnea as a reproducible sign that is sensitive for identifying children with CAP among those with respiratory complaints. Based on these studies, the World Health Organization proposed in 1990 the standardized management for children with acute respiratory infection by using tachypnea as the core diagnostic criteria. Since this early beginning, this proposed algorithm was intended to be used by lay healthcare workers, particularly in communities where access to a physician assessment and hospital assistance is difficult. Therefore, the different healthcare system structure along with the different healthcare system structure along with the distinct access to health care in urban facilities where physicians are working play a causative role in the use of tachypnea as a diagnostic criterion in developing countries and as a severity assessment sign in developed ones. More recently (2006 to 2009), however, the presence of tachypnea was evaluated among children age ≤5 years suspected of pneumonia seeking care at a US-based pediatric emergency department. Tachypnea had low sensitivity (34.3%) as a predictor of radiological-confirmed pneumonia; notably the chest
radiograph readings were not done according to systematic criteria. The low sensitivity compared with that found in other studies was attributed to the early care seeking behavior in this population and the likelihood that pneumonia illnesses were presenting very early in the course with minimal chest radiograph changes. The utility of these clinical signs to diagnose CAP in infants and children under 5 years in developing countries has been well established by its sensitivity and specificity using radiologic CAP as the gold standard. Moreover, the impact on childhood mortality (70% reduction) of such case management recommendation has been recognized.

In the current year (2013), World Health Organization has just launched a new classification for hospital-based care in which children with subcostal retraction (also called chest indrawing) are no longer classified as having severe CAP and can be treated on an outpatient basis. This change if widely implemented, studies to investigate the etiology of CAP in the setting of PCV and HibCV use, such as the Pneumonia Etiology Research for Child Health (PERCH) study, and the US-based Etiology of Pneumonia in the Community (EPIC) study will help to provide a sound, contemporary evidence base on which guideline revisions can be reconsidered updating for changing proportion attributable to different pathogens. It is clear that CAP is a complex disease, with difficulties in establishing an accurate etiologic diagnosis in most cases, and possibly some variability in etiology across regions of the world. Treatment recommendations based on the best available evidence improve outcomes of children and limit the use of unnecessary antibiotics and may need to be updated for areas with routine HibCV and PCV use.

REFERENCES