

Hospital Based Surveillance for Radiological Pneumonia in children under 5 years of age in Lucknow District, Uttar Pradesh (UP), India

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ABSTRACT

Background and Aims: Community-acquired pneumonia (CAP) accounts for 17% of <5 year mortality in UP, where there is no immunization program for Streptococcus pneumoniae (SP) or Haemophilus influenzae (HI). This study aims to determine the proportion of radiologically-confirmed primary endpoint pneumonia (PEP) in children 2-59 months admitted to hospitals in Lucknow evaluation district.

Method: Institutional ethical approval and national clearances were obtained. A sentinel hospital surveillance system of public and private hospitals (35 rural, 85 urban) was established in Lucknow. Children aged 2-59 months fulfilling WHO definition of pneumonia with lower chest in-drawing (LCI) were eligible. Clinical data and chest radiographs were obtained; digitalized radiographs were reviewed by 4 radiologists trained in WHO-standardized interpretation methodology. They independently classified radiographs as PEP, PEP and infiltrates, infiltrates, normal and uninterpretable; final diagnosis was given by concordance of 2 radiologists.

Results: During 2015, 516 cases were recruited; 509 had concordant findings by 2/4 radiologists. Cases by age were: 2-11 months: 194 (15.9%), 12-23 months: 76 (30.3%), 24-59 months: 69 (27.5%). 170 (33.4%) radiographs were uninterpretable; leaving 339 evaluable radiographs. PEP with or without other infiltrates was found in 21.5% (73/339; 95% CI: 17.5-26.2) [2-11 months: 15.9% (31/194); 12-23 months: 30.3% (23/76) and 24-59 months: 27.5% (19/69), 4 children died.

Conclusion: Preliminary results suggest at least 1/5th of hospitalized children with CAP with LCI have PEP with or without infiltrates, indicative of possible bacterial etiology. These findings re-emphasize the pressing need for prevention against SP and HI.

INTRODUCTION

- Pneumonia is responsible for about 1.4 million deaths in children <5 years, mostly in India and within India in the states of Uttar Pradesh (UP) and Bihar.
- Hence dedicated efforts are required to focus on strategies to reduce pneumonia specific mortality.

OBJECTIVES

1. To estimate the annual incidence of radiological pneumonia in children between 2-59 months of age, in pre-specified districts.
2. To document the clinical and demographic characteristics of cases of WHO defined community acquired pneumonia (CAP) with lower chest in-drawing (LCI) and severe CAP, by establishment of hospital-based surveillance network.

MATERIALS & METHODS

- Study Design: Prospective hospital based radiological pneumonia surveillance
- Geographic Location: Two North Indian States- Uttar Pradesh (U.P.) & Bihar (Fig. 1)
- Study Sites: 4 Districts - Lucknow, Etawah, Patna & Darbhanga. (Fig. 1)

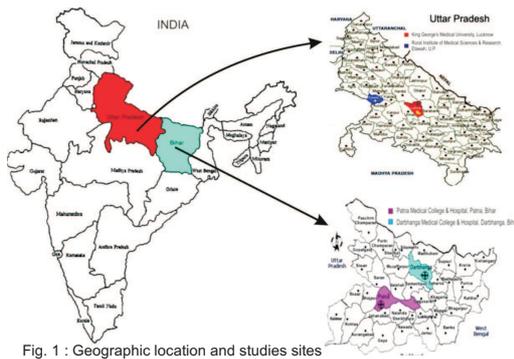


Fig. 1 : Geographic location and studies sites

METHODOLOGY

- Children enrolled from those admitted in (i) tertiary teaching hospitals (b) network of 120 hospitals in Lucknow.(Fig.2)

Eligibility Criteria :

Inclusion criteria:(a) aged 2 – 59 months (b) symptoms of WHO defined CAP with LCI and severe CAP (c) residing in the pre-specified district (d) digital or analog chest x-ray picture available (e) parent provides consent for participation.

Exclusion criteria:(a) cough and respiratory symptoms for more than 14 days (to exclude tuberculosis) (b) pleural tap/intercostal drainage has been done prior to hospitalization (as radiological picture would have altered) (c) who have been admitted within 14 days of discharge from a hospital facility (as they are likely to have nosocomial infections).

• Data abstracted from hospital records. One copy of routine chest x-ray collected, digitalized and archived electronically.

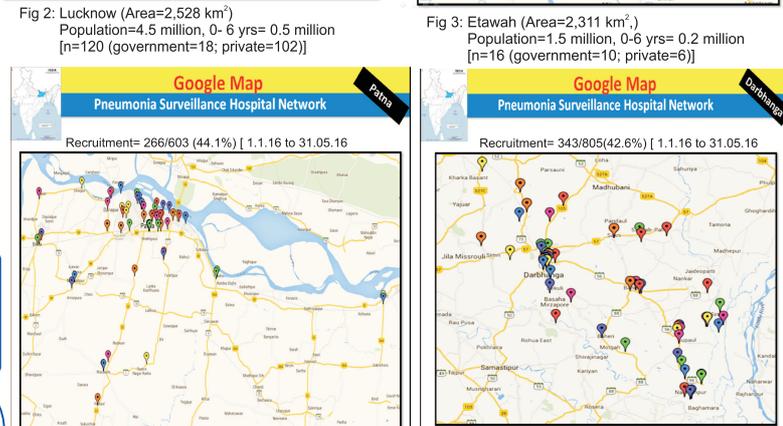
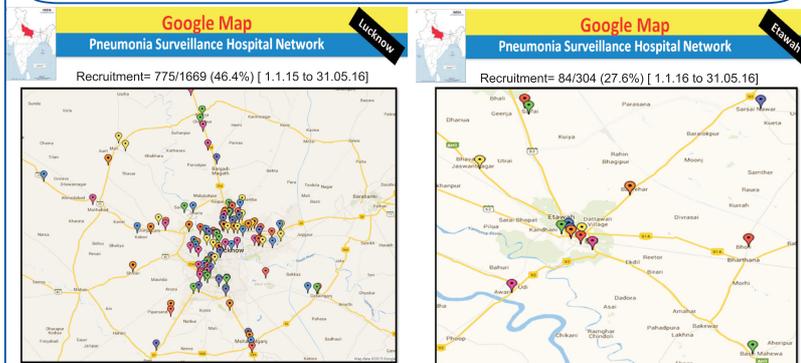
• Digitalized radiographs reviewed by 3 radiologists trained in WHO-standardized interpretation methodology.

• Radiologist independently classified radiographs as PEP, PEP and infiltrates, infiltrates, normal and uninterpretable; final diagnosis was given by concordance of 2 radiologists.

• In Phase I (2015) procedures were standardized, hospital network established and recruitments initiated from Lucknow district.

• This was expanded in Phase II (2016) in Etawah district (U.P) and Patna & Darbhanga districts of Bihar after establishment of hospital network (Fig.3,4 &5)

PNEUMONIA SURVEILLANCE HOSPITAL NETWORK



Project Investigators & CCU Team



Panel of Radiologists

PRELIMINARY RESULTS OF 2015 FROM LUCKNOW

- 516 cases recruited; 4 children died.
- 509 X-rays had concordant findings by 2/4 radiologists
- Uninterpretable radiographs : 170 (33.4%)
- Evaluable radiographs:339 (66.6%)
- Normal : 66.9% (227/339)
- Primary End Point Pneumonia with or without infiltrates: 21.5% (73/339)
- Other infiltrates only in 11.50% (39/339)

IMPLICATIONS & FUTURE WORK

- Baseline incidence of radiological pneumonia in Uttar Pradesh and Bihar will be estimated and follow up data will enable assessment of impact of PCV introduction
- Plans are being developed to add nasopharyngeal carriage evaluation in both states, with the goal of setting up a robust effort for impact assessment.

WEBSITE & PUBLICATION

PROJECT WEBSITE : www.capxrs.org

PUBLICATION: S.Awasthi et al. Hospital Based Surveillance for Radiological Pneumonia in children under 5 years of age in Uttar Pradesh and Bihar. Pediatric Infectious Disease. 2016 Jun 15. doi:10.1016/j.pid.2016.06.008

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