

Large Scale CT Dose Audit Through Radiology Information Systems (RIS)

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Background

IRS

- MPE and RPA for a number of trusts mainly in North West England

Me

- Scientific Officer / Trainee RPA
- Worked with IRS for nearly 8 years
- Specialist areas CT, Digital Imaging & Research

Background

AUDIT THROUGH RIS

- Since 2007, IRS have been working on auditing using RIS data
 - Patient Dose Audit
 - Clinical Audit
 - Automatic QA

Background

PATIENT DOSE AUDIT

- Using exposure factor data or dose data (DAP/DLP) from ALL patients for:
 - Common Examination Types
 - Main Rooms / Departments
 - Over any time period required

Background

CLINICAL AUDIT

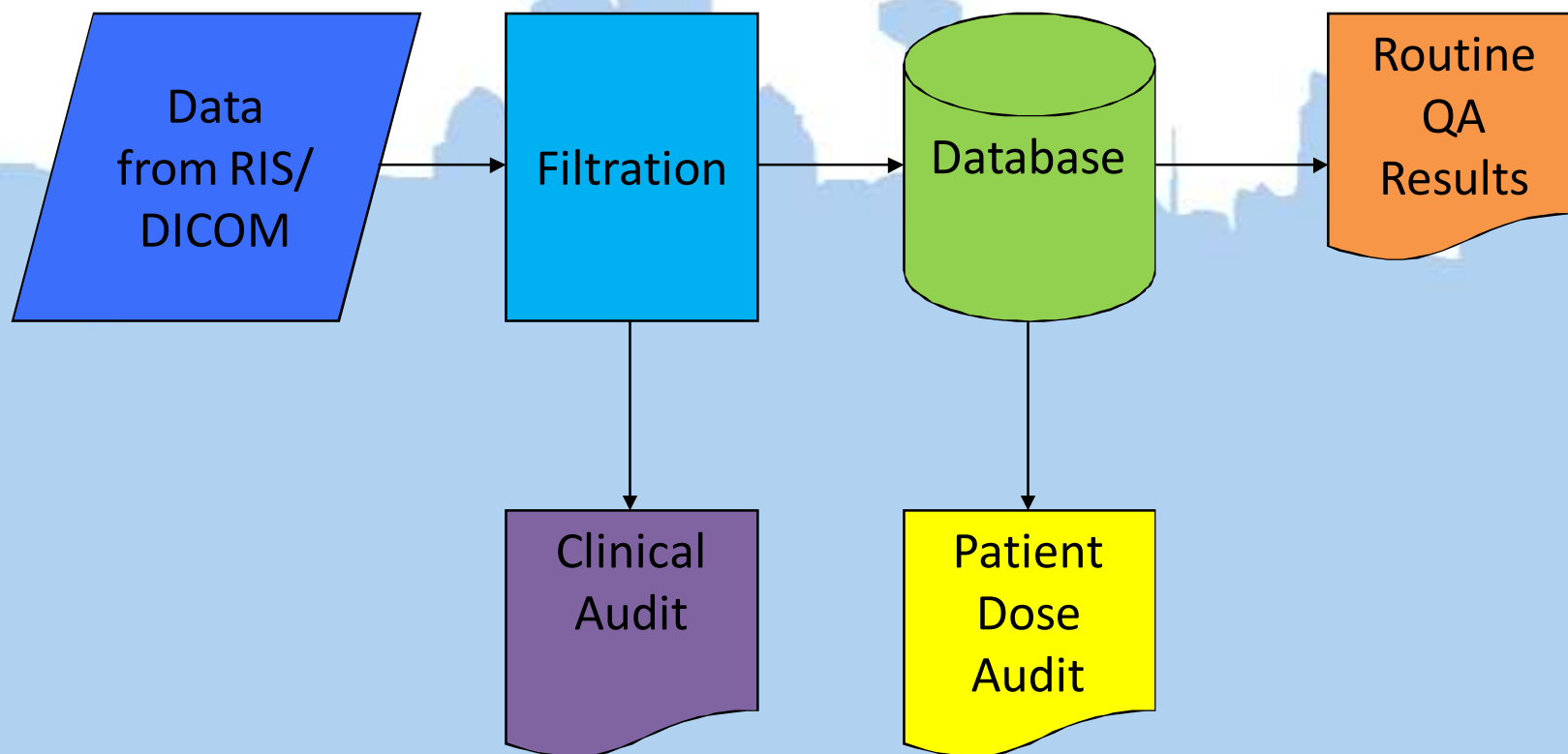
- **What information is missing?**
- **Can this be reported back to trust?**
- **Are other IRMER requirements recorded**
 - **Patient Identification**
 - **Pregnancy check**
 - **Justification by a practitioner**

Background

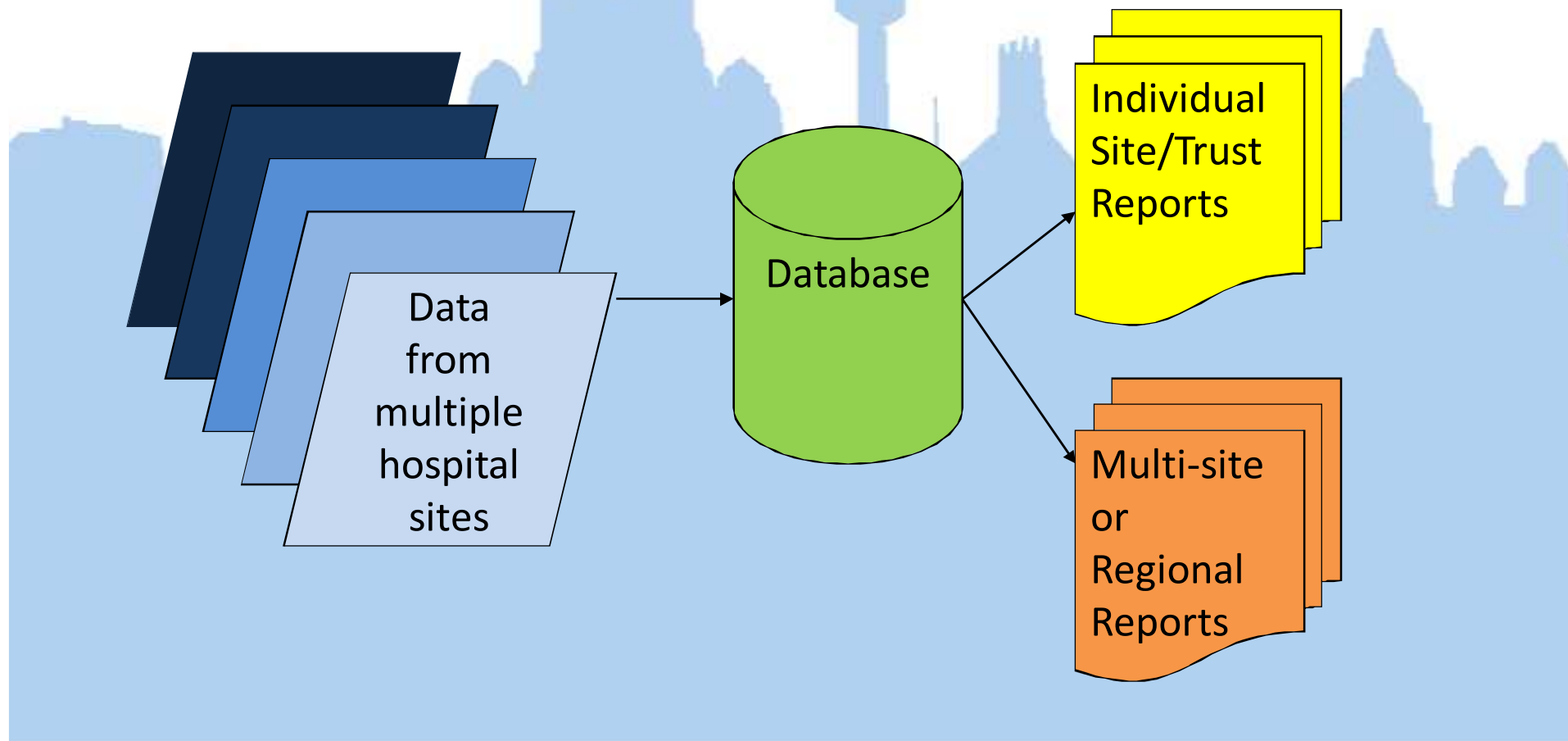
AUTOMATED QA

- Can any of the examination data be used for routine equipment performance checks? (WIP)

Background



Background



Data Content

- All of this has been done for plain film examinations so far.
- From 2007 to 2009, we obtained 730,000 examination records from 5 hospitals
- 47,750 of these records are CT examinations from 6 scanners @ 4 hospital sites

Can any of these processes be applied to CT?

Data Acquisition

DIRECT

- Contact RIS manager (via Radiology)
- Ask nicely (biscuits work) for specific fields (next slide)
- A 'stat' is produced in either XLS, CSV or XML format

CENTRALLY

- Country divided into Regions
- Regions divided into Clusters
- Find friendly RIS manager (upgrade to chocolate)
- They can obtain data from whole cluster (with same RIS?)

Data Content

GOLD STANDARD AUDIT FIELDS

- Date of Examination
- Patient ID
- Age or DOB
- Gender
- Patient Height
- Patient Weight
- Modality
- Room Name
- Operator/Radiographer 1 to 3
- Examination
- Projection
- kV
- mAs
- Dosage
- Practitioner
- Patient ID Check
- Pregnancy check
- Patient Mobility

Data Content

PD AUDIT FIELDS

- Date of Examination
- Patient ID
- Age or DOB
- Gender
- Patient Height
- Patient Weight
- Modality
- Room Name
- Operator/Radiographer 1 to 3
- Examination
- Projection
- kV
- mAs
- Dosage
- Practitioner
- Patient ID Check
- Pregnancy check
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Analysis

- Individual site data is pooled
- Statistics applied
 - Mean of Dosage field
 - Standard Deviation
 - Mean kV / mA(s)

Discussion

EXAMINATION NAME

- CT Abdomen & pelvis with contrast
- CT Abdomen/Pelvis with contrast
- CT Ankle Lt/Rt

Discussion

DOSAGE FIELD

- DAP in plain film (very inaccurate)
- DLP in CT (Expected to be pretty accurate)

Discussion

CT Urogram:

54yo M, DLP=10677002(units?)!!

(Removing this data point gives mean DLP as 720)

19 records have DLP=0

(Mean now 735)

DLP range now 7211 to 95

Refined Results

Examination Name	Number of records	Mean DLP	SD of DLP	Mean kVp	Mean mA
Head	9441	830	580	123	3434
Chest	3014	505	603	120	3614
Abdomen and pelvis	2188	763	565	120	4630
Abdomen	2174	741	591	120	4956
Angiogram Pulmonary	1867	536	331	120	5088
Chest/Abdo/Pelvis	1659	945	646	120	5009
Abdomen & pelvis with contrast	779	775	901	120	4086
Sinuses	1283	229	298	120	1979
Thorax & Abdo & Pelvis with Contrast	842	1016	757	120	5255
Thorax and Abdomen with Contrast	692	703	593	120	3733
Urogram	963	735	594	120	
Chest/Abdo	511	584	258	120	4036

CTUG 2010



Discussion

METHOD HAS BEEN SHOWN TO WORK FOR PLAIN FILM ON AN INDIVIDUAL SITE BASIS

- Individual scanner CT patient dose audits have started

REGIONAL (UNFILTERED) DATA HAS BEEN SENT TO HPA AS PART OF NATIONAL DOSE AUDIT

Discussion

METHODS FOR FILTERING PLAIN FILM DATA NEED TO BE INVESTIGATED FOR CT DATA

- Defining 'impossible' and 'suspect' data

SIMILAR WORK HAS BEEN PERFORMED IN FINLAND, SWEDEN AND DUBAI

- Contacted for collaboration
- Web-based database will make this easy
- Willing to collaborate with anyone UK

The Future

- **Extend the study. More sites, more scanners**
- **Improve the analysis process**
- **Clinical audit / QA?**
- **DICOM, I must mention DICOM!**

Acknowledgements

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