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Co-infection of respiratory pathogens influencing severity of acute respiratory infection in children under 5 years

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Acute respiratory infections (ARI) leading to pneumonia, bronchiolitis or reactive airway disease are the leading cause of death and ill health among children under 5 years in developing countries. With introduction of molecular diagnostic methods like real time based multiplex PCR tests, polymicrobial infection is being increasingly detected in both hospitalized and OPD cases of ARIs, but their clinical significance is poorly documented. In a recent study in 2016-17, we screened 618 under 5 years children with ARI for 21 different viral and bacterial respiratory pathogens in a tertiary hospital in northeast India using real time taqman probe based multiplex assay. The most common respiratory pathogen in indoor cases vs OPD was RSV (27.3% vs 11.5%, p-value: 0.0001) followed by *Streptococcus pneumoniae* (SP) (16.4% vs 28%) and Rhinovirus (RV) (13.5% vs 9.6%) respectively. Co-infection of 3 or more pathogen was common and was observed in 25% of indoor cases (76/304) and 32.1% of OPD cases (101/314). Co-infection rate was similar in both indoor and OPD cases, however coinfection

of RSV, RV & SP was significantly higher in indoor cases compared to OPD cases. RSV, RV and SP infection were significantly associated with breathlessness/respiratory distress (p-value=0.0001). It was seen that U5 children presenting RSV with bacterial superinfection specially *Streptococcus pneumoniae* was significantly associated with severe breathlessness/respiratory distress (OR:10.2; 95% CI: 5.3 to 19.6% p-value=0.0001). Moreover, 23 different RV serotypes was found to be circulating in the region. Rhinovirus C was found to be significantly associated with breathlessness/respiratory distress than RV A or RV B infection. In developing country like India, where U5 mortality due to ARIs is very high, pneumococcal conjugate vaccine has now recently been introduced from May 2017 in the UIP. Furthermore, development of an effective low cost RSV vaccine is necessary to lower the morbidity and mortality associated with ARIs in developing countries.

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