

The use of mobile imaging and Philips SkyFlow in improving patient safety in the placement of NG tubes

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Aims of Presentation

- Explore the national and local evidence of Safe NG tube placement
- Change of Clinical practice
- Use of Mobiles and Philips SkyFlow in the imaging of NG tubes
- Results of change of practice
- Next Steps



National evidence

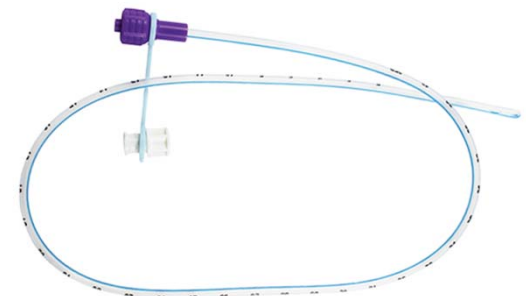
Between 2005-2013 the National Patient Safety Agency (NPSA) published 4 safety alerts including the following document:

Patient Safety Alert NPSA/2011/PSA002: Reducing the harm caused by misplaced nasogastric feeding tubes in adults, children and infants

On 1 April 2016 the statutory patient safety functions previously delivered by NHS England transferred with the national patient safety team to [NHS Improvement](#) which then issued a new document:

NHS/PSA/RE/2016/006 Nasogastric tube misplacement: continuing risk of death and severe harm

- Aspiration through a misplaced NG feeding tube is considered a 'Never event'
- Over a 4.5 year period 95 incidents relating to misplaced NG tubes were reported
- 45 were attributed to Radiology
- 5 were looking at the wrong X-ray (date error)
- 40 were due to misinterpretation



The Radiographers Responsibilities

Patient Safety Alert NPSA/2011/PSA002

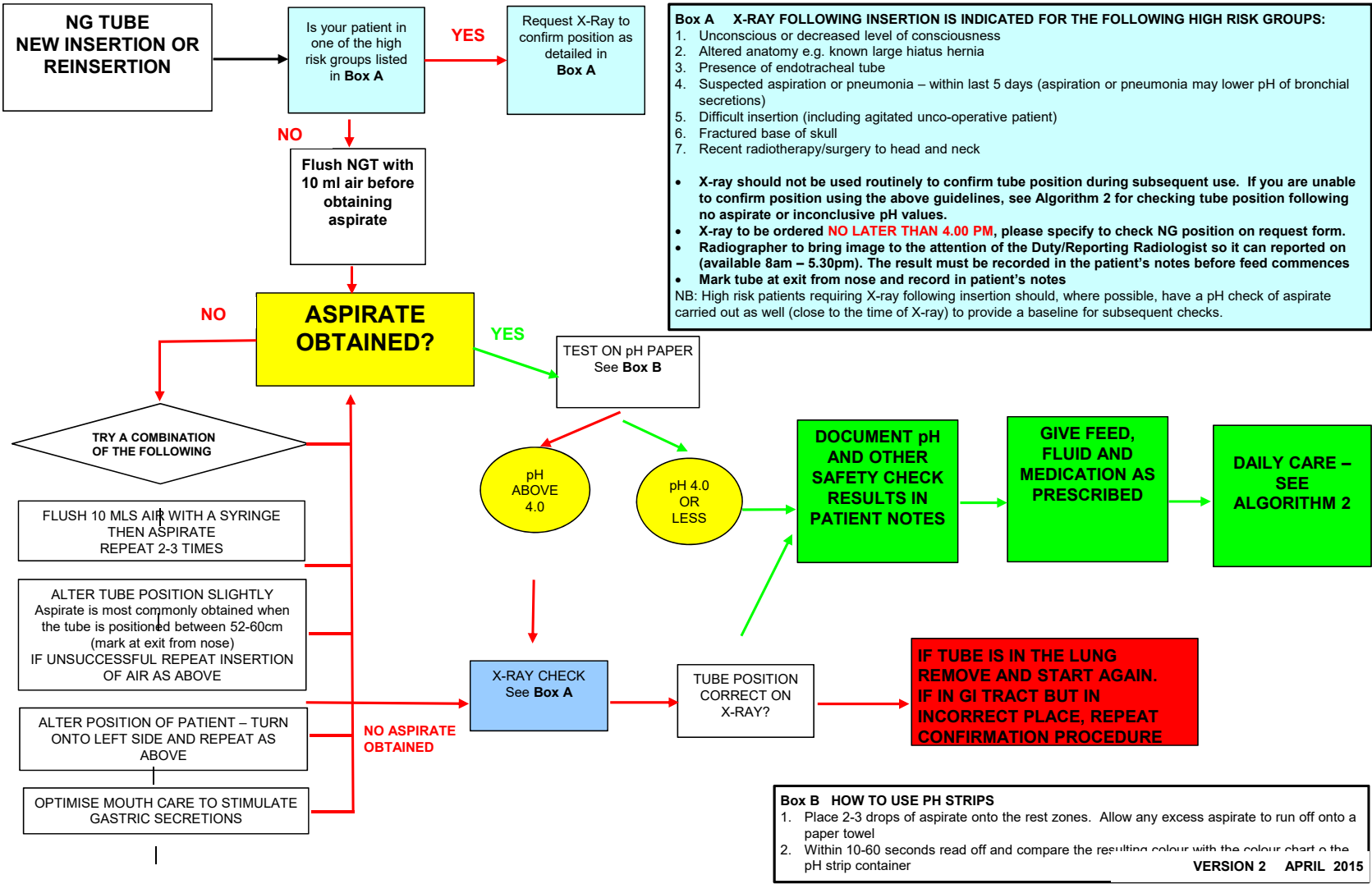
The radiographer performing the chest x-ray must ensure that:

- 1. The exposure of the x-ray is adjusted to allow the nasogastric tube to be visible to the bottom of the image.
- 2. The x-ray is centred lower than would normally be appropriate for a chest x-ray so that it shows the abdomen as far as possible below the diaphragm.
- 3. The x-ray must show the bottom of both hemi-diaphragms in the midline.
- 4. If the tube is misplaced with the tip in for example the bronchus, the tube should be removed before the patient leaves the department.

Historical Local issues

- NG tube issues included
- 2 patients who aspirated due to misplaced NG tubes.
- Poor RIS system, which delayed requests
- Aged equipment limited fixed plate DR
- Suboptimal imaging with CR cassettes
- No standard practice of imaging patients with NG tubes in situ
- Poor Portering support
- Clinical risks if NG is incorrectly sited
- Delays in Reporting





Box A X-RAY FOLLOWING INSERTION IS INDICATED FOR THE FOLLOWING HIGH RISK GROUPS:

1. Unconscious or decreased level of consciousness
2. Altered anatomy e.g. known large hiatus hernia
3. Presence of endotracheal tube
4. Suspected aspiration or pneumonia – within last 5 days (aspiration or pneumonia may lower pH of bronchial secretions)
5. Difficult insertion (including agitated unco-operative patient)
6. Fractured base of skull
7. Recent radiotherapy/surgery to head and neck

- X-ray should not be used routinely to confirm tube position during subsequent use. If you are unable to confirm position using the above guidelines, see Algorithm 2 for checking tube position following no aspirate or inconclusive pH values.
- X-ray to be ordered **NO LATER THAN 4.00 PM**, please specify to check NG position on request form.
- Radiographer to bring image to the attention of the Duty/Reporting Radiologist so it can be reported on (available 8am – 5.30pm). The result must be recorded in the patient's notes before feed commences
- Mark tube at exit from nose and record in patient's notes

NB: High risk patients requiring X-ray following insertion should, where possible, have a pH check of aspirate carried out as well (close to the time of X-ray) to provide a baseline for subsequent checks.

Box B HOW TO USE PH STRIPS

1. Place 2-3 drops of aspirate onto the test zones. Allow any excess aspirate to run off onto a paper towel
2. Within 10-60 seconds read off and compare the resulting colour with the colour chart on the pH strip container

VERSION 2 APRIL 2015

Existing Trust Guidance

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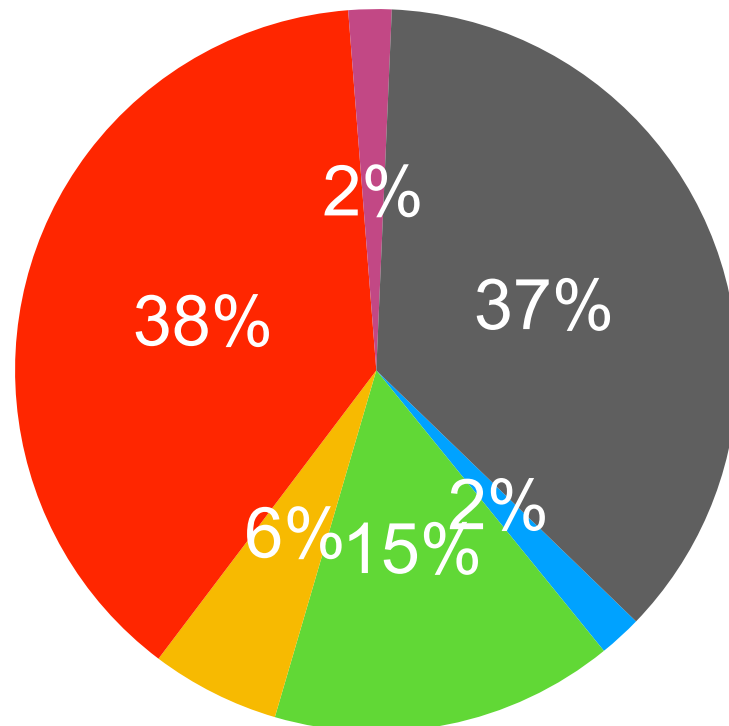
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Departmental Audit

In March 2017 the Radiology department conducted an Audit on NG tube placement reviewing 51 patients who had NGT placement.



KEY

- tip not visible
- under exposed but reportable
- very under exposed
- tube was not adequately visualised
- tube not advanced enough
- Good quality



Changing Clinical Practice

- Activated RIS national code to identify NG tubes: XNASG
- Change of RIS and PACS allowed for order com requesting of In patients
- Creation of SOP to standardise practice
- Purchase of 2nd DR mobile machine
- Purchase of Philips SkyFlow software
- Change of Portering workflow to within Radiology
- Training of Radiology staff to Identify and remove NG tubes placed in the left or right bronchus



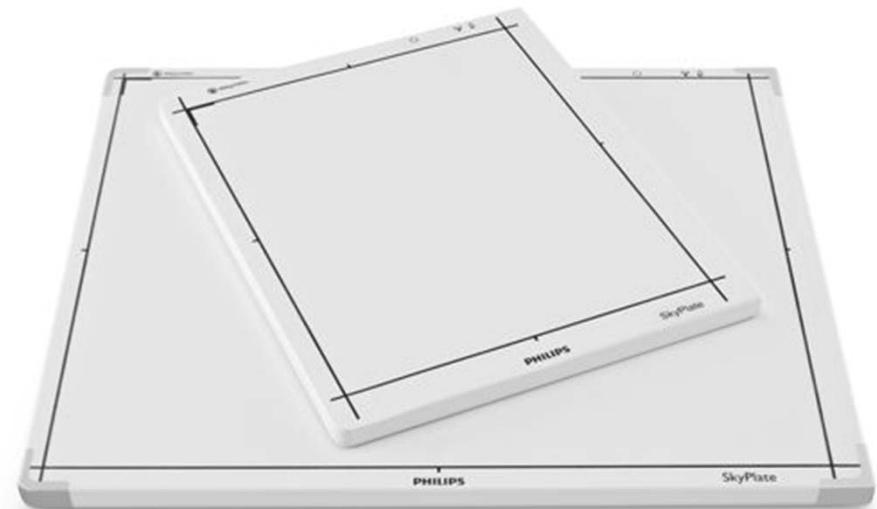
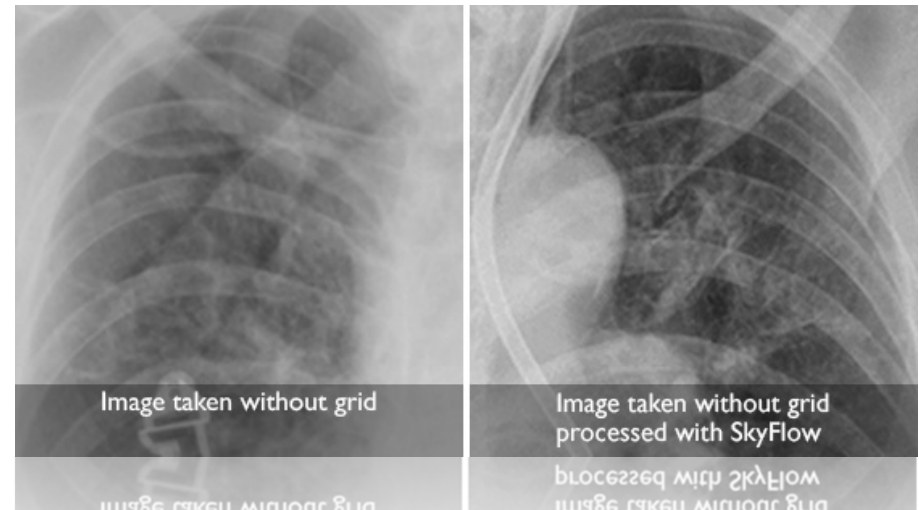
Mobile imaging

- Relatively cheap
- Versatile
- Interchangeable detectors
- Philips SkyFlow compatible
- Contingency planning/ disaster recovery



Advantages of Philips SkyFlow

- Ease of Use
- Linked to all free detector AP Chest X-rays
- Improved image quality
- Decreased repeats and rejects



- Philips SkyFlow is a scatter correction software algorithm
- Determines what is the primary radiation
- Determines the predicted pattern of the scattered radiation
- Removes the scattered radiation creating a 'grid like' image without the need of a stationary grid
- Increase image contrast without increase in dose



figure 1. Primary Radiation

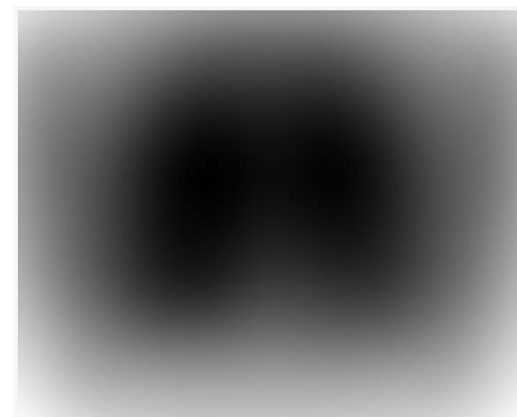


figure 2. Scatter Radiation

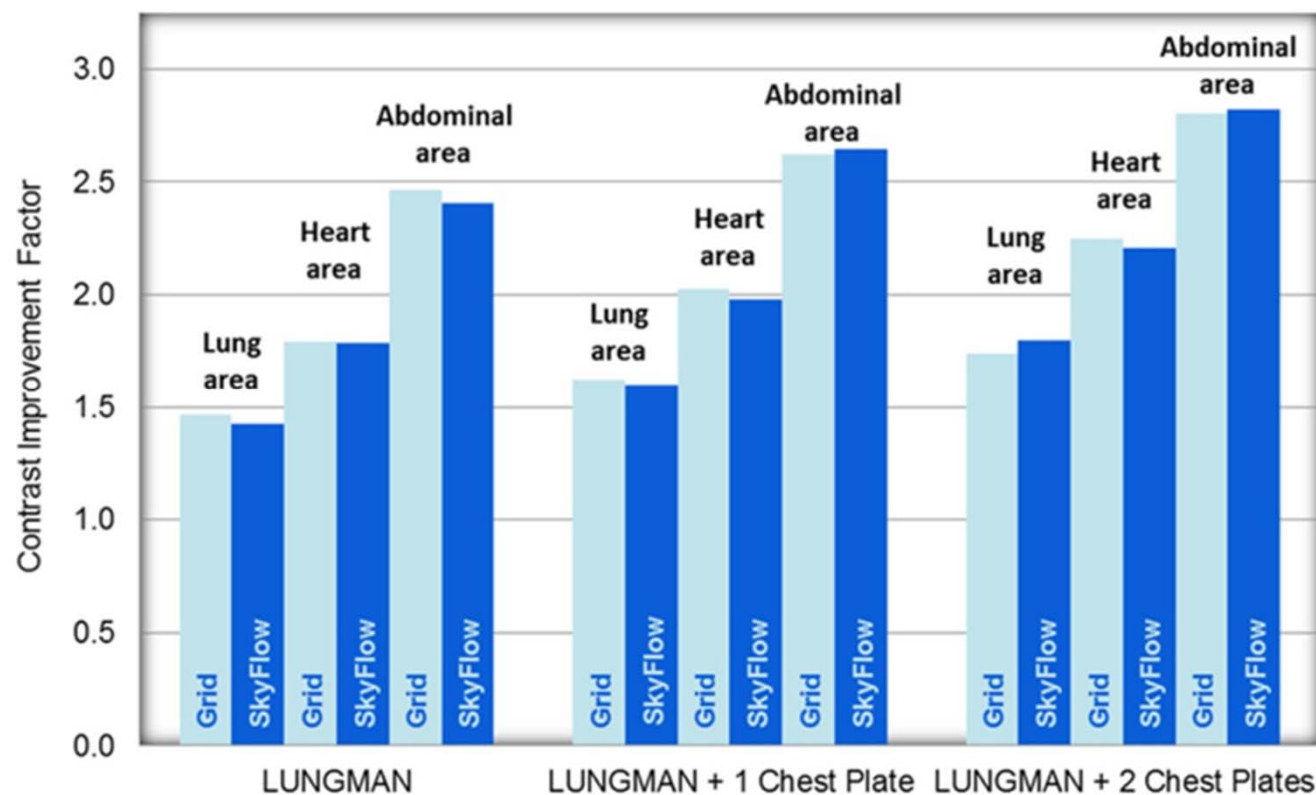
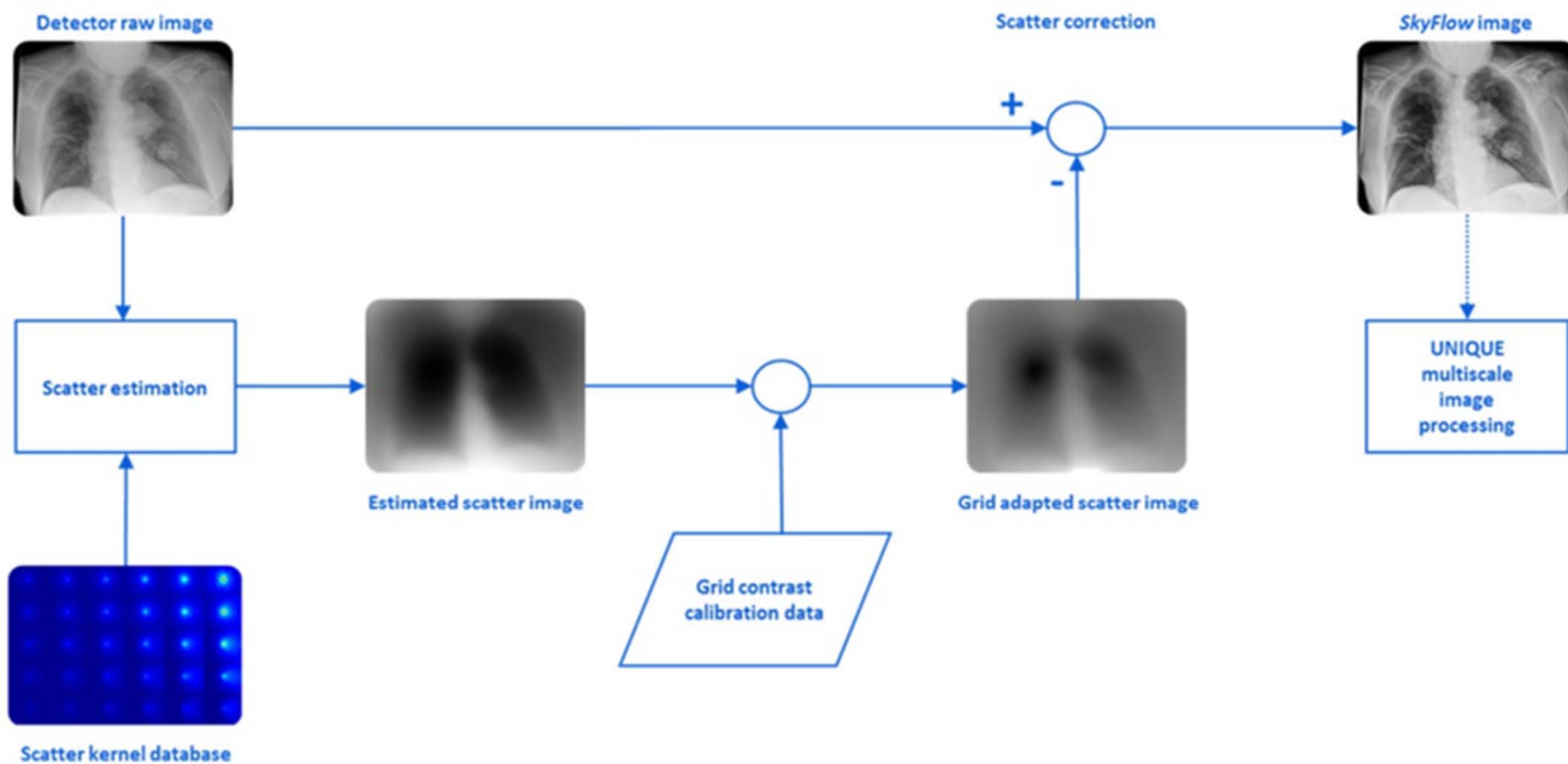
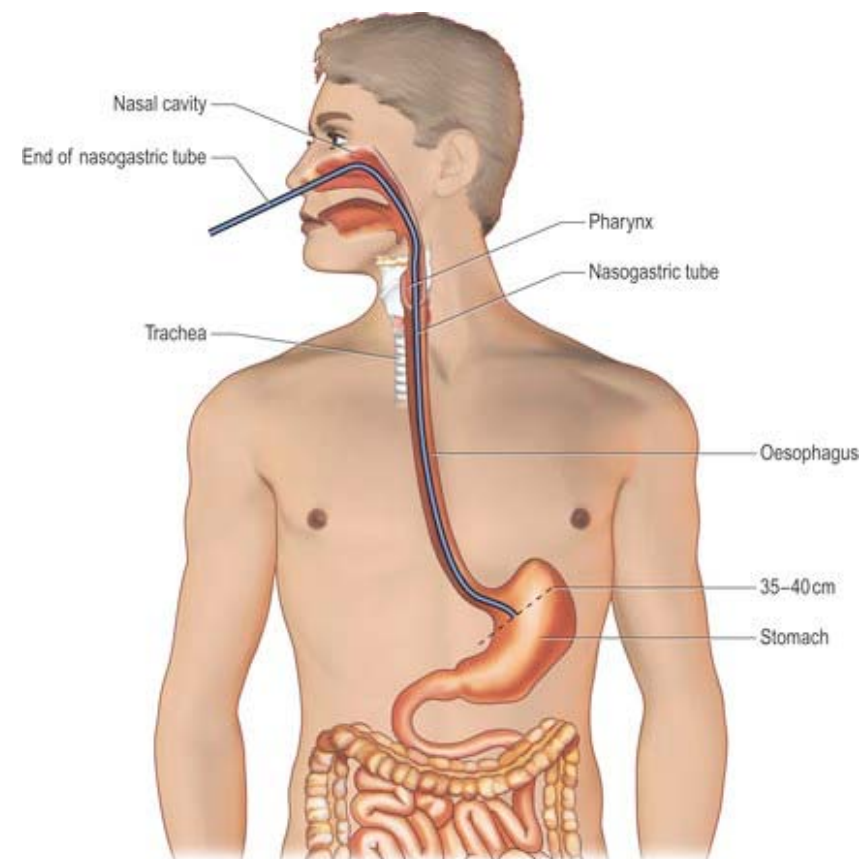
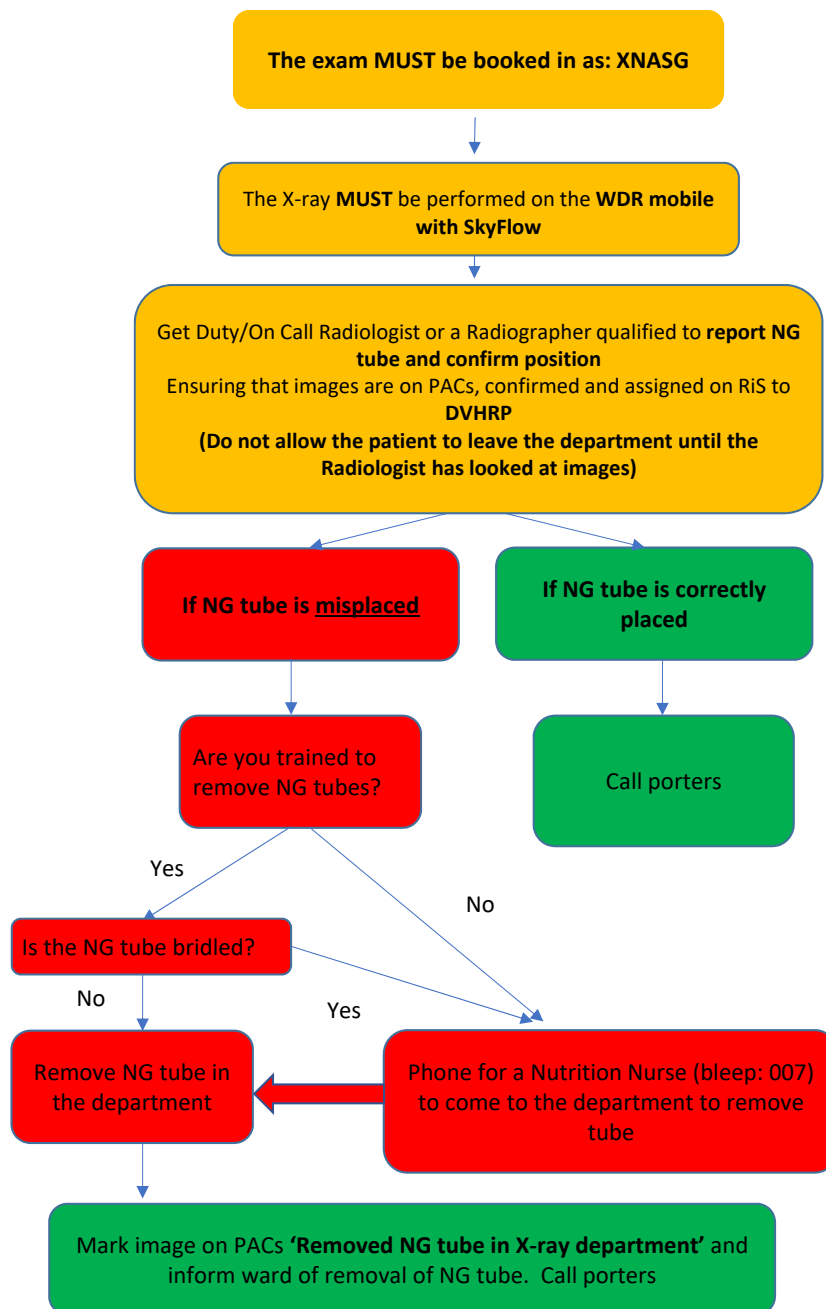


figure 3. Combined image



SOP: Naso-gastric tubes

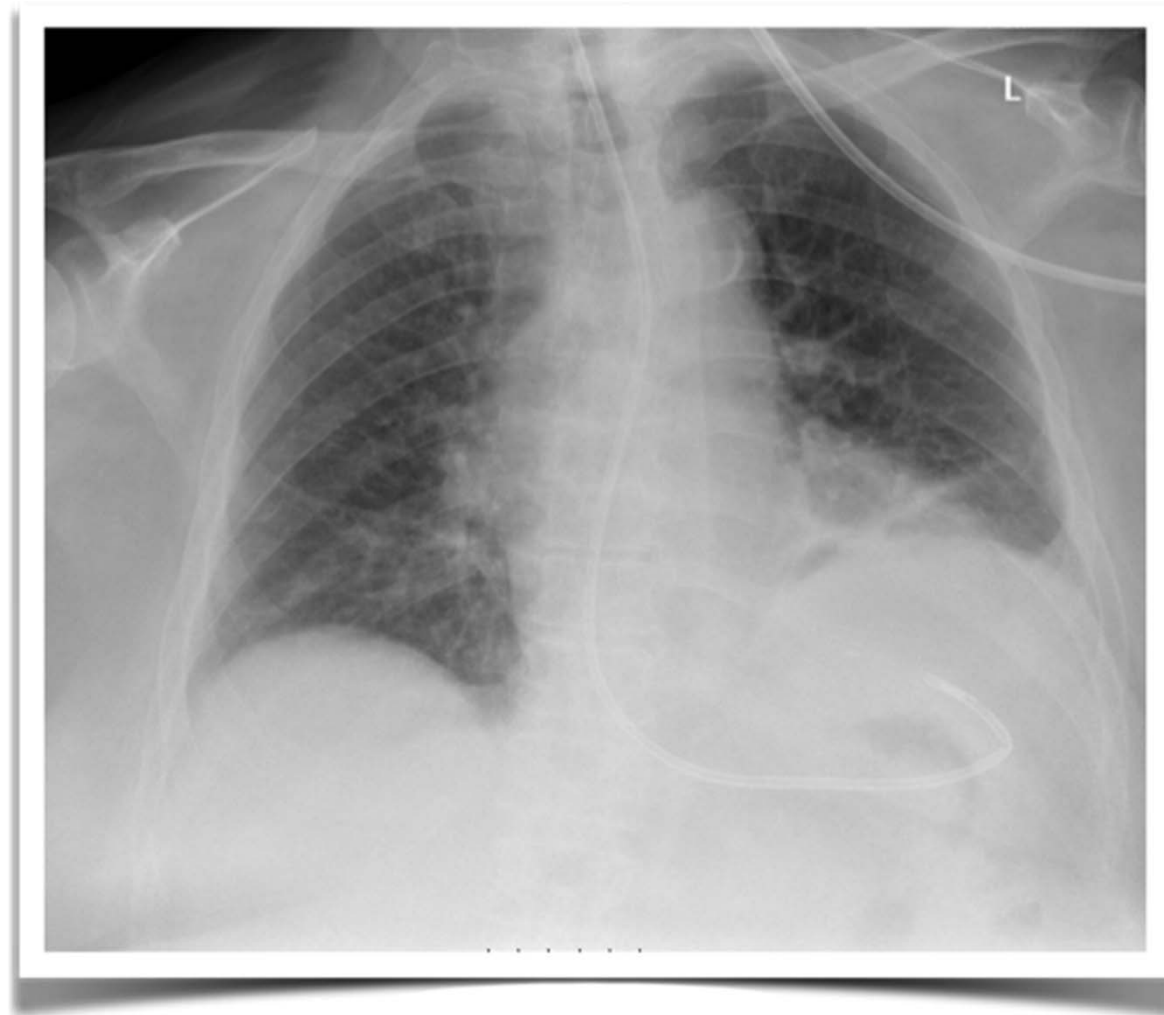
It is important that a confirmed misplaced NG tube is removed at the earliest opportunity:



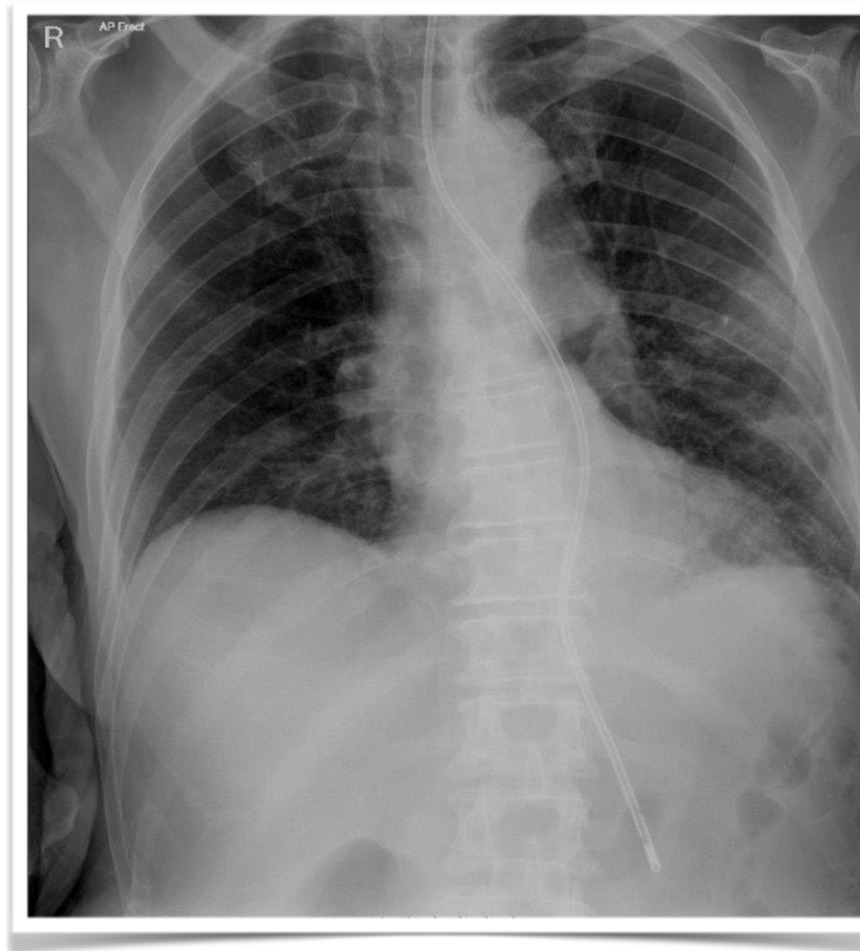
CR Chest X-ray



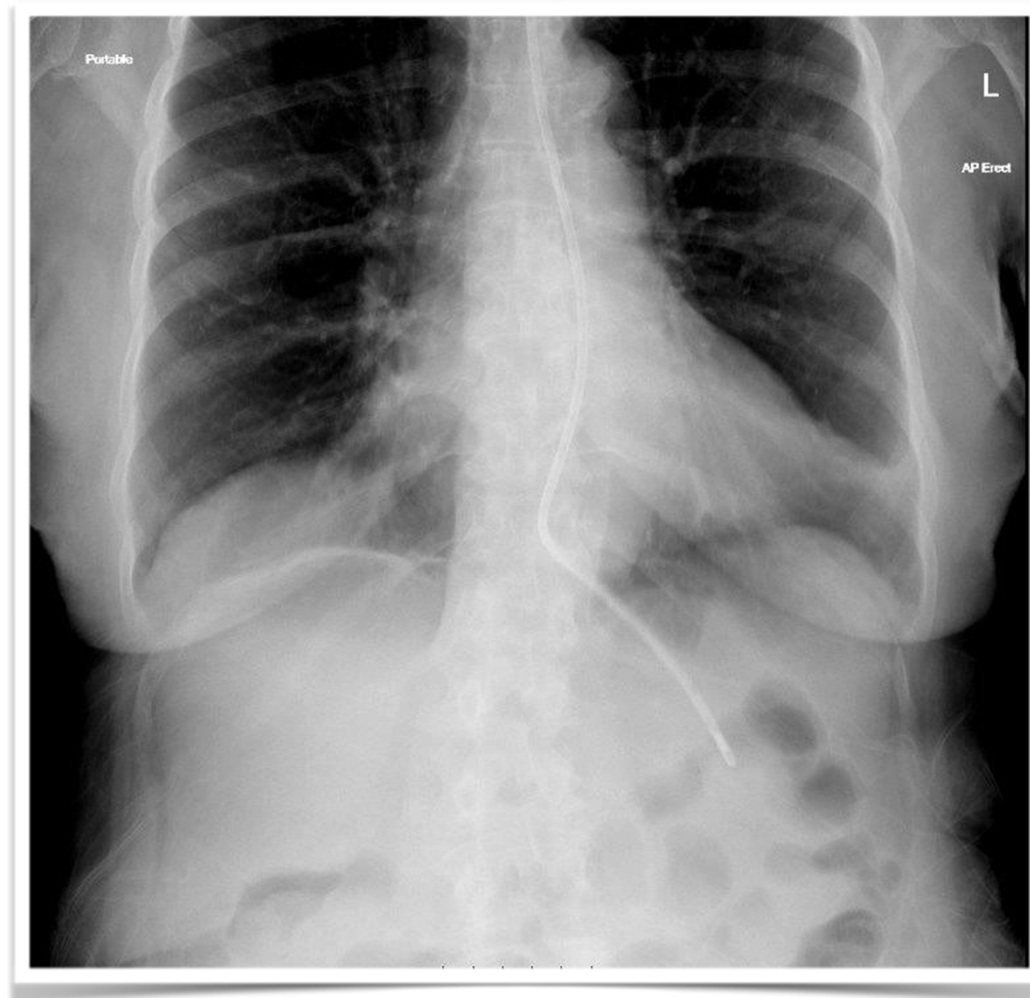
WDR without SkyFlow



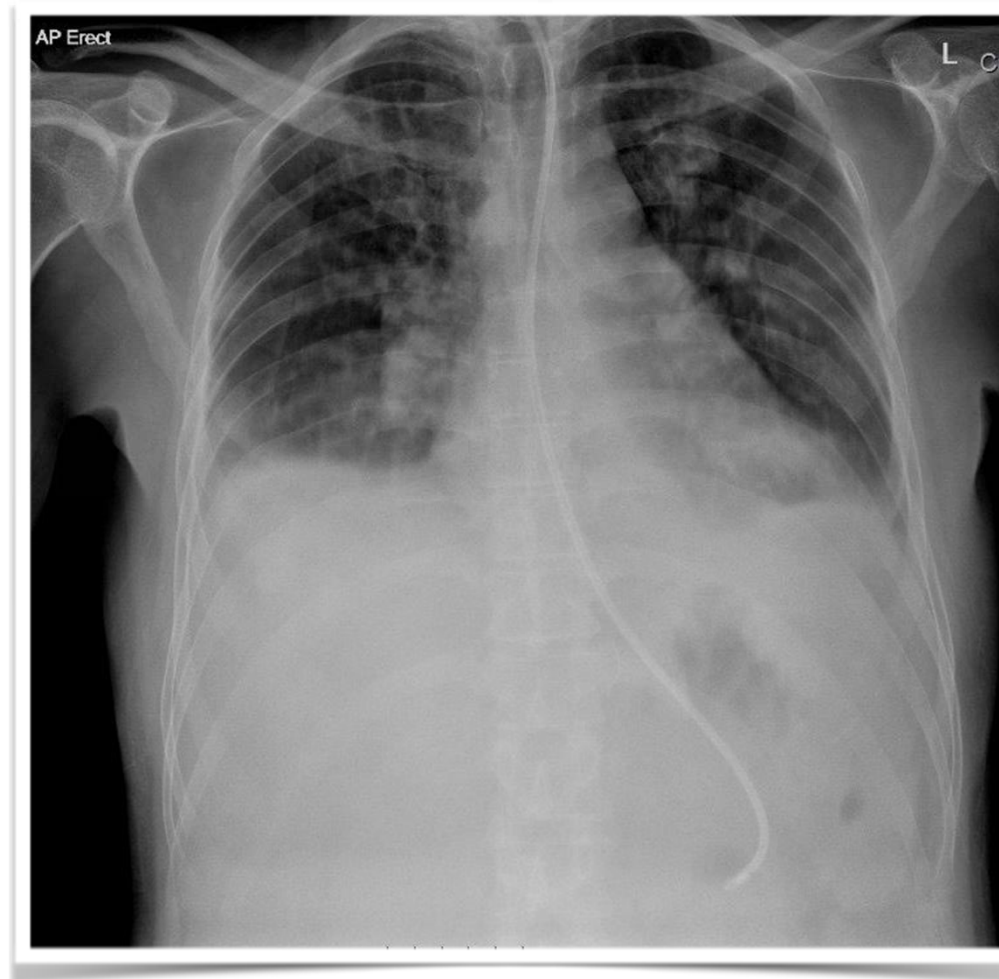
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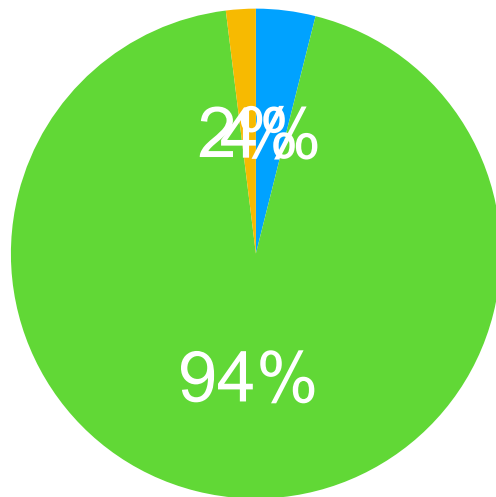


WDR with SkyFlow

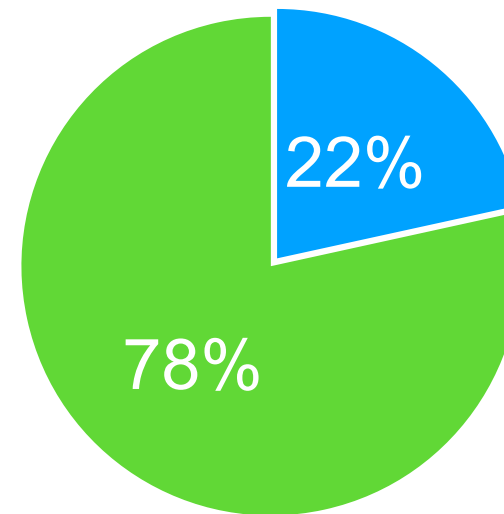


Re-Audit Sept 2018

■ under exposed ■ good quality
■ over exposed



■ Didi diagnost WPD
■ wDR mobile with skyflow



- Increase of 57% in the diagnostic quality of NG tube x-rays
- The tip was seen in 100% of cases
- Average dose for SkyFlow was 15uGy*m2.

- No delay between referral and receipt of request
- Increased accuracy and confidence in Radiologist reports
- Decrease in delays from placement of NG tube to feeding
- No Patient has left the Radiology department with a misplaced tube in the 10 months since change of practice



1. Installation of a DR room with SkyFlow

- Removes the need to use the mobile machines on ward patients who can travel to the department
- Reduces bottleneck and time delays of using the wDR mobile machines within the Xray rooms





2. The Radiological report

- Radiologists have refused to adopt the standard report construct proposed by the NPSA
- Chest Reporting Radiographers to report the NG tubes

The Radiological report:

- **The Date and time in the text body of the report**
- **The Position of the NG tube, whether or not passing through the midline**
- **The position of the tip of the NG tube and its site within the stomach**
- **An action titled Plan: whether or not it is safe to proceed to feeding/ if advancement or withdrawal of the feeding tube is required**

Any Questions?

