At a Glance: Surveillance for Enteric Fever in Asia Project (SEAP)

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Outline

Rationale

Objectives

Methods

Results

Summary
Surveillance for Enteric Fever in Asia Project (SEAP) Rationale

- Address some shortcomings of previous studies and fill knowledge gaps
  - Population-based incidence rates
    - Burden on children under 2 years
  - Severity of illness and clinical complication rates
  - Case-fatality rates
  - Antimicrobial resistance patterns as it relates to clinical outcomes
  - Economic impact
  - Burden in peri-urban and rural areas
Objectives

Characterize the burden of enteric fever in selected countries in Asia

- Age-specific population-based adjusted incidence
- Risk factors for severe illness
- Long-term impact
  - Incidence of complications
  - Case-fatality rates
- Evolving patterns of antimicrobial resistance for S. Typhi and Paratyphi
- Cost of illness: health care and societal perspective
- Explore the relationship, if any, between antimicrobial resistance, antimicrobials prescribed, and outcomes

Establish a biobank of Salmonella bacterial strains and plasma
Methods

Phase I
- Retrospective data collection to inform design of phase II
- Four countries: Bangladesh, Nepal, Pakistan, India

Phase II
- September 2016 to August 2018
- Multi-country, multi-site, prospective, population-based surveillance

Bangladesh
- Dhaka Shishu Hospital (DSH)
- Shishu Sasthya Foundation Hospital
  - ~15,000 blood cultures/year
  - Serve the majority of Dhaka City population (~8.5M)
  - ~3.4M catchment area
  - Urban and peri-urban

Nepal
- Kathmandu Medical College and Teaching Hospital
- Dhulikhel Hospital
  - ~5,000 blood cultures/year
  - Serve the entire Kathmandu Valley (~2.5M)
  - ~330,000 catchment area
  - Urban, peri-urban and rural

Pakistan
- Aga Khan University Hospital
- Kharadar General Hospital
- National Institute of Child Health*
  - ~38,000 blood cultures/year
  - Serve the majority of Karachi population (~20M)
  - ~3M catchment area
  - Urban, peri-urban, slum settlements
Phase II Components

- Hospital-based Surveillance
- Health Care Utilization Survey
- Biobank
- Economic Evaluation
- Enhanced Laboratory-based Surveillance
- Patient Follow-up

SEAP

[Image: Diagram showing the relationship between the components]
Phase II Study Flow

Outpatient
Fever for ≥3 consecutive days within the last 7 days

Inpatient
Clinical suspicion or a confirmed diagnosis of enteric fever

Hospital Laboratory/Laboratory Networks
Positive blood culture for *Salmonella* Typhi or Paratyphi

Surgical
Ileal perforation, even in the absence of laboratory confirmation.

Urine Sample

Biobank (Plasma and Isolates)

• Cost of Illness
• Risk Factors (including 10% at enrollment)

Follow-Up
Chart Review

Complications

Post-Mortem Survey

Death

6-week Follow-up
Age Distribution of Confirmed Enteric Fever Cases
Phase I and Phase II (n=5328)

Bangladesh, 2013-2014, 2016-2017 (n= 597)

- ≤ 9 mon: 19 (3%)
- 9 mon < n ≤ 2 yr: 104 (17%)
- 2 yr < n ≤ 5 yr: 200 (34%)
- Total: 323 (54%)

India, 2014-2015 (n= 1382)

- ≤ 9 mon: 2 (<1%)
- 9 mon < n ≤ 2 yr: 29 (2%)
- 2 yr < n ≤ 5 yr: 79 (6%)
- Total: 110 (8%)

Pakistan, 2012-2014, 2016-2017 (n= 3108)

- ≤ 9 mon: 29 (1%)
- 9 mon < n ≤ 2 yr: 272 (9%)
- 2 yr < n ≤ 5 yr: 690 (22%)
- Total: 991 (32%)

Nepal, 2013-2017 (n= 241)

- ≤ 9 mon: 2 (1%)
- 9 mon < n ≤ 2 yr: 5 (2%)
- 2 yr < n ≤ 5 yr: 11 (5%)
- Total: 18 (8%)

Median: 5 (Range: 0-65)

Median: 24 (Range: 0-90)

Median: 9 (Range: 0-82)

Median: 20 (Range: 0-68)
Antimicrobial Resistance by Country
Phase I and Phase II (n=4109)

MDR
- Resistant to Ampicillin OR Amoxicillin, AND
- Resistant to Chloramphenicol, AND
- Resistant to TMP-SMX

% Resistant

Bangladesh (n=404)  Pakistan (n=3035)  Nepal (n=241)  India (n=429)
Summary

SEAP is a cost-effective surveillance approach that has collected patient-level data on >5,000 enteric fever cases from four countries

- Expected to enroll over 3500 cases prospectively (Phase II)

Phase II ongoing activities will:

- Identify high-risk populations who would benefit from prevention interventions
- Measure the individual and societal economic burden of typhoid
- Describe risk factors for typhoid including household water and sanitation practices
- Characterize the clinical outcomes and case-fatality rate in different settings and subpopulations
- Quantify the relationship between antimicrobial resistance and severe outcomes including mortality rates
- Provide baseline rate for assessing impact of future interventions
- Archive isolates and plasma for future use in a Biobank
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