Purpose
The purpose of this SOP is to describe the reasons for requesting a chest x-ray in a hospitalized CHAIN participant, interpretation and possible storage of chest x-ray. Hospitalized participants may require a chest x-ray at enrollment or if there is a deterioration during admission.

Responsibility
This SOP applies to doctors and clinical officers for the CHAIN study.

The Principal Investigator (through the study coordinator when applicable) retains the overall responsibility of implementation of these standard procedures.

The study clinical coordinator is responsible for answering questions you may have about the content of this SOP and any other relevant study documentation. Please contact that study clinical coordinator through your site coordinator.

Abbreviations/Definitions
CRF Case report form

Materials
Clinical examination and vital signs SOPs
Enrollment and Daily Record CRF
Stethoscope
Pulse oximeter
CHAIN Chest X ray request form

Indications for Chest x-ray

Children who have the following signs and symptoms should have a chest x-ray unless they are too unwell to attend the x-ray department and there is no portable x-ray service available, or if the x-ray department is unable, e.g. no radiographer, machine broken. All children who have a chest x-ray should have antero-posterior and lateral views.

Symptoms:
Cough
Difficulty breathing
Poor feeding
Known contact with TB

Vital signs:
Temperature > 38C
Respiratory rate > normal range for age as indicated in SOP for vital signs
CHAIN CHEST X RAY SOP

Oxygen Saturations <90% in room air

Examination:
Nasal flaring
Head nodding
In-drawing or tracheal tug
Asymmetric air entry on listening with stethoscope
Crackles or wheeze on listening with stethoscope
Dullness to percussion

**Interpretation of Chest X-ray**

The findings of the chest x-ray should be documented in the investigation results CRF. Two clinicians (doctor or clinical officer) with experience in chest x-ray interpretation should review the x-ray and agree on findings. If there is disagreement an opinion should be sought from the PI.

1) Assess the quality of the x-ray:
   - Rotation – check if the ribs appear symmetrical, and if there is equal distance on both sides between the medial border of the clavicle and the vertebra. If there is asymmetry this is suggestive of rotation.
   - Penetration – The vertebral bodies should be just visible behind the cardiac silhouette. An over penetrated x-ray will be black, an under penetrated x-ray will be white. Be aware that pleural effusions and severe air-space opacification may result in white lung-fields, however, the vertebrae should be visible unless there is midline shift.
   - If there is rotation or incorrect penetration consider repeating the x-ray

2) Look for abnormalities on the chest x-ray.
   - The cardiac silhouette should be central and to the left. The right lung has 3 lobes, upper, middle and lower.
   - Assess the position of the trachea – it should be central if there is no rotation.
   - First look at the lung fields. The pulmonary vessels should reach the ribs. If they do not, consider pneumothorax
   - Look at the horizontal fissure and the costophrenic angles to determine if there are any signs of fluid overload/cardiac failure or pleural effusion.
   - A normal chest x-ray

<table>
<thead>
<tr>
<th>CHEST X RAY: ALL SITES</th>
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<tbody>
<tr>
<td>Date (DD/MM/YY)</td>
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Version 1.01 (14Sep2016)
<table>
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<tr>
<th>Result after review by 2 clinicians</th>
<th>Normal</th>
<th>Abnormality on left</th>
<th>Abnormality on right</th>
<th>Bilateral abnormality</th>
<th>Abnormality seen on lateral view only</th>
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<tbody>
<tr>
<td>Midline</td>
<td>Trachea central</td>
<td>Y</td>
<td>N</td>
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<tr>
<td>Abnormality, circle all that apply</td>
<td>Airway compression and / or tracheal displacement</td>
<td>Soft tissue density suggestive of lymphadenopathy</td>
<td>Air space opacification</td>
<td>Nodular picture / Miliary</td>
<td>Pleural effusion suspected</td>
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<tr>
<td>Other abnormality</td>
<td>Cardiomegaly</td>
<td>Rib fracture</td>
<td>Mediastinal mass</td>
<td>Pneumothorax</td>
<td>Rib features consistent with rickets</td>
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Document history

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Site training record

All sites are required to maintain a master copy of this SOP that documents the site staff that have been trained on this SOP.

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